What determines the capital structure of real estate companies?

An analysis of the EPRA/NAREIT Europe Index

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Abstract

Purpose – This paper aims to investigate the determinants affecting the choice of the capital structure of European property companies.

Design/methodology/approach – The analysis considers the set of companies belonging to the EPRA/NAREIT Europe Index (both REITs and non-REITs) and is based on panel data to get greater reliability and to check the cross-time path of explanatory variables. Seven independent variables (size, profitability, growth opportunities, cost of debt, ownership structure, risk, and category) are studied over a five-year period.

Findings – Results clearly show that non-REIT companies are significantly more leveraged than REITs, confirming the importance of the tax-exempt status in affecting capital structure choices. The negative relationship between operating risk and leverage demonstrates that the managers of riskier firms tend to reduce the overall company's uncertainty by adopting a more careful capital structure. Moreover, more profitable firms have less recourse to leverage. Evidence also suggests that the company's asset size is able to directly influence the amount of debt issued, confirming the hypothesis that debt is cheaper for bigger firms and its issue is affected by economies of scale.

Originality/value – The paper represents a break point with past literature for the sample, based on European companies, and the methodology, that relies more on market rather than on balance-sheet or income statement items (obtaining higher comparability and avoiding country-specific bias mainly concerning law, fiscal and earning management issues).

Keywords Financial management, Financing, Decision making, Property management, Real estate

Paper type Research paper

1. Introduction

This paper investigates the capital structure of listed European property companies: a series of factors has been determined and consequently a regression analysis on leverage has been run in order to understand their importance in the choice between equity and debt. In order to have an internationally significant and recognised sample, the data used for the analysis over a five years period refer to the set of property companies belonging to the EPRA NAREIT Europe Index, composed by 37 real estate investment trusts (REITs) and 60 standard property companies[1].

The sub-industry breakdown among REITs and REC has allowed to control how the same explanatory variables are able to differently affect capital structure of companies according to the tax status. Moreover, the internationally diversified sample

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contributed to smooth country's specific peculiarities about fiscal and regulatory issues, especially for what concerns the REITs. The research is also aimed at investigating the importance of tax-exempt status in affecting capital structure choices.

The reminder of the paper is structured as follows. In the first part a review of literature will be followed by an extensive analysis of previous empirical findings. The second part relates to the current analysis. A detailed description of the sample and the methodology used will be provided. Results will be eventually shown and interpreted by comments and conclusions.

2. Capital structure: theories and findings

So far, existing literature has not been able to clearly explain the reasons of leverage choices: practitioners and academic literature have deeply investigated the issue, but many concerns still remain. Modigliani and Miller (1958) made the first attempt to solve the problem and even though they had good intuitions, their theory has shown to be weak and based on unrealistic assumptions: however, their work is considered as the starting point of the optimisation theory. Today there is also the behavioural theory stating that different degrees of leverage are justified by the attempt to solve contingent situations that affect the day-to-day activity of firms. Developed by Myers (1984) and Myers and Majluf (1984), the pecking order model[2] argues that managers have privileged information about the firm value that investors do not have. For this reason they should organise the capital structure of the firm they manage by taking into account this information asymmetry thus minimising its cost for current shareholders. Managers always prefer issuing debt to avoid the potential valuation discount associated with equity issues. Of course, the theory does not predict the existence of a perfect debt equity ratio because the current leverage of a firm reflects its cumulative requirements of external financing.

The optimisation theory states that, in case of firm's assets and investment plan held constant, every company has a long term target debt ratio that maximises its market value, evolving from a sophistication of Modigliani and Miller's capital structure findings. The perfect leverage maximises the benefits deriving from the use of debt and minimises the costs associated with it and deviations from target capital ratio are only temporary.

All equity firms are able to modify the firm's capital structure by adding as much debt as they want: assuming the existence of corporate tax[3] and tax deductibility of interest payments, the enterprise value is expected to grow as soon as leverage increases. In fact adding new debt will increase the tax shield; unfortunately, bankruptcy costs are expected to increase accordingly.

The verification of the existence of the trade off theory[4] in the real world is a long lasting exercise for academics. Recently, having as sample an inter industry set of companies, Ozkan (2001) provided evidence that UK firms do have target debt ratios and adjust to their target ratio relatively quickly. Leary and Roberts (2005) confirmed that firms actively rebalance their leverage to stay within an optimal range. Fischer *et al.* (1989) simultaneously confirm the POT and trade off findings by developing a model of optimal capital structure choice in the presence of recapitalisation costs. This analysis builds upon the traditional tax/bankruptcy cost theory of capital structure relevance. Results demonstrate the dangers of viewing observed debt ratios as optimal;

to avoid these problems they employ a different measure of capital structure relevance, namely the range over which the firm allows its debt ratio to vary. The model provides distinct predictions relating to firm-specific properties to the range of optimal leverage ratios: smaller, riskier, lower-tax, lower-bankruptcy cost firms will exhibit wider swings in their debt ratios over time.

Fama and French (2002) while attempting to compare TOM and POT, among others, noted that regressions of firms' debt ratios show reliable evidence that leverage is mean-reverting even though the rate of the adjustment is quite slow (7-17 per cent per year). Moreover, even Taggart (1977), Marsh (1982), Auerbach (1985), and Opler and Titman (1994) found mean reversion in debt ratios or evidence that firms appear to adjust towards debt targets. Bradley *et al.* (1984), in a huge research involving 851 firms and 20 years of data, showed that optimal firm leverage is, as predicted by the TOM, inversely related to the expected costs of financial distress but surprisingly leverage was found to be directly influenced by the non-debt tax shield rather than by the debt tax shield. Hackbarth *et al.* (2007) go beyond the TOM arguing that the theory is not only able to justify a certain debt level but, using a structural pricing model featuring a tax-shield bankruptcy cost TOM, it is also possible to infer the optimal debt structure in terms of bank and market debt to borrow or issue.

