Deviation from target capital structure, cost of equity and speed of adjustment

Qing Zhou, Kelvin Jui Keng Tan, Robert Faff, Yushu Zhu

PII: S0929-1199(16)30068-2
DOI: doi: 10.1016/j.jcorpfin.2016.06.002
Reference: CORFIN 1048

To appear in: *Journal of Corporate Finance*

Received date: 29 June 2015
Revised date: 12 June 2016
Accepted date: 13 June 2016

Deviation from target capital structure, cost of equity and speed of adjustment

Qing Zhou[a,b,*], Kelvin Jui Keng Tan[b], Robert Faff[b], Yushu Zhu[b]

[a] *School of Management, Xi'an Jiaotong University,* 710049*, China*
[b] *UQ Business School, The University of Queensland, QLD* 4072*, Australia*

Abstract

In this paper, we analyze the impact of leverage deviation (i.e., actual minus target optimal leverage) on the implied cost of equity capital. Our special focus is on whether (and to what extent) the sensitivity of the cost of equity to leverage deviation, influences the speed with which firms adjust their financial leverage towards the target. Confirming theoretical predictions, we find that the cost of equity is positively related to leverage deviation and that firms whose cost of equity is more sensitive to leverage deviation exhibit faster speed of adjustment towards target. Collectively, our findings imply that capital structure targeting is not equally important to all firms. Indeed, we argue that while evidence of the trade-off theory will tend to be obscured in broad samples, it can hold strongly in meaningfully chosen sub-samples of firms - namely, those characterized by high sensitivity of equity cost to leverage deviation.

JEL classification: G32

Keywords: Leverage deviation, sensitivity, cost of equity, speed of adjustment

*Corresponding Author: Qing Zhou; Address: UQ Business School, The University of Queensland, Brisbane, QLD4072, Australia; Tel:+ 61 7 3346 8106; Fax: +61 7 3346 8166; Email: q.zhou@business.uq.edu.au

1. Introduction

Corporate capital structure decision making, in a setting of complex dynamics and endogenous relationships, poses a serious unresolved puzzle for finance scholars and practitioners around the globe. A primary manifestation of the puzzle is our inability to convincingly explain the cross-sectional heterogeneity in firms' observed capital structure decisions (Graham and Leary, 2011). In the current paper, we confront this challenge by examining the dynamics of firm capital structure and the cost of equity capital. Specifically, we analyze the impact of leverage deviation (i.e., deviation from the target optimal leverage, where a positive deviation reflects over leverage) on the implied cost of equity capital (i.e., the ex ante cost of equity capital inverted from a discounted cash flow valuation model), to discover whether the sensitivity of the cost of equity to leverage deviation, influences the speed with which firms adjust their financial leverage towards the target.

Much of the extant literature in the capital structure area, has focused on testing three preeminent theories – (a) the static trade-off model; (b) the pecking order model; and (c) the market timing model – that, collectively, yield many major empirical successes and just as many empirical disappointments. More recent advances in the area, incorporate dynamics into the traditional static framework, based on the intuition and argument that firms should/do partially adjust towards their target leverage over time. New dynamic models explain the empirical observation of deviations from target leverage. However, the empirical estimates of the speed of adjustment (SOA) in the direction of target leverage continue to vary considerably across studies (e.g., Huang and Ritter, 2009; Lemmon et al., 2008; Welch, 2004), and, generally, scholars argue that the empirical SOA is not sufficiently rapid to convincingly support the dynamic trade-off argument (Graham and Leary, 2011). In sum, although these theories are often able to explain broad patterns, they fail to adequately explain much of the observed cross-sectional heterogeneity in capital structure. Indeed, to date, many argue that explaining this heterogeneity remains the most important outstanding question in capital structure research (Welch, 2013).

The moderate success of alternative theories raises the possibility that capital structure decisions are not equally important to all firms'goal of value maximization and that firms can thus be characterized by the heterogeneous financing choices they make (e.g., Binsbergen et al., 2010; Korteweg, 2010). However, most studies examine the value effect primarily from the perspective of the benefits and costs of debt financing based on debt's impact on cash flow, and studies rarely examine the value effect directly from the perspective of the cost of equity capital. Motivated by this gap in the literature, we investigate the effect of leverage deviation on the cost of equity capital that has potential implications for firm valuation. We find that the cost of equity is positively related to the leverage deviation, that is, as a firm's financial leverage deviates further from target leverage, the higher (lower) is the cost of equity when the firm's leverage is above (under) target leverage.

Our first finding contributes to the stream of research on the impact of capital structure change on firm value. In contrast to the majority of current studies that mainly focus on the benefits and costs associated with debt financing, we examine the valuation effect from the perspective of the influence of leverage deviation on the ex ante cost of equity capital. In particular, we are the first in the corporate finance field to examine the impact of the deviation from target leverage on a firm's cost of equity capital and the implications for the dynamic adjustment of capital structure.

Although the CAPM and Modigliani and Miller (MM) (1958) theory suggest a positive relationship between equity returns and leverage, the empirical results are mixed (see George and Hwang, 2010; Penman et al., 2007; Fama and French, 1992; Bhandari, 1988, for example). Previous empirical studies that employ leverage levels ignore the role of target leverage in creating substantial heterogeneity, which we argue leads to mixed results. Intuitively, two firms with the same leverage ratio but which have very different target leverage, will likely have different risk profiles (Ippolito et al., 2012). Accordingly, we focus our study on the deviation from target leverage rather than the level of leverage per se. In a dynamic setting with market frictions, it is rational for managers of firms to maintain a reasonable proximity to optimal leverage, rather than to single-mindedly strive for a unique leverage ratio target. As such, we would fully expect to observe cross-sectional variation in leverage away from target; in addition to the deviation of leverage due to the firm-specific factors. Notably, contrasting previous studies, we use ex ante cost of equity capital rather than ex post realized stock return, which allows us to examine whether the deviation of leverage is related to equity holders' perceived ex ante risk.

Firmly founded on the above, our second contribution comes from examining heterogeneity in the SOA. The existence of adjustment costs can cause a firm's leverage to systematically deviate from target leverage (Fischer et al., 1989). Moreover, as the opportunity cost of leverage deviation is likely to have important investment- or firm-specific components, it is also likely that SOAs are heterogeneous across firms (Elsas and Florysiak, 2011). In other words, capital structure theories are conditional and work better under certain conditions (Frank and Goyal, 2009; Myers, 2003); for example, firms with leverage that is more value relevant should adjust faster than counterpart firms whose leverage is less value relevant (Graham and Leary, 2011). Intuitively, the former constitutes a more powerful and meaningful sub-sample of firms for testing the trade-off theory.

Figure 1 provides a simple pictorial representation that characterizes the two contrasting polar types. Most notably, we see the "firm value" curve of the value relevant firm is much steeper and peaked than its low value relevant counterpart firm. Intutitively, other things equal, the former firm will be far more sensitive to leverage deviations than the latter because the firm value impact will be larger. However, most previous studies disregard the impact of heterogeneity in SOA and use panel regressions to estimate an average SOA, which might easily camouflage the "true" capital structure adjustment behavior of individual firms.

[Insert Figure 1 here]

On this second point, our findings indicate that firms in different quartiles with respect to the sensitivity of the cost of equity capital to leverage deviations, adjust their leverage at different speeds, as predicted. More specifically, we document that the firms in the top quartile adjust significantly faster than firms in the lower quartiles and thus show more support for the trade-off theory. These findings echo the sentiment of Graham and Leary (2011) that empirical tests of capital structure should focus on the subset of firms for which capital structure is most value relevant.

There are other recent studies examining the conditional nature of SOA (e.g., Chang et al., 2014; Cook and Tang, 2010), and the results of these studies all suggest that there are potential heterogeneities in SOAs. The potential heterogeneity across the entire sample, widely used as one pooled sample, can lead to fundamental econometric problems in estimating dynamic partial adjustment models (see Hendricks and Smith, 2015; Bontempi and Golinelli, 2012) inducing downward biased SOAs. Consistent with this theme, our results also show that the SOA estimates using the sub-sample of firms with a cost of equity that is highly sensitive to leverage deviation, are meaningfully higher than the counterpart estimates derived from the pooled full sample.

The remainder of the paper is organized as follows. Section 2 presents the theoretical background and derives our hypotheses analytically. Section 3 details the sample, data sources and variable definitions. Section 4 describes the empirical method we employ, including the main models and estimations. Section 5 presents and discusses the empirical results. Section 6 performs robustness tests to address potential concerns with the empirical design. Section 7 concludes.

2. Theory and hypotheses development

2.1. Analytical derivation

Modigliani and Miller (1958) (hereafter "MM") theory suggests that there is a positive relationship between the cost of equity and leverage. We expand MM (1958 and 1963) to demonstrate how deviating from optimal leverage affects the cost of equity capital. MM posit that – in the absence of taxes – the expected return of a share of stock is equal to the appropriate capitalization rate for a pure equity stream in the firm's risk class plus a premium related to financial risk. The financial risk premium is equal to the product of the leverage ratio and the spread between the cost of capital for an all-equity firm and the cost of debt (Dhaliwal et al., 2006), i.e.,

$$r_E^L = r_E^U + (r_E^U - r_D)L \tag{1}$$

where r_E^L is the cost of levered equity, and r_E^U is the cost of unlevered equity. r_D is the cost of debt, and L is the firm's financial leverage ratio.

When corporate tax is introduced (Modigliani and Miller, 1963), equation (1) becomes:

$$r_E^L = r_E^U + (r_E^U - r_D)(1 - T_c)L \tag{2}$$

where T_c is corporate tax rate.

Equation (2) also holds when a firm maintains optimal target leverage, TL, and the firm's cost of equity, r_E^O, is described as:

$$r_E^O = r_E^U + (r_E^U - r_D)(1 - T_c)TL \tag{3}$$

Taking the first difference between equations (2) and (3), we have:

$$r_E^L - r_E^O = (r_E^U - r_D)(1 - T_c)(L - TL) \tag{4}$$

We denote $L - TL$ as L^{dev}, which measures the excess of a firm's leverage relative to optimal leverage (hereafter, the leverage deviation). As such, a positive (negative) deviation denotes a situation of over (under) leverage. We denote $(r_E^U - r_D)(1 - T_c)$ as the parameter δ, which measures how sensitive a firm's cost of equity is to a unit change of leverage deviation. The parameter δ is positive as long as the after-tax return on equity is greater than the after-tax return on debt, i.e., $(r_E^U - r_D)(1 - T_c) > 0$, and this condition appears reasonable over a relevant range of leverage (Dhaliwal et al., 2006; Modigliani and Miller, 1958) that can be met under most market conditions. Equation (4) can be simplified to:

$$r_E^L = r_E^O + \delta * L^{dev} \tag{5}$$

We are interested in examining how the deviation from the target optimal leverage ratio affects equity holders' required rate of return. Accordingly, we take the partial derivative of r_E^L with respect to L^{dev} and obtain:

$$\frac{\partial\, r_E^L}{\partial\, L^{dev}} = \frac{\partial\, r_E^O}{\partial\, L^{dev}} + \delta \tag{6}$$

As shown in equation (3), r_E^O is a function of TL; thus, if we take the partial derivative of r_E^O with respect to L^{dev}, we have:

$$\frac{\partial\, r_E^O}{\partial\, L^{dev}} = \delta * \frac{\partial\, TL}{\partial\, L^{dev}} = \delta * \frac{1}{\frac{\partial\, L}{\partial\, TL} - 1} \tag{7}$$

and further substituting equation (7) into equation (6), we have

$$\frac{\partial\, r_E^L}{\partial\, L^{dev}} = \delta * \frac{1}{\frac{\partial\, L}{\partial\, TL} - 1} + \delta = \delta * (\frac{1}{1 - \frac{\partial\, TL}{\partial\, L}}) \tag{8}$$

One special case of equation (8) is when TL is irrelevant to L, then equation (6) becomes $\frac{\partial\, r_E^L}{\partial\, L^{dev}} = \delta$. Since δ is positive and $\frac{\partial\, TL}{\partial\, L} < 1$ in most of plausible market scenarios,[1] equation (8)

[1]Mathematically, $\frac{\partial\, TL}{\partial\, L}$ can be smaller or bigger than 1. However, the quantity is more likely to be less than 1 indicating that the change of target leverage is smaller than the change in the actual leverage, economically, theoretically, empirically and academically. *Economically*, if the value is bigger than 1, we would rarely observe the narrowing gap between actual leverage and the target leverage ratio, which would contradict much of the existing empirical evidence that supports targeting behavior (e.g., Flannery and Rangan, 2006; Hovakimian et al., 2004; Rajan and Zingales, 1995). *Theoretically*, it is less than 1 because target leverage is typically estimated (and bounded) with yearly firm characteristics, while actual leverage is not bounded by firm characteristics and can change at any time. *Empirically*, this phenomenon is clearly evidenced by the descriptive statistics of leverage and target leverage in Tables 1 and 4, respectively. Specifically, Table 1 shows that the standard deviation in actual leverage ($L_{i,t}$) over the whole sample is 0.1998 indicating a much greater change than in Table 4 that shows the corresponding standard deviation in target leverage ($TL_{i,t}$) of 0.1117. *Academically*, this is consistent with

is generally positive. This leads to our first hypothesis:

Hypothesis I: The cost of equity is positively related to the leverage deviation.

The value of L^{dev} is positive (negative) for firms whose leverage is above (below) target leverage. Hence, when the leverage is above (below) target, the positive effect means that the further the firm's leverage deviates from the target leverage, i.e., more positive (negative) leverage deviation, the higher (lower) the cost of equity.

