EPRA RESEARCH

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Capital structure and firm performance

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1 Executive summary

Capital structure theoretically matters for firm value as soon as the assumption of frictionless capital markets underlying the traditional Modigliani and Miller (1958, 1963) irrelevance proposition is violated. Research allocates considerable resources to identifying firm characteristics that reflect real-world market frictions, such as asymmetric information or agency costs, and may thus drive capital structure choices. Insight into the relationships between firm characteristics and the corresponding optimal capital structure is valuable for managers and investors if capital structure empirically has a significant impact upon firm value.

The characteristics of REITs as regulated, tax-exempt, going concerns that operate portfolios of large, long-lived assets with significant debt capacity and distribute the majority of income as dividends, have a number of implications for the optimal capital structure that helps improve firm value. The optimal capital structure of a firm is a complex package of claims that encompasses multiple dimensions. Especially in real estate, debt may be secured against specific assets, or unsecured. More generally, interest rates may be fixed or floating, or firms may issue convertible debt instead of conventional debt. Empirical research is typically limited to a small number of capital structure dimensions, such leverage or debt maturity, which are commonly studied in isolation. In reality, each of the multiple dimensions of capital structure may influence firm value individually, and there may be significant interactions. Our first objective is to identify those combinations of capital structure characteristics that are empirically related to superior firm quality.

Real estate, because of its fixed location that depends on the surrounding economic, financial and regulatory conditions, is local in nature. Therefore, the financing of real estate investments is intricately linked to local credit market conditions and the local institutional environment. International disparities in legal and tax systems as well as the culture of different financial systems may have significant implications for the empirical links between the composition of capital structure and firm value across countries. However, international capital structure research often focuses on industrial firms, excluding real estate, and so far produces mixed results on the significance of institutional factors. Existing research thus offers limited practical guidance for the optimal capital management of international real estate firms. Our second objective is to contrast and compare the empirical links between capital structure and firm quality across the US and a sample of European markets.

In the wake of the global financial crisis, research into the relationships between the composition of corporate capital structure, financial flexibility, liquidity and financial constraints and the links to firm value has attracted significant attention. Our third objective is therefore to examine a selection of sub-periods before and after the onset of the recent global financial crisis to explore how the links between the composition of capital structure and firm value vary through different regimes in the real estate and capital market cycle.

In our empirical analysis, we study a sample of international listed real estate investment firms from the US (1993-2013) and a selection of European countries, including France, Germany, the UK, and the Netherlands (2001-2013). We include all firms reported on the SNL Financial database that are classified as equity REITs in the sample countries.

We first employ unconditional multivariate analysis to identify those combinations of capital structure characteristics that are associated with a stronger firm quality. We find that stronger firms tend to employ less leverage, longer debt maturity, maintain larger proportions of fixed-rate debt, rely less on secured debt, have more line of credit capacity but use it less, and hold smaller cash reserves. These results for the full sample are closely aligned with those for the US firms.

An analysis by geography suggests that the European firms are more homogeneous than those in the US. The earlier leverage result extends to the European sample too. However, the inverse relationship between leverage and firm quality is the only significant result in the European sample. Therefore, our results suggest that a firm characteristic-informed optimal capital structure is less directly related to firm value in Europe than it appears to be in the US. This interpretation implies that institutional factors in Europe, potentially driving variation in the relative cost of different forms of capital, may outweigh the impact of firm characteristic-related capital structure choices on firm value.

We subsequently explore the marginal impact of changes in individual dimensions of capital structure on firm value in the full sample, conditioning on existing firm and capital structure characteristics. Our results largely support our findings from the unconditional multivariate analysis but additionally suggest significant interactions between individual dimensions of capital structure. For example, on an unconditional basis, both secured debt and leverage are individually associated with lower firm quality. The conditional analysis reveals an inverse relationship between leverage and firm quality but a positive relationship between secured debt and firm quality in the US. Our finding suggests that highly levered firms, whose capital structure exposes them to increased bankruptcy risk, may be able to mitigate the effects of leverage on firm quality by pledging collateral when sourcing debt capital. Conditional on high leverage, stronger firms with a sound asset base may be in a better position to do so.

The analysis of the marginal effects of capital structure choices on firm value in Europe allows us to identify a number of differences across the institutional environments that prevail in our set of European sample countries. Overall, our results resonate the findings from the unconditional multivariate analysis. Most poignantly however, high leverage has the strongest negative effect on firm value in Germany, followed by more moderate effects in France, the Netherlands and the UK. This finding suggests that the international capital markets react differently to variation in leverage levels, depending on the underlying institutional setting.

The longer history of detailed capital structure data available for the US firms allows us to measure variation in the sensitivity of firm value to capital structure choices across different real estate and capital market regimes inside and outside of the recent global financial crisis. Overall, we find that the marginal effects of capital structure choices on firm value are robust to variation in these capital market regimes. The exception is the relationship between revolving credit facilities and firm quality, which is significantly positive, but only during the crisis period. Our finding supports the view that, consistent with the unconditional multivariate analysis in the full sample, stronger firms have more line of credit capacity. During the crisis however, these firms have also been able to rely more heavily on previously granted lines of credit as a source of liquidity, whereas weaker firms faced substantial refinancing risk and lenders were also perhaps less willing to allow these weaker firms to draw down their lines of credit.

Our results have significant practical implications for managers and investors of international listed real estate firms. First, our findings assist managers in optimising multiple dimensions of capital structure choices to improve firm value, depending on the characteristics of the firm, the institutional environment and the prevailing capital market regime. Second, our findings provide guidance for investors in international real estate firms in drawing inferences about firm quality from the composition of corporate capital structure in different countries and at different points in the cycle. Overall, our conclusions offer substantial benefits for financial decision-makers by promoting well-informed capital structure and investment choices.

We proceed as follows. Section “Background” presents a brief review of the literature and assists us in forming expectations about the relationships between REIT characteristics and the optimal composition of capital structure. Section “Data and method” outlines sample structure and variable definitions, presents descriptive statistics and summarises our empirical approach. Section “Results” discusses our empirical findings. The final section concludes.

2 Background

REITs are cash-constrained investment vehicles that focus on owning and operating large, long-lived, relatively illiquid assets with significant debt capacity. Unlike externally managed funds, REITs are going concerns and are not taxed at the entity level. These basic characteristics have implications for optimal capital structure.

We expect that stronger REITs use lower leverage

Regulated REITs are exempt from corporate taxation if they distribute 90% of taxable income as dividends. Howe and Shilling (1988) show that in the absence of tax benefits, REITs cannot compete for debt and will favour equity. Consistently, Shilling (1994) shows that REIT firm value is maximised for equity-only financing. In addition, Harrison, Panasian and Seiler (2011) argue that the focus on owning and operating real estate properties that is imposed by the REIT regime, combined with the size and limited liquidity of the underlying assets, magnifies bankruptcy costs, further reducing the incentive for REITs to employ debt. On balance, the absence of tax shield benefits of debt for REITs, in conjunction with arguably high bankruptcy costs, suggests that REITs achieve higher measures of firm value when they employ low levels of leverage (Barclay, Heitzman and Smith, 2013).

