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US REITs capital structure determinants and financial economic crisis effects

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Abstract

Purpose – The purpose of this paper is to identify the capital structure determinants through an analysis of 74 All-Equity REITs listed in the US market from 2005 to 2014. Furthermore, the paper aims at understanding the impact of the financial economic crisis (FEC) among the identified explanatory variables.
Design/methodology/approach – A fixed effect panel regression model is performed based on Trade-off Theory (TOT) and Pecking Order Theory as a starting point to provide expectations on the relationships incurring among the identified variables.
Findings – First, while tangibility of assets and crisis evidenced a positive relationship with REITs' financial leverage, operating risk and growth opportunities variables displayed a negative relationship. Meanwhile, size and profitability did not appear to influence the capital structure. Second, it appears that the positive effects of tangibility of assets and profitability variables on US REITs' capital structure increased as a consequence of the FEC. Operating risk and growth opportunities variables slightly increased their negative relationship with US REITs' capital structure after the FEC. The TOT prevails when explaining the economic reality underlying US REITs.
Practical implications – The paper contributes to the understanding of US REITs' financing decisions within the US market. The FEC also had a substantial indirect impact on the financial leverage determinants of US REITs, the latter being nowadays more oriented to maintaining a flexible capital structure.
Originality/value – The paper provides a comprehensive view of the medium-term effect of the FEC on US REITs' capital structure.

Keywords Capital structure, REITs, Leverage, Pecking Order Theory, Financial economic crisis, Trade-off Theory

Paper type Research paper

1. Introduction

The Trade-off Theory (TOT) and the Pecking Order Theory (POT) are the most relevant theories when explaining the capital structure drivers of firms. Property investment is a capital intensive business where the capital structure has an important role. Several studies have investigated the determinants of capital structure of real estate vehicles based on these traditional theories, but the financial economic crisis (FEC) strongly changed their financing strategies.

The paper first introduces the main characteristics of both theories in order to build *ex ante* expectations on the relationships between selected variables and financing decisions of REITs Then, the paper investigates the main determinants of the capital structure for US REITS in a ten-year annual time frame ranging from 2005 to 2014 and then tracks the effects of the FEC in the years 2008-2010 to understand the changes by identifying the two different periods (2005-2009 and 2010-2014).

The following two main factors influenced the choice of specific variables to be implemented in the model: an analysis of the most relevant measures influencing real estate investment vehicles' financing decisions; and an analysis of the most relevant studies conducted during previous years with reference to the specific issue the paper aims at

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addressing. Selected variables are those which are evidenced to be the most economically and statistically significant in such research. From this perspective, the paper aims at testing their application to the US REITs market as well as the impact of the FEC in their ability to drive the financing decisions of REITs in the US market. *FINANCIAL LEVERAGE* is chosen as the dependent variable measured as total debt-to-total assets ratio at book value, similar to the loan-to-value ratio, a key measure widely used in property financing. The explanatory variables, based on the two aforementioned theories, are *PROFITABILITY*, measured as EBIT-to-total assets ratio, used to look at US REITs' ability to generate operating profit out of their investments; *TANGIBILITY OF ASSETS*, measured as tangible fixed assets-to-total assets ratio, used to track the presence of tangible fixed assets (less risky and more transparent) in US REITs' balance sheets; *OPERATING RISK*, measured as REITs' unlevered beta, used in order to look at the vehicle's inherent risk arising from its operating activities; *SIZE*, measured as the natural logarithm of total assets at book values, used to verify each REIT's relative *SIZE* and to examine whether this is a relevant driver to explain the financing decisions of real estate vehicles; *GROWTH OPPORTUNITIES*, measured as market price-to-NAV ratio, used to examine investors' forward looking expectations about a specific REITs' growth potential and their impact of REITs financing decisions. Finally, *CRISIS*, a dummy variable which is implemented in the model in order to examine whether the FEC had a direct role in driving financing decisions of US REITs and the magnitude of such impact.

Two analyses are performed based on a fixed effect panel regression model.

The first analysis is performed on 74 All-Equity REITs listed in the US market on the whole ten-year period ranging from 2005 to 2014 and aims at providing an understanding of the main drivers influencing capital structure decisions as well as examining whether the FEC had a direct impact on the financing decisions of US REITs by means of the implementation of the dummy variable *CRISIS*.

The second analysis aims at looking at the indirect effect of the FEC on US REITs financing decisions, whether relationships among variables changed and to what extent this was as a consequence of the FEC. The ten-year period is divided into two shorter periods, 2005-2009 and 2010-2014, identified as the pre-FEC period and the post-FEC period. This break in time considers the lag in time which it takes for triggered market contingencies (the FEC started in 2007-2008) to be transformed into managerial and strategic decisions.

The paper is organised as follows: in Section 2, the TOT and the POT will be analysed in order to build expectations regarding the relationships incurring between selected variables and the capital structure decisions of firms. Furthermore, in Section 3, characteristics of the fixed effects panel regression model and main variables selected are introduced. Finally, in Section 4, models are performed and findings are analysed. Specifically, the main drivers influencing REITs' capital structure are analysed in Section 4.1. Next, the indirect role of the FEC is investigated throughout Section 4.2 by means of the implementation of the before and after FEC models. Finally, results are compared against theories expectations in Section 4.3. In Section 5, the main conclusions are presented.

2. Literature review

Previous studies on the capital structure mainly refer to the TOT and POT; each theory is introduced together with its relative applicability to the REITs industry.

2.1 TOT

The TOT of capital structure, first developed by Modigliani and Miller (1958), considers a positive relationship between the market value of firms and their capital structure. However, a question is raised regarding whether a 100 per cent debt capital structure could be

considered optimal to a firm. From this perspective, a balance between benefits (i.e. diversification, tax deductibility, increased returns, etc.) and costs (i.e. bankruptcy and agency costs) should be identified when considering debt financing.

When applying the TOT provisions to the specific case of REITs, it is possible to draw the following conclusions: REITs are unique investment vehicles, being subject to investment restrictions and dividends distribution obligations in order to benefit from tax exemption. Hence, reference to benefits from tax deductibility indicated by the TOT does not find support in the case of REITs. In addition, as far as agency costs are concerned, it is acknowledged that they are very close to 0 in the case of REITs. On one hand, this is due to the fact that internal managers during the last two decades tended to replace external managers. Hence, interests tend to be aligned between managers and equity holders. On the other hand, in order to qualify an institution as REIT, managers are forced to distribute at least 90 per cent of yearly generated earnings in the form of dividends. This additional dimension acts as a strong limit to the managerial freedom over the financing strategy of REITs.

In theory, it may appear that REITs have little, if no, incentive to *FINANCIAL LEVERAGE* their investments due to their regulatory status and the characteristics of their management. However, by examining the data available concerning the REITs industry, conflicting results arise. Harrison *et al.* (2011) stated that REITs are forced by law to invest in a single asset class (real estate) and that they do not have the opportunity to diversify into other classes such as stocks or bonds. The low level of diversification is to be considered as a substantial cost of financial distress and as a consequence, greater bankruptcy costs make issuing debt securities more expensive for non-diversified firms, other things being equal. However, Harrison *et al.* (2011) found the TOT to be the most relevant theory that explains REITs' capital structure decisions. Furthermore, in contrast to the idea of debt being REITs' least preferred form of financing, Dimovski and Zabreski (2012) pointed out that the real estate market is not an integrated market and diversification may be created through the definition of different typologies and geographical locations. They argued that the real estate market shows characteristics of heterogeneity, and diversification benefits may still be achieved. Hence, looking at debt as a means to achieve diversification in a context of capital constraint, it may act to lower costs of financial distress. To conclude, according to the TOT, debt, though not benefitting from tax deductibility, may still be appealing to REITs managers as it allows them to achieve diversification for capital constrained companies.