Building on hypothesis I, it is logical to hypothesize that the sensitivity of the cost of equity to leverage deviation (i.e. δ) exerts a direct impact to leverage deviation. We posit our second hypothesis as follows:

Hypothesis II: The absolute value of leverage deviation is negatively related to the sensitivity of the cost of equity to leverage deviation (i.e. δ).

That is, the more sensitive the cost of equity capital is to deviation from target leverage (i.e the higher is the δ), the smaller the absolute leverage deviation; hence firms move their actual leverage ratio towards target leverage. Specifically, L^{dev} is negatively (positively) related to δ for firms whose leverage is above (below) their target leverage.

Finally, we expect that whether and how fast a firm adjusts to target leverage is related to how sensitive the firm's cost of equity is to the deviation from target leverage. In a dynamic capital structure adjustment framework, SOA is essentially:

$$SOA = \frac{\partial L}{\partial L^{dev}} \tag{9}$$

SOA=1 means that the actual leverage adjusts fully to the target leverage. The partial adjustment model assumes firms only adjust to their target leverage gradually each period due to adjustment costs and other market frictions. Since δ is negatively related to absolute value of leverage deviation, δ should then be positively related to SOA. Thus, we state our hypothesis as follows:

Hypothesis III: The more sensitive the cost of equity capital is to the deviation from target leverage, (i.e. the higher is the δ), the more rapid (or higher) will be the SOA.

DeAngelo and Roll (2015) who find that firms actual leverage varies significantly over time using data between 1901 and 2008.

2.2. Link to existing literature

Empirical evidence on the relation between the required rate of return and financial leverage is mixed with both positive (e.g., Dhaliwal et al., 2006; Ippolito et al., 2012) and negative (e.g., Fama and French, 1992; George and Hwang, 2010) associations documented in the previous literature. Thus, whether the theoretical relation holds in the presence of adjustment costs and other frictions that prevent firms from maintaining optimal leverage, remains controversial. Such inconclusive evidence is exacerbated by the effects of the heterogeneity of target leverage across firms. Firms with the same level of observed actual leverage but with different optimal leverage targets leads to different required risk premia from equity investors and thus different valuations (Ippolito et al., 2012). Put differently, a direct test of the association between the leverage level and the cost of equity can easily be confounded by heterogeneity in target leverage ratios.

With this concern upper most in our minds, contrasting previous studies, we derive a relation between the leverage deviation (rather than leverage level) and cost of equity. In this manner, the set-up of our theoretical model is motivated by two aspects.[2] First, our primary focus is to investigate the dynamic adjustment of a firm's financial leverage from the perspective of the impact of leverage dynamics on the cost of equity. Indeed, we derive theoretical links between leverage deviation and the cost of equity, which allows for the incorporation of leverage dynamics into our analyses. Second, we can eliminate the impact of the heterogeneity of the target leverage ratio on the empirical examination of the relation between returns and leverage by focusing on the leverage deviation or relative leverage rather than the observed actual leverage (e.g, Ippolito et al., 2012).

We illustrate our first hypothesis and the link with existing studies in Figure 2. The left panel of Figure 2 shows the theoretical MM prediction on the relation between the level of leverage and cost of equity, while the right panel presents the relation in our Hypothesis II. Both figures present linear relations, but our way of testing can eliminate the impact of the heterogeneous target leverage, and thus we can focus on the variation of the leverage deviation that is mostly caused by external economic shocks. Our way of testing echoes the sentiment of

[2] In a recent and contemporaneous study, Ippolito et al. (2012) also tests the relation between cost of equity and leverage deviation. Our paper differs from theirs in the following three ways. First, our study examines the implications of leverage deviation for corporate financing decisions while their study is from the perspective of investment and asset pricing and documents relative leverage premiums . Second, we provide formal analytical derivation while their study begins with empirical investigation. Third, we focus on the ex ante cost of equity capital rather than the ex post stock return.

Myers (1984) that any study on firm's capital structure decision should first define whether the variation of leverage comes from the variation in target leverage or from the variation in actual leverage.

[Insert Figure 2 here]

Beyond the examination of the relation between leverage deviation and the cost of equity, we also further investigate into the heterogeneity of the sensitivity of the cost of equity to the leverage deviation in Hypothesis II, which further leads to Hypothesis III on the relation between the cost of equity sensitivity and the dynamic adjustment that reduces such leverage deviations, especially when they become large.

In a dynamic leverage adjustment framework, firms dynamically adjust their leverage to close the gap between the actual leverage and their target leverage, depending on the relative size and timing of tax benefits and associated costs of debt financing. As there are differences in adjustment costs and benefits across firms, SOA can potentially vary quite widely across firms. A growing number of studies examine the heterogeneity in SOA (e.g., Byoun, 2008; Cook and Tang, 2010; Chang et al., 2014; Faulkender et al., 2012) and find evidence for pronounced heterogeneity. Our Hypotheses II and III are in line with this strand of literature.

Additionally, the potential heterogeneity in SOA can also cause an upward bias in the estimated coefficient on the lagged leverage in a dynamic adjustment model (see Hendricks and Smith, 2015), which results in a downward biased estimate of SOA. The SOA estimates using subsamples with homogeneous firms is one way of addressing this concern (e.g., Bontempi and Golinelli, 2012). We take this on board in our empirical analysis below.

3. Data and variable definitions

3.1. Data

We retrieve annual financial information from the Compustat North America Fundamentals Annual database and stock price data from the Center for Research in Security Prices (CRSP) database. To obtain analysts' earnings forecast data for calculating the implied cost of equity capital, we merge the Compustat and CRSP data with the I/B/E/S summary files. The other input variables for the implied cost of equity capital calculation, GDP growth rates and government bond yields, are obtained from the Federal Reserve Bank.

We exclude ADRs, closed-end funds, REITS, financial firms (SIC 6000-6999) and regulated utilities (SIC 4900-4999) from our sample. We also omit firms with undefined Compustat formats and foreign firms (format codes 4, 5, and 6) from our sample. Following common practice in the literature (e.g., Huang and Ritter, 2009), we exclude extremely small companies with beginning-of-year book assets of less than 10 million, measured in terms of 1998 purchasing power. We also eliminate from our sample firm-year observations reflecting accounting changes stemming from the adoption of Statement of Financial Accounting Standards (SFAS) No. 94 because the financing decisions of these firms might be affected by this change in accounting standards. Firm-years with negative book value of equity are also omitted from the sample.

We winsorize both the dependent and independent variables at the 1st and 99th percentiles to reduce the potential impact of outliers. The initial sample covers the period from 1975 to 2012, which consists of 17,537 firm-year observations. We merge the initial sample with marginal tax rate (MTR) data used by Graham (1996a) and Graham (1996b), and we omit observations with missing MTR. This reduces our sample to 12,147 firm-year observations over the sample period from 1980 to 2011.

3.2. Variable definitions

3.2.1. Measures of firm leverage

We define financial leverage as the ratio of ***T***otal ***D***ebt to ***M***arket value of assets ($\text{Lev}_{\textbf{TDM}}$). The market value of assets is the sum of the market value of equity, i.e., (*prcc_c * cshpri*, Compustat acronyms) + total debt (*dltt+dlc*) + preferred-liquidation value (*pstkl*) − deferred taxes and investment tax credit (*txditc*). We also examine the sensitivity of our findings to adopting three alternative definitions of leverage as detailed later under robustness analysis. We include the details of the calculations of these alternative measures of financial leverage in Appendix A.1.

3.2.2. Estimation of target leverage

Following Byoun (2008) and Uysal (2011), our primary measure of target leverage (TL) is based on the fitted value from yearly cross-sectional regressions of leverage on the determinants (X_i) of capital structure specified as follows:

$$TL_{i,t} = \beta X_{i,t-1} + \varepsilon_{i,t} \tag{10}$$

Target leverage is unobservable and different sets of factors have been employed in the literature (e.g., Titman and Wessels, 1988; Rajan and Zingales, 1995; Hovakimian et al., 2001; Fama and French, 2002; Flannery and Rangan, 2006; Kayhan and Titman, 2007) to gain a reliable empirical proxy. These sets have both overlapping and specific determinants, and in cases where different variables are used, they essentially measure the same firm characteristics. For example, in measuring firm size, while some studies use total assets, other studies use sales, the choice is unlikely to be crucial because they are highly correlated (Frank and Goyal, 2009). Following Frank and Goyal (2009) and Marchica and Mura (2010) (among many others), we use six core factors for the purpose of modelling target leverage: (1) median industry leverage; (2) market-to-book assets ratio; (3) tangibility; (4) profitability; (5) log of assets; and (6) inflation. We provide detailed definitions and calculations of these factors in Appendix A.1. To ensure that our results are not driven by our specification of the target leverage model, as detailed later in the robustness section, we also provide analyses based on an alternative set of leverage determinants (Flannery and Rangan, 2006).

3.2.3. Estimating the cost of equity

Ex post realized returns are widely recognized as a noisy measure of the cost of equity (e.g. Blume and Friend, 1973; Froot and Frankel, 1989; Elton, 1999). The classical asset pricing models are also regarded as imprecise measures for expected returns (e.g. Fama and French, 1997). The deficiencies of traditional expected return proxies have led to recent developments in the implied cost of capital approach, first developed in accounting (e.g., the recent survey by Easton et al., 2009), and now more widely applied in finance (e.g. Pástor et al., 2008; Chen et al., 2013).

Various models have been proposed in the previous literature, and there is no consensus regarding which model is superior (see Botosan and Plumlee, 2005; Lee et al., 2011, for comparisons of different measures). We estimate the cost of equity capital implied in analysts' earnings forecasts and stock prices. Following recent applications of the implied cost of capital in empirical corporate finance research (e.g., Attig et al., 2008; Chen et al., 2009; Boubakri et al., 2012), we use the arithmetic average of six alternative estimates, including "r_{GLS}" (see Gebhardt et al., 2001), "r_{EPR}" and "r_{GGM}" (see Gordon and Gordon, 1997), "r_{AGR}" and "r_{MPEG}" (see Easton, 2004) as well as "r_{OJM}" (see Ohlson and Juettner-Nauroth, 2005). The adoption of the average of different estimates can alleviate concerns regarding model uncertainty that could lead to spurious results (Jäckel, 2014) and concerns regarding measurement error in which a particular cost of equity measure is associated with firm characteristic variables or risk proxies differently (e.g., Dhaliwal et al., 2006). For example, the r_{GLS} and r_{OJM} estimates often display negative and positive associations with long-term growth rates.

3.2.4. Measures of the sensitivity of the cost of equity to leverage deviation

Our main results are based on a direct estimate of the sensitivity of the cost of equity to leverage deviation, in turn, based on the definition of the measure, δ, that is, $\delta = (r_E^U - r_D) * (1 - Tc)$. The three inputs include the unlevered cost of equity (r_E^U), the cost of debt (r_D) and the corporate tax rate (T_c) in the respective year.[3]

We can estimate unlevered cost of equity from the levered cost of equity that we have defined, that is, $r_E^U = (r_E^L + r_D * (1 - T_c) * L) / (1 + (1 - T_c) * L)$ by rearranging model (2). We use four steps to calculate r_D. First, we retrieve the data for all public debt and the features associated with this public debt (such as offering date, maturity, offering amount and yield) from the Fixed Investment Securities Database (FISD). We exclude Rule 144A debt that is typically registered as public debt at a later stage and observations with missing values. Second, to compute default spreads, we take the difference between yield from public debt and the equivalent risk-free rate for a given maturity. Because we only have a fixed set of maturities for government bonds, we match individual bonds to the closer government bond maturity. For example, we match the maturities of corporate bonds of less than 1.5-year to 1-year government bonds, of 1.5-2.5 years to 2-year bonds, of 3.5-4 years to 3-year bonds, of 4-6 years to 5-year bonds, of 6-9 years to 7-year bonds, of 9-15 years to 10-year bonds, of 15-25 years to 20-year bonds, and of over 25 years to 30-year bonds, respectively. We also delete bond issues that have lower offering yields than the government bond yield of an equivalent maturity. Third, if a firm issues more than one type of debt, the default spread will be weighted by its outstanding debt balances. To obtain the cost of debt, we add 10-year government bond yields to each respective default spread. At the fourth step, if a firm does not issue any debt in a particular year, we proxy their cost of debt using that of their counterpart with similar credit rating ranges corresponding to its respective year. More specifically, we have four different credit rating ranges shown below from the worst credit rating to the best credit rating: (1) S&P BBB-; (2) between BBB- and

[3] Top statutory corporate tax rate (T_c) takes the following values: 0.48 if year>=1971 & year<=1978; 0.46 if year>=1979 & year<=1986; 0.40 if year=1987; 0.34 if year>=1988 & year<=1992; 0.35 if year>=1993. The data are retrieved from https://faculty.fuqua.duke.edu/~jgraham/taxform.html

BBB+; (3) between A- and A+; and (4) between AA- to AAA.