We expect that stronger REITs use longer debt maturities and favour fixed-rate debt

We see three main reasons for this expectation. First, REITs hold assets whose useful economic life is relatively long. Therefore, consistent with the asset matching principle (Myers, 1977), REITs should hold long-maturity debt. Second, for a given level of leverage, longer maturity reduces refinancing risk for the borrower. Third, the cost of debt is a function of default risk. Default risk in turn is related to the level of leverage as well as the time to maturity (Merton, 1974). For the same pre-issuance level of leverage, longer maturities increase the time for the borrower to grow the value of the assets in order to redeem the outstanding debt balance at maturity, reducing the relative cost of long-term debt (Alcock, Finn and Tan, 2012). As a result, firms with long-lived assets and high bankruptcy costs, that aim to manage the cost of debt and their refinancing risk in a prudent fashion, should favour long-term debt.

The term to maturity has further implications for the duration of the debt. As debt maturity increases, so does the sensitivity of the debt to variation in the underlying interest rate. As a result, we also expect that strong firms carry higher shares of fixed-rate debt, reflecting prudent management of interest rate risk.

The role of cash holdings and dividend payout ratios

The REIT regulation requires firms to pay out 90% of taxable income as dividends, restricting their ability to accumulate cash. Stronger firms arguably are more profitable in the sense that they extract more income from the assets in place. Higher levels of income allow these stronger firms to increase dividend payout to investors beyond the regulatory requirement, to accumulate more cash, or to do both.

The catering theory of dividend payout suggests that managers pay more dividends when investors put a stock price premium on high dividend-paying firms, suggesting a positive relationship between payout ratios and firm value for complying firms (Baker and Wurgler, 2004).

The free cash flow theory suggests that high cash holdings may allow managers to divert these funds into inefficient investment projects that don't serve shareholder interests, in an attempt to build a corporate empire (Jensen, 1986; Stulz, 1990; Zwiebel, 1996). This view would suggest that high cash holdings are generally a sign of poor firm quality.

On the other hand, from the point of view of maintaining financial flexibility to exploit investment opportunities, there may be circumstances when external sources of funds are restricted, as in the recent global financial crisis, and cash reserves may be beneficial for firm value under these circumstances (Damodaran, 2001; Campello et al., 2010; 2011).

REITs have significant debt capacity, but should they exploit this capacity?

Debt generally gives outside investors an opportunity to monitor management (Williamson, 1988; Harris and Raviv, 1990). The suitability of real estate assets as collateral in particular increases the scope for outsiders to monitor, control and recover residual value in the event of bankruptcy, increasing the debt capacity of all REITs (Harrison, Panasian and Seiler, 2011).

However, when asset quality is unobservable, then only high-quality firms with a strong balance sheet are able to source unsecured funds, creating a separating signalling equilibrium between high- and low-quality firms (Giambona, Mello and Riddiough, 2012). This view is also broadly consistent with the moral hazard approach to explaining the secured debt choice, where the stylized empirical fact is that secured debt carries a higher interest rate than unsecured debt. Moral hazard models then focus on the association of pledged collateral with various measures of borrower quality, and have also offered some explanations for why lower quality borrowers pledge more collateral to finance investment.

As a result of this discussion, we generally expect to find an inverse relationship between firm quality and secured debt, as well as a positive relationship between firm quality and the line of credit capacity.

Other capital structure and firm characteristics

A number of studies examine the use of convertible debt. The rationale for convertible debt is commonly premised on the lower informational sensitivity of convertible debt relative to straight equity, resulting in relatively lower adverse selection costs. This explanation is particularly relevant for firms with high levels of asymmetric information about the quality and riskiness of their underlying assets or if investors are concerned about ex-post risk shifting (Green, 1984; Brennan and Kraus, 1987; Brennan and Schwartz, 1988). In these situations, convertible debt may help resolve agency conflicts based on asymmetric information, resulting in a more subdued drop in share prices than that likely to occur following a straight equity issuance (Constantinides and Grundy, 1989; Stein, 1992). On this basis, we expect that lower quality firms may rely more heavily on convertible debt.

Sinai and Gyourko (1999) examine the effect of the UPREIT structure on firm value. The UPREIT structure permits the issuance of tax-exempt operating partnership units in exchange for properties. This structure stands in contrast to regular REITs that must pay for properties with cash or stock, giving rise to a capital gains tax liability for the seller. Under the UPREIT regime, capital gains tax is deferred until the seller converts their operating partnership units into shares or the REIT sells the corresponding properties. The deferral of the capital gains tax liability can represent a sizeable advantage for the seller, potentially enabling UPREITs to purchase properties at lower prices compared to regular REITs. Furthermore, the existence of UPREIT shares may improve management commitment, as the tax penalty of selling these shares gives managers an incentive to continue to hold, raising their equity stake in the firm and thus aligning their interests with those of regular outside shareholders. On the other hand, the same tax penalty may also incentivise managers not to sell UPREIT properties when current market pricing suggests that it is economically sensible to do so. On balance however, we expect a positive relationship between UPREIT equity and firm value.

3 Data and method

Data set and variable definitions

We study a sample of international listed real estate investment firms from the US and a selection of European countries, including France, Germany, the UK, and the Netherlands. This selection of European markets is informed by prior international capital structure research in order to facilitate a comparison of the results (Brounen, DeJong and Koedijk, 2004). We include all firms reported on the SNL Financial database that are classified as equity REITs in the sample countries. SNL coverage for the US begins in 1989, but we begin the sample period in 1993, the inception of the modern REIT era marked by the introduction of the UPREIT legislation. European coverage on SNL begins in 2001. Firms that were formed during the study period enter the sample when they first appear on SNL. Firms that were acquired or went out of business during the sample period are included for as long as they are active on SNL and dropped when they become inactive, to avoid survivorship and selection bias. All firm-level accounting data are obtained from SNL. Our initial sample contains a total of 2,336 firm-year observations from 137 firms. Table 1 presents a breakdown of the number of firms and observations. Figure 1 shows the evolution of the sample in terms of the number of firms by geography and year.

Table 1: Sample composition by country, 1993-2013 (for US) and 2001-2013 (for Europe)

Country	Min	Max	N
DE	2	3	16
FR	6	17	150
GB	9	25	234
NL	5	5	60
US	45	137	1876

The table presents the breakdown of the number of firms and observations by country, as well as the minimum and maximum number of firms by country in the study period.

For the purpose of our unconditional multivariate analysis, we measure firm value using Tobin's q ratio (Tobin, 1969). We calculate Tobin's q as the ratio of the market value of assets relative to the book value of assets (Ott, Riddiough and Yi, 2005; Giambona, Mello and Riddiough, 2012). The market value of assets is defined as the book value of assets minus the book value of common equity plus the market value of common equity, calculated as the number of shares outstanding multiplied by the closing share price at the end of the period.