Other authors do not consider the TOM as a valid justification of leverage, Hovakimian *et al.* (2001) found evidences that firms appear to adjust towards debt targets but they also stated that the target debt equity ratio may change over time as the firm profitability and stock price change, thus partially accepting both the TOM and the POT. The point according to which debt ratio is inversely related with past profitability[5] is also confirmed by Rajan and Zingales (1995) and Titman and Wessels (1998). Mixed evidences with the TOM were not determinant in explaining capital structure nor were they with the POT. Also Chirinko and Singha (2000) observed that their empirical evidence can evaluate neither the POT nor the static TOM.

Belonging to the family of behavioural theories is Shyam-Sunder and Myers (1999) who tested the theory over the period 1971-1989 on a sample of 157 firms and found that the POT has much greater time-series explanatory power than the static TOM. However, their opinion drives to contrasting results with respect to Brennan and Kraus (1987), Noe (1988) and Constantinides and Grundy (1989), in fact they concluded that firms do not necessarily have a preference for issuing straight debt over equity and that under investment problem can be resolved through signalling with the richer set of financing option. According to Bontempi (2002), based on a sample of Italian firms, companies are divided into trade off and pecking order types; there is not a perfect model that can be used for all the firms. Similar conclusions are supported by Ghosh and Cai (1999), pointing out that the POT performs at least as well as the static TOM in explaining capital structure. Franz and Goyal (2003), testing a sample of US firms from 1971 to 1998 had similar results, arguing that the POT is able to justify leverage of larger firms in earlier years, while, over time, support for the pecking order declines for two reasons. Smaller firms are increasingly publicly traded during the 1980s and 1990s than during the 1970s. Since small firms do not follow the pecking order, the overall average moves further from this theory. However, the time period effect is not entirely due to more small firms in the 1990s. Even when attention is restricted to the largest quartile of firms, support for the POT declines over time. Equity substantially becomes more important as time goes by.

3. Literature review on capital structure determinants

This section of the paper develops a framework able to critically justify which are the key variables in affecting leverage and the way they act in order to increase or reduce the debt exposure of firms. Discussion will derive both from an analysis of existent empirical researches and from a critical reasoning whose aim is to point out and logically link causes and effects of debt's determinants on capital structure. Only the implied effects of POT and TOM will be considered and deepened. As usual, the analysis of the considered determinants in order to justify leverage of property companies will be handled with a special care, particularly for what concerns the REITs industry.

TOM and POT agree in defining which variables are likely to affect the capital structure even though the way they are expected to act and the underlying assumptions of their behaviour is very often totally different.

3.1 Size

Both the TOM and the POT assign to the company's size a big explanatory power in determining leverage. The TOM states that leverage increases as soon as the company's size grows up; bigger firms are expected to be more diversified, the diversification increases the stability of cash flows and consequently it allows an heavier recourse to debt issues. This argument also concludes that larger firms have an easier access to the capital markets and they borrow at more favourable interest rates. Contrastingly, sustainers of the POT regard size as a proxy for information asymmetry between insiders and capital markets. Larger firms are more closely observed by analysts and should be more capable of issuing more sensitive securities like equity and should have lower debt. A negative relationship between size and the level of leverage is eventually predicted. Although the POT does not explicitly imply it, this conclusion can also be read in the light of the role of the cost of debt and equity issue relatively to the firm size. Small firms will incur in relatively higher expenses in case of a seasoned equity offering or in case of a bond offering, therefore for them it will be cheaper to borrow short-term debt through credit lines and bank loans rather than activate a market issue.

Numerous studies analysing the concept of "too big to fail" (Ennis and Malek, 2005) suggest that company's size can be used as a negative indicator of probability of default and therefore as a proxy for risk. According to this hypothesis, bigger firms could carry on a proportionately higher amount of debt on their balance sheet without suffering a substantial negative effect while smaller firms seem to react more negatively to an increase in the level of leverage. For Rajan and Zingales (1995) firm size is positively correlated with leverage, Fama and French (2002) argue that, because of their level of diversification, larger firms are expected to have less volatile earnings, which also induces a higher leverage ratio. Harris and Ravin (1991), using a cross sectional test discovered that leverage increases with firm size and also Dessì and Robertson (2003) using both a static model and a dynamic one had similar results[6].

A basic explanation of the direct relation among leverage and size for REITs has been given by Capozza and Seguin (2001): the fact that liabilities are expensive to manage justifies a different degree of leverage. Issuing public debt requires the services of a trustee and bond rating agencies. Moreover, once debt is added to the capital structure, management time is needed to finance, refinance, account, report and

disclose. These characteristics imply that for larger REITs with more absolute dollars of debt, the cost of adding an additional dollar of assets financed by debt will be lower. Thus, larger REITs are expected to use more leverage and indeed a substantial positive relationship exists between REITs size and leverage. Also Maris and Elayan (1990), in their analysis of REITs' capital structure, found that the size variable is positive and statistically significant, indicating that larger REITs are more heavily leveraged than smaller REITs. According to Panno (2003), the direct relationship between leverage and size reflects the better access of large firms to financial markets, the relative low proportion of bankruptcy costs to the value of firms and the flexibility of banks of larger firms to borrow money when they are in financial distress. The diversification effect allowing bigger companies to be more levered, stated by the TOM, does not seem to be able to affect REITs' leverage. Although REITs can assume huge dimensions and can be able to invest in different asset classes and different geographical areas that are not perfectly correlated, their level of diversification will be in any case sub-optimal with respect to conglomerates and anyway it is linked to only one reference market (real estate). REITs stability of cash flows is difficult to be reached by increasing the business diversification because of specific regulations at which REITs are enforced. Morri and Beretta (2008), analysing a sample of 119 listed REITs with different investment strategies and in different property sectors found that large REITs are less constrained when seeking funds in the capital markets and can use more debt.