4. Empirical Method

4.1. Empirical models

4.1.1. Hypothesis I: The impact of leverage deviation on the cost of equity

Hypothesis I addresses the relation between leverage deviation and the cost of equity. We specify the following regression model to test **Hypothesis I**:

$$r^L_{E_{i,t+1}} = \nu + \phi L^{dev}_{i,t} + \tau Controls_{i,t} + \varepsilon_{i,t} \quad (11)$$

where $r^L_{E_{i,t+1}}$ is the implied cost of equity capital. The test variable is $L^{dev}_{i,t}$ defined as the excess of actual leverage relative to optimal target leverage. For more details on various measures of firm leverage, estimation of target leverage, and the implied cost of equity, refer back to Section 3.2. *Controls* are the control variables that are shown in previous studies to affect the cost of equity capital (e.g., Boubakri et al., 2012; Attig et al., 2008). Specifically, we control for firm risk (StockVar) (see Hail and Leuz, 2006); firm size, which is measured as the natural logarithm of the market value of the outstanding common shares in millions of US dollars (LnMV) (see Botosan and Plumlee, 2005); book-to-market (LnBM), which is calculated as natural logarithm of the ratio of the book value of equity to the market value of equity; and stock liquidity (Liquidity) (see Amihud and Mendelson, 1986). We also control for price momentum (BHRET6m), which is measured as the most recent 6-month buy-and-hold return; analyst forecast bias (ForecastBias) and dispersion (ForecastDispersion). Although these analyst forecast accuracy variables are not risk factors, their omission can cause spurious regression results due to biased analyst forecasts and measurement error problems in estimating the implied cost of equity capital (see Wang, 2015). We provide details of definitions and data sources of these variables in Appendix A.2.[4]

The coefficient of interest is ϕ. **Hypothesis I** predicts a positive sign for ϕ. However, the interpretation of the positive sign for ϕ are different for underleveraged and overleveraged subsamples of firms. For example, the further the actual leverage moves away from its target for

[4]There are also three additional factors that are found to be important in recent cross-country cost of equity studies: (1) large shareholders (Attig et al., 2008), (2) legal protection and corporate governance (Chen et al., 2009), and (3) political connection (Boubakri et al., 2012). We do not include these three additional controls in our main results as they can significantly reduce our usable sample period. In unreported results, our main results remain robust when we control for these three additional variables. These results are available upon request.

overleveraged (underleveraged) firms, the higher (lower) the implied cost of equity. Accordingly, we split the entire sample into two sub-samples and examine the matter separately.

Model (11) is our baseline regression which omits the dynamics of expected equity return. As stock returns can be serially correlated (e.g., Fama and French, 1988; Summers, 1986) and investor expectations are likely to be extrapolative (e.g., Greenwood and Shleifer, 2014), we incorporate the dynamics of the cost of equity i.e., the one period lag of the cost of equity, in an alternative specification. Accordingly:

$$r^{L}_{E_{i,t+1}} = \nu + \rho r^{L}_{E_{i,t}} + \phi L^{dev}_{i,t} + \tau Controls_{i,t} + \varepsilon_{i,t} \tag{12}$$

In empirically testing **Hypothesis I**, endogeneity is a potential concern. In particular, there could be reverse causality associated with leverage deviation and the cost of equity capital. For example, a positive relationship between leverage deviation and the cost of equity can be expected from two alternative perspectives. First, a larger leverage deviation for a firm with positive leverage deviation can lead to higher financial risk, and thus affect equity investors' required return on firm equity, which will lead to a higher cost of equity capital for the firm. Second, a firm might issue debt because of its high cost of equity capital, which will lead to a larger leverage deviation for firms that previously have a positive leverage deviation.[5] As such, ignoring the endogeneity of leverage deviation can potentially affect the inferences that we draw regarding the impact of leverage deviation on the cost of equity capital.

There are other potential sources of endogeneity, such as the measurement error in leverage deviation. As the true target leverage is unobservable, we can only approximate true target leverage using observed firm characteristic variables. Unavoidable measurement error can be correlated with the residual in model (12). Additionally, leverage deviation and the cost of equity capital might be jointly affected by some unobservable firm and economic fundamentals. Moreover, the model specification (12) incorporating dynamics via a lagged dependent variable can also cause the "short panel bias" problem (see Flannery and Hankins, 2013).

We use ex ante cost of equity, one period forward, to alleviate the concern of the reverse causality, as it is more likely that the increased deviation from target leverage increases the perceived risk of equity investors and thus lead to a higher required rate of equity return (i.e. implied cost of equity capital). However, future expectation of the implied cost of equity is

[5]We thank an anonymous referee for pointing this out to us.

less likely to affect the capital structure decision in the past. To further address problems arising from potential sources of endogeneity, we employ both two-stage least squares (2SLS) and Generalized method of moments (GMM) to estimate model (12). Specifically, we use the firm's Marginal Tax Rate (MTR) from Graham (1996a) and Graham (1996b) as an exogenous instrumental variable for the leverage deviation (Molina, 2005). Graham (1996a) shows that firms with higher MTRs are more inclined to issue more debt than firms with lower MTRs. Hence, the debt ratio is closely linked to MTR and can be used as an instrumental variable for firm leverage (Molina, 2005). As both leverage and the target leverage are endogenous and linked to firm decisions to balance the tax benefits of debt and the costs of induced financial distress, leverage deviation is also closely linked to MTR.

We use fixed-effects panel regression as our baseline model. However, fixed-effects panel specifications only produce consistent estimates under the assumption of strict exogeneity. A concern can arise that strict exogeneity is violated when a firms deviation of the cost of equity is subject to simultaneity and dynamic endogeneity (i.e., persistence in deviations from the cost of equity). If this is the case, the fixed effects method is not adequate to control for all sources of endogeneity. To address this concern, we employ estimation procedures that are robust to dynamic endogeneity, simultaneity and unobserved heterogeneity, namely, Arellano and Bond's (1991) difference GMM (AB) and Blundell and Bond's (1998) system GMM (BB). We include both firm and year fixed effects to control for omitted firm- and year-specific factors. In our empirical analyses shown later, the instruments used for the orthogonality conditions of model (12) include the second and third lags of the dependent variables (r_E^L), the variable of interest (L^{dev}), and control variables.[6]

4.1.2. Hypothesis II: The impact of cost of equity sensitivity on leverage deviation

Our second hypothesis involves the impact of the cost of equity sensitivity on the magnitude of the leverage deviation. We test **Hypothesis II** in the following model:

$$L_{i,t+1}^{dev} = \upsilon + \kappa\delta_{i,t} + \psi Controls_{i,t} + \varepsilon_{i,t} \tag{13}$$

[6]As a result, sequential exogeneity is assumed for both GMM estimations of model (12). Specifically, this assumption implies that the cost of equity, leverage deviation and control variables are assumed orthogonal to future innovations in the cost of equity, but potentially correlated with past and present innovations. Sequential exogeneity is a much weaker condition than strict exogeneity, and, hence, provides a more realistic setting for our investigation.

The coefficient of interest in testing **Hypothesis II** is κ, which predicts a negative sign for the sub-sample of overleveraged firms and a positive sign for the sub-sample of underleveraged firms. The intuition behind these predictions is that it is costly for firms to remain distant from their optimal target leverage when the δ is high. We use the common determinants (see Frank and Goyal, 2009) of leverage as control variables detailed in Appendix A.1.

In addition, we alternatively augment the baseline model (13), with a lagged dependent variable to once again incorporate dynamics of leverage change. As with the estimation of models in the preceding subsection, we again employ both 2SLS and GMM to estimate the augmented version of model (13).

4.1.3. Hypothesis III: The impact of cost of equity sensitivity on the SOA

Our primary goal in this study is to understand the heterogeneity in adjustment speeds of firms' financial leverage ratios from the perspective of the cost of equity. Intuitively, if all other conditions hold constant, cases of firm equity value or cost of equity that are more sensitive to the deviation from target leverage, should adjust faster to target leverage, as stated in **Hypothesis III**. To confirm this intuition, we perform the following two tests.

First, we divide our full sample into four sub-samples based on the quartile of the sensitivity of cost of equity to the leverage deviation, δ. We estimate the partial adjustment model for each sub-sample as well as for the full sample. **Hypothesis III** predicts that firms in the top quartile should adjust faster (i.e. display higher SOA) than firms in the other quartiles and in the full sample, on average.

We test this hypothesis in the context of the partial adjustment model (see Flannery and Rangan, 2006), which includes lagged leverage to control for prior leverage and fixed effects to control for unobservable firm characteristics. The basic form of partial adjustment model is as follows:

$$L_{i,t+1} - L_{i,t} = \lambda(TL_{i,t+1} - L_{i,t}) + \eta_{it+1} \tag{14}$$

where L is a firm's leverage ratio defined in the preceding section, TL is the target leverage ratio that can be estimated using equation (10). The parameter, λ, is the adjustment speed towards the target (i.e., the SOA), η is the error term, and X_i is a vector of observable firm-specific determinants of the target leverage defined in Appendix A.1.

Model (14) can be estimated using both two- and one-stage estimation procedures. As the two-stage method suffers from the errors-in-variables problem, contemporary research (see Flannery and Rangan, 2006) primarily adopts a one-stage estimation approach by substituting equation (10) into equation (14), producing the following model:

$$L_{i,t+1} = (1-\lambda)L_{i,t} + (\lambda\beta)X_{i,t} + \lambda F_i + \eta_{i,t+1} \tag{15}$$

Given that λ is the SOA, the higher the coefficient for the lagged leverage in model (15), the lower the SOA.

Second, following Cook and Tang (2010), we augment model (15) with a high δ dummy variable and an interaction term to test the significance of δ on the SOA. Specifically, HighDummy takes a value of 1 if δ is in the highest quartile and a value of 0, otherwise. The interaction term is the product of the HighDummy and the first lag of the firm's actual leverage ratio. The augmented model takes the following form:

$$L_{i,t+1} = (1-\lambda)L_{i,t} + \alpha_0 HighDummy + \alpha_1 HighDummy * L_{i,t} + (\lambda\beta)X_{i,t} + \lambda F_i + \eta_{i,t+1} \tag{16}$$

In model (16), the primary focus is the coefficient on the interaction term ($HighDummy * L_{i,t}$). **Hypothesis III** predicts a negative α_1, implying that the coefficient on lagged leverage is smaller for firms in the top quartile than firms in the other three quartiles and, thus, they exhibit a faster SOA. We use the BB method as it is the most reliable estimator for the lagged dependent variable (i.e. 1- SOA) for estimating dynamic "short panels" in the presence of endogenous independent variables and other complicated corporate data issues (Flannery and Hankins, 2013).

5. Estimation and empirical results

5.1. Descriptive statistics

We report summary statistics for all key variables in Panel A of Table 1. Panels B and C show the correlation coefficients for the determinants of target leverage and the control variables used in regression models involving the cost of equity as the dependent variable. We can see that these variables are not highly correlated and that there is, thus, little concern about multicollinearity.[7] Consistent with existing studies (e.g., Frank and Goyal, 2009), the median

[7]Although the variables Profitability and Mktbk have a high sample correlation coefficient of 0.5276, the unreported variance inflation factor is well below 10.

leverage (Lev_{TDM}) is below target leverage. There is a large cross-sectional difference in the leverage ratio. For example, the first quartile of Lev_{TDM} is 0.0789 and the third quartile is 0.3605, and the maximum is 0.7994.

[Insert Table 1 here.]

In our empirical analyses, we use the arithmetic average of the estimates from six implied cost of equity methods to alleviate the model uncertainty problem in selecting a single cost of equity measure. Panel A of Table 2 presents the summary statistics for the six individual estimates of the cost of equity and the average of these estimates. Our estimated average cost of equity capital (r_E^L) shows a relatively moderate variation with a mean of 0.1060 and a standard deviation of 0.0374, which is consistent with estimates in the prior literature (see Botosan et al., 2011; Easton and Monahan, 2005). Panel B reports pairwise sample correlation coefficients across these cost of equity estimates. Some of the measures are highly correlated, such as the r_{GLS} and r_{GGM}, and r_{EPR} and r_{OJM} pairings.

[Insert Table 2 here.]

To check the consistency of our target leverage regression with the existing literature, we present the coefficient estimates in Table 3 using the fixed effects panel method (both firm and year fixed effects). The standard errors are corrected for both heteroskedasticity and clustering. The estimates are largely consistent with those found in previous studies (e.g., Frank and Goyal, 2009; Marchica and Mura, 2010). Reliance on debt in the target capital structure decreases with the profitability (Huang and Ritter, 2009) and market-to-book asset ratio (Flannery and Rangan, 2006) and increases with firm size (Flannery and Rangan, 2006).

[Insert Table 3 here.]

We also report summary statistics for estimated target leverage across each year from 1980 to 2011 in Panel A of Table 4. Panel B of Table 4 shows the summary statistics of average actual and absolute values of leverage deviation for the full sample. The median leverage deviation is −0.0145, which is consistent with previous studies showing that many firms are underleveraged (e.g., Molina, 2005; Devos et al., 2012). Over the sample period, the mean annual cross-sectional target leverage fluctuates between 0.1697 and 0.3362, with an evident drop post 2008 global financial crisis but a gradual increase in recent years. However, as detailed later, our main results remain robust to a sample period before 2008.

[Insert Table 4 here.]

5.2. Hypothesis I

Table 5 investigates the positive relation between the leverage deviation and the firm's cost of equity, as hypothesized in **Hypothesis I**. To assist the interpretation of the results, we divide our full-sample into a sub-sample of overleveraged firms (i.e., the actual leverage is above the target leverage) and a sub-sample of underleveraged firms (i.e., the actual leverage is below the target leverage). We estimate and present results for these two sub-samples in Panel A and Panel B, respectively. We estimate a static baseline fixed effects regression (model (11)) and a dynamic model (model (12)).

Panel A of Table 5 shows that, regardless of which estimation method we use, for the sub-sample of overleveraged firms, the coefficient on the key test variable, leverage deviation, L^{dev}, is statistically significant and positive in all cases, which implies that the higher the leverage deviation (i.e., the more that leverage deviates from above target leverage), the higher the implied cost of equity capital. The results shown in Panel A of Table 5 support **Hypothesis I**. For the sub-sample of underleveraged firms in Panel B, the impact of leverage deviation is not consistently significant, which means that the hypothesized positive impact of leverage deviation on the cost of equity is not evident in this group. In other words, the **Hypothesis I** effect is stronger in firms that are overleveraged.

[Insert Table 5 here.]