We choose to focus on Tobin's q as a measure of firm value for a number of reasons. First, the measure is intricately related to the firm's cost of capital because the numerator, the market value of the firm's assets, increases as the cost of capital decreases. The measure is thus firmly based on the premise that managers aim to maximise firm value by minimising the cost of capital of the firm. Further, it reflects that in the presence of capital market imperfections, the capital structure of the firm is a significant driver of firm value. Second, Tobin's q takes into account the real side of corporate capital management (the efficient deployment of investment capital) by including assets in place. Higher productivity of the assets in place affects the numerator and the denominator of Tobin's q equally. The financial side of corporate capital management (capital structure choices) on the other hand only affects the numerator via the cost of capital. Therefore, Tobin's q measures the contribution to firm value from capital structure choices, after controlling for the effects of the real side of capital management.

We measure Tobin's q for each firm-year. We exclude observations with Tobin's q values outside of [0.5,2] to mitigate any undue influence of outliers. We relate Tobin's q to the following set of capital structure characteristics. Following the literature, we measure market leverage as the ratio of total liabilities plus mezzanine items to the book value of assets. We measure the share of fixed-rate debt, secured debt and convertible debt as a proportion of total debt. We measure revolving credit facilities (capacity) relative to total assets, and the share of credit facilities used as the ratio of lines of credit drawn relative to line of credit capacity. Cash and cash equivalents are measured as a proportion of the market value of assets. We measure UPREIT equity as the difference between the implied market capitalisation of the firm and its total market capitalisation relative to the total market capitalisation of the

firm. Given the level of data available for US firms, we further include the ratio of dividends paid out to total funds from operations and we measure debt maturity as the ratio of debt maturing in more than three years to total debt for these REITs. We discard observations where the ratio variables debt maturity, fixed-rate, secured and convertible debt or the ratio of cash to total assets lie outside [0,1].

For the regression analysis, we additionally calculate the following set of firm characteristics as control variables that are commonly found to be significantly associated with firm value and corporate capital structure. Firm size is the natural logarithm of the market value of the firm, calculated as the number of shares outstanding multiplied by the closing share price at the end of the period.

Profitability is the ratio of EBITDA to book value of assets. Earnings volatility is measured as the standard deviation of the first differences in EBITDA over four years, scaled by the average book value of assets for this period.

Descriptive statistics

Table 2a (Table 2b) presents the characteristics of the sample firms by geographic region (individual country) during the study period. The q-ratio for US firms is on average higher than in Europe (mean 1.28 versus 0.99) and more volatile (standard deviation 0.27 versus 0.19). US REITs use significantly more fixed-rate debt (0.77 versus 0.69) but this doesn't take into account that European firms may utilise swap contracts to fix interest rates. US REITs have significantly higher line of credit capacity (measured relative to total assets) and a higher share of credit facilities drawn than European firms (0.15 and 0.36 versus 0.10, respectively). On average, US REITs have an UPREIT equity ratio of 0.08, but there is no equivalent to this measure for European REITs. US firms are significantly larger than European firms by market value ($1.72bn versus $1.46bn). Further, US firms are more profitable than their European counterparts (EBITDA to total assets ratio of 0.08 versus 0.05). There are no significant differences in the use of secured and convertible debt, in corporate cash holdings or earnings volatility.

Table 2a: Firm characteristics by region, 1993-2013 (for US) and 2001-2013 (for Europe)

Variable	US			Europe		
Statistic	N	Mean	SD	N	Mean	SD
q-ratio	1876	1.28***	0.27	460	0.99	0.19
Market leverage	1876	0.47	0.18	453	0.52	0.19
Debt maturity	1655	0.54	0.22	0	n/a	n/a
Fixed-rate to total debt	1808	0.77***	0.21	391	0.69	0.28
Secured debt to total debt	1806	0.63	0.35	353	0.74	0.36
Convertible debt to total debt	1806	0.02	0.08	439	0.02	0.07
Revolving credit facilities to total assets	1849	0.15**	0.11	22	0.10	0.13
Share of credit facilities drawn	1693	0.36***	0.30	15	0.10	0.20
Cash to market value	1871	0.02	0.05	453	0.04	0.06
UPREIT to total equity	1875	0.08***	0.13	460	0	0
FFO payout ratio	1609	0.70	0.26	0	n/a	n/a
Market value of the firm ($m)	1876	1720**	2900	460	1460	2160
Profitability	1875	0.08***	0.05	433	0.05	0.09
Earnings volatility	1603	0.03	0.07	293	0.10	0.09

The table presents the descriptive statistics for the firm characteristics of the equity REITs in the sample over the period 1993-2013 (for US) and 2001-2013 (for Europe) by geographic region. All firm-level accounting data is obtained from SNL Financial. Tobin's q is defined as the ratio of the market value of assets over the book value of assets. The market value of assets is calculated as book value of assets minus book value of common equity plus market value of equity (number of common shares outstanding multiplied by the end of year share price). We include the following capital structure characteristics. Market leverage is measured as the ratio of total liabilities plus mezzanine items to the book value of assets. Debt maturity is measured as the ratio of debt maturing in more than three years to total debt (not available for Europe). We measure the share of fixed-rate debt, secured debt and convertible debt as a proportion of total debt. We measure the share of revolving credit facilities (capacity) relative to total assets, and the share of credit facilities used as the ratio of

*lines of credit drawn relative to line of credit capacity. Cash and cash equivalents are measured as a proportion of the market value of assets. We measure UPREIT equity as the difference between the implied market capitalisation of the firm and its total market capitalisation relative to the total market capitalisation of the firm (not available for Europe). We further include the ratio of dividends paid out to total funds from operations (not available for Europe). The control variables included in our analysis are firm size, measured as the market capitalisation of the firm (number of shares outstanding multiplied by end-of-period closing price), profitability, measured as the ratio of EBITDA to total assets, and earnings volatility, measured as the standard deviation in earnings growth over four years, scaled by average book value of assets over this period. The table also shows the results from a two-group mean-comparison test across the US and Europe. Significance is indicated as follows: * p<0.1, ** p<0.05, *** p<0.01.*

Table 2b: Firm characteristics by country in Europe, 2001-2013

Variable	Germany			France			UK			Netherlands		
Statistic	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
q-ratio	16	0.92	0.12	150	1.06	0.23	234	0.95	0.16	60	0.98	0.10
Market leverage	10	0.57	0.13	150	0.56	0.19	233	0.50	0.20	60	0.48	0.09
Fixed-rate to total debt	16	0.38	0.35	108	0.67	0.33	219	0.74	0.24	48	0.63	0.22
Secured debt to total debt	16	1.00	0.00	75	0.63	0.40	224	0.81	0.32	38	0.46	0.38
Convertible debt to total debt	16	0.00	0.00	136	0.03	0.07	227	0.01	0.04	60	0.04	0.12
Revolving credit facilities to total assets	0	n/a	n/a	1	0.07	n/a	10	0.16	0.16	11	0.05	0.08
Share of credit facilities drawn	1	n/a	n/a	0	n/a	n/a	9	0.11	0.22	6	0.10	0.18
Cash to market value	16	0.07	0.04	150	0.03	0.03	227	0.05	0.08	60	0.02	0.02
Market value of the firm ($m)	16	286	248	150	2230	2900	234	1070	1700	60	1330	978
Profitability	16	0.03	0.03	136	0.06	0.05	225	0.04	0.11	56	0.06	0.05
Earnings volatility	7	0.03	0.02	91	0.06	0.05	155	0.14	0.10	40	0.06	0.03

The table presents the descriptive statistics for the firm characteristics of the European equity REITs in the sample over the period 2001-2013 by country. All firm-level accounting data is obtained from SNL Financial. Tobin's q is defined as the ratio of the market value of assets over the book value of assets. The market value of assets is calculated as book value of assets minus book value of common equity plus market value of equity (number of common shares outstanding multiplied by the end of year share price). We include the following capital structure characteristics. Market leverage is measured as the ratio of total liabilities plus mezzanine items to the book value of assets. We measure the share of fixed-rate debt, secured debt and convertible debt as a proportion of total debt. We measure the share of revolving credit facilities (capacity) relative to total assets, and the share of credit facilities used as the ratio of lines of credit drawn relative to line of credit capacity. Cash and cash equivalents are measured as a proportion of the market value of assets. The control variables included in our analysis are firm size, measured as the market capitalisation of the firm (number of shares outstanding multiplied by end-of-period closing price), profitability, measured as the ratio of EBITDA to total assets, and earnings volatility, measured as the standard deviation in earnings growth over four years, scaled by average book value of assets over this period.