3.2 Profitability

Only very few do not sustain the existence of a relationship among use of debt and profitability, among them is Omet (2004), and Helwege and Liang (1996). Although the importance of its effect on the level of borrowing is certain, the direction it takes has not yet clearly been defined since some experts believe it negatively affects while others believe it positively affects the amount of debt used. The way in which the profitability issue is expected to affect the level of leverage strongly depends on the way in which debt is considered, book or market value. In case of book leverage the TOM predicts a positive relationship among the two factors, but when the market leverage is considered, the relationship is expected to vary. In such a situation the market value of the overall firm will increase because of the raise in profitability and this effect will automatically drive to a decrease of the overall market leverage ratio. On the other hand, according to the POT, since the market value of the company is expected to increase due to an improved profitability, the relationship will continue to be negative but, in this case, it will be stronger than in the book leverage case. The TOM states that since less profitable firms provide lower returns for shareholders, a great degree of leverage will increase the bankruptcy risk and the cost of borrowing, and will therefore still further lower shareholders returns. Low shareholders returns will also limit equity issues, therefore firms facing positive NPV investment opportunities will avoid external financing and additional leverage in particular. There will also be a demand side effect as the market will be reluctant to provide capital to such firms. On the other hand, the deductibility of interest payments is expected to induce more profitable firms to further increase their ROE by financing the bulk of their operations with debt. Thus, for the TOM it undoubtedly exists a positive relation between leverage and profitability. The POT (Myers, 1977) predicts the existence of a negative relationship among the two factors; more profitable firms will demand less

debt than less profitable ones since they will be expected to have internal funds available to finance projects.

Akhtar (2005) supports this theory by using a multivariate Tobin regression; his results provide negative and highly significant coefficients for what concerns both multinational and domestic companies. Leary and Roberts (2005) using EBITDA over total assets as a proxy for profitability in their panel data of 3,494 firms and 127,308 observations found concurring opinion to this theory. Among others the most notable researchers that corroborate the negative link between leverage and profitability are: Hovakimian (2004), Friend and Lang (1998), Rajan and Zingales (1995), Grier and Zychowicz (1994), Fama and French (2002), Baker and Wurgler (2002) and Frank and Goyal (2003). On the other hand MacKay and Phillips (2001) challenged the common finding by stating that the two factors are linked by a positive coefficient. Gaud *et al.* (2007) argue that an increase in ROA raises the need for financing because ROA enters with a positive sign in the "debt issues versus equity issues" regression. ROA is still positive when it is entered in the "debt issues versus no transaction regression". Strebulaev (2007) asserts that in his dynamic model of an economy with infrequent adjustments, the profitability is positively related to leverage at refinancing points even though the author points out that for firms that do not refinance the relationship continues to be negative.

The role of profitability in explaining REITs' leverage has been judged as insignificant by Feng *et al.* (2007). The high dividend for payout requirements at which REITs are enforced does not allow them to maintain an adequate level of free cash flows able to finance possible future positive NPV projects or to use retained earnings for current needs. Low free cash flows imply, both in case of high profitability and in case of low profitability, that REITs must issue debt to raise funds, pushing the debt ratio at higher level.

The uncertainty of economic performances during time is considered to be a critical factor in determining the level of leverage. The two main theories are unanimous in stating that more risky firms are characterised by lower debt ratios. Riskier firms are likely to have unpredictable cash flows, thus their capacity to pay back interests and capital components of a loan can be strongly affected by the general economic cycle. Moreover, whenever cash flows are expected to be volatile, firms would avoid issuing too much debt in order to keep some degree of leverage capacity to exploit should a new profitable project show up unexpectedly. Only a few researchers have rejected the hypothesis of existence of a direct link among leverage and business risk, among them Titman and Wessels (1988), Ferri and Jones (1979), and Flath and Knoeber (1980).

3.3 Growth

The effect of growth is considered by both theories to have a deep role in the determination of capital structure. The TOM predicts that firms with more investment opportunities will be characterised by a lower amount of debt. This behaviour can also be read as a disciplinary role of debt: firms with more investment opportunities have less need of the disciplining effect of debt payments to control free cash flows. Moreover, assuming that firms are concerned with future as well as with current financing problems, it is very likely that firms with large expected growth opportunities will maintain a low risk debt capacity to avoid financing future investment with equity offerings or passing the investment. Notwithstanding that,

debt is supposed to grow when investments exceed retained earnings and to fall when investments are less than retained earnings and thus, *ceteris paribus*, leverage is predicted to be higher for firms that face higher investment opportunities.

Growth has been showed by researchers to follow the TOM model and therefore assuming a negative and significant value. Among others Barclay *et al.* (2006), Long and Malitz (1985), Smith and Watts (1992), Bradley *et al.* (1984) documented a negative relation between market leverage and market-to-book-value ratio.

Given the peculiarities of the industry, REITs are not characterised by high growth rates and certain measures of growth are even unavailable for them (i.e. R&D). The supposed behaviour of growth illustrated by the POT, presented above, is not expected to work in the REITs sample. In fact, the rule that implies that REITs have to distribute most of their earnings, does not allow them to follow the standard relationship usually observed between investment opportunities and retained earnings.

3.4 Cost of debt

Unquestionably the interest rate to be paid on debt affects the amount of debt requested by firms. Low interest rates will push the demand while high rates are expected to decrease the leverage ratio of firms. This behaviour is well pronounced in the real estate industry where, due to the historical low level of returns, a good liability management can represent a substantial competitive advantage for companies. Ooi (1999) had empirical results consistent with the traditional notion that firms time measure their long-term debt issues based on their expectation of future interest rate movements and on the prevailing property market conditions. Other researchers state that REITs' leverage increases when the interest they have to pay on debt is bigger. Considering that the cost of debt is a sum of two variables, namely the rating and the level of interest rate settled by central banks, it is possible to conclude that during periods characterised by higher interest rates the leverage increases. This finding is unexpected and in strong disagreement with the market timing theory. However, the direct relation between interest rates and leverage acquires a meaning only by considering the assumption stated by Bredin and Stevenson (2006): following an increase in interest rates the stock price is expected to lower and consequently leverage is expected to increase. McCue and Kling (1994) explored the relationship between the macroeconomics variable and real estate returns, showing that macroeconomic factors explain almost 60 per cent of the variation in the real estate prices. Of course, the cost of debt is not only driven by macroeconomics factors but also by the company's specific elements such as the ability of the management, growth prospective, financial stability of the firm etc. A synthetic indicator of cost of debt that is exclusively driven by in-company factors is the rating. Molina (2005) found that the leverage's effect on ratings is threefold stronger than it would be should the endogeneity of leverage be ignored. This stronger effect results in a higher impact of leverage on the ex ante cost of financial distress, which can offset the current estimate of debt's tax benefit.