Finally, the TOT is used in order to draw expectations on relationships occurring among capital structure determinants.

2.2 POT

According to the POT of capital structure, managerial decisions over capital structure are influenced by two main factors: information asymmetries; and contingent market conditions (Murray and Goyal, 2005).

Based on the aforementioned factors, the POT establishes a "preference order" for a firm in terms of financing instruments. Overall, management prefers internal financing to external financing and debt over equity between external financing choices (Weigl and Wittenber, 2011).

However, though the POT is applicable to many industries, there might be the risk of a lower explanatory power at a REIT level. Indeed, REITs are forced by law to distribute at least 90 per cent of their declared earnings in order to maintain the tax exempt status. This requirement acts as a strong limit to the discretion over REITs financing decisions. Both insiders and outsiders should acknowledge that, in this perspective, information asymmetries hold to a much lesser extent with reference to REITs. Moreover, the nature and the characteristics of real estate investing further squeezes the informational gap. Real estate assets are income generating assets, with most of their returns coming directly from their

ability to generate operating cash flows through lease contracts. The only residual value comes from other aspects such as human capital, growth opportunities, economies of scale, etc. Nevertheless, the POT is still considered relevant as it helps to build expectations regarding relationships incurring between capital structure determinants and REITs' financial leverage.

3. Data and methodology

The main purpose of this paper is to discover what are the main capital structure determinants of US REITs. An additional analysis is performed to understand the effects on the capital structure as a consequence of the FEC. Finally, it is empirically identified which, among the TOT and POT, better reflects and explains the capital structure decisions.

3.1 Data description

The study was based on US Equity REITs continuously listed in the period 2005-2014 whose required data were available.

Data were extracted from Bloomberg (i.e. *OPERATING RISK*), Datastream (i.e. *PROFITABILITY*, *SIZE* and *GROWTH OPPORTUNITIES*) and Orbis (i.e. *TANGIBILITY OF ASSETS*). The time interval used to build the database was annual. In order to improve the quality of the analysis, they have been checked on a line by line basis. At this stage, no REITs have been removed from the list. Furthermore, an analysis of the listing period has been carried out. Hence, the website of each institution and public available information has been analysed with the aim of getting a better understanding as regards this specific driver of the analysis. Finally, to further strengthen the meaningfulness of the constructed data set, financial statements of selected companies have been cross-checked with the aim of finding coherence between data used and actual data. In order to perform the analysis, 25 data for each variable have been randomly selected and compared with actual financial statements published by selected firms. This method is considered significant since it is a widespread methodology used by audit firms when monitoring the internal control systems of their customers.

In few cases, the investigated databases did not provide complete data with reference to specific REITs. As a consequence, 26 REITs were erased from the data set.

From the initial 115 All-Equity REITs headquartered in the USA, the sample population takes into account 74 All-Equity REITs throughout a ten-year time frame, ranging from 2005 to 2014. Total market capitalisation represented in the analysis is 480 billion dollars as of year-end 2015, this represents ca. 51.1 per cent of total market capitalisation of listed US REITs and 54.2 per cent of listed All-Equity REITs. Table I summarises the various steps conducted throughout the sample selection process.

We checked that the financial leverage variable was normally distributed over time and REITs, showing the classical bell shape. This variable shows a decreasing trend over the sample period of the analysis: REITs having an average financial leverage ratio substantially concentrated around 50 per cent, slightly decreasing after the FEC.

This was also confirmed by testing for heterogeneity across years and REITs. The former shows how, on average, the dependent variable changes across years. The average financial leverage ratio has a decreasing pattern over the years, in addition to a

Step	Requirement	*n*
(A)	All-Equity REITs listed in the US market	115
(B)	REITs from (A) listed in the period 2005-2014	−15
(C)	REITs providing all required data	−26
Final	All-Equity REITs used in the analysis	74

Table I. Sample selection process

constant confidence interval representing dispersion around the mean. Moreover, the average financial leverage ratio slightly increased up to year 2008, when the FEC was triggered. This confirms the idea that US REITs were showing a riskier capital structure in the context of economic expansion, while constantly reducing the financial leverage ratio in the period following the FEC.

Financial leverage changes across REITs and with an average ratio in a range between 45 and 55 per cent, with a low dispersion around the mean. There are a few REITs with an average ratio beyond these boundaries, and only three REITs whose average ratios are considered outliers, being substantially higher (in two cases) or considerably lower compared to other observations. However, the results evidence the fact that outliers do not play a relevant role, thus not impacting the model's significance.

3.2 Methodology

In order to explain capital structure determinants, we used *FINANCIAL LEVERAGE* as a dependent variable and we tested a set of explanatory variables based on the two main theories. This is the most meaningful variable when measuring the capital structure of firms. For the purpose of this paper, *FINANCIAL LEVERAGE* is the debt-to-total assets ratio measured at book values, as in other studies (Harrison *et al.*, 2011; Morri and Beretta, 2008). Indeed, greater importance is given to this type of ratio when considering REITs financing decisions, while the D-to-E ratio might be a proper measure when considering accounting choices and their effects. Hence, for the purpose of the analysis, the following measure for *FINANCIAL LEVERAGE* variable has been selected:

$$FINANCIAL\ \ LEVERAGE = \frac{\text{Total debt}}{\text{Total assets}}$$

A fixed effect panel regression model was created that takes into account the effect of each selected explanatory variable on the dependent variable, while controlling for other explanatory variables. As a matter of fact, a simple multivariate linear regression model could not be used since it is necessary to get rid of cross-sectional correlations created by each company being measured on a ten-year time frame:

$$\begin{aligned} FINANCIAL\ \ LEVERAGE_{i,t} = \alpha &+ \beta 1 \times PROFITABILITY_{\ i,t} \\ &+ \beta 2 \times TANGIBILITY\ \ OF\ \ ASSETS_{i,t} \\ &+ \beta 3 \times OPERATING\ \ RISK_{i,t} + \beta 4 \times SIZE_{i,t} \\ &+ \beta 5 \times GROWTH\ \ OPPORTUNITIES_{i,t} \\ &+ \beta 6 \times CRISIS_{i,t} + \varepsilon \end{aligned}$$

The study aims at not only identifying US REITs' capital structure determinants, but also to understand whether the FEC played a substantial role in the financing decisions of these vehicles, and the dummy variable *CRISIS* was added towards this aim.