Within Europe, there is little cross-country variation in q-ratios, leverage, convertible debt, cash holdings and profitability. However, the share of fixed-rate debt varies significantly between a minimum of 0.38 (Germany) and a maximum of 0.74 (UK). Similarly, the share of secured debt varies between a minimum of 0.46 (Netherlands) to a maximum of 1 (Germany). In Europe, revolving credit facilities are rare by number of observations (22 in total) and credit capacity varies significantly across countries from a minimum of 0.05 of assets (Netherlands) to a maximum of 0.16 (UK). The use of these credit facilities appears to be more homogeneous, with an average of approximately 0.10 in the Netherlands as well as the UK. The largest European firms are in France (mean market value of $2.23bn). The smallest firms are in Germany ($0.29bn). Earnings volatility varies significantly between a minimum of 0.03 in Germany and a maximum of 0.14 in the UK.

Table 3 presents pairwise correlation coefficients between the variables of interest. We find a number of significant and numerically high correlations between firm quality and characteristics. We find inverse correlations between the q-ratio and leverage, the share of secured debt, the share of credit facilities drawn, cash holdings and earnings volatility, respectively. Conversely, we find positive correlations between the q-ratio and debt maturity, fixed-rate debt, revolving credit facility capacity, firm size and profitability, respectively. Moreover, we find a number of significant correlations among the firm

characteristics themselves. For instance, high leverage tends to coincide with high levels of secured debt, high shares of credit facilities drawn, high shares of UPREIT equity and earnings volatility. On the other hand, high leverage also tends to coincide with low line of credit capacity, cash holdings, FFO payout ratios, small firm size and low profitability. These correlations suggest possible interactions between the capital structure characteristics. Finally, the table generally shows levels of correlation below 0.8, alleviating concerns surrounding multicollinearity.

Table 3: Cross-correlation table for capital structure and firm characteristics, full sample

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	q-ratio	1.0000													
(2)	Market leverage	-0.4535*	1.0000												
(3)	Debt maturity	0.1032*	0.0597	1.0000											
(4)	Fixed-rate to total debt	0.1613*	0.0449	0.4709*	1.0000										
(5)	Secured debt to total debt	-0.2094*	0.3204*	-0.0269	0.0111	1.0000									
(6)	Convertible debt to total debt	0.0158	-0.0380	0.0140	0.0194	-0.2468*	1.0000								
(7)	Revolving credit facilities to total assets	0.0921*	-0.1356*	-0.2247*	-0.2795*	-0.1908*	0.0073	1.0000							
(8)	Share of credit facilities drawn	-0.1574*	0.2499*	-0.2982*	-0.3860*	-0.0214	0.0074	0.2377*	1.0000						
(9)	Cash to market value	-0.1476*	-0.1122*	-0.0002	0.0180	0.1935*	-0.0098	-0.1904*	-0.2589*	1.0000					
(10)	UPREIT to total equity	0.0448	0.2938*	-0.0338	0.0508	0.2414*	-0.1131*	-0.1174*	0.1422*	-0.0728*	1.0000				
(11)	FFO payout ratio	0.0364	-0.0875*	0.0606	0.0183	-0.1287*	0.0692*	0.0909*	0.0600	-0.1276*	-0.0719*	1.0000			
(12)	Market value of the firm ($m)	0.2831*	-0.1322*	0.0946*	0.1193*	-0.3119*	0.0336	-0.0960*	-0.1727*	-0.0743*	-0.0538*	-0.1259*	1.0000		
(13)	Profitability	0.3261*	-0.2190*	0.0933*	0.0681*	-0.1278*	0.0258	0.0624*	0.0306	-0.0298	0.0309	0.0265	0.0402	1.0000	
(14)	Earnings volatility	-0.2923*	0.0694*	-0.0879*	-0.1036*	0.1690*	-0.0482	0.0214	0.0266	0.3824*	-0.0944*	-0.0854*	-0.0729*	0.0524	1.0000

*The table presents the pairwise Pearson correlation coefficients for the capital structure and firm characteristics of the equity REITs in the sample over the period 1993-2013 (for US) and 2001-2013 (for Europe) combined. All firm-level accounting data is obtained from SNL Financial. Tobin's q is defined as the ratio of the market value of assets over the book value of assets. The market value of assets is calculated as book value of assets minus book value of common equity plus market value of equity (number of common shares outstanding multiplied by the end of year share price). We include the following capital structure characteristics. Market leverage is measured as the ratio of total liabilities plus mezzanine items to the book value of assets. Debt maturity is measured as the ratio of debt maturing in more than three years to total debt (not available for Europe). We measure the share of fixed-rate debt, secured debt and convertible debt as a proportion of total debt. We measure the share of revolving credit facilities (capacity) relative to total assets, and the share of credit facilities used as the ratio of lines of credit drawn relative to line of credit capacity. Cash and cash equivalents are measured as a proportion of the market value of assets. We measure UPREIT equity as the difference between the implied market capitalisation of the firm and its total market capitalisation relative to the total market capitalisation of the firm (not available for Europe). We further include the ratio of dividends paid out to total funds from operations (not available for Europe). The control variables included in our analysis are firm size, measured as the market capitalisation of the firm (number of shares outstanding multiplied by end-of-period closing price), profitability, measured as the ratio of EBITDA to total assets, and earnings volatility, measured as the standard deviation in earnings growth over four years, scaled by average book value of assets over this period. Significance is indicated as follows: * p<0.01.*

Empirical method

We aim to identify the capital structure characteristics that strong firms have in common. We employ an unconditional multivariate analysis to identify those combinations of capital structure characteristics that are associated with a higher value of Tobin's q. We sort all firm-year observations into quintiles ranked by Tobin's q, with quintile 1 containing the weakest (lowest q-ratio) firms and quintile 5 containing the strongest (highest q-ratio) firms. We tabulate the corresponding mean capital structure characteristics in each quintile and then test the hypothesis that these means differ significantly across the top and bottom quintiles. We conduct this analysis for all firms, and subsequently replicate it for the firms from the US and Europe separately in order to explore any systematic differences in the institutional background.