3.5 Ownership and control

The effect that the existence of a big blockholder has on the leverage of a company has not been taken into consideration by the TOM and not even the POT does provide any direct indicator on how the company ownership could modify leverage. Corporate financing decisions are influenced by managers' adverse incentives and the incentives

for managers to act opportunistically can be influenced by the structure of equity ownership. Big institutional shareholders will have the incentive to monitor and to influence the management in order to protect their significant investment. Blockholders are argued to reduce the scope of managerial opportunism, resulting in lower direct agency conflicts between managers and shareholders. On this situation the management may not be able to adjust the debt ratio to its own interest as freely as if investors did not exist. Since the economic stake of blockholders increases when their level of share ownership rises, the incentives of blockholders to protect their investment can be expected to increase as soon as the level of their share ownership enhances. Hence, *ceteris paribus*, corporate debt ratios are likely to be inversely related to the level of floating shares according to the POT.

A strong pressure from the takeover market may force firms to increase profitability by adding debt. Moh'd *et al.* (1998) pointed out that the level of debt in capital structures is inversely and significantly related to the institutional shareholdings. Short *et al.* (2002), on a UK sample, and Bathala *et al.* (1994), on a US sample, have got similar results: debt ratios are negatively related to ownership by large external shareholders. The contrasting theory stating that *ceteris paribus* corporate debt ratios are likely to be a positive function of the level of ownership of blockholders is stated by Brailsford *et al.* (2002). The same result has been confirmed by Firth (1995). Omet (2008) provided supporting evidences to the fact that ownership structure does have a significant impact on capital structure even though this impact has not been clearly defined, although the ownership structure of companies has a negative impact on one measure of leverage (total liabilities divided by total assets) and a positive impact on another measure of leverage (long term debt divided by total assets).

Theoretically, REITs are expected to behave on the same way as any other company except for one substantial difference. Ownership restrictions, at which REITs are subjected, basically different in each European country, deter the formation of blockholders. This fact weakens the monitoring by boards and allows managers to withhold or conceal material information. This behaviour explains why the reduction of the agency problem is not expected to work properly in case of legal ownership restrictions. Capozza and Seguin (2003) found that REITs companies' leverage was negatively related to the insider ownership.

3.6 Operating risk

Given the low level of operating risk that affects the real estate industry, REITs and property companies present levels of debt that are significantly higher than other types of firms and therefore in line with theoretical predictions. Anyway this behaviour is in contrast with traditional hypothesis and expectations because for REITs interests are treated as tax undeductable expenses. Maris and Elayan (1990) settled up a regression to explain how operational risk affects the level of debt in REITs capital structure, their findings display that mortgage REITs leverage is positively affected by the degree of operational risk, while equity REITs do have a minor recourse to debt as the operational risk increases. Delcoure and Dickens (2004), based on data that exclusively refer to REITs and RECs, concluded that business risk, measured by funds from operations to total assets, is an important measure to explain a certain level of leverage for both REITs and RECs, but of greater importance to REITs. REITs systematic risk

has been found to be negatively related to the ratio of funds from operations to total assets. According to Kale *et al.* (1991) the relation between business risk and capital structure is roughly U-shaped, decreasing for low levels of business risk and increasing for high levels while for Ghosh *et al.* (2000) the relationship between the two items is quadratic. Morri and Beretta (2008) found than when operating risk is high, REITs choose lower debt level.

Firms working in the same industry have been found to have a homogenous capital structure, this evidence is strictly related to the fact that firms operating in the same business are characterised by the same level of operating risk and thus the optimal leverage should be the same. Bradley *et al.* (1984) in a cross-sectional analysis of inter-industry sample found that the industry factor was able to explain the variability of leverage thanks to a 54 per cent R^2 (Table I).

4. Sample description

The analysis is based on data referring to the 97 European property companies belonging to the FTSE EPRA NAREIT Europe Index[7] (REIT and non-REIT). The overall dataset is constituted by 37 REIT and 60 REC companies. Among the REC there are mainly development, property management and service's companies. Countries that present a more developed real estate market have a higher number of companies belonging to the index (i.e. UK).

The analysis has been deepened in two directions to consider the asset allocation of the portfolio, both geographic (domestic and international) and by use[8]. Owing to the nature of their business, REITs and RECs have been analysed by using slightly different data and variables.

A REC has been classified as domestic if more than 80 per cent of its revenues[9] come from domestic activities while international if it produces at least 20 per cent of its income abroad. Diversified have been considered companies that have less than 80 per cent of their revenues or income deriving from their primary activity[10].

In the case of REITs the portfolio breakdown of income producing properties has been used as proxy for diversification. A REIT has been considered as diversified if the major asset class in which it invests does not weight more than 80 per cent of its overall property portfolio[11]. The level of international diversification of REITs has been investigated by analysing the geographical breakdown[12].

While in absolute terms the number of internationally diversified (12) and business diversified (24) REITs are close to the number of internationally diversified (16) and business diversified (19) property companies, there is a big difference in percentage for business diversification. Business diversified REITs are 65 per cent (32 per cent of RECs), while international diversified REITs are 32 per cent (27 per cent for RECs).

