The interrelationships between REIT capital structure and investment

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Abstract

We explore the interdependence of investment and financing choices in US listed Real Estate Investment Trusts (REITs) in the period 1973-2011. We find that the investment and financing choices of REITs are interdependent, but they are not made simultaneously. Our results suggest that investment determines leverage, but leverage has no apparent effect on investment decisions. The fundamental role of investments for the financial success of the firm in the REIT business model leads managers to prioritise the investment decision over the leverage decision. Conversely, the debt-overhang conflict between shareholders and debt holders that theoretically drives the reverse influence of leverage on the optimal investment policy does not appear to filter through to the actual investment choices of REITs. Our findings suggest that REIT managers utilise the maturity dimension of capital structure to mitigate potential investment distortions and ensure that investment remains on its value-maximising path. We also present novel evidence on the role of investments in driving a wedge between REIT target leverage and actual leverage levels, and on the interplay of investments and leverage adjustments towards the target ratio in explaining REIT capital structure dynamics.

Key words: Agency conflict, capital structure, leverage, maturity, investment, REITs

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1 Introduction

In any given period, the managers of Real Estate Investment Trusts (REITs) have to choose a level of investment and how to fund this investment. They can begin by considering the capital structure in place and then choose the level of investment conditional on the capital available. Alternatively, managers can identify suitable investment projects and then determine the appropriate capital structure to fund these investment projects. A priori, it is unclear whether the investment decision or the capital structure decision should take priority as both choices arguably have a significant impact on firm value. Childs, Mauer, and Ott (2005) argue that leverage distorts the optimal exercise policy of growth options and that these distortions may result in under- or over-investment, depending on the nature of the investment opportunity. From this perspective, capital structure determines investment. In contrast, Lambrecht and Myers (2013) argue that managers choose leverage to keep investment on its optimal path in order to maximise the utility of the rents that they extract as a function of the income generated from the firm's investments. In this framework, capital structure follows investment.

If REIT managers follow the prediction in Childs, Mauer, and Ott (2005) and prioritise the leverage decision, then this reflects a conflict of interest between shareholders and debt holders. In this framework, REITs are likely to underinvest in projects that expand the firm's asset base as equity holders have to bear the full cost of the project but have to share the benefits of the investment with debt holders. Conversely, REITs are likely to over-invest in projects that facilitate the shifting of risk to debt holders, that is, where a riskier new asset substitutes for a safer asset in place.

If, on the other hand, REIT managers follow the argument in Lambrecht and Myers (2013) and prioritise the investment decision, then this reflects an agency conflict between shareholders and managers. From this perspective, the leverage choice represents the residual parameter in managerial decisions. Managers are primarily interested in maximising the rents they receive from the firm. Therefore, they focus on implementing an optimal investment policy that maximises these rents. They choose leverage to facilitate the implementation of this optimal policy. In this framework, the question of optimal capital structure is of secondary importance. Empirically, the direction of this relationship between investment and leverage choices therefore offers insight into the question of which conflict of interest has the greater impact on managerial decisions in REIT investment and capital structure choices.

The REIT sector provides an especially suitable field to study the interactions of investment and capital structure choices due to the REIT regulation. In principle, managers of industrial firms have to choose the level of dividend pay-out in addition to investment and capital structure. For REITs, dividend payout is exogenously determined by regulation.[1] As the sources and uses of capital must balance in every period (Lambrecht and Myers, 2013), and as dividend pay-out is exogenously determined, identification of the interactions between investment and capital structure is significantly more straight-forward for REITs than for industrial firms.

However, examining the interaction between leverage and investment in REITs does not remove all endogeneity concerns. First, capital structure choices are multi-dimensional (Alcock, Finn, and Tan, 2012; Barclay, Marx, and Smith, 2003; Johnson, 2003; Leland and Toft, 1996). These choices encompass leverage and debt maturity, introducing a simultaneity bias. Further, as per the propositions in Childs, Mauer, and Ott (2005) and Lambrecht and Myers (2013), the direction of the interaction between leverage and investment is unclear. In addition, leverage and investment choices may be simultaneously determined. Therefore, we estimate a system of equations using 3SLS regression. In order to identify the system, we determine a set of instruments for debt maturity and investment. Our approach allows us to explore the interrelationships between leverage and investment while simultaneously accounting for the multi-dimensionality of capital structure by explicitly modelling maturity.

Consistent with Lambrecht and Myers (2013), we find that REIT investment influences leverage, but not vice versa. REIT managers appear to be more sensitive to the investment decision than the capital structure choice. The REIT business model relies on generating value from investing in real properties (Boudry, Kallberg, and Liu, 2010), placing the investment decision at the core of the REIT's financial success. Real estate assets are large, heterogenous, lumpy and characterised by low liquidity (Harrison, Panasian, and Seiler, 2011). Transactions may thus be less frequent and investment opportunities may arise in an irregular fashion. At the same time, the REIT model requires a certain scale in order to achieve diversification given the high levels of idiosyncratic risk embedded in the heterogenous, lumpy underlying assets (Ball and Glascock, 2005). Consequently, REIT managers with the financial flexibility to optimally respond to an investment opportunity when it arises are in a superior position to enhance firm value and thereby increase the rents they receive.

[1] The REIT regulation in different countries differs slightly, but all require an overwhelming majority of net income to be distributed as dividends. For example, in the USA REITs are required to pay out 90% of net income as dividends.

On the other hand, leverage may have a relatively weaker impact on REIT firm value. The tax exemption of REITs reduces the value of the tax shield benefits of debt (Howe and Shilling, 1988). The secure nature of real estate cash flows facilitates redeployment in the event of bankruptcy and thus reduces financial distress costs (Williamson, 1988). The simple REIT business model further limits agency costs that may reduce firm value unless REITs employ leverage to mitigate the underlying conflicts (Boudry, Kallberg, and Liu, 2010). As a result, the costs of sub-optimal capital structure may be lower for REITs. If the consequences of sub-optimal capital structure are less severe, then the pursuit of an optimal capital structure becomes a secondary priority relative to the implementation of an optimal investment policy.

Our findings suggest that the fundamental role of investments for the financial success of the REIT leads REIT managers to prioritise the investment decision over the leverage decision. Conversely, the agency conflict between shareholders and debt holders that drives the theoretical influence of leverage on the exercise policy of growth options (Childs, Mauer, and Ott, 2005) does not appear to filter through to actual investment choices. Our findings suggest that REIT managers adjust debt maturity, rather than leverage, to mitigate the conflict between shareholders and debt holders that potentially results in investment distortions and thus ensure that investment remains on its optimal path.

Our findings contribute to several dimensions of the debate about REIT leverage choices. The firm characteristic-based trade-off between the costs and benefits of leverage suggests low incentives for REITs to use leverage and is at odds with the empirical observation of persistently high levels of leverage in REITs (Harrison, Panasian, and Seiler, 2011). The view of leverage as a residual variable employed as a means of absorbing the implications of investment choices may consequently offer a rational alternative explanation why REITs hold significant levels of leverage.

Our results also offer insight into the question why REIT leverage tends to exceed the levels predicted by the static trade-off theory on the basis of the firm characteristics that proxy for the various costs and benefits of leverage (Harrison, Panasian, and Seiler, 2011). Specifically, we find that managerial efforts to optimise investment drive a wedge between actual leverage and its static target. Consistent with the focus on firm value, REIT managers also appear reluctant to adjust capital structure back to its target if this risks diluting measures of firm value and performance (Hovakimian, Opler, and Titman, 2001).

Further, most existing studies of multidimensional REIT financing choices consider static leverage levels.[2] However, Graham and Leary (2011) report that within-firm variation in leverage through time accounts for almost half of the total variation in leverage on an industry-level. In this context, we find that investment is a significant driver of changes in leverage. However, we also find that the deviation from target leverage is significantly related to leverage dynamics. Our finding suggests that REIT managers, while focusing on optimal investment, are also concerned about maintaining a certain target level of leverage. This concern may reflect efforts to maintain a certain target level of debt rating as proposed in Brown and Riddiough (2003). Our findings therefore also establish original evidence on drivers of REIT leverage dynamics.