The first explanatory variable used in the model is *PROFITABILITY*[1]. The EBIT-to-total assets ratio is considered as a good measure for *PROFITABILITY* variable (as in Morri and Artegiani, 2015) since it measures the capability of a firm's core and operating activities to generate profit, and it is a good approximation of the net operating income, a key metric widely used in real estate investments:

$$PROFITABILITY = \frac{\text{Earnings before interest and taxes}}{\text{Total assets}}$$

The second explanatory variable taken into consideration in the model is *TANGIBILITY OF ASSETS*. It is acknowledged that companies whose assets are mostly tangible provide

greater level of guarantees to their creditors. Indeed, tangible assets on a firm's balance sheet are more reliably measurable. Moreover, by acting as strong collaterals, tangible assets appear less risky for external investors. From this perspective, it is straightforward to select a measure summarising the weight of tangible assets in REITs' total assets since REITs are required to invest no less than 75 per cent of assets in income producing properties. Similar measures have been used by Harrison *et al.* (2011) and Morri and Beretta (2008). The tangible fixed assets/total assets ratio is selected in order to take into account the effect of the *TANGIBILITY OF ASSETS* in the capital structure of US REITs:

$$TANGIBILITY\ \ OF\ \ ASSETS = \frac{\text{Tangible fixed assets}}{\text{Total assets}}$$

As in Morri and Artegiani (2015), the unlevered beta calculated by Bloomberg was used to estimate *OPERATING RISK as* average monthly data from 1 January 2005 to 31 December 2014. The use of the unlevered beta, rather than the levered one, was preferred to show the *OPERATING RISK* only, while the latter takes into consideration also financial risk:

$$OPERATING\ \ RISK = \text{Unlevered yearly beta} = \frac{\text{Average yearly levered beta}}{\left(1+\left(\text{Debt/Equity}\right)\times\left(1-t\right)\right)}$$

It is acknowledged both theoretically (TOT and POT) and empirically (Kurshev and Strebulaev, 2005) that larger firms tend to make a greater use of debt. Total assets were identified as the more straightforward and meaningful approximation of a firm's *SIZE*; to avoid issues because of the relative magnitude compared to other variables, a natural logarithm function was used as in Morri and Beretta (2008) and Morri and Artegiani (2015):

$$SIZE = \ln(\text{Total assets at book value})$$

The ratio that best approximates the perceived *GROWTH OPPORTUNITIES* in the US real estate market is considered the price to net asset value ratio. The share price captures expectations about *GROWTH OPPORTUNITIES* in the market price of each outstanding share. Furthermore, the NAV is considered as the value of the net assets per each outstanding share. It is a widespread measure in the US market since, in contrast to the European market, it is not required to measure NAV at market values on a quarterly basis for listed REITs. As a matter of fact, US REITs measure their NAV at book values, so it is considered useful to be measured against the market price of outstanding shares in order to assess the market's perceived level of *GROWTH OPPORTUNITIES*. To conclude, based on the aforementioned reasons, the P-to-NAV ratio is considered as being substantially meaningful for the purpose of the current analysis:

$$\text{Total } NAV \text{ per share} = \frac{\text{Total assets}-\text{Net debt}-\text{Preferred equity}}{\text{Average outstanding shares of the year}}$$

then:

$$GROWTH\ OPPORTUNITIES = P/NAV = \frac{\text{Market price per share}}{NAV \text{ per share}}$$

Finally, the *CRISIS* variable is taken into consideration as a dummy variable, as follows:

- "0" if a period different from 2008-2010, thus taking into consideration the expansion period before the FEC, and the recovery period right after the FEC; and
- "1" if a period between 2008-2010, representing the period in which the FEC was triggered in the US market, with a strong impact on the real estate industry.

3.3 Expected effects of the independent variables

An analysis is conducted in order to assess the expected effect of each implemented explanatory variable on REITs' financing choices according to the TOT and POT.

Theories expectations relating relationships among explanatory variables and the US REITs *FINANCIAL LEVERAGE* variables are summarised in Table II.

Starting from *PROFITABILITY*, expectations from the theories envision contrasting relationships. The TOT considers that the more REITs are able to diversify across segments and geographical locations, the more they would benefit from diversification and lower costs of financial distress. From this perspective, the TOT expects a positive relationship between *PROFITABILITY* and REITs' financial leverage. On the other hand, the analysis of the POT provides the idea that more profitable REITs prefer to finance their investments through equity financing rather than debt financing given the preference for internal resources. Mackay and Phillips (2002) and Barclay *et al.* (2006) showed empirical results in line with expectations from the TOT, while Morri and Artegiani (2015) support predictions from the POT when analysing European REITs.

With reference to the *TANGIBILITY OF ASSETS* variable, both selected theories expect a positive relationship between REITs level of financial leverage and the presence of tangible assets on their balance sheet. Tangible assets are – by nature – more transparent and provide the possibility for the investor to better monitor managerial activities and to measure their values reliably. This, according to the TOT, would contribute to lowering the cost of financial distress and to enhance the level of debt-holders' protection in case of default. Similarly, the POT expected that tangible assets contribute to lower the level of information asymmetries, thus providing the incentive for REITs to look for external financing sources. Morri and Beretta (2008), Harrison *et al.* (2011) and Giambona *et al.* (2013) confirm the hypothesis pointed out by both theories.

When considering the relationship between REITs' *OPERATING RISK* and their level of financial leverage, both theories consider a negative relationship among these two variables. According to TOT expectations, REITs whose operating risk is higher show, in turn, a higher probability of bankruptcy and higher cost of debt which acts to prevent them from using external resources to finance their investments. The POT considers instead operating risk as the greatest source of information asymmetries, which in turn provides the incentive for REITs managers to look for internal financing rather than returning to external sources of capital. Ooi (1999), Newell (2006), Giambona *et al.* (2008), Morri and Beretta (2008) and Chikolwa (2009) confirmed the theories' hypotheses, demonstrating that REITs showing a lower level of risk benefit from sourcing cheaper funds. However, opposite results have been found by Jakobsen and Olsson (2015) and Marts and Elayan (1990) in their analysis of Mortgage REITs.

Conflicting results arise when considering theories expectations with reference to the relationship between REITs' size and their level of debt financing. According to the TOT, a positive relationship exists between REITs' size and their level of financial leverage, since larger size REITs enjoy greater opportunities for diversification which in turn provide lower volatility of their cash flows and lowers their inherent risk as well as their costs of financial

Table II.
Theories expectations on relationships among variables

Identified variable	TOT	POT
Profitability	Positive	Negative
Tangibility of assets	Positive	Positive
Growth opportunities	Negative	Mixed
Size	Positive	Mixed
Risk	Negative	Negative

distress. In contrast, the POT provides mixed results when looking at such relationship. On the one hand, larger firms tend to benefit from greater interests and monitoring activities from stakeholders. This would, in turn, act to lower information asymmetries between internal and external players as well as the cost of issuing equity securities. On the other hand, extant literature points out that, regardless of the security type, *SIZE* should widen firms' ability to access capital markets and issue financial securities given their ability to benefit from lower financing costs. Rajan and Zingales (1995), Booth *et al.* (2001), Ariff *et al.* (2008), Harrison *et al.* (2011) and Jakobsen and Olsson (2015) empirically confirmed predictions from the TOT.

Finally, conflicting results are expected from the analysed theories when considering the role of the *GROWTH OPPORTUNITIES* variable on REITs' financing choices. The TOT expects a negative relationship between these two variables since managers are less likely to commit money on investments showing characteristics of high risk, high volatility, and not being focused on the specific firm's core business in periods of higher growth opportunities. On the other hand, the POT provides mixed results. Higher growth opportunities may not be fully understood by external investors, and they would be considered as an additional risk factor widening information asymmetries, thus preventing REITs from raising debt capital in order to finance their investments during periods of high growth opportunities. In contrast, this idea may hold to a lesser extent when referring to companies that are, by nature, short of internal financing (REITs). Indeed, when firms' retained earnings are much smaller in comparison to the *SIZE* of their investments, then they are forced to access capital markets in order to raise funds and to fully exploit market growth opportunities. The second case would imply a positive relationship between *GROWTH OPPORTUNITIES* and REITs' level of financial leverage. To conclude, it is not clear how the POT addresses the *GROWTH OPPORTUNITIES* variable, as it most likely depends on the specific characteristics of each market. Most studies conducted on this theme have so far showed that a negative relationship occurs between REITs' financial leverage and market *GROWTH OPPORTUNITIES*. For instance, Barclay *et al.* (2006), Ariff *et al.* (2008) and Harrison *et al.* (2011) found results in line with the TOT.