We then isolate the marginal impact of changes in individual capital structure characteristics on firm quality, *ceteris paribus*. We employ a conditional analysis of the capital structure characteristics of the sample firms. For each firm *i* in year *t*, we estimate the q-ratio as a function of the capital structure characteristics and the set of control variables. We estimate the following equation using OLS:

$$Q_{it} = a + b_1 MLev_{it} + b_2 Fix_{it} + b_3 Sec_{it} + b_4 Conv_{it} + b_5 Cash_{it} + b_6 Size_{it} + b_7 Profit_{it} + b_8 Vol_{it} + u \quad [1]$$

where *MLev* is market leverage, *Fix* is the share of fixed-rate debt, *Sec* is the share of secured debt, *Conv* is the share of convertible debt, and *Cash* is the ratio of cash holdings to assets. The control variables are *Size*, the natural logarithm of the firm market capitalisation, *Profit*, the ratio of EBITDA to total assets as a measure of profitability, and earnings volatility *Vol*. We further control for property sector effects using indicator variables. We cluster standard errors by firm (Petersen, 2009; Thompson, 2011). We replicate this estimation for European and US firms separately, and for the period of the global financial crisis (2007 to 2009) and the non-crisis years in our sample separately.

We then focus on the analysis of European firms and explore the implications of different institutional environments in the sample countries. Specifically, we create a set of interaction terms between the country indicator variables and each of the capital structure characteristics that are available for the European firms in turn. This analysis allows us to evaluate the differences in the relationships between the individual capital structure characteristics and firm value, measured as Tobin's q, across the European sample countries.

Finally, we focus on the analysis of the US firms in two aspects. First, given data available on debt maturity, UPREIT equity, line of credit capacity, share of credit facilities drawn and FFO payout ratio, we are able to include these additional dimensions of corporate financial policy into the estimation. Second, given the longer history of the data in the US, we are able to examine sub-periods during (2007-2009) and outside of the recent global financial crisis. Again, we create a set of interaction terms between the sub-period indicator variable and each of the capital structure characteristics in turn. This analysis allows us to evaluate the differences in the relationships between capital structure choices and firm value across two distinct financial capital and real estate market regimes.

4 Results

What are the capital structure characteristics that strong firms have in common?

Table 4 presents the results of the unconditional, cross-sectional multivariate analysis by quintile to identify the combinations of capital structure characteristics that are empirically associated with a higher value of Tobin's q. The top panel presents the results for all firms, the middle panel focuses on the US firms and the bottom panel focuses on the European firms.

Table 4: Capital structure characteristics by quintile

All firms

Quintile	q-ratio	Market leverage	Debt maturity	Fixed-rate to total debt	Secured debt to total debt	Convertible debt to total debt	Revolving credit facilities to total assets	Share of credit facilities drawn	Cash to market value	UPREIT to total equity	FFO payout ratio
1	0.867	0.585	0.468	0.685	0.726	0.026	0.131	0.498	0.037	0.023	0.648
2	1.055	0.544	0.526	0.760	0.750	0.020	0.132	0.389	0.035	0.084	0.674
3	1.189	0.490	0.533	0.778	0.662	0.017	0.146	0.340	0.020	0.087	0.713
4	1.340	0.421	0.555	0.770	0.591	0.028	0.153	0.341	0.017	0.075	0.743
5	1.643	0.351	0.562	0.805	0.526	0.023	0.155	0.308	0.018	0.053	0.696
Difference	0.776***	-0.234***	0.093***	0.120***	-0.200***	-0.002	0.0239*	-0.190***	-0.019***	0.030***	0.045**
t-stat	(92.07)	(-20.53)	(4.62)	(7.63)	(-8.25)	(-0.41)	(2.50)	(-6.94)	(-5.79)	(5.16)	(1.99)

US

Quintile	q-ratio	Market leverage	Debt maturity	Fixed-rate to total debt	Secured debt to total debt	Convertible debt to total debt	Revolving credit facilities to total assets	Share of credit facilities drawn	Cash to market value	UPREIT to total equity	FFO payout ratio
1	0.934	0.589	0.468	0.711	0.723	0.021	0.132	0.468	0.039	0.023	0.648
2	1.128	0.532	0.526	0.788	0.713	0.018	0.137	0.355	0.022	0.084	0.674
3	1.245	0.468	0.533	0.777	0.616	0.027	0.154	0.351	0.018	0.087	0.713
4	1.389	0.404	0.555	0.785	0.570	0.025	0.152	0.326	0.016	0.075	0.743
5	1.682	0.345	0.562	0.811	0.531	0.023	0.155	0.306	0.018	0.053	0.696
Difference	0.749***	-0.244***	0.093***	0.010***	-0.192***	0.001	0.0232**	-0.162***	-0.021***	0.030***	0.045**
t-stat	(79.36)	(-18.80)	(4.62)	(6.11)	(-7.48)	(0.25)	(2.73)	(-6.74)	(-4.62)	(5.16)	(1.99)

Europe

Quintile	q-ratio	Market leverage	Debt maturity	Fixed-rate to total debt	Secured debt to total debt	Convertible debt to total debt	Revolving credit facilities to total assets	Share of credit facilities drawn	Cash to market value	UPREIT to total equity	FFO payout ratio
1	0.776	0.605	n/a	0.649	0.695	0.024	n/a	n/a	0.035	0.000	n/a
2	0.896	0.555	n/a	0.720	0.770	0.028	0.055	0.000	0.035	0.000	n/a
3	0.962	0.554	n/a	0.713	0.809	0.027	0.049	0.000	0.034	0.000	n/a
4	1.044	0.490	n/a	0.726	0.818	0.014	0.111	0.155	0.048	0.000	n/a
5	1.263	0.402	n/a	0.657	0.592	0.020	0.178	0.211	0.029	0.000	n/a
Difference	0.487***	-0.204***	n/a	0.008	-0.103	-0.004	n/a	n/a	-0.006	n/a	n/a
t-stat	(23.92)	(-6.99)	n/a	(0.17)	(-1.50)	(-0.39)	n/a	n/a	(-0.85)	n/a	n/a

*The table presents the capital structure characteristics of the equity REITs in our sample over the period 1993-2012 by Tobin's q quintile. The top panel presents the results for all firms. The middle panel presents the results for the US firms (1993-2013). The bottom panel presents the results for the European firms (2001-2013). Each panels also shows the spread (Difference) between the mean variable values across the 5th (highest) and 1st (lowest) Tobin's q quintile alongside the corresponding t-statistic from a two-group mean-comparison test. Significance is indicated as follows: * p<0.1, ** p<0.05, *** p<0.01.*

The strongest and most robust result is a negative relationship between Tobin's q and leverage across all firms, presented in the top panel of Table 4. The strongest (highest q-ratio, quintile 5) firms on average have a leverage ratio of 0.35 whereas the weakest firms (lowest q-ratio, quintile 1) on average have a significantly higher leverage ratio of 0.59. Further, stronger firms on average have higher proportions of fixed-rate debt (0.80 versus 0.69), suggesting that the reliance on variable rate debt is a sign of weakness. Stronger firms hold lower shares of secured debt (0.53 versus 0.73), suggesting that weaker firms are required to pledge collateral when borrowing capital whereas stronger firms are able to rely on corporate creditworthiness overall (Giambona, Mello and Riddiough, 2012). Consistent with out general expectation, stronger firms further hold less cash (0.02 versus 0.04).