From the perspective of managers, our results suggest that leverage may be used to facilitate the implementation of the firm's optimal investment policy and thus enhance firm value. The multi-dimensionality of capital structure, especially the maturity choice, allows managers to mitigate potential distortion effects that leverage in place may have on investment. From the point of view of investors, our results imply that high levels of leverage in REITs are not necessarily a sign of inefficient capital management.

2 Data and method

We examine all listed US REITs on *Compustat* (SIC Code 6798) from 1973, the first year when *Compustat* offers the full range of data we require, to 2011. We remove mortgage REITs (GIC Sub-industry 40402030). All firm data is obtained from *Compustat*. Individual stock and market return data is from *CRSP*. Bond yields are from the Federal Reserve Bank of St. Louis's Economic Database.

We exclude firms with missing observations and firm observations where the ratio of long-term debt to all debt lies outside [0,1]. Further, we winsorise all variables except dummy variables and the median leverage ratio of the sample firms' SIC 2-digit group at the 1^{st} and 99^{th} percentiles to control for any undue influence of outliers.

Leverage is measured as the ratio of total debt to market value of assets, following Billett, King, and Mauer (2007); Byoun (2008); Datta, Iskandar-Datta, and Raman

[2] See, for instance, Alcock, Steiner, and Tan (2012); Ghosh, Giambona, Harding, and Sirmans (2011); Giambona, Harding, and Sirmans (2008).

(2005); Stohs and Mauer (1996). The rate of investment is the ratio of the change in book capital from $t-1$ to t plus depreciation over the beginning-of-period book capital, where book capital is the book value of long-term debt, short-term debt, measured as debt in current liabilities or, if missing, current liabilities, and common equity, consistent with Fama and French (1999); Ott, Riddiough, and Yi (2005).

Given these variable definitions, we expect an inverse relationship between investments and leverage. This anticipated inverse relationship reflects that investments are typically less than fully levered. The rate of investment is the annual change in book capital over the value of book capital at the beginning of the year. Leverage is the ratio of total debt relative to the market value of the assets at the end of the year. Investments undertaken in the course of the year increase the value of the assets at the end of the year. If these investments are less than fully levered, then their contribution to the value of the assets is greater than the increase in debt taken on to carry out these investments. This disproportionate increase in the value of the assets relative to the value of the debt then generates an inverse relationship between investments and leverage. As a result, if investments drive leverage, then we expect a negative coefficient on the investment variable in the estimation of leverage.

Furthermore, we use the ratio of long-term debt (debt due after three years) to total debt as a proxy for debt maturity, following Barclay, Marx, and Smith (2003). The measurement of debt maturity varies in the literature, but Scherr and Hulburt (2001) report that different measures have little impact on empirical results. See Table 1 for details on variable definitions.

[Insert Table 1 about here.]

The estimation of leverage and investment

We estimate a 3SLS system of equations to explore the interactions in the choices of firm leverage and investment, controlling for the endogenous determination of debt maturity. We estimate the following system of equations:

$$Lev_{it} = \beta_{0,it} + \beta_1 Inv_{it} + \beta_2 Mat_{it} + \beta_3 MB_{it} + \beta_4 Abearn_{it} + \beta_5 LnSize_{it} \quad (1)$$
$$+ \beta_6 Vol_{it} + \beta_7 Dnol_{it} + \beta_8 Profit_{it} + \beta_{10} Ditc_{it} + \beta_{11} Fa_{it} + u_{it}$$
$$Inv_{it} = \gamma_{0,it} + \gamma_1 Lev_{it} + \gamma_2 Mat_{it} + \gamma_3 MB_{it} + \gamma_4 Retained_{it} + \gamma_5 Cash_{it} \quad (2)$$
$$+ \gamma_6 LnAge_{it} + \gamma_7 Equ_{it} + \gamma_8 Debt_{it} + v_{it}$$
$$Mat_{it} = \delta_{0,it} + \delta_1 Lev_{it} + \delta_2 Inv_{it} + \delta_3 MB_{it} + \delta_4 Abearn_{it} + \delta_5 LnSize_{it} \quad (3)$$
$$+ \delta_6 Vol_{it} + \delta_7 LnAmat_{it} + \delta_8 Drated_{it} + \delta_9 Term_{it} + e_{it}$$

where u_{it}, v_{it} and e_{it} are the residuals. The controls in (1) represent proxies for the standard determinants of leverage, as discussed for instance in Harrison, Panasian, and Seiler (2011). The variable MB is the market-to-book ratio. *Abearn* is abnormal earnings. $LnSize$ is the natural log of firm size. Vol is earnings volatility. *Dnol* is a dummy for the presence of losses carried forward. $Profit$ is firm profitability. *Ditc* is a dummy for investment tax credits. Fa is the fixed assets ratio. See Table 2 for details on variable definitions.

[Insert Table 2 about here.]

The identification of the system requires the choice of excluded instruments for the endogenous variables. The instruments for the rate of investment (Inv) in (2) are retained earnings (net of dividends) to total assets (*Retained*), cash to total assets ($Cash$) and dummies for the presence of debt issues (*Debtissue*) or equity issues (*Equissue*), following Riddiough and Wu (2009). In (3), the excluded instruments for debt maturity (Mat) are the log of asset maturity (*LnAmat*), a dummy for the presence of debt ratings (*Drated*) and the term structure (Brick and Ravid, 1985; Diamond, 1991; Myers, 1977; Sharpe, 1991; Titman, 1992). These variables pass the tests for relevant, strong and valid instruments.

The variables *Dnol*, $Profit$, MB, $LnSize$, *Ret* and $Cash$ are measured at the fiscal year-end prior to the year in which the dependent variable is measured (Billett, King, and Mauer, 2007; Datta, Iskandar-Datta, and Raman, 2005; Johnson, 2003; Riddiough and Wu, 2009). We include year fixed effects in (3) to capture the effect of latent macroeconomic factors (Korajczyk and Levy, 2003).

The 3SLS model allows us to account for the dependence between regressors and the error terms arising from endogeneity concerns as well as for potential cross-equation correlation of the errors driven by the possible interactions between leverage, investment and maturity. In such a modelling situation, and if the error terms are homoskedastic, 3SLS is a more efficient estimator than 2SLS (Greene, 2002). We test for heteroskedastic errors using the Pagan and Hall (1983) test of heteroskedasticity for instrumental variables estimation.

For robustness, we re-estimate Equations (1) to (3) but replace the levels of the main variables of interest with their first differences. This specification allows a marginal perspective on the relationships between leverage, investment and debt maturity before examining these interactions more directly in a dynamic framework.

The estimation of deviations from target and leverage dynamics

We consider two aspects of leverage dynamics. First, we estimate the deviation from target leverage (Dev) as a function of the rate of investment (Inv). We estimate the following fixed-effects panel:

$$\begin{aligned} Dev_{it} = \beta_{0,it} + \beta_1 Inv_{it} + \beta_2 Dnol_{it} + \beta_3 L.ROA_{it} + \beta_4 L.Ret_{it} + \beta_5 EPR_{it} \\ + \beta_6 Transfer_{it} + \beta_7 Drated_{it} + v_{it} \end{aligned} \tag{4}$$

where v_{it} is the residual. Lambrecht and Myers (2013) imply that managers are not concerned about a target level of leverage and only focus on optimising investment. Consistent with this view, we expect that deviations from target leverage are positively related to the rate of investment, hence we expect a positive sign on β_1.

The dependent variable, the deviation from target leverage (Dev) is measured as the difference between actual leverage and target leverage. We estimate target leverage as the predicted values from a projection of actual firm leverage on a set of proxies for the benefits and costs of leverage. [3] The predictors include $Indmed$, the annual median industry (2-digit SIC group) leverage, $Ditc$, a dummy for the presence of investment tax credits as a proxy for alternative tax shields, $Prof$, profitability, MB, the market-to-book ratio, $LnSize$, the log of firm size, Fa, the fixed assets ratio and Vol, earnings volatility. In the estimation of target leverage, we measure all variables contemporaneously (Byoun, 2008). See Table 2 for the definitions of the variables in the estimation of target leverage.