Column 1 in both Panels A and B present the estimation results for the static base model, as indicated by model (11). Because the test of the null hypothesis that the year dummies are jointly equal to zero is rejected (as shown in the test statistics section in column 1), we estimate the base model using both firm and year fixed effects. To better control for the potential endogeneity problem, we use 2SLS and GMM estimation methods. We instrument the leverage deviation with the firm's MTR and report 2SLS results in column 2 in both panel A and B.

To estimate the dynamic panel model (12) in columns 3 and 4 of Panels A and B, we adopt the BB and AB methods that are robust to dynamic endogeneity, simultaneity and also unobserved heterogeneity. Columns 3 and 4 of Panels A and B show the BB and AB estimation results, respectively.[8] Of secondary interest, is the inclusion of the dynamics in columns 3 and

[8]In addition to using MTR as an exogenous instrumental variable for L^{dev}, we employ the internally generated second and third lag of the cost of equity in differences and levels as predetermined instrumental variables for the lagged dependent variable. We report the *t*-statistics for the dynamic GMM coefficient estimates which is based on the HAC robust two-step standard errors that incorporates the Windmeijer (2005) finite-sample correction.

4 in both panels and, in particular, as shown in our results, the estimated coefficient on the lagged cost of equity is significant using both the BB and AB estimation methods.

We also perform the following four specification tests in columns 3 and 4 in both panels: (1) the AR(2) second-order serial correlation test; (2) the Hansen J test of over-identifying restrictions; (3) the exogeneity test of all instruments; and (4) the exogeneity tests of subsets of instruments. These specification results indicate that our dynamic GMM model specification is preferred.[9]

5.3. Hypothesis II

Table 6 presents the results for **Hypothesis II**, which focuses on the impact of the sensitivity of the cost of equity on the absolute deviation of target leverage. We employ the same empirical strategy as used in Table 5, that is, we split our full sample into a sub-sample of overleveraged firms (Panel A) and a sub-sample of underleveraged firms (Panel B). We present the estimation results of the empirical model (13) (and the augmented dynamic model) in Table 6. Columns 1 to 4 in Panels A and B represent the following four estimation methods: (1) fixed effects, (2) 2SLS with the sensitivity of cost of equity instrumented by the unlevered cost of equity capital, (3) BB, and (4) AB. In both BB and AB estimation, we use: (a) the unlevered cost of equity capital as the instrument for the sensitivity variable and (b) the second and third lags of the leverage deviation in levels and differences as instruments for the lagged leverage deviation. Generally, the validity tests of the instruments and subsets of the instruments cannot be rejected, which indicates that our instruments are appropriate.

[Insert Table 6 here.]

The primary coefficient of interest attaches to the cost of equity sensitivity, δ. Specifically, **Hypothesis II** predicts a negative (positive) sign for the sub-sample with positive (negative) leverage deviation, which indicates that the more sensitive the cost of equity is to the leverage

[9]First, the AR(2) test yields a p-value of 0.0380 (0.7306) in BB and 0.0397 (0.4234) in AB in Panel A (Panel B) for the positive (negative) leverage deviation sub-sample, respectively. These AR(2) results indicates that our GMM models do not suffer from the second-order serial correlation. Second, the J-statistic with a p-value of 0.3188 (0.1752) in BB and 0.2917 (0.5562) in AB in Panel A (Panel B) for the positive (negative) leverage deviation sub-sample, respectively, indicate that all of our instruments are valid. Third, the difference-in-Hansen test of exogeneity used in BB yields a p-value of 0.065 (0.218) in Panel A (Panel B), respectively, indicate that an additional exogeneity assumption that any correlation between our endogenous variables and the unobserved fixed effect is constant over time cannot be rejected. Fourth, our specification tests also show that all the subsets of instruments that we use in the levels equation or difference equation are exogenous in the BB and AB model. In short, the model identification and the validity of instrumental variables cannot be rejected for either the BB or AB methods, at the 1% significance level.

deviation, the narrower the absolute leverage deviation. While the estimates using fixed effects and BB methods are consistent with our predictions showing significant impact of the sensitivity on leverage deviation, the estimates from AB shows insignificant effects. Notably, previous studies show that: (a) BB performs better than the AB (e.g., Blundell and Bond, 1998); (b) BB is the most accurate estimator in the estimation of dynamic capital structure models when complicated corporate data issues exist (e.g., Flannery and Hankins, 2013); and (c) the fixed effects and BB methods provide the most accurate estimates for explanatory variables in the dynamic panel model (e.g., Flannery and Hankins, 2013). Accordingly, we weight heavily the estimation results from the fixed effect model and BB in our setting - thus favoring **Hypothesis II**.

5.4. Hypothesis III

We examine the heterogeneity of the SOA and test **Hypothesis III**, linking the sensitivity of the cost of equity to leverage deviation with SOA, in a dynamic partial adjustment framework. Our results are reported in Table 7. Column 1 uses the full sample, while columns 2 to 5 use sub-samples from the lowest quartile to the highest quartile ranked by the sensitivity of the cost of equity to the leverage deviation (δ). The coefficient estimate of interest relates to the lagged leverage (1-SOA); and thus, the higher the estimated coefficient on LagLeverage, the slower is the SOA.

[Insert Table 7 here.]

As shown in the table, the average SOA of the firms in the highest, δ, quartile adjust faster than the firms in the lowest and medium quartiles. Specifically, we see that the average SOA in the highest quartile is 0.5119 (i.e. $1 - 0.4881$), and thus the implied “half-life” adjustment is less than a year, while the SOA for the lowest quartile on average is 0.225 (i.e. $1 - 0.7750$) that indicate an implied “half-life” adjustment of almost three years. These results support the prediction of **Hypothesis III** - namely, that the more senstitive the cost of equity capital is to the deviation from target leverage, the more rapid is the SOA. However, the sequential pairwise differences in quartiles 1, 2 and 3 are minor and so are not as supportive. The estimated SOA in the first column using the full sample is 0.2457 ($1 - 0.7543$), which (as expected) is slower than the SOA of the firms in the highest quartile. Hence, Table 7 shows that ignorance of the heterogeneity of SOA can misleadingly arrive at an estimate of only a moderate adjustment of firms’ leverage.

To further assess **Hypothesis III** that the SOA is positively related to the cost of equity sensitivity to the leverage deviation, we estimate model (16) focussing on the sign of the coefficient on the interaction term between the lagged leverage and the HighDummy (that indicates the firm-year observation belongs to the highest quartile), that is, α_1 in model (16). The negative sign in the estimated model (16) shows that if firms are in the highest quartile (i.e. the group of firms whose cost of equity is most sensitive to the leverage deviation), the coefficient of lagged leverage in equation (16) will be reduced, indicating that the SOA in the highest quartile will be 48.46% faster than the firms in other three quartiles. Additionally, we also follow Cook and Tang (2010) and Chang et al. (2014) to estimate model (16) using the fixed effects panel regression method and in unreported results, we find that the interaction term between HighDummy and LagLeverage is also statistically significant using this alternative fixed effects method. The results support **Hypothesis III**.

6. Robustness tests

Guided by the many existing capital structure studies, there is great freedom in choosing across the key dimensions of one's research design. Accordingly, we check the robustness of our main results by employing alternative: (a) measures of corporate leverage; (b) set of determinants for target leverage estimation; and (c) sample period. Section 6.1 to Section 6.3, respectively, outline these alternative empirical choices, while Section 6.4 discusses the robustness tests results, as they relate to each of our three hypotheses. Section 6.5 summarizes the robustness tests.

6.1. Alternative measures of the corporate leverage ratio

A variety of definitions of leverage have been used in existing studies, and, for example, there is no consensus as to whether market- or book- leverage should be used. We use the firms market debt ratio (Lev_{TDM}) as our primary measure of leverage. The previous literature primarily adopts the market leverage ratio (e.g., Welch, 2004; Leary and Roberts, 2005; Hovakimian, 2006; Huang et al., 2016) and the importance of book ratios is typically downplayed (Flannery and Rangan, 2006). To check the robustness of our results, we re-examine the hypotheses using book leverage.

Additionally, previous studies also differ in their definitions of debt. The main difference in debt involves whether to include only long-term debt (*dltt*, Compustat acronym) or total debt including debt that involves current liabilities (*dlc*). Debt can also be adjusted to include other firm liabilities.

In summary, we check the robustness of our main empirical analysis to three other definitions of financial leverage: (a) total debt to book value of assets (Lev_{TDA}); (b) long-term debt to the market value of assets (Lev_{LDM}); and (c) long-term debt to the book value of assets (Lev_{LDA}). We provide details of calculations for these alternative measures of financial leverage in Appendix A.1.

6.2. Alternative set of determinants in target leverage estimation

In our main empirical results section, we use the six core factors identified in Frank and Goyal (2009) to estimate the target leverage ratio. We estimate the target leverage ratio using yearly cross-sectional regressions following Uysal (2011). As the target leverage ratio is unobservable and its estimation is critical for our empirical analyses, we check the sensitivity of our results to the adoption of an alternative set of determinants in the target leverage regression. Specifically, we use the variables in Flannery and Rangan (2006): (1) earnings before interest and taxes scaled by total assets (EBIT_TA); (2) market to book (MB); (3) depreciation scaled by total assets (DEP_TA); (4) the natural log of total assets (Ln(TA)); (5) fixed assets scaled by total assets (FA_TA), (6) R&D expense scaled by total assets (R&D_TA); and (7) the industry median debt ratio (Ind Median).

6.3. Alternative sample period

As the market conditions under which firms make their capital structure decisions may change over time, the association between the cost of equity and firms' capital structure decisions might be time-varying. Recent studies (e.g., Graham et al., 2014; DeAngelo and Roll, 2015) show that US corporations have dramatically increased their leverage ratios over the past century and that there are obvious regime-shifts. Thus, we check the robustness of our main empirical results in an alternative sub-sample period from 1980 to 2006, notably, a period prior to the global financial crisis to eliminate the effects of market stress. The length of this sample is 27 years, which is a common sample length used in empirical capital structure studies (e.g., Elsas et al., 2014).

6.4. Results for robustness checks

With regard to **Hypothesis I**, we tabulate the three robustness checks described above in Table 8. For brevity, we only report the key coefficients of interest in testing the hypotheses. Panel A presents the regression results for the linkage between cost of equity and the leverage deviation with various measures of leverage, while Panel B presents the results with the alternative set of target leverage determinants. Compared with the main results in Table 5, the results in Panel A and Panel B both strongly confirm that the cost of equity is positively related to leverage deviation and, that the effect is more robust and evident for the sub-sample of overleveraged firms. Panel C presents robustness testing results for testing **Hypothesis I** using the alternative sample period from 1980 to 2006. We can see that our main results are resilient in this new testing sample period. In sum, all three robustness tests provide consistent results and support for **Hypothesis I**.

[Insert Table 8 here.]

Table 9 shows the robustness test results for **Hypothesis II** which predicts that leverage deviation is negatively (positively) related to the sensitivity of the cost of equity to leverage deviation, δ, for overleveraged (underleveraged) firms. From Panel A, we can see that as predicted using the alternative book leverage measure, Lev_{LDA}, δ is negatively related to leverage deviation in the overleveraged sub-sample. Further, using Lev_{TDA}, δ is marginally insignificant ($t = -1.62$) for the overleveraged sub-sample, while δ is significant and positively related to the leverage deviation for the underleveraged sub-sample. With Lev_{LDM}, δ is insignificant in both the overleveraged and underleveraged sub-samples. Panel B shows that when we use alternative determinants for estimating target leverage, we find consistent results that δ is negatively related to leverage deviation for the overleveraged sub-sample. Our main results for **Hypothesis II** remain resilient to the alternative (shorter) sample period as shown in Panel C. In summary, while the robustness analysis for **Hypothesis II** is weaker, there is still some reasonable support for this hypothesis, especially in the case of overleveraged firms.

[Insert Table 9 here.]

We check the robustness for testing **Hypothesis III** which predicts the higher the δ, the more rapid will be the SOA, in Table 10. Recall that Table 7 shows that the average SOA of the firms in the highest quartile (ranked by the sensitivity of the cost of equity to the leverage deviation, δ) adjust faster than the firms in the other quartiles. We show robustness testing results of our main argument in Panel A using alternative leverage measures. Except for the test using Lev_{LDM}, the outcome of using Lev_{TDA} and Lev_{LDA} remains true to our main results reported earlier - highest quartile firms adjust faster. We can see from Panels B and C in Table 10, that our main findings for testing **Hypothesis III** also remain robust to the alternative set of determinants for target leverage estimation and sample period, respectively. Therefore, we can conclude that firms in the highest quartile ranked by δ, adjust significantly faster than firms in lower quartiles.

[Insert Table 10 here.]

6.5. Robustness summary

Collectively, our main results for all three hypotheses remain quite robust to using: (1) alternative book leverage ratios (Lev_{TDA} and Lev_{LDA}); (2) alternative target leverage ratio estimates; and (3) an alternative sample period. This robustness is particularly evident for **Hypothesis I**. However, we do acknowledge that when changing to the alternative market leverage measure, Lev_{LDM}, the findings in support of **Hypotheses II** and **III** become weak.

7. Conclusion

In this paper, our main innovation is to exploit the leverage deviation to examine the impact of the capital structure decision on a firms (implied) cost of equity capital. Notably, we investigate the firm's dynamic leverage targeting from the perspective of ex ante cost of equity capital. Specifically, we first derive our hypotheses analytically from the MM proposition II and then analyze the effects of a firm's leverage deviation from target leverage on the implied cost of equity capital. Next, we examine whether the sensitivity of the cost of equity to the leverage deviation varies across firms and whether the sensitivity can influence how much the firm deviates from optimal leverage. Further, we test whether firms with a cost of equity that is more sensitive to the leverage deviation, display faster speeds of adjustment toward target leverage.