The analysis of the US firms (middle panel of Table 4) provides more detailed insight on dimensions of capital structure that are unavailable or small in terms of the number of observations for the European sample firms from SNL.

The focus on US REITs reveals that stronger firms have longer debt maturity (0.56 versus 0.47), consistent with the asset matching (Myers, 1977) and signalling (Diamond, 1991) theories of corporate debt maturity. Further, stronger firms have higher line of credit capacity (0.15 to 0.13 relative to total

assets) but rely less heavily on drawing on these facilities (0.31 to 0.50 of capacity drawn). Stronger firms also have more UPREIT equity (0.05 versus 0.02). Lastly, stronger firms also have a higher FFO payout ratio (0.70 versus 0.65), broadly consistent with the catering theory of payout decisions.

The analysis of the European firms (bottom panel of Table 4) reveals two additional findings. First, the European results confirm the inverse relationship between firm value and leverage established for the US firms. Second however, the inverse relationship between firm value and leverage is the only significant finding in the analysis of the European sub-sample.

This difference may be due to either one or a combination of two potential reasons. On the one hand, the differences between the top and bottom quintiles across the firm characteristics in the European sub-sample generally carry the same sign as in the US sub-sample, but they are numerically smaller. The characteristic quintiles of the European firms appear to be more homogeneous on average than the quintiles of the US firms. On the other hand, it may be the case that investors in European firms are less sensitive to variation in capital structure characteristics and penalise firms with sub-optimal capital structure characteristics less heavily. This interpretation suggests that a firm characteristic-informed optimal capital structure is less directly related to firm value in Europe than in the US. This perspective implies that there are other factors, such as the relative cost of different types of capital for example that may potentially be introduced by variation in the institutional environment, which have a stronger impact on firm value in Europe than they do in the US.

The relationship between Tobin's q and variation in individual capital structure characteristics

Table 5 presents the results of the regression analysis exploring the marginal impact of changes in individual dimensions of capital structure on the levels of Tobin's q, after controlling for a set of other potentially value-relevant firm characteristics.

Table 5: Regression results for Tobin's q and capital structure characteristics

All	(1)	(2)	(3)	(4)	(5)
VARIABLES	All	US	Europe	Non-crisis	Crisis
Market leverage	-0.766***	-0.778***	-0.281**	-0.757***	-0.790***
	(0.10)	(0.11)	(0.11)	(0.13)	(0.11)
Fixed-rate to total debt	0.126**	0.079	0.016	0.106*	0.183**
	(0.05)	(0.06)	(0.07)	(0.06)	(0.08)
Secured debt to total debt	0.049	0.087*	0.006	0.062	0.031
	(0.04)	(0.04)	(0.06)	(0.04)	(0.05)
Convertible debt	<-0.01*	<-0.01**	<0.001	<0.001	<0.001
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Cash to market value	-0.191	-0.669*	0.448	-0.538	0.675*
	(0.32)	(0.36)	(0.31)	(0.36)	(0.40)
Log of firm size	0.025**	0.041***	0.015	0.027**	0.019
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Profitability	0.734***	0.820***	0.320***	0.866***	0.515***
	(0.17)	(0.31)	(0.09)	(0.27)	(0.19)
Earnings volatility	-0.637***	-0.156	-0.493***	-0.610***	-0.901***
	(0.17)	(0.18)	(0.17)	(0.20)	(0.30)
Constant	1.096***	0.956***	0.932***	1.081***	1.108***
	(0.20)	(0.21)	(0.17)	(0.21)	(0.26)
Observations	1,759	1,538	221	1,368	391
R-squared	0.462	0.467	0.403	0.431	0.558
Sector dummies	Yes	Yes	Yes	Yes	Yes

*The table presents the regression results estimating firm-year observations of Tobin's q for the REITs in our sample to their capital structure characteristics and firm characteristic control variables over the study period. All firm-level accounting data is obtained from SNL Financial. Column (1) shows the results for all firms. Columns (2) and (3) show the results for the US and the European sub-sample, respectively. Columns (4) and (5) show the results for all firms in the non-crisis sub-period and the crisis period (2007-2009), respectively. Property sector effects are captured using indicator variables. Robust standard errors, clustered by firm, are shown in parentheses. Significance is indicated as follows: * p<0.1, ** p<0.05, *** p<0.01.*

The results support an inverse relationship between leverage and firm quality. A one standard deviation increase in leverage results in a 14 basis points drop in Tobin's q across all firms. However, the marginal effect of leverage on firm quality varies across geography and time. Leverage is penalised more heavily in the US (14 points drop) than in Europe (5 points drop). Similarly, higher leverage is penalised slightly more heavily during the crisis (15 points drop) than outside of the crisis period (14 points drop).

The results also support a positive relationship between fixed-rate debt and firm quality (3 points increase in the q-ratio for a one standard deviation increase in the share of fixed-rate debt). Our finding may reflect the reduced refinancing risk involved in utilising fixed-rate debt. We further find that higher shares of fixed-rate in the capital structure had a stronger impact on firm quality during the crisis (4 points increase) than outside the crisis (2 points increase). The recent financial crisis period saw significant restrictions in the supply of debt capital. Capital markets were characterised by increased uncertainty surrounding the evolution of interest rate. As a result, firms faced higher levels of refinancing risk, increasing the relative benefits of fixed-rate debt.

We also find that firm quality is inversely related to the share of convertible debt, but the effect is small in economic terms. Our finding is conceptually consistent with the notion that the issuance of convertible securities is a sign of weakness. Equity and straight unsecured debt issuance is expensive for the firm, so out of weakness firms with a high current cost of capital issue convertible securities, trading off a lower current rate for future convertibility. These firms are also likely to be financially constrained, restricting their ability to exploit investment opportunities and thus grow the value of the firm. However, as the use of convertible debt appears to be less prevalent in Europe, our evidence suggests that the US firms in our sample mainly drive this result.

In contrast to the unconditional multivariate analysis suggesting an inverse relationship between the share of secured debt and firm quality, our regression results for the US firms suggest that, all else being equal, an increase in secured debt is related to an increase in Tobin's q. However, there is a 39% correlation between leverage and the share of secured debt, and a strong and consistent negative relationship between leverage and firm quality. On an unconditional basis, both secured debt and leverage are separately related to lower firm quality. The conditional analysis reveals that highly levered, poorer quality firms whose capital structure exposes them to increased bankruptcy risk, may be able to mitigate the effects of leverage on measures of firm quality and continue to access debt markets by pledging collateral for debt capital.

We further find that in the US, higher cash holdings are associated with lower values of Tobin's q. Riddiough and Wu (2009) show that bank lines are a substitute for cash in REITs, and that stronger firms with higher q-ratios have less need to hold cash because they have greater untapped longer-term debt and line of credit capacity. These firms also have more confidence in being able to consistently access equity markets. Therefore, because shareholders generally value relatively higher rates of dividend payout, stronger firms comply and reduce excess cash holdings, knowing they are secure in tapping capital and liquidity going forward. This interpretation is further consistent with recent studies on liquidity and capital structure, highlighting a crucial distinction between firms being cash constrained and financially constrained (Damodaran, 2001; Campello et al., 2010; 2011). However, we also find that during the recent crisis period, cash holdings actually supported higher q-ratios for all firms, suggesting that investors take a positive view on firms being able to rely on cash reserves when external sources of funds dry up as a result of capital market turmoil.