[3] This selection is largely informed by Byoun (2008); Harrison, Panasian, and Seiler (2011); Hovakimian, Hovakimian, and Tehranian (2004); Hovakimian, Opler, and Titman (2001); Kayhan and Titman (2007); Leary and Roberts (2005). Our results are robust when including debt maturity in the determination of target leverage to account for the multidimensionality of capital structure choices (Alcock, Finn, and Tan, 2012; Ghosh, Giambona, Harding, and Sirmans, 2011; Giambona, Harding, and Sirmans, 2008; Leland and Toft, 1996).

We obtain the coefficients to predict the target leverage ratio from all firms except financials, which include real estate investment firms, and construction firms. By excluding these firms, we avoid any bias introduced through the nature of real estate as the underlying asset class. [4]

We use this regression to obtain predicted values rather than for statistical inference. Therefore, we do not need to ensure the robustness of the standard errors (Hovakimian, Opler, and Titman, 2001). Further, Hovakimian, Opler, and Titman (2001) discuss the question of variables potentially featuring in the estimation of target leverage as well as that of dynamics in corporate capital structure. This concurrence would imply heteroskedasticity in the target estimation. In order to correct for any potential bias induced by this possibility, we estimate target leverage using FGLS and we assume that the error variance is a multiplicative function of the independent variables. [5]

In the panel estimation of the deviation from target leverage in (4), we control for a set of variables commonly associated with leverage dynamics in empirical studies, such as Byoun (2008); Hovakimian, Hovakimian, and Tehranian (2004); Hovakimian, Opler, and Titman (2001); Kayhan and Titman (2007) and Leary and Roberts (2005). See Table 3 for variable definitions and measurement.

[Insert Table 3 about here.]

Specifically, in Specification (1), we control for net operating losses carried forward ($Dnol$), as firms that accumulate losses tend to be over-leveraged relative to their target (Graham, 1996). Further, profitable firms may accumulate debt capacity in the sense of the dynamic pecking order theory. We control for the past return on assets ($L.ROA$), following Donaldson (1961) and Shyam-Sunder and Myers (1999). Higher market values passively reduce leverage and thus the deviation from target. Therefore, we also include the lagged stock return of the firm ($L.Ret$) and its earnings-to-price ratio (EPR), following Welch (2004).

We further control for impediments to adjusting the firm's capital structure. One such impediment arises due to a wealth transfer to debt holders when the firm issues equity. This transfer is particularly large for firms with long-term debt and those in financial distress. We therefore include an interaction term ($Transfer$) between

4 Our results are robust to estimating target leverage from REITs only.
5 Our results are robust when estimating target leverage using OLS.

the ratio of short-term debt to all debt and a dummy that takes the value of unity for negative operating income (Hovakimian, Opler, and Titman, 2001). Another impediment arises due to adjustment costs. We add a dummy for the presence of debt ratings ($Drated$) as these arguably reduce the cost of issuing capital (Cantillo and Wright, 2000; Faulkender and Petersen, 2006; Lee, Lochhead, Ritter, and Zhao, 1996; Lemmon and Zender, 2010; Whited, 1992).

In Specification (2), we further control for the possibility that managers may be reluctant to make adjustments to capital structure if these dilute accounting measures of value or performance. Therefore, we include a book value dilution dummy (MBD) that takes the value of unity if the market-to-book ratio is greater than one, and an earnings-per-share dilution dummy ($EPSD$) that takes the value of unity if the earnings-to-price ratio exceeds the yield on Moody's Baa-rated corporate bonds (Graham and Harvey, 2001).

For additional robustness, we estimate an alternative Specification (3). We add control variables for various aspects of market timing, including $L.EFWA$, the lagged external finance-weighted average market-to-book ratio (Baker and Wurgler, 2002), the term spread ($Term$) for the cost of debt, and the relative cost of debt ($RelCOD$), proxied by the yield on Moody's Baa-rated corporate bonds over that on 10-year government bonds (Ooi, Ong, and Li, 2010).

Here, we also control for the augment proposed in Byoun (2011), that the preservation of future financial flexibility influences capital structure, by including the earned-to-total capital ratio ($Ecap$), defined as retained earnings (item 36) relative to total assets (item 6). This variable proxies for the development stage of a firm and thus its need to retain financial slack to respond to future contingencies. [6]

In all specifications, we further control for the REIT property sectors using their GIC Subindex. Also, we include year fixed effects to capture the effect of latent macroeconomic shock factors (Korajczyk and Levy, 2003). We cluster standard errors by firm (Petersen, 2009; Thompson, 2011).

Graham and Leary (2011) observe that many of the traditional capital structure theories fail to explain changes in leverage. Lambrecht and Myers (2013) imply that changes in leverage are a positive function of investment. Therefore, we re-estimate

[6] REITs are required to pay out a substantial share of their income as dividends, arguable reducing the potential to retain earnings (Lehman and Roth, 2010). Alternatively, Byoun (2011) also considers the cash-to-total-capital ratio. Our findings are robust to employing this alternative measure.

Specifications (1) to (3). We replace the dependent variable with changes in leverage, measured as the first differences in the leverage series.

Descriptive statistics

Panel (a) of Table 4 presents descriptive statistics for the characteristics of the sample firms. The mean leverage ratio is 45%, higher than the leverage for the 2-digit SIC group of 41%.[7] Debt maturity averages 63%, suggesting that more than half of the debt held by REITs matures in more than three years. The average rate of investment is 15%, broadly consistent with the values reported in Ott, Riddiough, and Yi (2005). REIT growth opportunities, proxied by the market-to-book ratio, have a mean of 1.23. REITs are generally viewed as value-stocks (Ball and Glascock, 2005), suggesting that some agency debt-equity conflicts may be of lesser concern. The mean fixed assets ratio of REITs exceeds 50% and ranges up to 94%, reflecting the asset requirement of the REIT regulation and the investment focus of REITs on capital-intensive real estate assets. The average of REIT earnings volatility (0.04) is relatively low. This is consistent with the view that the traditional REIT business model focuses on the generation of stable income streams from the ownership and operation of direct real estate assets (Boudry, Kallberg, and Liu, 2010). Average asset maturity is c. 26 years, suggesting that the useful life of real estate is long.

Panel (b) of Table 4 summarises the potential drivers of leverage dynamics. Annual changes in leverage are low on average, consistent with the observation in Lemmon, Roberts, and Zender (2008) that leverage ratios are persistent through time. The deviation from target leverage, the difference between actual and estimated target leverage ratios, averages 11% above target and ranges from a minimum value of 22% below target to a maximum value of 62% above target, suggesting considerable variation in leverage relative to the static, firm characteristic-informed target.

[Insert Table 4 about here.]

Table 5 presents the correlation matrix for the variables in the estimation of (target) leverage, investment and maturity. The matrix generally shows low levels of correlation among the predictors. Table 6 presents the corresponding matrix for the variables in the estimation of leverage dynamics. Again, correlations among the predictors are low, alleviating concerns surrounding potential multicollinearity.

[7] This major group includes investment trusts, investment companies, holding companies, and miscellaneous investment offices

[Insert Tables 5 and 6 about here.]

Figure 1(a) shows the evolution of leverage in US listed equity REITs from 1977 to 2011. Over this period, REITs have held significant levels of leverage, with a median value of c. 45%. The figure also shows the optimal target leverage for these REITs, estimated as a function of firm characteristics that proxy for the benefits and costs of leverage. The median of estimated target leverage is c. 34%, suggesting that REITs have on average exceeded their optimal leverage by c. 11%. This observation is consistent with the view that REITs persistently hold more leverage than theory suggests (Harrison, Panasian, and Seiler, 2011).

Figure 1(b) describes the evolution of deviations from target leverage. Deviations fluctuate around a positive mean and the dispersion around this mean is significant throughout the entire study period. This observation raises the question of the economic forces that drive deviations between actual and target leverage. We suggest that the rate of investment may be one of these forces and explore the evidence for this proposition in a multivariate setting.