We find that the leverage deviation is significantly and positively related to a firm's cost of equity for the sub-sample of overleveraged firms. Moreover, the more sensitive the firm's cost of equity capital is to the leverage deviation, the smaller is the leverage deviation from the target leverage for overleveraged firms. In contrast, for underleveraged firms, no such linkage is detected. This indicates that the increase in the cost of equity capital is important (unimportant) for firms that are overleveraged (underleveraged). We also find that speeds of adjustment toward target leverage are heterogeneous across firms. Firms with costs of equity that are more sensitive to the leverage deviation adjust faster. The difference in SOAs is also more evident in those firms in the highest quartile, as ranked by sensitivity.

In sum, we argue that ignoring the heterogeneity of SOA across firms is likely to produce misleading conclusions, e.g., that firms are only making moderate leverage adjustments toward their target leverage ratios. More importantly, ignorance of this heterogeneity can lead to rejection of capital structure theory, in particular, the trade-off theory. While the theory might appear weak on average due to the offsetting effect of heterogeneous firms, it can hold in meaningful sub-samples, such as firms that are more sensitive to leverage change. Given the mixed results in the current empirical capital structure literature and the fact that financing decisions are not equally important to all firms, it is more logical to explore meaningfully chosen sub-samples of firms with capital structure decisions that are more value-relevant when testing alternative capital structure theories.

Acknowledgments

We thank the Editor Jeffry Netter and an anonymous referee for the constructive comments that have significantly improved the paper. We also thank Tracy Artiach, Audra Boone, Gordon Phillips, Marlene Plumlee, Tom Smith for their helpful comments during the development of the paper, and Khoa Hoang for data support.

Funding: This work was supported by the University of Queensland [UQECR1608889, 2016]; the China Postdoctoral Science Foundation [2015M580861, 2015]; and the Accounting and Finance Association of Australia and New Zealand [2014-2015].

References

Amihud, Y., Mendelson, H., 1986. Asset pricing and the bid-ask spread. J. Financ. Econ. 17 (2), 223–249.

Arellano, M., Bond, S., 1991. Some tests of specification for panel data: Monte carlo evidence and an application to employment equations. Rev. Econ. Stud. 58 (2), 277–297.

Attig, N., Guedhami, O., Mishra, D., 2008. Multiple large shareholders, control contests, and implied cost of equity. J. Corp. Financ. 14 (5), 721–737.

Bhandari, L. C., 1988. Debt/equity ratio and expected common stock returns: Empirical evidence. J. Financ., 507–528.

Binsbergen, V., Jules, H., Graham, J. R., Yang, J., 2010. The cost of debt. J. Financ. 65 (6), 2089–2136.

Blume, M. E., Friend, I., 1973. A new look at the capital asset pricing model. J. Financ. 28 (1), 19–34.

Blundell, R., Bond, S., 1998. Initial conditions and moment restrictions in dynamic panel data models. J. Econom. 87 (1), 115–143.

Bontempi, M. E., Golinelli, R., 2012. The effect of neglecting the slope parameters heterogeneity on dynamic models of corporate capital structure. Quant. Financ. 12 (11), 1733–1751.

Botosan, C. A., Plumlee, M. A., 2005. Assessing alternative proxies for the expected risk premium. Account. Rev. 80 (1), 21–53.

Botosan, C. A., Plumlee, M. A., Wen, H., 2011. The relation between expected returns, realized returns, and firm risk characteristics. Contemp. Account. Res. 28 (4), 1085–1122.

Boubakri, N., Guedhami, O., Mishra, D., Saffar, W., 2012. Political connections and the cost of equity capital. J. Corp. Financ. 18 (3), 541–559.

Byoun, S., 2008. How and when do firms adjust their capital structures toward targets? J. Financ. 63 (6), 3069–3096.

Chang, Y.-K., Chou, R. K., Huang, T.-H., 2014. Corporate governance and the dynamics of capital structure: New evidence. J. Bank. Financ. 48, 374–385.

Chen, K. C., Chen, Z., Wei, K. J., 2009. Legal protection of investors, corporate governance, and the cost of equity capital. J. Corp. Financ. 15 (3), 273–289.

Chen, L., Da, Z., Zhao, X., 2013. What drives stock price movements? Rev. Financ. Stud. 26 (4), 841–876.

Cook, D. O., Tang, T., 2010. Macroeconomic conditions and capital structure adjustment speed. J. Corp. Financ. 16 (1), 73–87.

Davis, J. L., Fama, E. F., French, K. R., 2000. Characteristics, covariances, and average returns: 1929 to 1997. J. Financ. 55 (1), 389–406.

DeAngelo, H., Roll, R., 2015. How stable are corporate capital structures? J. Financ. 70 (1), 373–418.

Devos, E., Dhillon, U., Jagannathan, M., Krishnamurthy, S., 2012. Why are firms unlevered? J. Corp. Financ. 18 (3), 664–682.

Dhaliwal, D., Heitzman, S., Li, O. Z., 2006. Taxes, leverage, and the cost of equity capital. J. Account. Res., 691–723.

Easton, P., et al., 2009. Estimating the cost of capital implied by market prices and accounting data. Found. Trend. Account. 2 (4), 241–364.

Easton, P. D., 2004. PE ratios, PEG ratios, and estimating the implied expected rate of return on equity capital. Account. Rev. 79 (1), 73–95.

Easton, P. D., Monahan, S. J., 2005. An evaluation of accounting-based measures of expected returns. Account. Rev. 80 (2), 501–538.

Elsas, R., Flannery, M. J., Garfinkel, J. A., 2014. Financing major investments: information about capital structure decisions. Rev. Financ. 18 (4), 1341–1386.

Elsas, R., Florysiak, D., 2011. Heterogeneity in the speed of adjustment toward target leverage. Int. Rev. Financ. 11 (2), 181–211.

Elton, E. J., 1999. Presidential address: expected return, realized return, and asset pricing tests. J. Financ. 54 (4), 1199–1220.

Fama, E. F., French, K. R., 1988. Permanent and temporary components of stock prices. J. Polit. Econ., 246–273.

Fama, E. F., French, K. R., 1992. The cross-section of expected stock returns. J. Financ. 47 (2), 427–465.

Fama, E. F., French, K. R., 1997. Industry costs of equity. J. Financ. Econ. 43 (2), 153–193.

Fama, E. F., French, K. R., 2002. Testing trade-off and pecking order predictions about dividends and debt. Rev. Financ. Stud. 15 (1), 1–33.

Faulkender, M., Flannery, M. J., Hankins, K. W., Smith, J. M., 2012. Cash flows and leverage adjustments. J. Financ. Econ. 103 (3), 632–646.

Fischer, E. O., Heinkel, R., Zechner, J., 1989. Dynamic capital structure choice: Theory and tests. J. Financ. 44 (1), 19–40.

Flannery, M. J., Hankins, K. W., 2013. Estimating dynamic panel models in corporate finance. J. Corp. Financ. 19, 1 – 19.

Flannery, M. J., Rangan, K. P., 2006. Partial adjustment toward target capital structures. J. Financ. Econ. 79 (3), 469–506.

Frank, M. Z., Goyal, V. K., 2009. Capital structure decisions: which factors are reliably important? Financ. Manage. 38 (1), 1–37.

Froot, K. A., Frankel, J. A., 1989. Forward discount bias: Is it an exchange risk premium? Q. J. Econ. 104 (1), 139–161.

Gebhardt, W. R., Lee, C., Swaminathan, B., 2001. Toward an implied cost of capital. J. Account. Res. 39 (1), 135–176.

George, T. J., Hwang, C.-Y., 2010. A resolution of the distress risk and leverage puzzles in the cross section of stock returns. J. Financ. Econ. 96 (1), 56–79.

Gordon, J. R., Gordon, M. J., 1997. The finite horizon expected return model. Financ. Anal. J. 53 (3), 52–61.

Graham, J. R., 1996a. Debt and the marginal tax rate. J. Financ. Econ. 41 (1), 41–73.

Graham, J. R., 1996b. Proxies for the corporate marginal tax rate. J. Financ. Econ. 42 (2), 187–221.

Graham, J. R., Leary, M. T., 2011. A review of empirical capital structure research and directions for the future. Annu. Rev. Financ. Econ. 3 (1), 309–345.

Graham, J. R., Leary, M. T., Roberts, M. R., 2014. A century of capital structure: The leveraging of corporate America. J. Financ. Econ.

Greenwood, R., Shleifer, A., 2014. Expectations of returns and expected returns. Rev. Financ. Stud., hht082.

Hail, L., Leuz, C., 2006. International differences in the cost of equity capital: Do legal institutions and securities regulation matter? J. Account. Res. 44 (3), 485–531.

Hendricks, N. P., Smith, A., 2015. Grouped coefficients to reduce bias in heterogeneous dynamic panel models with small T. Appl. Econ. (ahead-of-print), 1–14.

Hovakimian, A., 2006. Are observed capital structures determined by equity market timing? J. Financ. Quant. Anal. 41 (01), 221–243.

Hovakimian, A., Hovakimian, G., Tehranian, H., 2004. Determinants of target capital structure: The case of dual debt and equity issues. J. Financ. Econ. 71 (3), 517–540.

Hovakimian, A., Opler, T., Titman, S., 2001. The debt-equity choice. J. Financ. Quant. Anal. 36 (01), 1–24.

Huang, R., Ritter, J. R., 2009. Testing theories of capital structure and estimating the speed of adjustment. J. Financ. Quant. Anal. 44 (02), 237–271.

Huang, R., Tan, K. J. K., Faff, R., 2016. CEO overconfidence and corporate debt maturity. J. Corp. Financ. 36, 93–110.

Ippolito, F., Steri, R., Tebaldi, C., 2012. The relative leverage premium. In: AFA 2012 Chicago Meetings Paper.

Jäckel, C., 2014. Model uncertainty and expected return proxies. Available at SSRN 2364021.

Kayhan, A., Titman, S., 2007. Firms histories and their capital structures. J. Financ. Econ. 83 (1), 1–32.

Korteweg, A., 2010. The net benefits to leverage. J. Financ. 65 (6), 2137–2170.

Leary, M. T., Roberts, M. R., 2005. Do firms rebalance their capital structures? J. Financ. 60 (6), 2575–2619.

Lee, C. M., So, E. C., Wang, C. C., 2011. Evaluating implied cost of capital estimates. SSRN Working Paper Series.

Lemmon, M. L., Roberts, M. R., Zender, J. F., 2008. Back to the beginning: persistence and the cross-section of corporate capital structure. J. Financ. 63 (4), 1575–1608.

Marchica, M.-T., Mura, R., 2010. Financial flexibility, investment ability, and firm value: evidence from firms with spare debt capacity. Financ. Manage. 39 (4), 1339–1365.

Modigliani, F., Miller, M. H., 1958. The cost of capital, corporation finance and the theory of investment. Am. Econ. Rev. 48 (3), 261–297.

Modigliani, F., Miller, M. H., 1963. Corporate income taxes and the cost of capital: a correction. Am. Econ. Rev., 433–443.

Molina, C. A., 2005. Are firms underleveraged? an examination of the effect of leverage on default probabilities. J. Financ. 60 (3), 1427–1459.

Myers, S. C., 1984. The capital structure puzzle. J. Financ. 39 (3), 574–592.

Myers, S. C., 2003. Financing of corporations. Handb. Econ. Financ. 1, 215–253.

Ohlson, J. A., Juettner-Nauroth, B. E., 2005. Expected eps and eps growth as determinants of value. Rev. Account. Stud. 10 (2-3), 349–365.

Pástor, L., Sinha, M., Swaminathan, B., 2008. Estimating the intertemporal risk–return tradeoff using the implied cost of capital. J. Financ. 63 (6), 2859–2897.

Penman, S. H., Richardson, S. A., Tuna, I., 2007. The book-to-price effect in stock returns: accounting for leverage. J. Account. Res. 45 (2), 427–467.

Rajan, R. G., Zingales, L., 1995. What do we know about capital structure? some evidence from international data. J. Financ. 50 (5), 1421–1460.

Summers, L. H., 1986. Does the stock market rationally reflect fundamental values? J. Financ. 41 (3), 591–601.

Titman, S., Wessels, R., 1988. The determinants of capital structure choice. J. Financ. 43 (1), 1–19.

Uysal, V. B., 2011. Deviation from the target capital structure and acquisition choices. J. Financ. Econ. 102 (3), 602–620.

Wang, C. C. Y., 2015. Measurement errors of expected-return proxies and the implied cost of capital. Harvard Business School Account. & Manage. Unit Working Paper No. 13-098. Available at SSRN 1967706.

Welch, I., 2004. Capital structure and stock returns. J. Polit. Econ. 112 (1), 106–132.

Welch, I., 2013. A critique of recent quantitative and deep-structure modeling in capital structure research and beyond. Crit. Financ. Rev. 2(1), 131–172.