4. Results and findings

Throughout this section, main findings are introduced and analysed. First, in Section 4.1 capital structure determinants influencing US REITs' level of financial leverage are analysed over the ten-year time period ranging from 2005 to 2014. During the first analysis, the effect of most relevant drivers of financing decisions on US REITs level of financial leverage is investigated as well as the direct effect of the FEC on US REITs' capital structure. Second, findings from the first model are compared against expectations from the TOT and the POT in Section 4.2. Finally, in order to deepen the understanding of the effect of the FEC on US REITs' financing decisions, an additional analysis is performed in Section 4.2. Here, the indirect effect of the FEC on US REITs' level of financial leverage is tested. The goal of the analysis is to gain an understanding of whether, and to what extent, the FEC changed relationship incurring among variables, thus indirectly impacting US REITs' financing decisions.

4.1 The whole period

A fixed effect panel regression model[2] was implemented on the sample for the whole period from 2005 to 2014 (Table III).

Different tests have been carried out in order to confirm the significance of the model. The fixed effect model has been first tested for "poolability", thus pretending there is independence among observations, by means of a pool OLS regression method. The OLS model has been tested against the fixed effect panel regression model through the pF test.

Table III.
Fixed effects model estimates for REITs in the USA – sample period (2005-2014)

Balanced panel: n = 74, T = 10, N = 740 Variable	Estimate	Robust SE	*t*-value	Pr(> |*t*|)	Statistical significance
Profitability	0.094	0.202	0.47	0.640	
Tangibility	0.261	0.053	4.84	0.000	***
Op. Risk	(0.310)	0,032	(9.34)	0,000	***
ln(Size)	(0.020)	0,110	(1.75)	0,080	
Growth opp.	(0.002)	0,000	(2.72)	0,006	**
Crisis	0.122	0.005	2.09	0.036	*
Total sum of squares	3.163				
Multiple R^2	0.428				
Adjusted R^2	0.382				
F-statistic	82.44	on 6 and 660 df	*p*-value	0.000	

Notes: *Statistically significant as $0.01 \leqslant p\text{-value} < 0.05$; **robust significance if $0.001 \leqslant p\text{-value} < 0.01$; ***extremely significant if $p\text{-value} < 0.001$

The latter confirmed ($p < 0.05$) that the fixed effects model is a better choice for the purpose of the analysis. The Hausman test confirmed that the fixed effect model is to be considered more appropriate than the random effect model given the characteristics of the population. Finally, the fixed effects model has been tested for heteroscedasticity, showing the presence of heteroscedasticity. Hence, in order to get rid of this issue affecting the quality of the model, a robust covariance matrix has been used. Finally, looking at the *F*-statistic, the null hypothesis of no effect of each explanatory variable being tested on the dependent variable has been rejected (p-value < 0.05). In conclusion, the fixed effect panel regression model being tested is to be considered appropriate. The same hypotheses and tests have been performed in the case of the other models shown in the following paragraph, with the same conclusions being drawn.

The multiple R^2 value (0.38) confirmed the ability of the fixed effects model to explain the empirical cause-effect relationships incurring among variables.

Overall, findings show that *TANGIBILITY OF ASSETS, OPERATING RISK, GROWTH OPPORTUNITIES and CRISIS* are most relevant variables influencing US REITs financing decisions throughout the ten-year time frame identified. While *TANGIBILITY OF ASSETS* and *CRISIS* variables show a positive relationship with US REITs level of financial leverage, *OPERATING RISK* and *GROWTH OPPORTUNITIES* variables are found to negatively influence US REITs level of financial leverage during the investigated period.

Specifically, the model evidences that *PROFITABILITY* does not have a substantial impact on the capital structure decisions of US REITs. At a first glance, the positive relationship means that more profitable REITs tend to take advantage of their capability of making profits by either distributing earnings or retaining earnings for future periods, while taking debt to finance new investments. This effect is in line with the expectations of the TOT, while being in contrast to the POT. However, because of its low-statistical significance, *PROFITABILITY* is not a relevant explanatory variable and this finding is unexpected from two perspectives: the 90 per cent dividends distribution obligation forces REITs to distribute their earnings, thus leading to retained earnings being low in percentage terms, hence, the level of *PROFITABILITY* might have been expected to play a relevant role in US REITs' capital structure; though not statistically significant, the direction of the relationship might have been expected to be negative, rather than the positive one evidence instead.

The underlying reason for this is that REITs are tax transparent vehicles, which do not benefit from tax deduction and are not incentivised to take debt in order to lower tax expenditures. As a conclusion, REITs investors are looking for transparent vehicles which provide constant real estate income returns: in some cases, REITs might be incentivised to

pay out their earnings, and increase the level of debt (at a low cost given the good level of profitability) to finance new investments. Moreover, the decision to increase debt for more profitable REITs might be driven by the willingness to lower the WACC, thus further increasing final equity return. As a matter of fact, more profitable REITs enjoy a lower cost of debt allowing them to gather additional financial resources at a lower cost as compared to equity financing. In addition, profitable REITs might find the incentive to diversify their property portfolio by using additional debt: this reduces the costs of financial distress because of an increased diversification, in line with Dimovski and Zabreski (2012), who concluded that REITs are incentivised to take debt thanks to the opportunity to diversify their investments, thus lowering costs of financial distress. The same cannot apply to non-profitable REITs, which are penalised for a higher cost of debt. Findings differ from previous studies that found a negative and significant effect of profitability on REITs' level of financial leverage: among these, Jakobsen and Olsson (2015) found a considerably relevant role of profitability in determining the capital structure decisions of REITs in the European market.

The findings confirm the expected positive relationship of *TANGIBILITY OF ASSETS* since REITs with a greater percentage will in turn be able to bear a greater level of financial leverage, mainly due to their lower perceived riskiness because of their use as a secured collateral. Moreover, it is worth mentioning that the magnitude of such impact is relatively high and significant. These findings are in line with Morri and Beretta (2008), and Harrison *et al.* (2011) in their analyses over the capital structure of US REITs. Moreover, results confirm findings provided by Giambona *et al.* (2013) according to which a positive correlation between financial leverage and real estate collateral is shown, which increases when looking at "credit constrained" companies as REITs.

As expected from both the theories, *OPERATING RISK* has a negative strong impact with statistical significance and it is one of the most relevant variables affecting the capital structure. These findings are in line with several previous studies: Ooi (1999), Morri and Beretta (2008), Giambona *et al.* (2008), Newell and Peng (2009) and Chikolwa (2009) according to which REITs showing a lower level of risk can raise cheaper capital. Nevertheless, a few differences arise: Morri and Artegiani (2015) on European REITS, as well as Dimovski and Zabreski (2012) on Australian REITs found that *OPERATING RISK* is not a determinant variable influencing the capital structure choices of European REITs; moreover, Jakobsen and Olsson (2015) found a positive relationship in their recent study on European REITs.

According to the TOT, *SIZE* is expected to have a positive relationship, while mixed evidence comes from the POT. The sign is negative but not statistically significant, hence the variable is not a crucial determinant of the capital structure of US REITs. This may be due to the fact that size matters when referring to low/medium size REITs, while its relevance is lower for larger REITs, as in the US market (at the end of 2014 the average market capitalisation was $7 billion), where they are already large enough to have efficient access to the public debt market. The findings are in contrast to other studies: Harrison *et al.* (2011), Booth *et al.* (2001), Ariff *et al.* (2008) and Chikolwa (2009) found that size positively and consistently drives the capital structure of REITs, and in one case it was considered as the most significant driver of the capital structure of European REITs (Jakobsen and Olsson, 2015), where the average market capitalisation is lower.