[Insert Figure 1 about here.]

3 Results

3.1 The interactions between leverage and investment

Table 7 shows the results for the 3SLS estimation of leverage, investment and maturity, controlling for a comprehensive set of standard capital structure determinants and drivers of corporate investment. Our results suggest that REIT investment influences leverage, but not vice versa. REIT managers appear to prioritise the choice of investments over the leverage choice. This relative priority reflects managerial efforts to keep investment on its optimal path in order to maximise the rents that the managers extract from the firm. This finding is consistent with the theory of (Lambrecht and Myers, 2013) and reflects the implications of the agency situation between managers and equity holders.

[Insert Table 7 about here.]

Our finding also suggests the importance of the investment decision in the REIT business model. Investments in real estate assets represent the primary business activity of REITs (Boudry, Kallberg, and Liu, 2010). As a result, they are arguably the core driver of value for REITs. The REIT regulation further requires these firms to generate the majority of their income from the operation of the real estate assets they invest in. Therefore, these investments also represent the major source of REIT income. In Lambrecht and Myers (2013), income is the primary driver of the rents that managers extract from the firm as a function of firm income. The two move in lock-step. The maximisation of managerial rents then drives the relative priority of investments over leverage decisions.

Our findings suggest that leverage follows investment, which takes priority in managerial choices. Leverage therefore represents the residual decision in this agency-driven framework. This perspective potentially sheds new light on REIT leverage choices. The rationale developed in Lambrecht and Myers (2013) implies that leverage is chosen to absorb investment shocks. If the contribution to firm value from these investments is greater than the costs of sub-optimal leverage, then this argument may provide a rational explanation for REIT leverage. This view is further consistent with the observation in Graham and Leary (2011) that moderate changes in leverage may have little effect on actual firm value along a broad range of pre-issuance levels of leverage.

Childs, Mauer, and Ott (2005) argue that leverage influences investments as a result of the agency conflict between shareholders and debt holders. This conflict of interests arguably distorts the optimal exercise policy of growth options. These distortions may result in under- or over-investment, depending on the nature of the investment opportunity. We find no evidence that the level of leverage influences the rate of investment in the sample of REITs that we study. At first sight, our finding appears inconsistent with the proposition in Childs, Mauer, and Ott (2005). However, our findings do not suggest that the agency conflict between shareholders and debt holders that theoretically drives the effect of leverage on investment is irrelevant in REITs. Rather, our findings suggest that REIT managers adjust debt maturity, rather than leverage, to mitigate the implications of this conflict of interest and thus preempt deviations of investment from its optimal path.

Specifically, the rationale in Childs, Mauer, and Ott (2005) may be interpreted as the dynamic extension of the agency model of capital structure predicting a negative impact of growth opportunities on leverage (Myers, 1977). We find that growth opportunities, the basis for the possible distortions of investment decisions, measured as the market-to-book ratio, are relevant for REIT leverage choices. The shareholder-debt holder conflict does appear to exist in REITs. However, our findings suggest that REIT managers put in place measures to mitigate the adverse consequences of the agency conflict between shareholders and debt holders on actual investment policy. In other words, this conflict appears to exist but REIT managers ensure that is does not filter through to actual investment decisions.

Our findings suggest that the multi-dimensionality of capital structure allows REIT managers to mitigate the adverse implications of the agency conflict between shareholders and debt holders on investment. We find that debt maturity is an inverse function of the rate of investment. Our finding suggests that REIT managers employ the maturity dimension of capital structure in order to mitigate distortions in the firm's investment policies. This strategy is consistent with managerial incentives to keep investment on its optimal path in order to maximise the rents that managers earn as a function of the firm's income (Lambrecht and Myers, 2013). This strategy also appears to be effective, as the rate of investment seems to be higher when maturity is shorter to reduce the incentives for underinvestment. Our finding is consistent with the argument put forward in Childs, Mauer, and Ott (2005) that the more frequent repricing of shorter term debt helps mitigate investment distortions. Our result also resonates the static version of this theory posited in Hart (1993) and the empirical evidence in Barclay and Smith (1995); Guedes and Opler (1996); Stohs and Mauer (1996).

Barclay, Marx, and Smith (2003) argue that leverage and maturity are substitutes in the mitigation of agency conflicts that may cause investment distortions, suggesting and inverse relationship between these two dimensions of capital structure. This substitution rationale implies that leverage is inversely related to debt maturity and vice versa. We find evidence consistent with this rationale, as REIT leverage is inversely related to debt maturity. However, we find that REIT debt maturity is not significant in the determination of leverage.

Existing empirical evidence on the interactions between REIT leverage and maturity is mixed. Ghosh, Giambona, Harding, and Sirmans (2011) and Alcock, Steiner, and Tan (2012) find that REIT debt maturity has an inverse effect on leverage, but not vice versa. Giambona, Harding, and Sirmans (2008) only find evidence for a two-way interaction between REIT leverage and debt maturity when including the liquidation value of the firm in the estimation. These findings suggest that the interrelationships between REIT leverage and maturity respond to other fundamentals of the business that have a first-order influence on capital structure. Our results suggest that the existence of growth options and the exercise of these options, measured as the actual rate of investment, have a significant impact on the nature of the interaction between leverage and maturity.

We also find that investments are positively related to retained cash as a proxy for liquidity constraints reflecting costly external finance and collateral capacity effects. Our finding is consistent with the evidence presented in Riddiough and Wu (2009). Further, we find that investment is positively related to equity issues, also consistent with the evidence in Riddiough and Wu (2009). Ott, Riddiough, and Yi (2005) argue that REITs finance new investments primarily using long-term debt. However, the evidence presented here suggests that REITs employ a mix of debt and equity to finance new investments.

In sum, it appears that the optimisation of corporate investment policy is a primary driver of REIT leverage and maturity choices, consistent with the theory put forward in Lambrecht and Myers (2013). The evidence on the remaining drivers of capital structure choices in terms of leverage and debt maturity is generally consistent with prior findings in the empirical corporate finance and REIT-specific literature. In the following, we explore the empirical evidence for a number of additional implications of the theory in Lambrecht and Myers (2013), as they relate to the role of leverage targets and leverage dynamics through time.

3.2 Deviations from REIT target leverage

Table 8 presents the regression results for deviations from target leverage of US listed equity REITs over the study period. Specification (1) controls for the standard set of factors driving or inhibiting dynamic adjustments to capital structure. Specification (2) additionally controls for a set of accounting measures of value or firm performance that might be of concern in making changes to the firm's capital structure. Specification (3) allows for measures of market timing as well as a measure of financial flexibility. Our evidence supports the implication of Lambrecht and Myers (2013) that investment drives a wedge between target and actual leverage as observed debt levels are the cumulative outcome of past investment decisions. Our evidence is robust across the three Specifications.

[Insert Table 8 about here.]

We interpret our findings as evidence that deviations from target may not only be the result of prohibitive adjustment costs that inhibit the correction of capital structure towards its target as originally suggested in Fischer, Heinkel, and Zechner (1989); Goldstein, Ju, and Leland (2001). Rather, our result suggests that there is actual value potential in allowing temporary deviations of leverage from its target level. These deviations are related to the rate of investment, suggesting that they are driven by efforts to optimally exploit investment opportunities.

We find that the lag of returns on assets and the earnings-to-price ratio are inversely related to deviations from target capital structure. This finding is consistent with the notion that higher firm values passively reduce leverage (Hovakimian, Hovakimian, and Tehranian, 2004; Hovakimian, Opler, and Titman, 2001; Kayhan and Titman, 2007; Welch, 2004).

Further, we find some evidence that the book value dilution measure is inversely related to deviations from target leverage (Graham and Harvey, 2001; Hovakimian, Hovakimian, and Tehranian, 2004). Our finding suggests that as the risk of diluting this measure increases, leverage is kept more closely aligned with the target.