Table 1: Summary statistics and sample correlations between main explanatory variables

Panel A: Descriptive statistics

	Mean	St. dev	Min	Q1	Median	Q3	Max
Leverage (Lev_{TDM})	0.2412	0.1998	0.0000	0.0789	0.2025	0.3605	0.7994
Sensitivity (δ)	0.0146	0.0139	0.0000	0.0048	0.0107	0.0197	0.0766
IndustLev	0.2190	0.1617	0.0000	0.0862	0.1968	0.3236	0.6620
Mktbk	1.2296	0.6826	0.4147	0.7758	1.0365	1.4847	6.9918
Tang	0.3185	0.2160	0.0232	0.1489	0.2697	0.4470	0.8796
Profitability	0.1486	0.0672	-0.0122	0.1039	0.1432	0.1871	0.3889
LnAssets	6.7367	1.6186	3.5435	5.5486	6.5634	7.7798	11.0679
Inflation	0.0320	0.0165	0.0116	0.0229	0.0290	0.0379	0.1208
StockVar	0.1606	0.1693	0.0052	0.0640	0.1109	0.1980	6.5940
LnMV	6.6193	1.7904	1.4730	5.3113	6.5084	7.7094	13.0512
LnBM	-0.5449	0.6619	-6.9124	-0.9385	-0.5267	-0.1210	2.6948
Liquidity	0.9984	0.0167	0.3968	1.0000	1.0000	1.0000	1.0000
BHRET6m	0.0571	0.2859	-0.7797	-0.1105	0.0319	0.1810	4.4437
ForecastBias	0.1237	1.4084	-7.5714	-0.0504	0.0177	0.1515	9.2000
ForecastDispersion	0.0725	0.2894	-4.2603	0.0179	0.0375	0.0804	15.1375

Panel B: Correlation coefficients of determinants of target leverage

	IndustLev	Mktbk	Tang	Profitability	LnAssets
Mktbk	-0.3586***				
Tang	0.3769***	-0.1084***			
Profitability	-0.0870***	0.5276***	0.2118***		
LnAssets	0.1586***	-0.0260***	0.1415***	0.0208	
Inflation	0.1740***	-0.1797***	0.1628***	0.0590***	-0.0510***

Panel C: Correlation coefficients of control variables for cost of equity capital

	StockVar	LnMV	LnBM	Liquidity	BHRET6m	ForecastBias
LnMV	-0.2615***					
LnBM	0.0861***	-0.3969***				
Liquidity	-0.0276***	-0.0076	0.013			
BHRET6m	0.0104	0.0139	-0.1479***	-0.0076		
ForecastBias	0.0405***	-0.0863***	0.1022***	-0.0065	-0.0772***	
ForecastDispersion	0.0300***	-0.0592***	0.0629***	-0.0118	-0.0044	0.0436***

This table describes the variables used in the regressions. Panel A provides summary statistics for key variables. Panel B presents Pearson's correlation coefficients for the target leverage determinants. Panel C reports Pearson's correlation coefficients for control variables for the cost of equity capital. Spearman correlations are consistent with the Pearson correlations and omitted for brevity. There are 12,147 firm-year observations in our final sample. The sensitivity of cost of equity to leverage deviation, δ, is measured by $(r_E^U - r_D) * (1 - Tc)$, where r_E^U is the cost of unlevered equity, r_D is the cost of debt and T_c is the corporate tax rate. For more detailed calculation of this variable, δ, see Section 3.2.4. Details of all variable measurements are provided in Appendix A.1 and A.2. *** indicates statistical significance at the 1% level.

Table 2: Summary statistics and sample correlations between implied cost of equity estimates

Panel A: Descriptive statistics

	Mean	St. dev	Min	Q1	Median	Q3	Max
r_{GLS}	0.1211	0.0488	0.0397	0.0911	0.1085	0.1338	0.5956
r_{EPR}	0.0789	0.0450	0.0000	0.0547	0.0699	0.0916	0.8699
r_{GGM}	0.1155	0.0507	0.0280	0.0843	0.1020	0.1279	0.6120
r_{AGR}	0.0881	0.0827	0.0002	0.0433	0.0632	0.1019	0.7766
r_{MPEG}	0.1505	0.0570	0.0319	0.1114	0.1368	0.1760	0.5699
r_{OJM}	0.0843	0.0414	0.0000	0.0608	0.0762	0.0980	0.5056
r_E^L	0.1060	0.0374	0.0452	0.0800	0.0964	0.1200	0.2574

Panel B: Pearson correlation coefficients

	r_{GLS}	r_{EPR}	r_{GGM}	r_{AGR}	r_{MPEG}	r_{OJM}
r_{EPR}	0.4577***					
r_{GGM}	0.9688***	0.5734***				
r_{AGR}	0.1664***	0.1864***	0.1918***			
r_{MPEG}	0.6732***	0.2593***	0.6943***	0.3915***		
r_{OJM}	0.5613***	0.9721***	0.6664***	0.1827***	0.2986***	
r_E^L	0.8067***	0.6664***	0.8603***	0.5889***	0.7585***	0.7309***

The table provides summary statistics and correlation coefficients for six individual implied cost of equity capital measures, including r_{GLS} (see Gebhardt et al., 2001), r_{EPR} and r_{GGM} (see Gordon and Gordon, 1997), r_{AGR} and r_{MPEG} (see Easton, 2004), and also r_{OJM} (see Ohlson and Juettner-Nauroth, 2005). Adopting the average of different estimates can alleviate the concern of the model uncertainty problem that may lead to spurious results (Jäckel, 2014). r_E^L is calculated as an arithmetic average of the six individual implied cost of equity measures. Panel A reports summary statistics and Panel B presents Pearson correlation coefficients. There are 12,147 firm-year observations in our final sample. *** indicates statistical significance at 1% level.

Table 3: Target capital structure regression

Independent variable	Estimated coefficient	Sign in the literature	Consistent with literature
LagIndustLev	0.2826***	+	Yes
	(12.18)		
LagMktbk	-0.0363***	−	Yes
	(-10.58)		
LagTang	0.0464	+	Yes
	(1.48)		
LagProfitability	-0.4327***	−	Yes
	(-12.78)		
LagLnAssets	0.0527***	+	Yes
	(9.48)		
LagInflation	0.8675**	+	Yes
	(2.17)		
Constant	-0.1239**		
	(-2.11)		
Observations	12,147		
Number of firms	1,692		
Adjusted R-squared	0.2588		
Firm fixed effects	Yes		
FYear fixed effects	Yes		
H_0: The coefficients for all year dummies are jointly equal to zero			
F test (***p***-value)	< 0.01		

This table presents the target leverage regression results. The dependent variable is leverage (Lev_{TDM}), which is defined as the ratio of total debt to market value of assets. The first column lists each of the target leverage determinants used in the target leverage regression. Appendix A.1 provides detailed definitions and data sources for these variables. The independent variables are lagged by 1 year and are indicated by the prefix "Lag" in variable names. We include both firm and year fixed effects. To save space, we only report coefficient estimates in column 2 for the determinants and omit the coefficient estimates for firm and year dummies. The robust t statistics are enclosed in parentheses. The standard errors are corrected for heteroskedasticity and firm clustering. ***, ** and * represents significance at the 1%, 5%, and 10% levels, respectively. F-test is for the null hypothesis of no significant year fixed effect. Column 3 presents the predicted signs of the debt determinants in previous studies and column 4 checks whether the estimated signs are consistent with previous studies.

Table 4: Summary statistics of target leverage and leverage deviation year by year

Panel A: Descriptive statistics of target leverage by year								
year	N	Mean	St. dev	Min	Q1	Median	Q3	Max
1980	203	0.2795	0.0902	0.0000	0.2210	0.2843	0.3435	0.4953
1981	136	0.3362	0.1043	0.0320	0.2685	0.3425	0.4170	0.5950
1982	256	0.2762	0.0959	0.0112	0.2050	0.2803	0.3371	0.5496
1983	118	0.2757	0.0862	0.1093	0.2056	0.2793	0.3482	0.4699
1984	169	0.2894	0.1013	0.0246	0.2236	0.2895	0.3586	0.5633
1985	145	0.2621	0.0996	0.0010	0.1906	0.2544	0.3425	0.4849
1986	163	0.2723	0.0909	0.0585	0.2051	0.2716	0.3414	0.4784
1987	137	0.2967	0.0877	0.0308	0.2445	0.3006	0.3522	0.5293
1988	226	0.2588	0.0894	0.0223	0.2051	0.2560	0.3218	0.4785
1989	257	0.2412	0.0881	0.0141	0.1883	0.2443	0.2937	0.5059
1990	289	0.3040	0.1116	0.0192	0.2228	0.3123	0.3792	0.5991
1991	341	0.2483	0.0934	0.0105	0.1915	0.2469	0.3101	0.5078
1992	359	0.2172	0.0976	0.0010	0.1516	0.2181	0.2833	0.4501
1993	376	0.1914	0.0835	0.0052	0.1328	0.1882	0.2521	0.4054
1994	322	0.2140	0.0971	0.0057	0.1486	0.2104	0.2890	0.4566
1995	363	0.2201	0.0936	0.0007	0.1560	0.2154	0.2831	0.4831
1996	387	0.2049	0.0884	0.0020	0.1419	0.2091	0.2635	0.4441
1997	369	0.1966	0.0826	0.0096	0.1445	0.1961	0.2505	0.3886
1998	514	0.2338	0.1084	0.0018	0.1554	0.2291	0.3079	0.5335
1999	431	0.2780	0.1170	0.0146	0.1842	0.2699	0.3741	0.5750
2000	427	0.3159	0.1251	0.0011	0.2295	0.3146	0.4055	0.5955
2001	392	0.2561	0.1225	0.0021	0.1707	0.2570	0.3490	0.5541
2002	392	0.2736	0.1395	0.0006	0.1675	0.2740	0.3764	0.6107
2003	539	0.2039	0.1044	0.0038	0.1261	0.1934	0.2694	0.4911
2004	529	0.1819	0.0969	0.0027	0.1079	0.1722	0.2440	0.4801
2005	629	0.1734	0.0981	0.0022	0.1042	0.1625	0.2225	0.4856
2006	567	0.1697	0.0915	0.0074	0.1026	0.1570	0.2274	0.4742
2007	542	0.1929	0.1008	0.0025	0.1225	0.1777	0.2555	0.5571
2008	627	0.2721	0.1239	0.0074	0.1862	0.2627	0.3496	0.6782
2009	485	0.1972	0.0980	0.0038	0.1201	0.1877	0.2693	0.4895
2010	712	0.1756	0.0914	0.0009	0.1046	0.1634	0.2365	0.4833
2011	745	0.2078	0.1086	0.0001	0.1246	0.1945	0.2794	0.5411
Total	12,147	0.2277	0.1117	0.0000	0.1433	0.2199	0.3036	0.6782
Panel B: Actual and absolute leverage deviation								
Actual value of leverage deviation	12,147	0.0149	0.1536	-0.4066	-0.0880	-0.0145	0.0964	0.6536
Absolute value of leverage deviation	12,147	0.1161	0.0975	0.0018	0.0436	0.0908	0.1586	0.4432

This table reports summary statistics of firms' target leverage ratio for the sample period from 1980 to 2011. Panel A presents summary statistics of estimated target leverage year by year using the cross-sectional regression. The last row of Panel A reports the summary statistics for the overall sample. Panel B provides summary statistics of the actual and absolute values of the leverage deviation. The leverage deviation is defined as actual minus target leverage ratio.

Table 5: Testing Hypothesis I: The impact of the leverage deviation on firm cost of equity

Dependent Variable: r_E^L	Panel A: Overleveraged (Hypothesis I: $\phi > 0$)				Panel B: Underleveraged (Hypothesis I: $\phi > 0$)			
	(1) Base	(2) 2SLS	(3) BB	(4) AB	(1) Base	(2) 2SLS	(3) BB	(4) AB
L^{dev} (ϕ)	0.0472***	0.2790***	0.0777***	0.0872***	0.0149**	4.1418	0.0095	0.0343
	(9.57)	(3.66)	(4.32)	(3.65)	(2.36)	(0.40)	(0.28)	(1.03)
Lagr_E^L			0.3549***	-0.2837**			0.2654**	-0.4719***
			(3.95)	(-2.07)			(2.33)	(-2.83)
StockVar	0.0107*	0.0505***	0.0220***	-0.0011	0.0132***	0.1765	0.0153	0.0022
	(1.79)	(5.27)	(2.78)	(-0.14)	(3.98)	(0.46)	(0.68)	(0.23)
LnMV	-0.0004	0.0035***	0.0017**	0.0035	-0.0014*	0.0097	-0.0044	-0.0055
	(-0.37)	(2.67)	(2.29)	(0.77)	(-1.84)	(0.43)	(-1.62)	(-0.31)
LnBM	0.0049***	-0.0029	0.0001	0.0055**	0.0042***	0.1073	-0.0021	0.0153
	(4.30)	(-1.06)	(0.08)	(2.16)	(3.42)	(0.43)	(-0.30)	(1.48)
Liquidity	-0.2750	0.1456	-0.2126	-0.1243	-0.0057	-2.6324	1.2407*	-0.0772
	(-1.26)	(0.40)	(-0.65)	(-0.48)	(-0.04)	(-0.39)	(1.94)	(-0.10)
BHRET6m	0.0021	0.0004	0.0124***	0.0024	0.0005	-0.0096	0.0200**	-0.0004
	(1.39)	(0.19)	(3.96)	(0.78)	(0.41)	(-0.26)	(2.57)	(-0.06)
ForecastBias	0.0035***	0.0017	0.0011	0.0007	0.0013	0.0303	0.0018	-0.0032
	(3.19)	(1.01)	(0.70)	(0.48)	(1.30)	(0.44)	(0.26)	(-0.79)
ForecastDispersion	-0.0039	-0.0013	-0.0079	-0.0047	0.0001	0.0759	-0.0196	0.0041
	(-1.03)	(-0.27)	(-1.49)	(-0.79)	(0.02)	(0.45)	(-0.81)	(0.21)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
H_0: the coefficients for all year dummies are jointly equal to zero F test p-value	0.0000				0.0000			
Tests of endogeneity (Ho: variables are exogenous) F test p-value		0.0000				0.0000		
First-stage Adjust R-squared		0.1232				0.0825		
First-stage Partial R-squared		0.0050				0.0000		
F test p-value		0.0000				0.6862		
Arellano-Bond test for AR(1) in first differences:			0.0000	0.0503			0.0001	0.9239
Arellano-Bond test for AR(2) in first differences:			0.0380	0.0397			0.7306	0.4234
Hansen test of overid. restrictions:			0.3188	0.2917			0.1752	0.5562
Difference-in-Hansen tests of exogeneity of instrument subsets:								
GMM instruments for levels:								
Hansen test excluding group			0.772				0.271	
Difference (null H = exogenous)			0.065				0.218	
IV:								
Hansen test excluding group			0.309	0.268			0.202	0.337
Difference (null H = exogenous)			0.455	0.490			0.094	0.992