GROWTH OPPORTUNITIES ex ante expectations provide mixed results according to the different theories. The empirical result, a negative sign in line with the TOT and with other studies (Ariff *et al.*, 2008; Chikolwa, 2009; Harrison *et al.*, 2011; Niskanen and Flakenbach, 2012), confirms that it is a relevant variable driving the capital structure of REITs in the US market. REITs prefer to maintain a flexible capital structure to be able to raise external funds when needed.

CRISIS played a role in influencing the capital structure of US REITs. It is known that the FEC affecting the USA from 2008 to 2010 heavily hampered the ability of the real estate

market to continue its run to all-times peaks. This was mainly due to the subprime crisis, which substantially impacted the value of underlying real estate property assets. Expectations establish the idea that a lower value of firm assets leads to a higher degree of *FINANCIAL LEVERAGE*, other things being equal. The findings, with a positive coefficient of 0.12, confirm this idea: during years of financial crisis, on average, US REITs' level of financial leverage increased by 0.12. Moreover, it is worth noting the *p*-value test evidencing that the *CRISIS* variable is statistically significant at a 5 per cent confidence level. Findings evidenced a strong impact of the subprime crisis on US REITs, acting to increase their level of financial leverage.

In the following section, an additional analysis is performed in order to understand whether the financial turmoil, in addition to increasing US REITs' level of financial leverage, also impacted relationships incurring among identified variables.

4.2 The effects of the FEC on US REITs' capital structure determinants

The same analysis is now carried out on the two sub-periods to investigate whether, and to which extent, the FEC changed the capital structure determinants:

(1) 2005-2009: the period of expansion before the triggering of the FEC which nevertheless includes also the period immediately following the FEC. This is mainly due to the fact that financing strategies take time to adapt to the new market contingencies and are not immediately implemented.

(2) 2010-2014: the period following the FEC. After a few years of economic recession, REITs had time to re-design their capital structures so that they were more responsive to newly established relationships between the determinants and their financing strategies.

The choice to look at the FEC's indirect effect on US REITs' financing decisions through the division of the ten-year period in two shorter periods is mainly due to the following reasons: previous studies (as in Morri and Artegiani, 2015) divide into two periods of analysis to examine the effects of the FEC on the specific issue they want to represent; a willingness to increase as much as possible the reliability of the analysis by drawing two longer periods (vs three shorter periods) so as to catch the real and "normalised" effect of explanatory variables of the dependent variables during the analysed period; and selected explanatory variables in most cases are measured at book values, which do not immediately react to market contingencies as they trigger. Instead, they usually need a lag in time in order for market contingencies to show up in REITs' balance sheets and to be transformed into the strategic and financing decisions of REITs. From this perspective, it is acknowledged that the FEC triggered in the USA by the end of 2007 showed its effects up to circa 2010. However, it has also been decided to include within this first period the years 2008 and 2009. This is mainly due to the fact that capital structure adjustments did not take place immediately once the FEC started and their effect is postponed in the future.

Results are expected to be in line with those for the whole period. Tables IV and V summarise the two models.

The adjusted R^2 is 0.14 in the before financial economic crisis (BFEC) model, and circa 0.52 in the post financial economic crisis (PFEC) model. The first model shows a lower adjusted R^2, but is still satisfactory. Hence, it is possible to confirm that both models show a significant capability to explain the economic reality that they purport to represent. Moreover, the *F*-statistic test carried out rejects the null hypothesis that none of the explanatory variables have an impact on the dependent variable. From this perspective, the *p*-value, being lower than 0.05, confirms the ability of both models to capture relationships among explanatory variables and the dependent variable. As a consequence,

it is possible to validate both models and to start analysing the underlying economic significance of the findings.

Overall, findings highlight that some variables substantially change their impact as a consequence of the FEC. *PROFITABILITY* and *TANGIBILITY OF ASSETS* variables shift from being non-significant variables to being relevant for US REITs financing decision in the PFEC period. Moreover, *OPERATING RISK* and *GROWTH OPPORTUNITIES* strengthen their role in the PFEC period, since their relationships with US REITs financing decisions enhance in the period following the FEC. Looking at the specific effect of each explanatory variable, in the BFEC period, *PROFITABILITY* does not have an impact on the capital structure decisions of US REITs. As a matter of fact, it is found to be statistically insignificant, thus not influencing in a significant manner the capital structure. The β coefficient, though not explaining a relevant role, is positive at circa 0.08. Substantially different results are provided by the PFEC model, considering effects in the time period 2010-2014. As a matter of fact, *PROFITABILITY* is now significant and has a positive relationship. Moreover, the β coefficient in the PFEC model is positive at ca. 0.44, substantially increased as compared to the BFEC model. This means that REITs started taking into consideration *PROFITABILITY* as a relevant driver of their financing decisions, and that more profitable REITs, on average, tend to benefit from lower cost of debt applied to wealthy and healthy firms, thus benefitting from lower WACC. This finding is in contrast with the expectations of the POT, while in line with the TOT. Contingencies might play a relevant role when trying to explain its economic meaning. As a matter of fact, the

Balanced panel: n = 74, T = 5, N = 370

Variable	Estimate	Robust SE	*t*-value	Pr(> |*t*|)	Statistical significance
Profitability	0.084	0.290	0.29	0.771	
Tangibility	0.151	0.116	1.30	0.193	
Op. risk	(0.191)	0.052	(3.65)	0.000	***
ln(Size)	0.032	0.018	1.80	0.071	
Growth opp.	(0.0002)	0.000	(3.58)	0.000	***
Total sum of squares	0.948				
Multiple R^2	0.181				
Adjusted R^2	0.142				
F-statistic	12.913	on 5 and 291 df	*p*-value	0.000	

Note: ***Extremely significant if *p*-value < 0.001

Table IV.
Fixed effect model for REITs in the USA – before the financial economic crisis period (2005-2009)

Balanced panel: n = 74, T = 5, N = 370

Variable	Estimate	Robust SE	*t*-value	Pr(> |*t*|)	Statistical significance
Profitability	0.441	0.204	2.15	0.031	*
Tangibility	0.117	0.058	2.02	0.004	**
Op. risk	(0.587)	0.050	(11.52)	0.000	***
ln(Size)	(0.011)	0.014	(0.81)	0.415	
Growth opp.	(0.020)	0.000	(3,40)	0.000	***
Total sum of squares	0.991				
Multiple R^2	0.668				
Adjusted R^2	0.525				
F-statistic	117.12	on 5 and 291 df	*p*-value	0.000	

Notes: *Statistically significant as $0.01 \leqslant p\text{-value} < 0.05$; **robust significance if $0.001 \leqslant p\text{-value} < 0.01$; ***extremely significant if *p*-value < 0.001

Table V.
Fixed effect model for REITs in the USA – after the financial economic crisis period (2010-2014)

expansionary monetary policy "Quantitative Easing" implemented by the FED contributed to substantially lower the cost of debt. In a context in which profitable firms may benefit from a lower cost of financing, profitable REITs might have increased their incentive to use debt financing rather than equity financing, the latter being more expensive anyway. Moreover, in view of increasing the level of diversification, the context of expansionary monetary policy might have provided an incentive to profitable REITs to take debt in order to improve their diversification. *PROFITABILITY* has become a relevant driver for REITs financing decisions as a consequence of the FEC. Moreover, the direction of the relationship is positive, meaning that more profitable REITs, on average, enjoy a greater amount of debt rather than taking additional equity, which is more expensive and acts to lower the level of profitability. This is to be considered a crucial finding since it points out that the FEC had a considerable impact on the willingness of REITs to finance their investments through debt given a certain level of profitability.