As far as the control variables are concerned, and consistent with intuition, our findings further suggest that firms with higher Tobin's q ratios tend to be larger and more profitable with stable earnings.

Focus on Europe reveals significant differences across countries

Table 6 presents the regression results for European firms, allowing us to evaluate the differences in the relationships between the individual capital structure characteristics and firm value, measured as Tobin's q, across the European sample countries.

Table 6: Regression results for Tobin's q and capital structure characteristics in Europe

Europe	(1)	(2)	(3)	(4)	(5)
VARIABLES	Leverage	Fixed rate	Secured	Convertible	Cash
France*Leverage	1.330***				
	(0.44)				
UK*Leverage	1.746***				
	(0.29)				
Netherlands*Leverage	1.631***				
	(0.28)				
France*Fixed		0.018			
		(0.21)			
UK*Fixed		-0.119			
		(0.13)			
Netherlands*Fixed		-0.014			
		(0.19)			
UK*Secured			0.301**		
			(0.14)		
Netherlands*Secured			0.297*		
			(0.17)		
France*Convertible				<0.001	
				(0.00)	
Netherlands*Convertible				<0.001	
				(0.00)	
France*Cash					7.49
					(4.52)
UK*Cash					6.675*
					(3.59)
Netherlands*Cash					7.515**
					(3.65)
Market leverage	-2.037***	-0.355***	-0.346***	-0.383***	-0.385***
	(0.28)	(0.10)	(0.11)	(0.11)	(0.11)
Fixed-rate to total debt	-0.014	0.086	0.009	0.027	0.014
	(0.06)	(0.12)	(0.07)	(0.07)	(0.07)
Secured debt to total debt	0.051	0.021	-0.184	0.038	0.037
	(0.05)	(0.06)	(0.14)	(0.06)	(0.06)
Convertible debt	<0.001	<0.001	<0.001	<0.001	-0.000*
	(0.00)	(0.00)	(0.00)	(0.00)	0.00
Cash to market value	0.477*	0.497**	0.298	0.474*	-6.244*
	(0.25)	(0.23)	(0.23)	(0.24)	(3.58)
Log of firm size	0.007	0.009	0.004	0.01	0.009
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Profitability	0.293***	0.275***	0.257***	0.266***	0.253***
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Earnings volatility	-0.393***	-0.394***	-0.392***	-0.423***	-0.423***
	(0.12)	(0.12)	(0.12)	(0.13)	(0.12)
Constant	1.839***	0.877***	1.197***	0.888***	1.338***
	(0.17)	(0.18)	(0.23)	(0.18)	(0.27)
Observations	221	221	221	221	221
R-squared	0.484	0.467	0.517	0.462	0.466
Sector & country dummies	Yes	Yes	Yes	Yes	Yes

*The table presents the regression results estimating firm-year observations of Tobin's q for the equity REITs in Europe, taking into account cross-country differences through interaction terms between the capital structure characteristics and the country indicator variables in Columns (1) to (5), respectively. Property sector and country main effects are captured using indicator variables. Robust standard errors, clustered by firm, are shown in parentheses. The reference category is Germany. Significance is indicated as follows: * p<0.1, ** p<0.05, *** p<0.01.*

Our results continue to support the inverse relationship between leverage and firm value. However, we also find that there are significant differences in the extent to which investors penalise firms for higher levels of leverage. Our results suggest that leverage is penalised most severely by investors in Germany (38 basis points drop in q-ratio for a one standard deviation increase in leverage), followed by France (13 points drop), the Netherlands (7 points drop) and the UK (5 points drop).

We find that the coefficient of the share of secured debt in the reference country (Germany) carries a negative sign, consistent with our finding from the unconditional multivariate analysis, but the coefficient is insignificant. This finding may be driven by the small number of observation for this variable in Germany (16). By comparison however, the use of secured debt appears to be significantly positively related to firm quality in the UK and the Netherlands. France was excluded here due to multicollinearity. These findings are consistent with the interaction between firm quality, leverage and secured debt that we have observed in the full sample. Highly levered firms with lower q-ratios attempt to continue to access debt markets by pledging collateral when they borrow capital.

We find that cash holdings are generally associated with higher firm quality. However, the European sample period is significantly shorter than the US sample, and thus more heavily impacted by the effects of the recent financial crisis where cash reserves appeared to have been beneficial. In the country analysis, cash holdings appear to be associated with lower firm quality in the reference country (Germany) but the marginal effect of cash holdings is significantly positive in the UK and the Netherlands. Our finding may thus again resonate the results from the full sample that during the recent financial crisis period, cash holdings were associated with stronger firm quality as cash-rich firms were able to maintain financial flexibility when the supply of outside (debt) capital was restricted.

As for the remaining capital structure characteristics, we find that firm quality appears to be unaffected by the share of fixed-rate debt or convertible debt. In the individual European countries we study.

Focus on the US reveals few differences across market regimes

Table 7 presents the regression results for US firms. This analysis allows us to add two additional angles to our study. First, we are able to include data on debt maturity, line of credit capacity and usage, UPREIT equity, and FFO payout ratio as additional dimensions of corporate financial policy into the estimation. Second, given the longer history of the data in the US, we are able to split the sample into sub-periods during (2007-2009) and outside of the recent global financial crisis. This analysis allows us to evaluate the differences in the relationships between capital structure characteristics and firm value across financial market regimes.

Table 7: Regression results for Tobin's q and capital structure characteristics in the US