Table I.
Leverage's determinants expected effect on capital structure

	Trade-off model		Pecking order theory	
	Book value	Market value	Book value	Market value
Size	+		−	
Profitability	+	(?)	−	−
Growth	−	−	+(−)	
Ownership and control	(?)		+	
Operating risk	−		−	

The huge difference can be due to the nature of the business itself. While the set of competencies needed to run a portfolio of retail properties can be leveraged and therefore can also be used in order to manage a residential property portfolio, the set of competencies needed to lead a development division are usually very different to the ones needed to manage a service company, and thus in the last case scale economies cannot be exploited. The similar percentage of internationally diversified companies can be interpreted as an alignment due to the increased globalisation, especially for capital intensive industries. All REITs have been found to be specialised in at least one principal asset class: the majority of them are specialised in office (18), followed by shopping centre and retail (respectively six and five).

Financial data are taken from Datastream based on the financial years from 2002 to 2006. Analysis are initially carried out based on the sum of data deriving from different years, later the overall sample has been divided in order to distinguish REITs from REC[13] (Tables II and III).

Leverage ratio (non-REITs)	Mean	Median	Min.	Max.	SD
Book value ratios					
Total debt/total equity	1.424	1.219	0.199	4.353	0.966
Total debt/total asset	0.466	0.478	0.127	0.722	0.147
Total liabilities/total asset	0.576	0.593	0.295	0.834	0.138
Total debt/capital (debt + equity)	0.530	0.549	0.166	0.813	0.161
Short-term debt/total debt	0.217	0.115	0.000	1.000	0.262
Long-term debt/total debt	0.833	0.892	0.153	1.000	0.204
Short-term debt/total asset	0.104	0.050	0.000	0.588	0.144
Long-term debt/total asset	0.385	0.400	0.106	0.709	0.159
EBIT/interest expenses	5.146	4.220	0.633	23.843	4.109
EBITDA/inerest expenses	5.297	4.235	0.650	23.865	4.062
Market value ratios					
Total debt/total equity (MV)	0.799	0.765	0.117	2.402	0.491
Total debt/capital (debt + equity)	0.408	0.433	0.105	0.706	0.144

Table II.
Leverage ratios statistics for REC companies (2006 data)

Leverage ratio (non-REITs)	Mean	Median	Min.	Max.	SD
Book value ratios					
Total debt/total equity	0.805	0.663	0.022	2.472	0.599
Total debt/total asset	0.350	0.366	0.021	0.612	0.152
Total liabilities/total asset	0.431	0.452	0.031	0.702	0.167
Total debt/capital (debt + equity)	0.393	0.399	0.022	0.712	0.176
Short-term debt/total debt	0.210	0.096	0.002	1.000	0.276
Long-term debt/total debt	0.859	0.934	0.002	1.000	0.220
Short-term debt/total asset	0.061	0.027	0.001	0.286	0.074
Long-term debt/total asset	0.311	0.312	0.000	0.611	0.152
EBIT/interest expenses	54.847	8.587	1.976	1,188.4	210.0
EBITDA/inerest expenses	55.193	8.598	3.472	1,440.4	257.1
Market value ratios					
Total debt/total equity (MV)	0.511	0.485	0.011	1.608	0.339
Total debt/capital (debt + equity)	0.309	0.327	0.011	0.617	0.139

Table III.
Leverage ratios statistics for REIT companies (2006 data)

Leverage is total debt to capital ratio, where capital is defined as the sum of total debt and equity[14]. The book value has been used for debt, while market data have been used to find the equity value. This proxy moves its steps from Bowman's (1980) theory supporting the equivalence among the two kinds of data[15].

When analysing average ratios it is clear that REITs are averagely less levered that RECs companies. The first four indicators of leverage show average values that are significantly higher for RECs. This suspect is confirmed by considering the debt-equity ratio[16] measured at market values (averages at 0.329 vs 0.408 and medians at 0.327 vs 0.433). On the previous ratios the value of standard errors, although not negligible, is not high. The analysis of statistics on the characteristics of debt (e.g. short term debt ÷ total debt and long term debt ÷ total debt), provides very similar results for what concerns both companies' type, their average proportion of short term debt over all debt is around 0.2 while the proportion of long term debt is about 0.8. Actually, although on these factors the standard deviation has reasonable values, by observing maximum and minimum figures the existence of big outliers can be noted. Outliers coming from very few firms make the distributions of short term and long term debt ratios wide. In fact both samples present at least one example of firm financed by 100 per cent long term debt, but even by 100 per cent short term debt. For RECs, the interest coverage ratio, calculated with an EBIT or with an EBITDA numerator, is averagely very high and close to 4 (median) and 5 (average); unfortunately some outliers, characterised by negligible interest expenses, do not allow to reach a reliable conclusion of interest coverage ratios for REITs.

The average size of REITs is much bigger than the average size of a non-REIT: average market capitalisation is €3,069 mln vs €1,160 mln while the average total asset value is €4,237 mln vs €1,880 mln.

5. Methodology

The analysis[17] is conducted by using a panel data linear regression model where the dependent variable is LEVERAGE during a certain time period (from 2002 to 2006); by the use of panel data, the analysis allows to understand if the variables that impact the capital structure today are the same as during the last five years period. Given the underlying assumptions of the ordinary least square methodology, the explanatory power and the reliability of the linear regression model will be tested by implementing a series of statistical checks in order to investigate on the existence of multicollinearity[18], heteroskedasticity[19] and autocorrelation[20]:

$$LEVERAGE_i = \alpha + \beta_1 \times SIZE_i + \beta_2 \times PROFITABILITY_i + \beta_3 \times GROWTH_i + \beta_4 \times COST\ OF\ DEBT_i + \beta_5 \times OWNERSHIP\ STRUCTURE_i + \beta_6 \times RISK_i + \beta_7 \times REIT_i + \varepsilon_i$$

where:

$$\text{LEVERAGE} = \frac{\text{Total Debt}_{\text{book value}}}{(\text{Equity}_{\text{market value}} + \text{Total Debt}_{\text{book value}})}$$

$$\text{SIZE} = \ln(\text{Total Assets}_{\text{book value}})$$

Several items exist that have historically been used in past researches as size measures. The amount of sales, the number of people employed and the amount of total assets are the most widely exploited. Given the fundamental characteristics of the real estate sector it is impossible to use the amount of sales or the number of people employed as a proxy for firm size. In this research, the proxy used for firm size is the total asset value modified:

$$\text{PROFITABILITY} = \frac{\text{EBIT}}{\text{TotalAssets}_{\text{book value}}}$$