This table tests Hypothesis I and reports regression results for firm' cost of equity (r_E^L) on the leverage deviation (L^{dev}) and control variables. The coefficients shaded are of main interest for testing the hypothesis. The firms' cost of equity (r_E^L) is the arithmetic the average of six alternative implied cost of equity estimates (see Table 2 for more details). The L^{dev} is defined as the difference between actual leverage ratio (L) and target leverage ratio (TL). The control variables of cost of equity are defined in Appendix A.2. Panel A presents results for the overleveraged sub-sample, while Panel B reports the results for the underleveraged sub-sample. In each panel, Column 1 shows results for the static benchmark model that excludes the lagged value of r_E^L and the model is estimated using fixed effects panel regression including year fixed effects. Column 2 uses instrument variables regressions with firms' MTR as an exogenous instrument variable. Columns 3 and 4 incorporate dynamics of the r_E^L and they are estimated using Blundell and Bond's (1998) system GMM (BB) and Arellano and Bond's (1991) difference GMM (AB), respectively. Columns 3 and 4 include the exogenous MTR and generated lagged (second and third lag are used) difference or levels of r_E^L as instrument variables. Year dummies are included for all the models in columns 1 to 4. We do not report the coefficients estimates for year dummies and the constant for brevity (though they are included in the model estimation). The robust t statistics are enclosed in parentheses. The standard errors are corrected for heteroskedasticity and firm clustering. The p-values of testing model specifications are reported for each model. Column 1 includes the test for joint significance of year dummies. Column 2 reports the p-values of the tests of endogeneity and the first-stage regression goodness-of-fit statistics. Column 3 and 4 includes Arellano-Bond test for autocorrelation in the differenced residuals with a null hypothesis of no autocorrelation, Hansen over-identification tests with a null hypothesis test has a null hypothesis that the instruments as a group are exogenous and tests for whether subsets (system generated and exogenous pre-specified instruments) of instruments are valid with exogeneity null hypotheses. ***, ** and * represents significance at the 1%, 5%, and 10% level, respectively.

Table 6: Testing Hypothesis II: The impact of the sensitivity of cost of equity to the deviation of target leverage on the leverage deviation

Dependent Variable: L^{dev}	Panel A: Overleveraged (Hypothesis II: $\kappa < 0$)				Panel B: Underleveraged (Hypothesis II: $\kappa > 0$)			
	(1) Base	(2) 2SLS	(3) BB	(4) AB	(1) Base	(2) 2SLS	(3) BB	(4) AB
Sensitivity (κ)	-0.2520*	-0.3811***	-0.4796*	0.0310	0.1070*	0.2649***	0.1985	-0.1293
	(-1.91)	(-2.76)	(-1.91)	(0.14)	(1.74)	(3.38)	(1.51)	(-1.29)
LagL^{dev}			0.4397***	-0.2009*			0.2132***	-0.0547
			(5.30)	(-1.69)			(2.70)	(-0.76)
IndustLev	0.0509***	0.0233	0.0252	0.0104	0.0557***	0.0846***	0.0722	-0.0945***
	(2.71)	(1.60)	(0.28)	(0.0674)	(5.02)	(8.73)	(1.14)	(-4.88)
Mktbk	-0.0663***	-0.0607***	-0.0488*	-0.1116**	0.0050***	-0.0007	0.0098	0.0228***
	(-8.90)	(-11.50)	(-1.87)	(-2.16)	(4.31)	(-0.46)	(0.93)	(6.91)
Tang	-0.0098	-0.0005	0.0522	-0.2275	-0.0166	0.0100	-0.0042	0.0050
	(-0.41)	(-0.04)	(0.95)	(-0.85)	(-0.95)	(1.47)	(-0.11)	(0.10)
Profitability	-0.443***	-0.2271***	-0.6044***	-0.7052***	-0.0922***	-0.1083***	-0.1512	0.0215
	(-11.69)	(-5.20)	(-3.10)	(-2.90)	(-4.96)	(-6.46)	(-1.49)	(0.58)
LnAssets	0.0134***	-0.0072***	-0.0130	0.0506	-0.0089***	-0.0032***	-0.0061	-0.0347***
	(2.59)	(-4.45)	(-1.51)	(0.91)	(-3.49)	(-4.47)	(-1.28)	(-3.69)
Inflation	-0.430	0.1286	4.1011*	1.1421	-0.0003	-0.1284	-2.7541	0.0122
	(-1.36)	(0.39)	(1.96)	(0.31)	(0.00)	(-0.60)	(-1.01)	(0.03)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
H_0: the coefficients for all year dummies are jointly equal to zero F test p-value	0.0000				0.0000			
Tests of endogeneity (Ho: variables are exogenous) F test p-value		0.0000				0.5361		
First-stage Adjust R-squared		0.9420				0.9152		
First-stage Partial R-squared		0.9359				0.9053		
F test p-value		0.0000				0.0000		
Arellano-Bond test for AR(1) in first differences:			0.0000	0.6557			0.0000	0.0533
Arellano-Bond test for AR(2) in first differences:			0.0830	0.1504			0.3797	0.0777
Hansen test of overid. restrictions:			0.1380	0.0286			0.4161	0.5173
Difference-in-Hansen tests of exogeneity of instrument subsets:								
GMM instruments for levels:								
Hansen test excluding group			0.5000				0.878	
Difference (null H = exogenous)			0.057				0.019	
IV:								
Hansen test excluding group			0.148	0.065			0.268	0.286
Difference (null H = exogenous)			0.268	0.439			0.165	0.730

This table tests Hypothesis II and reports regression results for firm's leverage deviation (L^{dev}) on the firm's sensitivity cost of equity to the deviation of target leverage (δ). The L^{dev} is defined as the difference between actual leverage ratio (L) and target leverage ratio (TL). The coefficients shaded are of main interest for testing the hypothesis. The control variables of financial leverage are defined in Appendix A.1. Panel A presents results for the overleveraged sub-sample, while Panel B reports the results for the underleveraged sub-sample. In each panel, Column 1 shows results for the static benchmark model that excludes the lagged value of L^{dev} and the model is estimated using fixed effects panel regressions including year fixed effects. Column 2 uses an instrument variable regression with the firm's unlevered cost of equity (r_E^U) as exogenous instrument variables. Columns 3 and 4 incorporate dynamics of the L^{dev} and are estimated using Blundell and Bond's (1998) system GMM (BB) and Arellano and Bond's (1991) difference GMM (AB), respectively. Columns 3 and 4 include the exogenous r_E^U and generated lagged (second and third lag are used) difference or levels of L^{dev} as instrumental variables. Year dummies are included for all the models in column 1 to 4. We do not report the coefficients estimates for year dummies and the constant for brevity (though they are included in the model estimation). The robust t statistics are enclosed in parentheses. The standard errors are corrected for heteroskedasticity and firm clustering. The p-values of testing model specifications are reported for each model. Column 1 includes the test for joint significance of year dummies. Column 2 reports the p-values of the tests of endogeneity and the first-stage regression goodness-of-fit statistics. Columns 3 and 4 include Arellano-Bond test for autocorrelation in the differenced residuals with a null hypothesis of no autocorrelation, Hansen over-identification tests with a null hypothesis that the instruments as a group are exogenous and tests for whether subsets (system generated and exogenous pre-specified instruments) of instruments are valid with exogeneity null hypotheses. ***, ** and * represents significance at the 1%, 5%, and 10% level, respectively.

Table 7: Testing Hypothesis III: The sensitivity of the cost of equity to the deviation of target leverage and heterogeneous speed of leverage adjustment

Variables	(1) Full sample	(2) 1 (Lowest)	(3) 2	(4) 3	(5) 4 (Highest)	(6) High vs. Low (Full sample)
LagLeverage $(1 - SOA)$	0.7543***	0.7750***	0.7927***	0.6396***	0.4881***	0.7128***
	(10.02)	(11.74)	(8.69)	(6.52)	(4.60)	(8.49)
HighDummy						0.0770
						(1.04)
HighDummy*LagLeverage (Hypothesis III: $\alpha_1 < 0$)						-0.4846**
						(-2.44)
LagIndustLev	0.3695*	0.0557*	0.0744	0.1083**	0.1987***	0.1220***
	(1.87)	(1.70)	(1.57)	(1.98)	(3.61)	(4.14)
LagMktbk	0.0304	-0.0007	-0.0003	-0.0043	-0.0153*	-0.0011
	(1.12)	(-0.12)	(-0.04)	(-0.50)	(-1.71)	(-0.18)
LagTang	0.0165	0.0271*	0.0214	0.0421***	0.0291**	0.0485***
	(0.40)	(1.71)	(1.44)	(3.00)	(2.06)	(4.79)
LagProfitability	0.0233	0.1095*	0.0590	-0.0408	0.0620	-0.0791**
	(0.13)	(1.77)	(0.85)	(-0.73)	(1.10)	(-2.38)
LagAssets	-0.0010	0.0061***	0.0032	0.0048**	0.0091***	0.0065***
	(-0.15)	(2.63)	(1.25)	(2.03)	(3.39)	(4.51)
LagInflation	1.9770	6.2747	1.2286	0.1241	10.2180	0.5108***
	(0.37)	(1.32)	(0.28)	(0.03)	(1.46)	(6.48)
Constant	-2.5509	-1.0804**	-0.3399	0.1582	-1.2427*	-0.0124
	(-1.27)	(-2.15)	(-0.62)	(0.33)	(-1.85)	(-0.43)
Observations	17,537	4,396	4,379	4,388	4,374	17,537
Arellano-Bond test for AR(1) in first differences:	0.2412	0.0000	0.0000	0.0000	0.0000	0.0000
Arellano-Bond test for AR(2) in first differences:	0.2910	0.1457	0.4802	0.5543	0.4704	0.2002
Hansen test of overid. restrictions:	0.1194	0.3801	0.1611	0.0148	0.2096	0.0000
Difference-in-Hansen tests of exogeneity of instrument subsets:						
GMM instruments for levels:						
Hansen test excluding group	0.569	0.984	0.862	0.502	0.763	0.000
Difference (null H = exogenous)	0.045	0.031	0.019	0.003	0.05	0.01
IV:						
Hansen test excluding group	0.094	0.339	0.194	0.004	0.394	0.000
Difference (null H = exogenous)	0.535	0.55	0.237	1.000	0.052	0.071

This table tests Hypothesis III and reports results for the dynamic leverage partial adjustment regressions. The coefficients shaded are of main interest for testing the hypothesis. The dependent variable is the firm's actual leverage. Appendix A.1. provides details of the calculation and data sources for the finance leverage determinants above. Column 1 is the baseline partial adjustment model (Flannery and Rangan, 2006, see) using a full sample of firms. Column 2 to 5 reports the regression results for the partial adjustment model for the firms in the lowest quartile to highest quartile sorted by the sensitivity of cost of equity to the deviation of target leverage (δ). Column 6 augments the baseline partial adjustment model with a dummy variable (HighDummy) and an interaction term. HighDummy takes the value of 1 if the firm-year observation belongs to the highest quartile sorted by δ and the value of 0 otherwise. We create an interaction term between lagged leverage ratio and HighDummy. The models from column 1 to 6 are all estimated using Blundell and Bond's (1998) system GMM (BB). The first and second lag of the difference of leverage are used as generated instruments and pre-determined control variables are used as exogenous instrumental variables. We do not report the coefficients estimates for year dummies and the constant for brevity (though they are included in the model estimation). The robust t statistics are enclosed in parentheses. The standard errors are corrected for heteroskedasticity and clustering. The p-values of testing model specifications are reported for each model including Arellano-Bond test for autocorrelation in the differenced residuals with a null hypothesis of no autocorrelation, Hansen over-identification tests with a null hypothesis test has a null hypothesis that the instruments as a group are exogenous and tests for whether subsets (system generated and exogenous pre-specified instruments) of instruments are valid with exogeneity null hypotheses. ***, ** and * represents significance at the 1%, 5%, and 10% level, respectively.

Table 8: Robustness tests of Hypothesis I (versus Table 5)

Panel A: Alternative leverage measures

	Overleveraged (HI: $\phi > 0$)			Underleveraged (HI: $\phi > 0$)		
	Lev_{TDA}	Lev_{LDM}	Lev_{LDA}	Lev_{TDA}	Lev_{LDM}	Lev_{LDA}
L^{dev} (ϕ)	0.0751***	0.0703***	0.0718***	0.0794***	0.0094	0.0135
	(3.87)	(3.61)	(4.04)	(2.67)	(0.28)	(0.44)

Panel B: Alternative target leverage ratio estimate

	Determinants from Flannery and Rangan (2006)	
	Overleveraged (HI: $\phi > 0$)	Underleveraged (HI: $\phi > 0$)
L^{dev} (ϕ)	0.0980***	0.021
	(5.52)	(0.80)

Panel C: Alternative sample period

	1980-2006	
	Overleveraged (HI: $\phi > 0$)	Underleveraged (HI: $\phi > 0$)
L^{dev} (ϕ)	0.0656***	0.0075
	(3.15)	(0.18)

This table presents the robustness tests results for Hypothesis I, that is, on the relation between cost of equity and the leverage deviation (L^{dev}). The table reports main coefficients for testing Hypothesis I and is comparable to Table 5. Panel A presents results using alternative leverage measures i.e. Lev_{TDA}, Lev_{LDM} and Lev_{LDA} as defined in Appendix A.1; Panel B uses alternative set of determinants for target leverage estimation used in Flannery and Rangan (2006); Panel C examines the robustness of results using an alternative sample period from 1980 to 2006. The models are all estimated using Blundell and Bond's (1998) system GMM. The robust *t* statistics are enclosed in parentheses. The standard errors are corrected for heteroskedasticity and clustering. ***, ** and * represents significance at the 1%, 5%, and 10% level, respectively.