3.3 Evidence on REIT leverage dynamics

Table 9 presents the regression results for changes in leverage of US listed equity REITs over the study period. Columns (1) to (3) replicate the specifications of the regression for deviations from target leverage. We find that the rate of investment is positively related to changes in leverage. This finding supports the proposition that REIT leverage reflects external investment shocks. This finding is consistent with the theory put forward in Lambrecht and Myers (2013).

[Insert Table 9 about here.]

We also find that the deviation from target leverage is positively associated with changes in leverage. As leverage deviates from the target, the adjustments to capital structure become more pronounced, consistent with a tendency to follow a broad target ratio of leverage. Leverage dynamics appear to be sensitive to the current level of leverage relative to the optimal target ratio, consistent with Graham and Leary (2011) and Hovakimian, Opler, and Titman (2001).

Lambrecht and Myers (2013) imply that managers are not concerned about maintaining an optimal target level of leverage. We find evidence to suggest that maintaining an optimal target level of leverage is not irrelevant to REIT managers. While the optimisation of the firm's investment policy appears to be an important determinant of REIT capital structure choices, REIT managers also seem to give some consideration to target leverage levels. This evidence is consistent with findings presented for instance in Brown and Riddiough (2003), who report that REITs appear to target a certain leverage ratio, albeit in order to maintain an investment-grade bond rating. Our finding is also indirectly consistent with Dudley (2012) who argues that large, lumpy investment projects, such as real estate investments, offer firms an opportunity to adjust leverage at low marginal cost.

Further, we find that operating losses carried forward and the lag of return on assets are positively related to changes in leverage. This finding is consistent with the argument that changes in firm value, induced by losses accumulated in the past, or by a higher return on assets in the past, passively induce changes in capital structure (Donaldson, 1961; Graham, 1996; Shyam-Sunder and Myers, 1999).

We find some evidence that the book value dilution dummy is inversely related to changes in leverage. This finding is consistent with Graham and Harvey (2001); Hovakimian, Hovakimian, and Tehranian (2004). The risk of diluting this measure of firm value appears to reduce the incentive for managers to make adjustments to capital structure.

We also find some evidence that the earnings-to-price ratio is inversely related to changes in leverage. As the earnings-to-price ratio increases, this implies a lower market value of the firm, passively increasing leverage, potentially beyond the target ratio. We would expect such a situation to prompt larger changes in leverage as the firm seeks to adjust capital structure back to target, consistent with the arguments put forward in Hovakimian, Hovakimian, and Tehranian (2004); Hovakimian, Opler, and Titman (2001); Kayhan and Titman (2007); Welch (2004).

However, a higher earnings-to-price ratio may also imply that the firm is in a situation where it may not be ideal to issue equity as the price of equity is low. The evidence for an inverse relationship between adjustments to leverage and the earnings-to-price ratio may to some extent also reflect market timing considerations in capital structure dynamics, broadly consistent with the rationale in Ooi, Ong, and Li (2010).

This interpretation of the earnings-to-price ratio in the context of changes in corporate leverage may also help explain the lack of significance of some of the other proxies for market timing, such as the term structure of interest rates and the relative cost of corporate debt (Ooi, Ong, and Li, 2010).

On the other hand, we find that the lag of EFWA MB, the timing measure suggested in Baker and Wurgler (2002), is inversely related to annual changes in leverage. Baker and Wurgler (2002) present empirical evidence that their proposed measure is inversely related to cumulative changes in leverage since the firm's IPO. Our evidence relates this measure to annual changes in leverage, but our results are qualitatively consistent.

4 Conclusion

In this study, we explore the interdependence of investment and financing choices in US listed REITs. We empirically contrast two conflicting theoretical predictions. Childs, Mauer, and Ott (2005) focus on the shareholder-debt holder conflict to propose that leverage distorts the optimal investment policy. ON the other hand, Lambrecht and Myers (2013) argue that, based on the manager-shareholder conflict, managers choose leverage to keep investment on its optimal path in order to maximise the utility of the rents they extract from the firm. Therefore, leverage follows investment. Empirical evidence on the nature and direction of the relationship between leverage and investment offers insight into the question which agency conflict dominates REIT investment and capital structure decisions.

Consistent with Lambrecht and Myers (2013), we find that investment determines leverage in REITs, whereas leverage does not appear to be a determinant of the rate of investment. This finding reflects the agency conflict between shareholders and managers.The fundamental role of investments for the financial success of the firm in the REIT business model leads managers to prioritise the investment decision over the leverage decision in order to maximise the rents they extract as a function of the firm's income. Conversely, the debt-overhang conflict between shareholders and debt holders that drives the reverse influence of leverage on the optimal investment policy does not appear to filter through to the actual investment choices of REITs. Our findings suggest that REIT managers utilise the maturity dimension of capital structure to mitigate potential investment distortions and ensure that investment remains on its rent-maximising path. Leverage appears to be the residual absorbing the impact of investment choices. Our results therefore suggest a rational explanation why tax-exempt, transparent REITs may hold significant levels of leverage.

We also present novel evidence on the role of investments in driving a wedge between REIT target leverage and actual leverage levels. We find that deviations from the optimal target level of leverage that is determined statically as a function of firm characteristics are driven by investment choices. Managerial efforts to optimise investment appear to take priority over efforts to optimise leverage levels. However, while investment is a significant determinant of leverage dynamics, REIT managers also appear to be concerned about maintaining a certain target level of leverage. As a result, our findings also shed new light on the interplay of investments and leverage adjustments towards the target ratio in explaining REIT capital structure dynamics.

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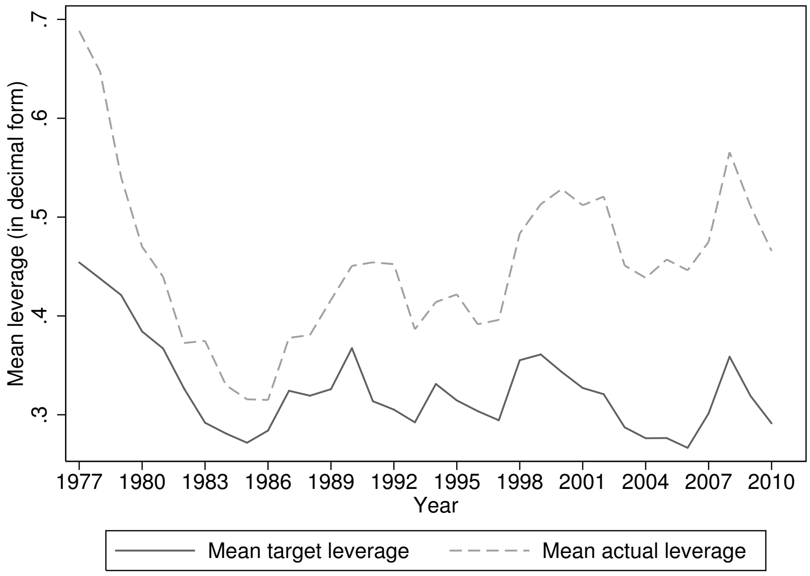
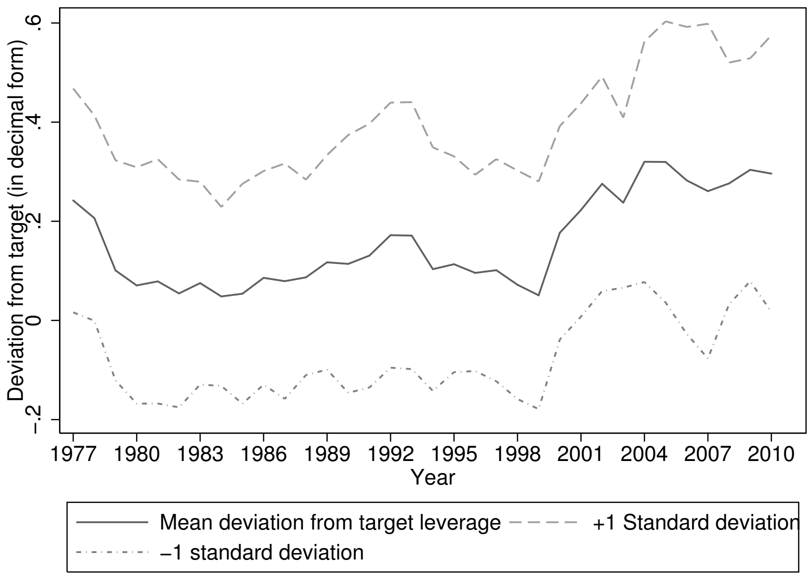
5 Figures and Tables