This ratio better displays the real profitability of a property company because it is more reliable and less corrupted from contingencies with respect to other commonly used indicators. EBIT is not netted from financial expenses, this fact is quite important for a research whose aim is to investigate the ratio among debt and profitability:

$$\text{GROWTH} = \text{Price to Book Value Ratio}$$

By choosing a market value proxy, on this case the price to book value, it will show the market expectations about cash flows' future development. By adopting the dividend discount model as a methodology to value the company's equity, the market price of a stock will be higher since the level of expected future cash flows associated with the share increases. Similarly to the beta, this indicator has the advantage of not being easily distorted by management decisions and strategies. Other indicators to measure the growth opportunities of a company are the percentage change of total assets or the ratio between capital expenditure and total assets. Both of them are biased indicators. First of all, they are not as forward looking as the market value, but they actually are backward looking. Moreover, they just consider the dimensional growth of the firm and not the future path of cash flows.

$$\text{COST OF DEBT} = \frac{\text{Interest on Debt}}{\text{Total Debt}_{\text{book value}}}$$

$$\text{OWNERSHIP STRUCTURE} = (1 - \text{Percentage of floating shares})$$

$$\text{RISK} = \text{Unlevered Beta}$$

$$B_u = \frac{Bl}{[1 + (1 - t) \times (D \div E)]}$$

where:

- B_l = beta levered[21].
- t = country corporate income tax rate[22] for the reference year for REC[23], 0 for REITs[24].
- $D \div E$ = leverage, debt calculated as book value and equity as market value.

Differently from the standard deviation of EBIT, the use of beta can also be considered as a variable based on a higher number of observations and thus more reliable and statistically significant. In fact while EBIT or any other accounting item is no more than quarterly calculated (in the best scenario) and with a substantial time-lag, the beta

is compounded with a daily frequency and it is immediately available. The beta, belonging to the family of market values, implies the powerlessness by managers to be manipulated. Conversely from EBIT, it is not affected from what has been defined as earning management practice:

REIT = Dummy Variable; 1 for REITs, 0 otherwise[25].

6. Results

The estimate of the pair-wise correlation coefficients[26] between any two regressors can definitively help to check the reliability of the research as a whole. The correlation among regressors is showed to be low, 20 out of 21 correlation coefficients are lower than 0.2 in absolute value. Only COST and RISK are related by a stronger correlation whose value (0.2832) is anyway very far from 1. According to these results the multicollinearity problem seems to be avoided even though the *t* statistics of 11 out of 21 observations are significant at 5 per cent level. Despite its significance, the extremely low absolute value of correlation does not allow for the existence of multicollinearity[27] (Table IV).

Adjusted R-squared is quite high (31 per cent) and it shows that the choice of the set of independent variables is able to give a substantial help in explaining how LEVERAGE behaves. A further confirmation of the overall goodness of the model is the F-statistic (23.44); excluding that the true slope coefficients are simultaneously zero. The analysis of the Pearson correlation, combined with the presence of numerous significant *t*-statistics and with the Klien's rule, reinforces the suspect of absence of multicollinearity[28]. Residuals are distributed according to a normal standard distribution; the Jarque Bera test has a *p*-value of 74 per cent. In performing the White heteroskedasticity test, the linear regression model has been found to be affected by variable variances, nevertheless, results coming from models corrected for the heteroskedasticity corroborate the fact that heteroskedasticity exists but its presence does not influence the values obtained in the analysis[29]. The model respects all the theoretical assumptions.

Analysing the significance of independent variables, six out of eight can be defined as orienting factors in explaining LEVERAGE. SIZE, PROFIT, OWNERSHIP, RISK and REIT have lower *p*-values than 0.01, corroborating an impressive high statistical significance of terms. The most powerful in affecting LEVERAGE decisions is

	Coefficient	Std. error	*t*-statistic	Prob.
C	0.438762	0.053211	8.24576	0.0000
SIZE	0.026414	0.006845	3.85886	0.0001
PROFIT	− 1.058227	0.168375	− 6.28495	0.0000
GROWTH	− 0.00346	0.002790	− 1.24029	0.2157
COST	0.219123	0.305373	0.71756	0.4735
OWNERSHIP	0.089205	0.027140	3.28685	0.0011
RISK	− 0.155436	0.021990	− 7.06859	0.0000
REIT	− 0.100366	0.015621	− 6.42520	0.0000

Table IV.
Empirical findings

Notes: *R*-squared – 0.309542; Adjusted *R*-squared – 0.296336; *F*-statistic – 23.44038; Prob (*F*-statistic) 0.00000

definitively PROFIT (−1.06), in line with the POT. Rajan and Zingales (1995) also found a negative correlation among the two variables, even if with very different coefficients in each country[30]. Myers (1977), Fama and French (2002) and Hovakimian (2004) also agree with this finding and reinforce, for healthy companies that are able to implement it, the preference for an internal funding strategy.

RISK is the second important element in the regression (−0.155), confirming the expectations of both TOM and POT. This result turns out to be in line with the vast majority of the existing literature on the topic regarding real estate and non real estate samples. Operationally risky property companies, characterised by higher unlevered betas, do not want to increase their overall exposure by adding further financial LEVERAGE and try to reduce their hazard by decreasing the amount of debt outstanding.

Influence of OWNERSHIP on LEVERAGE does not have much comparison in previous theories and empirical researches about the real estate industry. This paper, being the first to analyse and to find empirical results on this issue, will be able to help not only blockholders, but also standard shareholders to reconsider their position within the corporate governance of property companies and to clearly understand the way their investment can be affected by a certain OWNERSHIP STRUCTURE. Numerical results are unquestionable: the presence of blockholders is statistically significant at 1 per cent level with a positive coefficient of 0.09. Investors care about their money, for this reason they put pressure on the management that is strongly propelled to reach high performances and therefore to use LEVERAGE as a way to increase the expected return for shareholders. Cross-industry findings by Bathala *et al.* (1994) and Moh'd *et al.* (1998) lead to the same results by using similar methodologies.