US	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Leverage	Maturity	Fixed	Secured	Convertible	Revolving	Drawn	Cash	UPREIT	FFO Payout
Leverage*Crisis	0.137									
	(0.09)									
Maturity*Crisis		-0.054								
		(0.07)								
Fixed*Crisis			-0.142							
			(0.12)							
Secured*Crisis				-0.015						
				(0.04)						
Convertible*Crisis					-0.118					
					(0.17)					
Revolving*Crisis						0.394*				
						(0.22)				
Drawn*Crisis							0.102**			
							-0.04			
Cash*Crisis								-0.612		
								(0.55)		
UPREIT*Crisis									0.194	
									(0.18)	
FFO Payout*Crisis										0.000
										0.00
Market leverage	-0.918***	-0.873***	-0.874***	-0.873***	-0.873***	-0.863***	-0.882***	-0.874***	-0.871***	-0.874***
	(0.13)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)	(0.12)
Debt maturity	0.096*	0.107**	0.099*	0.096*	0.096*	0.097*	0.097*	0.095*	0.099*	0.096*
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Fixed-rate to total debt	0.04	0.041	0.065	0.041	0.043	0.031	0.040	0.040	0.036	0.042
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Secured debt to total debt	0.171***	0.170***	0.169***	0.173***	0.170***	0.172***	0.171***	0.170***	0.169***	0.170***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Convertible debt to total debt	0.075	0.073	0.077	0.069	0.119	0.055	0.07	0.071	0.081	0.073
	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.10)	(0.11)	(0.11)	(0.11)	(0.11)
Revolving credit facilities to total assets	0.328***	0.340***	0.348***	0.338***	0.342***	0.281**	0.331***	0.336***	0.330***	0.338***
	(0.12)	(0.12)	(0.11)	(0.12)	(0.12)	(0.12)	(0.11)	(0.12)	(0.11)	(0.12)
Share of credit facilities drawn	0.010	0.010	0.009	0.010	0.010	0.006	(0.010)	0.011	0.009	0.011
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Cash to market value	-0.722**	-0.727**	-0.728**	-0.714**	-0.714**	-0.702**	-0.745**	-0.623*	-0.737**	-0.706**
	(0.32)	(0.32)	(0.32)	(0.32)	(0.32)	(0.32)	(0.32)	(0.32)	(0.32)	(0.32)
UPREIT to total equity	0.182	0.162	0.17	0.164	0.165	0.156	0.17	0.168	0.136	0.165
	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)	(0.15)
FFO payout ratio	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log of firm size	0.067***	0.067***	0.067***	0.067***	0.067***	0.068***	0.067***	0.067***	0.067***	0.067***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Profitability	2.821***	2.794***	2.787***	2.798***	2.793***	2.836***	2.801***	2.804***	2.800***	2.802***
	(0.50)	(0.49)	(0.49)	(0.49)	(0.50)	(0.50)	(0.49)	(0.50)	(0.50)	(0.49)
Earnings volatility	-0.697	-0.677	-0.654	-0.691	-0.691	-0.692	(0.655)	-0.691	-0.679	-0.694
	(0.53)	(0.53)	(0.52)	(0.53)	(0.53)	(0.52)	(0.53)	(0.53)	(0.53)	(0.53)
Constant	0.316	0.287	0.277	0.294	0.293	0.293	0.304	0.293	0.304	0.299
	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)	(0.26)
Observations	1,208	1,208	1,208	1,208	1,208	1,208	1,208	1,208	1,208	1,208
R-squared	0.565	0.565	0.565	0.564	0.564	0.566	0.566	0.565	0.565	0.564
Sector & crisis dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*The table presents the regression results estimating firm-year observations of Tobin's q for the equity REITs in the US. Column (1) shows the full results for all of the capital structure variables, including debt maturity, UPREIT equity and FFO payout ratio. Columns (2) to (10) take into account differences across capital market regimes through interaction terms between the capital structure characteristics and the financial crisis indicator variable (marking the 2007-2009 period). Property sector and crisis main effects are captured using indicator variables. Robust standard errors, clustered by firm, are shown in parentheses. The reference category is the non-crisis period. Significance is indicated as follows: * p<0.1, ** p<0.05, *** p<0.01.*

Our results support a significant inverse relationship between leverage and firm quality. Our results also support the finding of a positive marginal effect of secured debt on firm quality, reflecting the significant positive correlation between the amount and the degree of and collateralisation of REIT debt.

The focus on the US further allows us to confirm a number of additional findings from the unconditional analysis. We find a conditional positive relationship between debt maturity and firm quality, as well as

between line of credit capacity and firm quality, and we find an inverse conditional relationship between cash holdings and firm quality.

The analysis however reveals few significant differences in the relationships between capital structure characteristics and firm quality across the two sub-periods during and outside of the recent global financial crisis. The exception is the relationship between revolving credit facilities (capacity and share of facilities drawn) and firm quality. Revolving credit facilities (capacity) generally tend to be associated with stronger firm quality, as per our unconditional results. This effect appears to be reinforced in times of capital market turmoil, as evidenced in the recent global financial crisis, when those stronger firms were able to rely on previously granted credit facilities. During the crisis, we also find a positive relationship between the lines of credit drawn and firm quality. This finding may reflect that firms with internal debt capacity that could refinance by relying on previously granted lines of credit and were thus not forced to tap the external capital markets under difficult economic conditions fared better during the crisis.

5 Conclusion

In this study, we empirically evaluate the implications of corporate capital structure choices for firm quality in a sample of international real estate investment firms. We find that the strongest firms in our full sample have a number of capital structure characteristics in common: low leverage, long debt maturity, high shares of fixed-rate debt, low shares of secured debt, suggesting that they are able to access capital markets against the backdrop of the quality of the firm without having to rely on collateral to mitigate lender concerns, and low cash holdings. Overall, our findings suggest that a defensive, prudent capital structure with low leverage and one that is aimed at managing refinancing risk through mitigating underinvestment problems by matching debt and asset maturity as well as managing interest rate risk through utilising fixed-rate instruments is able to make a significant contribution to firm value.

While the nature of the relationships between capital structure characteristics and firm value is broadly consistent across the sample countries, the extent to which firm value responds to leverage in particular varies significantly, with the strongest marginal negative effect observed in Germany. This example illustrates that institutional differences across countries may significantly influence the relationships between capital structure characteristics and firm value.

As a result, managers may be able to adjust capital structure decisions to the prevailing institutional environment in order to maximise the benefits of their choices for firm value. Investors on the other hand may be able to take these institutional differences into account when evaluating the capital structure of target firms for investment purposes.

Furthermore, concerns surrounding financial flexibility, financial and liquidity constraints in corporate capital management have received considerable attention in the aftermath of the global financial crisis. Our findings suggest that the relationships between capital structure choices and firm value remained mostly unaffected by the prevailing capital market regime. The exception is the relationship between lines of credit and firm quality. Our results suggest that stronger firms were able to support refinancing in the recent crisis by drawing on previously generated lines of credit, producing a positive relationship between lines of credit (capacity and proportion used) and firm quality during the crisis years.

In summary, the most pronounced finding of our analysis is an inverse relationship between leverage and firm value. The general robustness of this finding raises the question why firms deviate from what appears to be a clear, characteristic-informed optimal leverage ratio that is associated with significantly stronger firm value. Our analysis across geographies and capital market regimes suggests two potential reasons. First, the prevailing conditions in the institutional environment of the sample firms and their potential consequences for the relative cost of different forms of capital may outweigh the effects of optimising capital structure subject to a given set of firm characteristics. Second, the prevailing conditions in the capital markets, especially with regards to the supply of debt capital, may introduce significant variation in the value of financial flexibility in terms of debt capacity and liquidity through time. In the broadest sense, our findings therefore suggest that REIT capital structure choices may be understood as reflecting the consumption and provision of liquidity in real estate capital markets,

through balancing the costs and benefits of utilising and restoring their debt capacity in order to respond to the relative cost of different forms of capital through the cycle.

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Figures and Tables

Figure 1: Evolution of sample size, number of firms by geography and year

The figure shows the evolution of the sample in terms of the number of firms by geography and year. We include all listed real estate investment firms on the SNL database that are classified as equity REITs. Firms that were formed during the study period enter the sample when they first appear on SNL. Firms that were acquired or went out of business during the sample period are included for as long as they are active on SNL and dropped when they become inactive, to avoid survivorship and selection bias. SNL coverage for the US begins in 1989, but we begin the sample period in 1993, the inception of the modern REIT era marked by the introduction of the UPREIT legislation. European coverage begins in 2001.