Time series evolution of average target versus actual leverage and deviations from target



(a) Actual versus target mean leverage



(b) Mean deviation from target leverage and dispersion

Fig. 1. The figure shows the time series evolution of the annual cross-sectional mean actual leverage versus estimated target leverage in Panel 1(a) and the annual cross-sectional mean deviation from estimated target leverage plus/minus one (annual) standard deviation around this mean in Panel 1(b), all in decimal form. Leverage is the ratio of total debt to the market value of assets. All firm-level data is obtained from *Compustat*. Target leverage is estimated as a function of various proxies for costs and benefits of debt, see Table 2 for details. Deviations are measured as the average annual difference between estimated target leverage and firms' actual leverage. Standard deviation is the dispersion around this mean, calculated annually.

Summary of main variables of interest

Variable	**Measurement**	**Reference**
Leverage	Ratio of total debt (long-term debt, Compustat item 9, plus current liabilities, item 34 or item 5 if missing) to market value of assets (book value of assets, item 6, less book value of common equity, item 60, plus market value of common equity, common shares outstanding, item 25, multiplied by annual close price, item 199)	Billett, King, and Mauer (2007); Byoun (2008); Datta, Iskandar-Datta, and Raman (2005); Stohs and Mauer (1996)
Rate of investment	Ratio of the change in book capital from $t-1$ to t plus depreciation (item 14) over the beginning-of-period book capital, where book capital is the book value of long-term debt (item 9), short-term debt, measured as debt in current liabilities (item 34) or, if missing, current liabilities (item 5), and common equity (item 60)	Fama and French (1999); Ott, Riddiough, and Yi (2005)
Debt maturity	Ratio of long-term debt (measured debt due after three years) to total debt (long-term debt, item 9, plus current liabilities, item 34 or item 5 if missing)	Barclay, Marx, and Smith (2003)

Table 1
The table shows the definition of the main variables of interest, REIT leverage, investment and debt maturity, alongside their measurement in terms of the corresponding *Compustat* data items. *Compustat* item numbers are as of 2013. All firm-level accounting data is obtained from *Compustat*.

Control variables and proxies for REIT (target) leverage, investment and maturity

Variable	Measurement	References
	Leverage proxies	
Ditc	Investment tax credit dummy = 1 in their presence, 0 otherwise	DeAngelo and Masulis (1980)
Dnol	Net operating loss carry-forward dummy = 1 in the presence of carry-forwards, 0 otherwise	Graham (1996); Hovakimian, Opler, and Titman (2001)
Fa	Fixed assets ratio: Net property, plant and equipment to total assets: Item 8 / item 6	Titman and Wessels (1988)
Indmed	Industry median leverage ratio for SIC Code 6798, per year	Bradley, Jarrell, and Kim (1984)
LnSize	Firm size: Natural logarithm of the market value of the firm in millions of June 1982 US$, deflated using the PPWe	Rajan and Zingales (1995)
MB	Market-to-book ratio: [Item 6 - item 60 + (item 25 * item 199)] / item 6	Jensen and Meckling (1976); Myers (1977); Rajan and Zingales (1995); Titman and Wessels (1988)
Profit	EBITDA to total assets: Item 13 / item 6	Jensen and Meckling (1976); Zwiebel (1996)
Vol	Earnings volatility: Standard deviation of first differences in EBITDA (item 13) over 4 years preceding the observation year, scaled by average assets (item 6) over the period	Bradley, Jarrell, and Kim (1984); Rajan and Zingales (1995); Titman and Wessels (1988)
	Instruments for investment	
Cash	Cash holdings to total assets (item 1 / item 6)	Riddiough and Wu (2009); Strebulaev and Whited (2011)
Debtissue	Dummy for the presence of debt issues = 1 if [(long-term debt issuance (item 111) + long-term debt reduction (item 114) + current debt changes (item 301)) / lag of total assets (item 6)] > 0.05	Riddiough and Wu (2009)
Equissue	Dummy for the presence of equity issues = 1 if [(sale of common and preferred stock (item 108) - purchase of common and preferred stock (item 115) / lag of total assets (item 6)] > 0.05	Riddiough and Wu (2009)
LnAge	Log of firm age	Riddiough and Wu (2009)
Retained	Retained earnings to total assets ratio (item 36 / item 6)	Riddiough and Wu (2009); Strebulaev and Whited (2011)
	Instruments for debt maturity	
Drated	Debt rating dummy = 1 in the presence of debt ratings, 0 otherwise	Diamond (1991); Sharpe (1991); Titman (1992)
LnAmat	Asset maturity, log of gross depreciable property to depreciation (item 7 / item 125)	Myers (1977)
Term	Term structure: The difference between the month-end yields on a 10-year government bond and a 6-month government bond	Brick and Ravid (1985)

Table 2
The table shows the variables included in the estimation of REIT (target) leverage, investment and debt maturity alongside their measurement in terms of the corresponding *Compustat* (unless otherwise indicated) data items. *Compustat* item numbers are as of 2013. All firm-level accounting data is obtained from *Compustat*. Bond yields have been obtained from the Federal Reserve Bank of St. Louiss Economic Database.

Control variables and proxies for leverage dynamics

Variable	Measurement	References
Dnol	Net operating loss carry-forward dummy = 1 in the presence of carry-forwards, 0 otherwise	Graham (1996); Hovakimian, Opler, and Titman (2001)
Drated	Debt rating dummy = 1 in the presence of debt ratings, 0 otherwise	Byoun (2008); Cantillo and Wright (2000); Faulkender and Petersen (2006); Lee, Lochhead, Ritter, and Zhao (1996); Lemmon and Zender (2010); Whited (1992)
Ecap	Earned-to-total capital ratio: Retained earnings (item 36) / total assets (item 6)	Byoun (2011)
EPR	Earnings-to-price ratio: Item 172 / (item 125 * item 199)	Ooi, Ong, and Li (2010)
EPSdum	EPS dilution dummy = 1 if EP ratio > yield on Moody's Baa rated corporate bonds, 0 otherwise	Graham and Harvey (2001); Hovakimian, Hovakimian, and Tehranian (2004)
L.EFWA	Lagged external finance-weighted average market-to-book ratio	Baker and Wurgler (2002); Kayhan and Titman (2007); Leary and Roberts (2005)
L.Ret	Lagged average monthly stock return from *CRSP*	Hovakimian, Hovakimian, and Tehranian (2004); Hovakimian, Opler, and Titman (2001); Kayhan and Titman (2007); Ooi, Ong, and Li (2010); Welch (2004)
L.ROA	Lag of EBITDA to total assets: Item 13 / item 6	Donaldson (1961); Frank and Goyal (2003); Hovakimian, Hovakimian, and Tehranian (2004); Hovakimian, Opler, and Titman (2001); Kayhan and Titman (2007); Shyam-Sunder and Myers (1999)
MBdum	Book value dilution dummy = 1 if market-to-book ratio >1, 0 otherwise	Graham and Harvey (2001); Hovakimian, Hovakimian, and Tehranian (2004)
RelCOD	Relative cost of debt: The difference between the yield on Moody's Baa corporate bonds and 10-year government bonds	Ooi, Ong, and Li (2010)
Term	Term structure: The difference between the month-end yields on a 10-year government bond and a 6-month government bond	Ooi, Ong, and Li (2010)
Transfer	Proportion of debt due in less than 3 years, and an interaction between this variable and a dummy that takes the value of unity for negative operating income (item 13)	Hovakimian, Opler, and Titman (2001)

Table 3
The table shows the control variables included in the estimation of deviations from target leverage and changes in leverage in terms of the corresponding *Compustat* (unless otherwise indicated) data items. *Compustat* item numbers are as of 2013. All firm-level accounting data is obtained from *Compustat*. Bond yields are from the Federal Reserve Bank of St. Louis' Economic Database. Individual stock and aggregate stock market returns are from *CRSP*.