The REIT status is another decisive element in affecting capital structures. The REITs dummy variable has a significant negative value (−0.1) showing that companies adopting the REIT status are characterised by lower LEVERAGE, due to the lack of tax shields.

The SIZE is able to positively and significantly control for LEVERAGE: bigger firms can borrow at more favourable rates because they are perceived as less risky. Moreover, the economies of scale reached in case of debt issues by bigger firms by smoothing the amount of fix costs over a larger mass, represent a considerable cost advantage that can redirect financing choices. Once again this outcome is consistent with Rajan and Zingales (1995) and also with Dessì and Robertson (2003) that, using an UK sample in their static panel regression, found a positive and significant coefficient (0.25).

GROWTH and COST are not significant variables in explaining LEVERAGE (p-values respectively equal to 0.2157 and 0.4735); anyway the sign and the intensity of COST (0.22) suggest that more leveraged firms are characterised by higher COST OF DEBT.

GROWTH do not substantially impact on LEVERAGE (−0.003) even though this proxy has been shown by previous researchers to follow the TOM and therefore assuming a negative and significant value. Actually this effect can also be explained by the market timing theory: during periods characterised by high stock price increase (i.e. when the price-to-book-value ratio is high), managers prefer to launch seasoned equity offerings rather than debt issues.

6.1 Empirical evidence for REITs companies

Since previous results have demonstrated the REIT status as a critical factor in determining LEVERAGE, an industry breakdown analysis has been carried out in order to have a clearer picture of whether and how the same set of explanatory variables differently affect the two sub-samples (Table V).

The value of the adjusted R^2 (0.24) and the value of the F-statistic (9.59) confirm a good explanatory power of the model. The analysis of the correlation matrix among regressors and the implementation of Kelin's rule show that very likely multicollinearity is not present. All explanatory variables have an impressive significance at 5 per cent level, except OWNERSHIP. Coefficient's signs are consistent with the whole sample findings and only the OWNERSHIP STRUCTURE is negative rather than positive. PROFIT (−0.7) is always affecting LEVERAGE more heavily, but in a weaker way than the full sample. European REITs are considered as having a less dependent capital structure on PROFIT if compared with US REITs. Morri and Beretta (2008), using a similar model, found a much relevant PROFIT coefficient (around −3). The constraint to distribute a substantial percentage of their income for both European and US REITs should suggest that PROFIT is not significant, because theoretically both profitable REITs and non-profitable ones are compelled to issue debt when a new investment opportunity arises, since the previous year income has already been distributed.

In accordance with Maris and Elayan (1990), who indicate that larger REITs are more heavily leveraged than smaller ones, SIZE has been found to be a significant and positive explanatory variable. This result matches with findings by Capozza and Seguin (2003) who justified higher LEVERAGE for bigger firms because of economies of scale in debt issues. Anyway, SIZE has a very low explanatory power (0.03). Perhaps due to regulatory constraints and to the general belief that bigger firms are better diversified, it does not seem to properly work for REITs. As a matter of fact, in many countries the REIT status does not allow to run significant activities but those from the rental business. As reasonably expected, the dimension of the business does not matter when the underlying industry does not allow any diversification advantage. Even US REITs, according to Morri and Beretta (2008) and Feng *et al.* (2007), show an almost zero coefficient among SIZE and LEVERAGE.

REITs characterised by higher GROWTH carry on less debt (−0.07, significant at 1 per cent level). Once again, this evidence can be reconnected to the REITs regulatory requirements on the distribution of earnings, the effects that larger or lower GROWTH

	Coefficient	Std. error	*t*-statistic	Prob.
C	0.33162	0.069512	4.770673	0.0000
SIZE	0.03315	0.007656	4.329926	0.0000
PROFIT	−0.701844	0.228173	−3.07594	0.0025
GROWTH	−0.06985	0.024952	−2.79937	0.0058
COST	0.79642	0.398455	0.199877	0.0474
OWNERSHIP	−0.004655	0.03897	−0.11946	0.9051
RISK	−0.159623	0.037621	−4.24296	0.0000

Table V.
Empirical findings, the REIT sub-sample

Notes: *R*-squared – 0.269457; Adjusted *R*-squared – 0.241359; *F*-statistic – 9.58994; Prob (*F*-statistic) 0.00000

will have on LEVERAGE are actually very low, because notwithstanding the management expectations on growth, they will not be allowed to retain a bigger amount of earnings.

COST (significance at 5 per cent) is high enough (0.8) to cause a deep change in LEVERAGE strategy, which Bredin and Stevenson (2006) explain as follows: following an increase in interest rates the stock price is expected to lower and consequently LEVERAGE to increase.

RISK of REITs is very close with the RECs' one (−0.159 vs −0.162); the negative value confirms the cautious behaviour held by managers of more operationally risky firms. A comparison between REITs and other kind of property companies made by Delcoure and Dickens (2004) confirmed the importance of risk in determining LEVERAGE for both categories of companies. Morri and Beretta found that US REITs have an even more risk dependent capital structure (−1.44), almost ten times bigger than European. This phenomenon can be due to the more efficient US capital market. Operationally risky North American REITs are perceived by the financial community as much more dangerous in terms of debt repayment, so that the market penalises them when asking for financing and for this reason they borrow lower debt compared to less risky counterparts.

OWNERSHIP is not able to affect capital structure choices (−0.004) also because it is not statistically significant. Data referring to the REITs sub-sample are affected by heteroskedasticity[31].

6.2 Empirical evidence on the REC sample

The analysis of the correlation among regressors, of the R^2 value and the fact that four out of seven explanatory variables are statistically significant is a clear signal of nonexistence of multicollinearity. The adjusted R^2 0.28 per cent and the F-statistic (14.4) show a high ability of the linear regression model to interpret the data[32] (Table VI).