Table 9: Robustness tests of Hypothesis II (versus Table 6)

Panel A: Alternative leverage measures

	Overleveraged (HII: $\kappa < 0$)			Underleveraged (HII: $\kappa > 0$)		
	Lev_{TDA}	Lev_{LDM}	Lev_{LDA}	Lev_{TDA}	Lev_{LDM}	Lev_{LDA}
Sensitivity (κ)	-0.2488	-0.2915	-0.2704*	0.2383*	0.0639	0.1188
	(-1.62)	(-1.21)	(-1.68)	(1.90)	(0.53)	(1.11)

Panel B: Alternative target leverage ratio estimate

	Determinants from Flannery and Rangan (2006)	
	Overleveraged (HII: $\kappa < 0$)	Underleveraged (HII: $\kappa > 0$)
Sensitivity (κ)	-0.6361**	0.1909
	(-2.38)	(1.34)

Panel C: Alternative sample period

	1980-2006	
	Overleveraged (HII: $\kappa < 0$)	Underleveraged (HII: $\kappa > 0$)
Sensitivity (κ)	-0.6244**	0.0914
	(-1.99)	(0.60)

This table presents the robustness tests results for Hypothesis II, that is, on the relation between leverage deviation and the sensitivity of cost of equity capital to leverage deviation. The table reports main coefficients for testing Hypothesis II and is comparable to Table 6. Panel A presents results using alternative leverage measures i.e. Lev_{TDA}, Lev_{LDM} and Lev_{LDA} as defined in Appendix A.1; Panel B uses alternative set of determinants for target leverage estimation used in Flannery and Rangan (2006); Panel C examines the robustness of results using an alternative sample period from 1980 to 2006. The models are all estimated using Blundell and Bond's (1998) system GMM. The robust t statistics are enclosed in parentheses. The standard errors are corrected for heteroskedasticity and firm clustering. ***, ** and * represents significance at the 1%, 5%, and 10% level, respectively.

Table 10: Robustness tests of Hypothesis III (versus Table 7)

Panel A: Alternative leverage measures

	Lev_{TDA}			Lev_{LDM}			Lev_{LDA}		
Quartiles	1 (Lowest)	4 (Highest)	High vs. Low	1 (Lowest)	4 (Highest)	High vs. Low	1 (Lowest)	4 (Highest)	High vs. Low
LagLeverage ($1 - SOA$)	0.8147***	0.5060***	0.9476***	0.7742***	0.6315***	0.6915***	0.8024***	0.5602***	0.8308***
	(14.10)	(5.04)	(19.79)	(10.73)	(5.28)	(8.55)	(8.96)	(6.16)	(16.76)
HighDummy			0.1106***			-0.0203			0.1075***
			(2.97)			(-0.31)			(3.06)
HighDummy*LagLeverage (Hypothesis III: $\alpha_1 < 0$)			-0.2810***			-0.1245			-0.2865**
			(-2.68)			(-0.61)			(-2.56)

Panel B: Alternative target leverage ratio estimate

	Determinants from Flannery and Rangan (2006)		
Quartiles	1 (Lowest)	4 (Highest)	High vs. Low
LagLeverage ($1 - SOA$)	0.8034***	0.6424***	0.9425***
	(12.01)	(7.06)	(17.47)
HighDummy			0.1013***
			(2.64)
HighDummy*LagLeverage (Hypothesis III: $\alpha_1 < 0$)			-0.2906***
			(-2.75)

Panel C: Alternative sample period

	1980-2006		
Quartiles	1 (Lowest)	4 (Highest)	High vs. Low
LagLeverage ($1 - SOA$)	0.7465***	0.5623***	0.8198***
	(8.64)	(5.25)	(7.98)
HighDummy			0.1589
			(1.59)
HighDummy*LagLeverage (Hypothesis III: $\alpha_1 < 0$)			-0.6751**
			(-2.54)

This table presents the robustness tests results for Hypothesis III, that is, on the relation between the speed of adjustment (SOA) and the sensitivity of cost of equity capital to leverage deviation. The table reports SOA estimates of sub-samples of the lowest and highest quartile ranked by the sensitivity of cost of equity capital to leverage deviation (i.e., δ) and is comparable to Table 6. Panel A presents results using alternative leverage measures i.e. Lev_{TDA}, Lev_{LDM} and Lev_{LDA} as defined in Appendix A.1; Panel B uses alternative set of determinants for target leverage estimation used in Flannery and Rangan (2006); Panel C examines the robustness of results using an alternative sample period from 1980 to 2006. The models are all estimated using Blundell and Bond's (1998) system GMM. The robust t statistics are enclosed in parentheses. The standard errors are corrected for heteroskedasticity and firm clustering. ***, ** and * represents significance at the 1%, 5%, and 10% level, respectively.

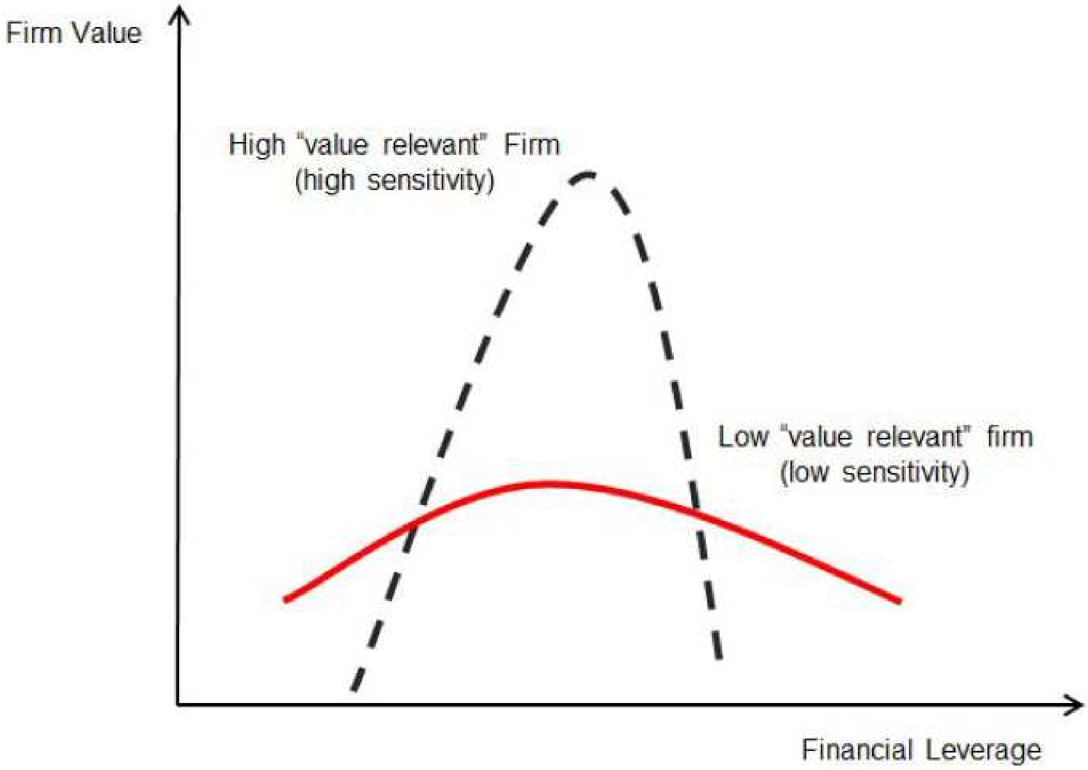

Figure 1: A characterization of the "firm value-financial leverage" relation for high value relevant vs. low value relevant firms.

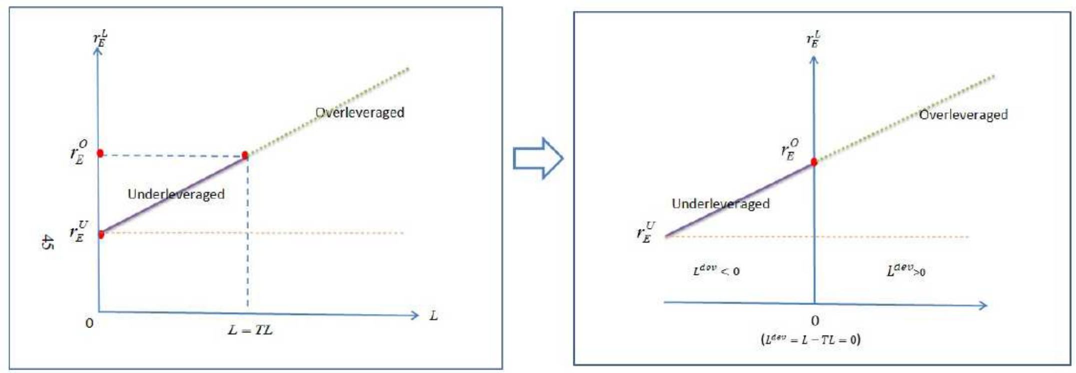

Figure 2: The relation between leverage, leverage deviation from target leverage and cost of equity. The green dotted line denotes the overleveraged case (L > TL), in which the actual leverage (L) is greater than target leverage (TL). The leverage deviation from target leverage, L^{dev}, is defined as L-TL. The purple solid line denotes the underleveraged case (L < TL). The (orange) dash line denotes the minimum cost of equity, r_E^U, which is the cost of equity when firms are unlevered.

Appendix A.1 Variable measurement, references and sources for leverage determinants

Variable	Measurement (Compustat Acronym)	References	Sources
MVA	Market Value of Assets = prcc_c*cshpri+dlc+dltt+pstkl-txditc	(Frank and Goyal, 2009)	Compustat
Part A: Leverage Measures			
Lev_{TDM}	Total Debt to the Market Value of Assets = (dlc+dltt)/MVA	(Frank and Goyal, 2009)	Compustat
Lev_{TDA}	Total Debt to the Book Value of Assets = (dlc+dltt)/at	(Frank and Goyal, 2009)	Compustat
Lev_{LDM}	Long-term Debt to the Market Value of Assets = (dltt)/MVA	(Frank and Goyal, 2009)	Compustat
Lev_{LDA}	Long-term Debt to the Book Value of Assets =(dltt)/at	(Frank and Goyal, 2009)	Compustat
Part B: Six Core Factors			
1) Profitability			
Profitability	Profitability = oibdp/at	(Frank and Goyal, 2009)	Compustat
2) Firm Size			
Assets	Natural logarithm of total assets at 1996 dollars = ln(at/GDPdeflator96)	(Frank and Goyal, 2009)	Compustat
AssetsBV	Total Assets at 1996 dollar = at/GDPdeflator96	(Frank and Goyal, 2009)	Compustat
3) Growth			
Mktbk	Market-to-Book Ratio=MVA/at	(Frank and Goyal, 2009)	Compustat
4) Industry			
IndustLev	Median Industry Market Leverage (Lev_{TDM})	(Frank and Goyal, 2009)	Compustat
5) Nature of Assets			
Tang	Tangibility = ppent/at	(Frank and Goyal, 2009)	Compustat
6) Macroeconomic Conditions			
Inflation	Expected inflation rate is the expected change in consumer price index over the coming year using data from the Livingston Survey.	(Frank and Goyal, 2009)	http://www.phil.frb.org/econ/liv/index.html.

This table summarizes the measurement of leverage ratio and leverage determinants used in our target leverage regression. Part A summarizes alternative measures of book and market leverage ratios and Part B summarizes six core leverage determinants used in Frank and Goyal (2009) and Marchica and Mura (2010)

Appendix A.2 Variable measurement, references and sources for the cost of equity determinants

Variable	Measurement (Compustat Acronym)	References	Sources
Liquidity	Number of non-missing and non-zero Daily Returns in 252 Trading days	Chen et al. (2009)	CRSP
ForecastBias	The median EPS forecast for year 1 minus actual EPS for the forecast date divided by the median EPS forecast for year 1	Boubakri et al. (2012)	I/B/E/S
ForecastDispersion	Dispersion of estimated first-year earnings per share divided by average earnings forecasts for the first year.	Attig et al. (2008)	I/B/E/S
StockVar	Volatility of stock returns over the past one year.	Attig et al. (2008)	CRSP & Compustat
BHRET6m	The past 6-month buy-and-hold return.	Chen et al. (2009)	CRSP
Market Value (MV)	Price per share times share outstanding at the end of June of calendar year t	Chen et al. (2009)	CRSP & Compustat
Book-to-Market (BM)	The book-to-market ratio for the for the fiscal year ending in calendar year t, is defined as in Davis et al. (2000), where book equity is the stockholders' equity (SEQ), plus blance sheet deferred taxes and investment tax credit (TXDITC), minus book value of preferred stock (in the following order: PSTKRV or PSTKL or PSTK) and market equity is the price times share outstanding at the end of December of calendar year t.	Davis et al. (2000)	CRSP & Compustat

This table summarizes the measurement and source of cost of equity determinants used in our cost of equity regressions.

Highlights

- We examine the impact of leverage deviation on the implied cost of equity capital
- We create a novel measure - the sensitivity of leverage deviation to cost of equity
- With this, we find the heterogeneity of speed of adjustment toward target leverage