TANGIBILITY OF ASSETS variable, in the BFEC period, has a positive relationship, however, as was the case for *PROFITABILITY*, it is not statistically significant. Hence, in the BFEC period it does not play a crucial role in driving the financing decisions of US REITs. The β coefficient in the model relating to the PFEC period, though not being statistically significant, is positive at ca. 0.15: it is possible to point out that substantial changes take place in the relationship between *TANGIBILITY OF ASSETS* and the capital structure of REITs as a consequence of the FEC. While in both model the sign and the magnitude of the relationship are the same, in the period PFEC the statistical significance is at a 1 per cent confidence level. The FEC, in addition to having a strong impact on the real estate market, substantially affected financial markets and debt availability. Tangible assets, though being less liquid, tend to be more stable in terms of valuation and cash flows, thus leading to a lower level of risk beard by capital providers. Moreover, real estate assets, by mean of mortgage financing, are good collateral for both banks and public debt market investors. The results evidence the fact that the FEC increased considerably the positive relevance of the *TANGIBILITY OF ASSETS* variable in driving US REITs' financing decisions: from this perspective, in the PFEC period, it is likely that REITs with a higher level of tangible assets could increase the level of financial leverage.

A negative relationship is evidenced by *OPERATING RISK* (ca. −0.19), meaning that will bear a higher cost of debt. This in turn lowers the incentive to finance investments through debt. It could be argued that, because REITs are forced to invest in properties, then the *OPERATING RISK* should be similar or equal in all cases, so from this perspective it should not be represented as a driver impacting the financing decisions of REITs. However, this is not in line with reality since it is acknowledged that the real estate market is a segmented, rather than an integrated, market (Dimovski and Zabreski, 2012): different categories of properties show a wide range of differences in term of yields, rent levels, investment horizons, and perceived risk. As a consequence, the *OPERATING RISK* variable should still be considered an important driver of REITs financing decisions, since different levels of risk arise according to the specific investment focus of each vehicle.

The effect of the *OPERATING RISK* variable slightly changes as a consequence of the FEC. At first glance, the BFEC model evidences again a negative, substantially high and statistically significant relationship among these two variables. However, the β coefficient is ca. −0.59 in the PFEC model, being substantially higher as compared to the one showed in the BFEC model. This can be interpreted in a significant manner: the FEC contributed to enhance the propensity or need of riskier REITs not to finance their investments through debt, while looking for alternative sources of capital, or giving up the possibility to invest. Firms showing a higher level of risk underlying their business will tend to bear a higher cost of debt as they are likely to be penalised by the market. Riskier REITs will in turn have the incentive to look for alternative sources of capital other than debt. This sentiment increased

in the PFEC period: while in the BFEC period, the economic expansion contributed to lower the risk perception, the opposite took place later. To conclude, the *OPERATING RISK* variable remains among the most relevant drivers of US REITs' financing decisions throughout the whole sample period, as well as in the two sub-samples identified. However, it appears that after the FEC an increased role is played by the *OPERATING RISK* variable on REITs' financing decisions, due to the nature and the intrinsic characteristics of REITs, the latter considerably increasing their concern for operating risk as a consequence of the FEC. This effect, though being interesting from an economic perspective, nevertheless decreases in importance from a statistical standpoint as compared to those evidenced by the *PROFITABILITY* and *TANGIBILITY OF ASSETS* variables.

The BFEC model evidences a positive (0.32) but not statistically significant impact of *SIZE* on the capital structure decisions of REITs. This finding is evidence for the fact that in the US, larger REITs do not tend to enjoy a great advantage in their ability to finance investments through debt as compared to smaller ones. When referring to the after PFEC model, it is clear that the relationship among *SIZE* and the capital structure choices of REITs changes direction as a consequence of the financial crisis. However, it remains statistically insignificant. This may be because REITs tend to be, on average, medium/large size companies, with a low presence of small/medium size REITs, with the size not being an issue when making financing decisions. It is possible to conclude that *SIZE* does not affect the capital structure decisions of REITs in the US, and that the FEC did not change this relationship.

In the whole period model there is a negative and statistically significant relationship of *GROWTH OPPORTUNITIES* variable in driving financing decisions of US REITs. In the BFEC period, the relationship is still negative, while in the PFEC period, the magnitude of the relationship, as a consequence of the FEC, slightly increases in absolute terms, though still being close to 0. This might be interpreted as an acknowledgement of REITs managers' ability or need to maintain an even more flexible financial structure during periods of high growth opportunities. These are linked with higher risk, higher information asymmetries and higher volatility. Hence, during periods of high growth opportunities, REITs prefer to finance investments with equity rather than debt. This allows them to maintain a flexible capital structure in view of periods of lower growth opportunities. The negative and significant relationship suggests the idea that US REITs, on average, prefer to give up the opportunity to use debt when growth potentials are perceived as being high. In doing so, they are able to maintain the required flexibility allowing them to prefer debt when growth opportunities will be lower. This effect slightly increased as a consequence of the FEC, with REITs appearing to have an even stronger incentive not to finance investments through debt in periods of high growth opportunities.

Findings are in line with results evidenced by Harrison *et al.* (2011), but in contrast with the idea that the real estate market is characterised by "temporary windows" (Morri and Artegiani, 2015) according to which there may be an incentive for REITs to take debt during periods of higher perceived growth opportunities.

To conclude, findings highlight that some variables substantially change their impact as a consequence of the FEC. On the one hand, the most relevant changes arise after the FEC in respect to variables significance. As a matter of fact, *TANGIBILITY OF ASSETS* shifts from being a non-significant variable to being a substantially significant variable, thus demonstrating that a larger number of US REITs starts taking into consideration the *TANGIBILITY OF ASSETS* driver when making financing decisions after the FEC; perhaps debt financiers are more willing to provide capital to REITs with better collateral assets to secure. Moreover, *PROFITABILITY* increases its role in determining the financing structure of US REITs. It acts to increase the ability of REITs to access the debt market, while less profitable REITs tend to be unable to benefit from this capital. On the other hand,

though being less relevant from a statistical standpoint, changes take place in the magnitude of relationships. *OPERATING RISK* and *GROWTH OPPORTUNITIES* increased in their effect on financing decisions of US REITs. Finally, *SIZE* is again not found to be a relevant driver of the capital structure of US REITs, both before and after the FEC. This is probably due to US REITs being characterised by average medium/large size.

Overall, the FEC is found to play a considerable role on US REITs financing decisions. As a matter of fact, they are currently more oriented to maintain a flexible capital structure, which represents nowadays a crucial driver for competition, characterising US REITs after the FEC.

4.3 Findings on financial theories on capital structure

Most findings set out by the whole period model are in line with expectations established by the TOT.