Descriptive statistics for capital structure determinants of REITs, 1973-2011

Panel (a) Leverage	**Mean**	**SD**	**Min**	**p25**	**p50**	**p75**	**Max**
Leverage	0.45	0.20	0.04	0.30	0.45	0.58	0.90
Debt maturity	0.63	0.28	0.00	0.48	0.71	0.85	1.00
Rate of investment	0.15	0.38	-0.63	0.00	0.06	0.21	2.98
Industry median leverage	0.41	0.11	0.25	0.33	0.37	0.47	0.69
Profitability	0.07	0.06	-0.14	0.04	0.08	0.11	0.22
Market-to-book ratio	1.23	0.38	0.56	0.96	1.22	1.42	2.58
Firm size	1586.73	2833.69	0.97	77.49	222.20	2408.55	18837.41
Earnings volatility	0.04	0.03	0.00	0.01	0.02	0.05	0.19
Abnormal earnings	0.00	0.16	-0.73	-0.03	0.00	0.04	0.70
Fixed assets ratio	0.52	0.32	0.00	0.34	0.54	0.81	0.94
Asset maturity	26.83	20.61	0.00	15.73	23.66	37.93	134.45
Term structure	1.45	1.19	-1.39	0.55	1.56	2.45	3.42
Proportion of firm years with							
Debt ratings	0.24	0.43	0.00	0.00	0.00	0.00	1.00
Investment tax credit	0.16	0.37	0.00	0.00	0.00	0.00	1.00
Operating loss carried forward	0.11	0.32	0.00	0.00	0.00	0.00	1.00
Equity issues	0.19	0.39	0.00	0.00	0.00	0.00	1.00
Debt issues	0.89	0.31	0.00	1.00	1.00	1.00	1.00

Panel (b) Deviations	**Mean**	**SD**	**Min**	**p25**	**p50**	**p75**	**Max**
D.Leverage	-0.01	0.10	-0.31	-0.06	-0.01	0.04	0.32
Deviation from target	0.11	0.22	-0.40	-0.06	0.10	0.28	0.62
Return on assets	0.07	0.05	-0.11	0.04	0.08	0.10	0.22
Stock return	0.01	0.03	-0.07	0.00	0.01	0.03	0.11
Earnings-to-price ratio	0.02	0.28	-2.03	0.02	0.07	0.11	0.44
Transfer	0.04	0.16	0.00	0.00	0.00	0.00	0.72
EFWA	0.23	0.80	0.00	0.00	0.00	0.00	3.76
Relative cost of debt	0.01	0.00	0.01	0.01	0.01	0.01	0.02
Earned-to-total capital ratio	-0.06	0.29	-1.42	-0.12	-0.00	0.08	0.44
Proportion of firm years with							
Book value dilution dummy	0.60	0.49	0.00	0.00	1.00	1.00	1.00
EPS dilution dummy	0.26	0.44	0.00	0.00	0.00	1.00	1.00

Table 4

The table reports descriptive statistics for US listed REITs between 1973 and 2011. Panel (a) shows the variables in the estimation of leverage and maturity. Panel (b) shows the variables in the estimation of deviations from the target leverage ratio and changes in the leverage ratio. Data is from *Compustat*, *CRSP* and Federal Reserve Bank of St. Louis' Economic Database. US listed REITs are firms with Standard Industrial Classification (SIC) code 6798. We exclude observations where debt maturity lies outside [0,1]. Variables are defined as outlined in Table 2 for the target leverage ratio and Table 3 for the deviation from the target leverage ratio, respectively. Dummy variables take the value of unity in the presence of the respective items, 0 otherwise.

Correlation matrix for determinants of (target) leverage

Variables	(1)	(2)	(3)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(15)	(16)	(17)	(18)	(19)	(20)
(1)	1.00																			
(2)	-0.01	1.00																		
(3)	-0.00	0.01	1.00																	
(4)	0.33	-0.13	-0.04	1.00																
(5)	-0.15	0.01	0.09	-0.06	1.00															
(6)	-0.40	0.09	0.14	-0.17	0.29	1.00														
(7)	-0.03	0.18	0.19	0.17	0.10	0.34	1.00													
(8)	-0.03	-0.06	-0.27	0.03	-0.21	-0.11	-0.20	1.00												
(9)	-0.02	-0.18	-0.02	0.00	0.03	-0.00	0.02	0.07	1.00											
(10)	0.08	0.12	0.18	-0.04	0.03	0.15	-0.00	-0.00	-0.03	1.00										
(11)	-0.10	0.12	0.07	-0.00	0.25	-0.03	0.10	-0.24	0.00	0.05	1.00									
(12)	-0.17	0.06	0.01	-0.08	-0.09	0.08	-0.12	0.11	-0.07	-0.19	-0.14	1.00								
(13)	-0.08	-0.18	-0.05	-0.02	0.12	0.00	-0.45	0.04	0.04	0.23	0.05	0.02	1.00							
(14)	-0.03	-0.02	-0.05	-0.22	-0.06	0.02	0.03	0.04	0.02	-0.18	-0.03	0.07	-0.06	1.00						
(15)	0.03	0.10	0.08	0.02	0.16	0.17	0.14	0.03	-0.01	0.60	0.05	0.04	0.02	0.00	1.00					
(16)	-0.13	0.07	0.13	0.08	0.02	0.19	0.58	-0.10	0.00	0.08	0.04	-0.12	-0.14	0.02	0.06	1.00				
(17)	-0.03	0.01	0.07	0.09	0.11	0.02	-0.04	-0.03	0.00	0.02	0.09	0.02	0.14	-0.03	0.33	-0.06	1.00			
(18)	0.13	-0.11	-0.03	0.12	-0.14	-0.07	-0.10	0.19	0.06	-0.04	-0.17	-0.02	0.11	-0.03	0.01	- 0.02	-0.03	1.00		
(19)	-0.21	0.35	0.06	-0.17	-0.02	0.17	0.23	-0.06	-0.01	-0.26	0.03	0.06	-0.27	0.02	-0.03	0.08	-0.09	-0.09	1.0	
(20)	0.04	-0.01	0.17	0.12	0.03	0.05	0.13	-0.02	0.02	0.11	0.02	-0.00	-0.05	-0.01	0.04	0.05	0.00	0.02	0.07	1.00

Table 5: The table reports the pairwise Pearson correlation coefficients between the variables potentially determining the (target) leverage ratio, investment and maturity. (1) is leverage. (2) is the rate of investment. (3) is debt maturity. (4) is the industry median leverage ratio. (5) is profitability. (6) is the market-to-book ratio. (7) is the log of firm size. (8) is earnings volatility. (10) is the log of asset maturity. (11) is retained earnings relative to total assets. (12) is the cash-to-total assets ratio. (13) is the log of firm age. (14) is the term structure of interest rates. (15) is the fixed assets ratio. (16) is the debt rating dummy. (17) is the investment tax credit dummy. (18) is the operating loss carried forward dummy. (10) is the equity issue dummy. (20) is the debt issue dummy. See Table 2 for details on variable definitions and measurement.