TANGIBILITY OF ASSETS and *PROFITABILITY* both envision positive relationships. However, empirical findings in the whole sample period do not provide evidence of a strong relationship of *PROFITABILITY*. Nevertheless, by looking at the PFEC model at Section 4.2, *PROFITABILITY* starts to be a crucial determinant of US REITs' capital structure as a consequence of the FEC. Furthermore, the model and the TOT agree on the idea of a negative and significant relationship occurring between *GROWTH OPPORTUNITIES* and *OPERATING RISK* variables. On the other hand, a surprising conclusion from the comparison between findings and the TOT expectations is related to the effect of the *SIZE* variable: according to the TOT, larger firms tend to show higher financial leverage, as they can benefit from being more profitable and safe in terms of stability of cash flows. However, findings demonstrated differences from two specific standpoints: the *SIZE* variable is not considered a relevant capital structure determinant for REITs in the US market; and the relationship with *SIZE*, despite being not significant, is negative. To conclude, the comparison between findings and the TOT expectations leads to, in most cases, aligned results. Two main differences arise in the context of this analysis: the *PROFITABILITY* variable in the model is in line with what has been stated by the TOT, but results highlight that its role is not considered relevant during the whole sample period, while it starts to play a relevant role in the PFEC period. In addition, the *SIZE* variable is empirically demonstrated to not have a relevant relationship. Findings are often not in line with expectations of the POT: more profitable companies should dispose of the necessary retained earnings in order to carry out investments. Hence, assuming their preference for internal financing, they will be able to enjoy a lower level of financial leverage. From this perspective, though *PROFITABILITY* is not statistically significant, empirical evidence is not in line with the POT. Moreover, given the high statistical significance of *PROFITABILITY* during the post-FEC period, the contrast between empirical results and the POT is, in this context, even more enhanced. This may also be affected by REITs' dividend pay-out constraints.

On the other hand, findings and the POT expectations are aligned with reference to *OPERATING RISK* and *TANGIBILITY OF ASSETS*. Their effects on the capital structure of companies are based on the role that information asymmetries play when making investment decisions. The more one variable increases the level of information asymmetries, the more it will negatively influence the capital structure decisions of firms, as is the case of the *OPERATING RISK* variable. On the other hand, as *TANGIBILITY OF ASSETS* acts to lower the level of information asymmetries, it was expected and empirically found to positively affect the financing choices of companies.

Additional differences arise with *GROWTH OPPORTUNITIES* and *SIZE* variables. On the one hand, findings evidence that *SIZE* is not statistically significant, in contrast with the POT. On the other hand, *GROWTH OPPORTUNITIES* are found to have a negative

and statistically significant relationship with US REITs' financial leverage. From this perspective, the non-clear position of the POT, in addition to differences arising with respect to the *PROFITABILITY* variable, might play a relevant role when analysing which, among the two introduced theories, better explains the findings provided by the fixed effects model.

To conclude, the POT is in line with empirical findings in the case of *TANGIBILITY OF ASSETS* and *OPERATING RISK*, while a non-clear relationship is expected in the case of *GROWTH OPPORTUNITIES* (negative relationship and statistically significant) and *SIZE* (negative and not statistically significant). Moreover, *PROFITABILITY* was expected to play a relevant and negative effect on the capital structure of firms by the POT. On the contrary, a positive and non-relevant relationship has been identified by the model, with increasing relevance as a consequence of the FEC, further contrasting with the POT expectations.

The comparison conducted between the TOT, POT and empirical findings helped to clarify which theories better reflects US REITs' empirical evidence. Findings from Harrison *et al.* (2011) support the TOT, while failing to support the POT. Findings provided by the current paper evidence a greater ability of the TOT when referring to capital structure decisions of REITs. The model demonstrates that *TANGIBILITY OF ASSETS*, *OPERATING RISK* and *GROWTH OPPORTUNITIES* are the most significant variables taken into consideration by REITs when making financing decisions. Their direction and meaningfulness is in line with the expectations of the TOT. On the other hand, the POT establishes a non-clear relationship between *GROWTH OPPORTUNITIES* and the financing choices of firms. Moreover, though not being statistically significant, a non-clear relationship is expected with reference to the *SIZE* variable and an opposite relationship is expected as regards *PROFITABILITY*, the latter being a significant variable in the period following the FEC. In addition to that, it is possible to conclude that the TOT better explains relationships occurring between US REITs' capital structure determinants and their financial leverage financing strategies.

5. Conclusion

This paper analysed, from different perspectives, the most relevant drivers of US REITs' capital structure and the FEC impact. During the period 2005-2014, the most relevant variables have been *OPERATING RISK, TANGIBILITY OF ASSETS, GROWTH OPPORTUNITIES* and *CRISIS,* in order of relevance. While *TANGIBILITY OF ASSETS* and *CRISIS* demonstrated a positive relationship with US REITs' level of financial leverage, for *OPERATING RISK* and *GROWTH OPPORTUNITIES* variables the sign was negative. The other selected variables, namely *SIZE* and *PROFITABILITY*, did not appear to have a strong influence.

OPERATING RISK has a negative and significant relationship in line with previous studies, confirming that REITs showing a lower level of risk benefit from the possibility of raising cheaper funds. REITs with a greater percentage of tangible fixed assets (*TANGIBILITY OF ASSETS*) are able to bear a greater level of financial leverage, mainly due to their lower perceived riskiness because of their use as a secured collateral. *OPERATING RISK* has a negative strong impact in line with previous studies, since a lower level of risk allows them to raise cheaper capital. *SIZE* is not statistically significant, possibly due to the fact that it matters when referring to low/medium size REITs, while its relevance is lower for larger REITs, as in the US market, where they are already large enough to have efficient access to the public debt market. The *GROWTH OPPORTUNITIES* relationship is negative, in line with the TOT and with other studies, confirming that it is a relevant variable driving the capital structure of REITs, that prefer to maintain the flexibility to be able to raise external funds when needed.

The FEC affecting the USA from 2008 to 2010 heavily influenced the capital structure, as confirmed by the positive coefficient of CRISIS, with US REITs that increased the use of debt.

The FEC had a strong impact on the capital structure of US REITs, the latter increasing their level of leverage during that period. Findings highlight that some variables substantially changed their impact as a consequence of the FEC.

In the BFEC period, *PROFITABILITY* does not have an impact on the capital structure decisions of US REITs, while in the PFEC period, REITs started taking into consideration *PROFITABILITY* as a relevant driver of their financing decisions, with more profitable REITs tending to benefit from the lower cost of debt applied to wealthy and healthy firms. The *TANGIBILITY OF ASSETS* variable, in the BFEC period, has a positive relationship but is statistically insignificant, meaning it does not have a crucial role in driving financing decisions; in the PFEC period there is a substantial change resulting in statistical significance. Real estate assets are good collateral for debt investors and this has become more important in a period where lenders have become more selective. *OPERATING RISK* slightly changes as a consequence of the FEC, with a higher coefficient compared to the BFEC result since the FEC contributed to enhance the propensity or need of riskier REITs to not finance their investments through debt, while looking for alternative sources of capital. In the PFEC period the relationship among *SIZE* and capital structure choices of REITs changes, but is still statistically insignificant, confirming the idea that, being REITs for average medium/large size companies, they can easily have access to the debt market without additional benefit for a larger size. In the PFEC period, the magnitude of the relationship of *GROWTH OPPORTUNITIES* slightly increases, though being still close to 0, confirming the REITs managers' ability or need to maintain an even more flexible financial structure during periods of high growth opportunities.

Overall, the FEC is found to play a considerable role on US REITs' financing decisions; they are currently more oriented to maintain a flexible capital structure, which represents nowadays a crucial driver for competition.

Finally, the findings, though acknowledging the ability of the POT to explain REITs' financing decisions, nevertheless evidence a greater ability of the TOT when referring to the capital structure decisions of REITs. First of all, it predicts a negative effect of *GROWTH OPPORTUNITIES* on leverage decisions of firms, while the POT does not provide a clear relationship on this theme. Moreover, *PROFITABILITY* being significant starting from the period following the FEC, the positive relationship evidenced between this variable and US REITs' financial leverage further strengthen the predictions of the TOT.

Notes

1. The main aim was to use the funds-from-operations (FFO)/total assets ratio, being the most relevant measure of profitability in the REITs market. Due to lack of data, it was necessary to use a different indicator of profitability.
2. The statistical software being used is "R".

References

Ariff, M., Taufuq, H. and Shamser, M. (2008), *How Capital Structure Adjusts Dynamically During Financial Crises*, Bond Business School Publications.

Barclay, M., Clifford, W.S. and Morellec, E. (2006), "On the debt capacity of growth options", *Journal of Business*, Vol. 79 No. 1, pp. 37-59.

Booth, L., Aivazian, V., Demirguc-Kunt, A. and Maksimovic, V. (2001), "Capital structure in developing countries", *The Journal of Finance*, Vol. 56 No. 1, pp. 87-130.

Chikolwa, B. (2009), "Determinants of capital structure for A-REITs", *15th Annual Conference of Pacific Rim Real Estate Society*, *Sydney*, *18-21 January*.

Dimovski, B. and Zabreski, P. (2012), "Determinants of capital structure of A-REITs and the global financial CRISIS", *Pacific Rim Property Research Journal*, Vol. 18 No. 1, pp. 3-19.

Giambona, E., Harding, J. and Sirmans, C.F. (2008), "Explaining the variation in REIT capital structure: the role of asset liquidation value", *Real Estate Economics*, Vol. 36, pp. 111-137.

Giambona, E., Golec, J. and Schwienbacher, A. (2013), "Debt capacity of real estate collateral", *Real Estate Economics*, Vol. 42 No. 3, pp. 578-605.

Harrison, D.M., Panasian, C.A. and Seiler, M.J. (2011), "Further evidence on the capital structure of REITs", *Real Estate Economics*, Vol. 39 No. 1, pp. 133-166.

Jakobsen, N. and Olsson, M. (2015), "What factors affect the capital structure of real estate firms? An analysis between listed firms on the European market", working paper, University of Gothenburg.

Kurshev, A. and Strebulaev, I.A. (2005), "Firm SIZE and capital structure", EFA 2005 Moscow meeting papers.

Mackay, P. and Phillips, G.M. (2002), "Is there an optimal industry financial structure?", Working Paper No. 9032, National Bureau of Economic Research.

Marts, B.A. and Elayan, F.A. (1990), "Capital structure and the cost of capital for untaxed firms: the case of REITs", *Journal of Real Estate Economics*, Vol. 18 No. 1, pp. 22-39.

Modigliani, F. and Miller, M.H. (1958), "The cost of capital, corporation finance and the theory of investment", *American Economic Review*, Vol. 48 No. 3, pp. 261-297.

Morri, G. and Artegiani, A. (2015), "Global financial crisis effect on the capital structure of EPRA/NAREIT Europe index companies", *Journal of European Real Estate Research*, Vol. 8 No. 1, pp. 3-23.

Morri, G. and Beretta, C. (2008), "The capital structure determinants of REITs: is it a peculiar industry?", *Journal of European Real Estate Research*, Vol. 1 No. 1, pp. 6-57.

Murray, M.Z. and Goyal, V.K. (2005), "Tuck school of business at dartmouth", *Financial Management Association International*, Vol. 38 No. 1, pp. 1-37.

Newell, G. (2006), "The changing risk profile of listed property trusts", *Australian Property Journal*, Vol. 39 No. 3, pp. 172-180.

Newell, G. and Peng, H.W. (2009), "The impact of the global financial crisis on A-REITs", *Pacific Rim Property Research Journal*, Vol. 15 No. 4, pp. 453-471.

Niskanen, J. and Flakenbach, H. (2012), "European listed real estate: the capital structure perspective", *Nordic Journal of Surveying and Real Estate Research*, Vol. 9 No. 1, pp. 76-97.

Ooi, J. (1999), "The determinants of capital structure evidence on UK property companies", *Journal of Property Investment & Finance*, Vol. 17 No. 5, pp. 464-480.

Rajan, R.G. and Zingales, L. (1995), "What do we know about capital structure? Some evidence from international data", *The Journal of Finance*, Vol. 50 No. 5, pp. 1421-1460.

Weigl, J. and Wittenber, L. (2011), "Market timing of capital structure factors influencing leverage decisions of firms", Inaugural Dissertation.

Further reading

Boudry, W.I., Kallberg, J.G. and Liu, C.H. (2010), "An analysis of REITs issuance decisions", *Real Estate Economics*, Vol. 38 No. 1, pp. 91-120.

Ertugrul, M. and Giambona, E. (2010), "Property segment and REIT capital structure", *The Journal of Real Estate Finance and Economics*, Vol. 43 No. 4, pp. 505-526.

Fama, E. and French, K. (2002), "Testing tradeoff and pecking order predictions about dividends and debt", *Review of Financial Studies*, Vol. 15 No. 1, pp. 1-37.

Feng, Z., Ghosh, C. and Sirmans, C.F. (2007), "On the capital structure of real estate investment trusts (REITs)", *Journal of Real Estate Finance and Economics*, Vol. 34 No. 1, pp. 85-101.

Geltner, M. and Clayton, E. (2014), *Commercial Real Estate Analysis and Investments*, 2nd ed., Chapter 23, Leap Publishing Services, pp. 585-622.

Ghosh, C. and Sirmans, N.R. (1992), "An analysis of seasoned equity offerings by equity REITs", *Journal of Real Estate Finance and Economics*, Vol. 19 No. 3, pp. 175-192.

Giacomini, E., Ling, D.C. and Naranjo, A. (2015), "Optimal capital structure and the effects of deviation from target financial leverage on REIT return performance", working paper, University of Florida.

Green Street Advisors (2009), *Capital Structure in the REIT Sector*, Green Street Advisors, Inc.

Green Street Advisors (2014), *REITs Valuation: The NAV-Based Pricing Model*, Green Street Advisors, Inc.

Harris, M. and Raviv, A. (1991), "The theory of capital structure", *The Journal of Finance*, Vol. 46 No. 1, pp. 297-355.

Jensen, M.C. and Meckling, W. (1976), "Theory of the firm: managerial behaviour, agency costs and capital structure", *Journal of Financial Economics*, Vol. 3 No. 4, pp. 305-360.

Kim, W.S. and Sorensen, E.H. (1986), "Evidence on the impact of the agency costs of debt incorporate debt policy", *Journal of Financial and Quantitative Analysis*, Vol. 21 No. 2, pp. 131-144.

Miller, M. (1977), "Debt and taxes", *The Journal of Finance*, Vol. 32 No. 2, pp. 261-275.

Modigliani, F. and Miller, M.H. (1963), "Corporate income taxes and the cost of capital", *American Economic Review*, Vol. 53 No. 3, pp. 433-443.

Morri, G. and Cristanziani, F. (2009), "What determines the capital structure of real estate companies? An analysis of the EPRA/NAREIT Europe index", *Journal of Property Investment & Finance*, Vol. 27 No. 4, pp. 318-372.

Myers, S.C. (1977), "Determinants of corporate borrowing", *Journal of Financial Economics*, Vol. 5 No. 2, pp. 147-177.

Myers, S.C. and Majiluf, N.S. (1984), "Corporate financing and investment decisions when firms have information that investors do not have", *Journal of Financial Economics*, Vol. 13 No. 2, pp. 187-221.

Stulz, R.M. (1990), "Managerial discretion and optimal financing policies", *Journal of Financial Economics*, Vol. 26 No. 1, pp. 3-27.

White, M.J. (1993), "Corporate bankruptcy: a US-European comparison", working paper, University of Michigan.

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