Correlation matrix for determinants of leverage dynamics

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
(1)	1.00														
(2)	0.20	1.00													
(3)	0.40	0.04	1.00												
(4)	-0.03	-0.15	0.07	1.00											
(5)	-0.07	-0.12	0.10	0.19	1.00										
(6)	-0.08	-0.21	0.09	0.30	0.17	1.00									
(7)	0.02	0.03	-0.14	-0.30	-0.08	-0.33	1.00								
(8)	-0.14	-0.11	0.12	0.28	0.21	0.13	-0.12	1.00							
(9)	0.01	0.02	-0.05	0.05	-0.05	0.27	-0.04	-0.03	1.00						
(10)	0.01	0.05	-0.00	-0.04	-0.03	-0.01	-0.03	-0.02	-0.03	1.00					
(11)	-0.15	0.02	-0.02	-0.00	-0.04	-0.11	0.05	0.01	-0.09	0.03	1.00				
(12)	0.02	0.10	0.09	-0.08	0.00	-0.04	-0.06	0.06	-0.02	0.15	0.18	1.00			
(13)	0.02	-0.17	0.16	0.43	0.07	0.34	-0.24	0.12	0.04	-0.08	-0.02	-0.03	1.00		
(14)	-0.04	0.11	-0.11	-0.14	-0.01	-0.08	0.12	-0.08	0.04	-0.01	-0.03	-0.08	-0.25	1.00	
(15)	0.00	-0.00	0.07	0.01	-0.01	0.07	-0.09	0.19	-0.08	0.12	0.02	0.27	0.04	-0.02	1.00

Table 6: The table reports the pairwise Pearson correlation coefficients between the variables potentially determining leverage dynamics. (1) is the change in leverage. (2) is the difference between actual leverage and the estimated target leverage. (3) is the rate of investment. (4) is the lagged return on assets. (5) is the lagged average annual stock return on the firm. (6) is the earnings-to-price ratio. (7) is the variable capturing the wealth transfer to debt holders from equity issues, especially relevant for firms with long-term financing and in financial distress. (8) is the book value dilution dummy. (9) is the earnings per share dilution dummy. (10) is the lagged external finance-weighted average market-to-book ratio. (11) is the term structure of interest rates. (12) is the relative cost of debt. (13) is the earned-to-total capital ratio. (14) is the dummy for the presence of net operating losses carried forward. (15) is the dummy for the presence of debt ratings. See Table 3 for details on variable definitions.

Regression results for REIT leverage, investment and maturity

	(1)	(2)	(3)
VARIABLES	Leverage	Rate of investment	Debt maturity
Rate of investment	-0.162**		-0.536***
	(0.06)		(0.13)
Debt maturity	0.094	-0.476***	
	(0.10)	(0.15)	
Leverage		-0.214	-0.651***
		(0.22)	(0.22)
Market-to-book ratio	-0.181***	0.136	-0.076
	(0.04)	(0.09)	(0.08)
Abnormal earnings	0.212**		0.202
	(0.10)		(0.15)
Log of firm size	-0.008		0.074***
	(0.01)		(0.02)
Earnings volatility	-1.535***		-1.942***
	(0.47)		(0.67)
Operating loss carried forward	-0.001		
	(0.05)		
Investment tax credit	-0.130***		
	(0.05)		
Profitability	-0.094		
	(0.26)		
Fixed assets ratio	0.130**		
	(0.06)		
Retained earnings-to-assets ratio		0.367***	
		(0.13)	
Cash-to-assets ratio		-0.527	
		(0.47)	
Log of firm age		-0.043	
		(0.11)	
Equity issue		0.177**	
		(0.07)	
Debt issue		0.120	
		(0.09)	
Log of asset maturity			0.064*
			(0.03)
Debt rating			0.058
			(0.07)
Term structure			-0.023
			(0.03)
Constant	0.676***	0.370	0.446
	(0.07)	(0.38)	(0.36)
Observations	119	119	119
R-squared	0.247	0.016	0.022
Pagan Hall	0.625	0.186	0.989
Year fixed effects	No	No	Yes

Table 7

The table presents the results from a 3SLS regression for the leverage, investment and debt maturity of US listed equity REITs over the period 1973-2011 on a set of control variables. See Table 2 for details on variable definitions and measurement. Robust standard errors (clustered by firm) are stated in parentheses. Pagan Hall shows the p-value of the Pagan and Hall (1983) test of heteroskedasticity for instrumental variables estimation. The null hypothesis is that error terms are homoskedastic. Significance is indicated as follows: *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Regression results for deviations from target leverage

VARIABLES	(1) Impediments	(2) Accounting measures	(3) Timing & Flexibility
Rate of investment	0.098***	0.107***	0.099***
	(0.02)	(0.02)	(0.02)
Operating loss carried forward	-0.005	-0.007	0.022
	(0.03)	(0.03)	(0.03)
Lag of return on assets	-0.412*	-0.312*	-0.409
	(0.22)	(0.19)	(0.25)
Lag of stock return	-0.336	-0.304	-0.327
	(0.28)	(0.25)	(0.29)
Earnings-to-price ratio	-0.061**	-0.072***	-0.080***
	(0.03)	(0.02)	(0.03)
Transfer	0.019		
	(0.04)		
Debt rating	0.042		
	(0.04)		
Book value dilution dummy		-0.083***	
		(0.03)	
EPS dilution dummy		-0.002	
		(0.02)	
Lag of EFWA MB			0.020
			(0.03)
Term structure			-0.001
			(0.01)
Relative cost of debt			-4.026
			(5.39)
Earned-to-total capital ratio			0.027
			(0.10)
Constant	0.228***	0.289***	0.103
	(0.05)	(0.05)	(0.07)
Observations	688	688	640
R-squared	0.205	0.242	0.218
Number of firm clusters	121	121	116
Sector fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes

Table 8

The table presents the results from a firm fixed effects panel regression of deviations from target leverage (dependent variable) of US listed equity REITs over the period 1973-2011 on a measure of the rate of investment. Specification (1) controls for the standard set of factors driving or inhibiting dynamic adjustments to capital structure. Specification (2) additionally controls for a set of accounting measures of value or firm performance that depend on leverage and thus might be of concern in making changes to the firm's capital structure. Specification (3) allows for the dynamics of leverage and measures of market timing as well as a measure of financial flexibility as an additional test for the robustness of Our results. See Table 3 for details on variable definitions. Robust standard errors (clustered by firm) are stated in parentheses. Significance is indicated as follows: *** p<0.01, ** p<0.05, * p<0.1.

Regression results for changes in leverage

	(1)	(2)	(3)
VARIABLES	Impediments	Accounting measures	Timing & Flexibility
Deviation from target	0.297***	0.284***	0.296***
	(0.05)	(0.05)	(0.05)
Rate of investment	0.114***	0.116***	0.125***
	(0.02)	(0.02)	(0.02)
Operating loss carried forward	0.034**	0.033**	0.033*
	(0.02)	(0.02)	(0.02)
Lag of return on assets	0.206**	0.225**	0.253**
	(0.09)	(0.09)	(0.10)
Lag of stock return	0.011	0.006	-0.195
	(0.20)	(0.20)	(0.16)
Earnings-to-price ratio	-0.033	-0.040*	-0.030
	(0.02)	(0.02)	(0.02)
Transfer	0.021		
	(0.03)		
Debt rating	-0.012		
	(0.02)		
Book value dilution dummy		-0.019*	
		(0.01)	
EPS dilution dummy		-0.002	
		(0.01)	
Lag of EFWA MB			-0.022**
			(0.01)
Term structure			0.000
			(0.01)
Relative cost of debt			-2.572
			(3.33)
Earned-to-total capital ratio			-0.024
			(0.04)
Constant	-0.034	-0.054***	-0.065
	(0.02)	(0.02)	(0.05)
Observations	687	687	639
R-squared	0.404	0.406	0.412
Number of firm clusters	121	121	116
Sector fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes

Table 9

The table presents the results from a firm fixed effects panel regression of changes in leverage (dependent variable) of US listed equity REITs over the period 1973-2011 on a measure of the rate of investment. Specification (1) controls for the standard set of factors driving or inhibiting dynamic adjustments to capital structure. Specification (2) additionally controls for a set of accounting measures of value or firm performance that depend on leverage and thus might be of concern in making changes to the firm's capital structure. Specification (3) allows for the dynamics of leverage and measures of market timing as well as a measure of financial flexibility as an additional test for the robustness of Our results. See Table 3 for details on variable definitions. Robust standard errors (clustered by firm) are stated in parentheses. Significance is indicated as follows: *** p<0.01, ** p<0.05, * p<0.1.