Differently from the previous analysis, SIZE is not a statistically significant factor in determining LEVERAGE for REC and however its value is close to nil, perhaps due to the characteristics of the sub-sample (low variability in asset dimension). It is possible that the majority of non REITs companies do not reach the critical asset value that allows them to enjoy the "too big to fail" advantages.

PROFIT does not change much with respect to previous findings (−1.20): it is still the highest, confirming the preference to use internal funds. The value of OWNERSHIP

	Coefficient	Std. error	*t*-statistic	Prob.
C	0.570557	0.096232	5.928957	0
SIZE	0.009727	0.012392	0.784961	0.4334
PROFIT	−1.195687	0.241778	−4.945395	0
GROWTH	−0.00108	0.003113	−0.346869	0.729
COST	0.141703	0.484709	0.292347	0.7703
OWNERSHIP	0.083761	0.03659	2.289186	0.0231
RISK	−0.162316	0.028323	−5.730867	0

Notes: *R*-squared – 0.296596; Adjusted *R*-squared – 0.276008; *F*-statistic – 14.40663; Prob (*F*-statistic) 0.00000

Table VI.
Empirical findings, the REC sub-sample

(0.083), being positive and statistically significant, shows that the presence of big shareholders on the governance and the monitoring effect they bring within the company increase the LEVERAGE ratio and reduce the agency problem. Conversely, RISK works in the opposite direction (−0.16), confirming the fact that more operationally risky firms are reluctant in adding a further risk component by increasing the degree of financial LEVERAGE. Comparing the overall set of results with REC companies' sub-sample, LEVERAGE is substantially shaped by the same explanatory variables roughly with the same strength[33].

6.3 Time series comparison

In order to check if the elements that affect capital structure choices work steadily during time, a series of regressions have been run[34] (Table VII).

The explanatory power of the model over time is quite constant and the level of adjusted R^2 goes from 0.2 to 0.42, moreover the F-statistic is always significant at 1 per cent level. The value of RISK as well as the membership to the REITs family has an extraordinary strength to affect LEVERAGE during the comprehensive time period surveyed.

During each examined year, REITs have lower LEVERAGE than RECs and values constantly around −0.11. The tax advantages scheme at which REIT are enforced are strongly suspected to definitively differentiate the capital structure of non-taxpaying firms.

PROFIT and SIZE are statistically significant for five out of ten regressions. SIZE is permanently positive; PROFIT roughly behaves with the same regularity even though its coefficient is negative and slightly more volatile. GROWTH, COST OF DEBT and OWNERSHIP are not powerful in affecting the debt structure over time. Their high *p*-values are unreliable tools in determining the firm's financial structure. Data on the internationality of operations and on the diversification of the business have been introduced in the analysis concerning year 2006[35]. The INTERNATIONALITY is negative (−0.068) while the DIVERSIFICATION effect influences the business in the opposite way, for both factors (1.414 *t*-statistics) its coefficient is not properly significant (respectively 0.368 and 0.161).

7. Conclusion

This study has investigated the factors affecting the capital structure of property companies considering both the pecking order and TOM, analysing both REITs and common real estate companies. The main findings can be summarised as follows:

(1) The tax exempt status of REITs is definitively important in affecting capital structure decisions: RECs are significantly more LEVERAGED than REITs (0.408 vs 0.329). Of course companies having different business will have different financing due to the peculiarity of their activities, which is confirmed by strong findings of intra-industry similarities in firm's LEVERAGE when detecting the REIT and REC sub samples.

(2) Empirical findings matches with TOM when analysing whether and how strongly OPERATING RISK affects LEVERAGE, constantly negative and statistically significant. Firms with a high level of operating risk have lower LEVERAGE, due to the purpose to maintain a moderate total risk profile, avoid to add financial risk.

	Total	*t*-stat	REIT	*t*-stat	non-REIT	*t*-stat	2006	*t*-stat	2005	*t*-stat	2004	*t*-stat	2003	*t*-stat	2002	*t*-stat
C	0.438	8.245***	0.331	4.770***	0.57	5.928***	0.308	2.670***	0.262	1.916*	0.584	4.574***	0.44	3.694***	0.513	4.391***
SIZE	0.026	3.858***	0.033	4.329***	0.009	0.784	0.038	2.856***	0.041	2.562**	0.012	0.808	0.033	2.151**	0.027	1.856*
PROFIT	−1.058	−6.284***	−0.701	−3.075***	−1.195	−4.945***	−0.898	−2.904***	−0.213	−0.593	−1.769	−3.097***	−1.352	−2.099**	0.426	0.876
GROWTH	−0.003	−1.24	−0.069	−2.799***	−0.001	−0.346	−0.018	−1.23	0.019	0.855	−0.006	−0.332	−0.001	−0.513	−0.08	−4.029***
COST	0.219	0.717	0.796	1.998**	0.141	0.292	−0.316	−0.407	−0.101	−0.187	0.134	0.165	0.514	0.522	0.828	1.298
OWNER	0.089	3.286	−0.004	−0.119	0.083	2.289**	−0.047	−0.86	−0.076	−1.276	0.08	1.241	0.084	1.257	0.048	0.846
RISK	−0.155	−7.068***	−0.159	−4.242***	−0.162	−5.730***	−0.057	−1.508	−0.118	−2.443**	−0.158	−2.967***	−0.184	−3.042***	−0.248	−4.575**
REIT	−0.1	−6.425***	N/A	N/A	N/A	N/A	−0.093	−2.973***	−0.121	−3.716***	−0.131	−3.947***	−0.128	−3.549***	−0.135	−4.025***
R^2	0.296		0.241		0.276		0.29		0.2		0.334		0.262		0.419	
F-STAT	23.44		9.589		14.406		5.979		3.766		6.105		4.564		7.929	

Notes: Statistically significant at *10 per cent; **5 per cent; ***1 per cent

Table VII.
Coefficients and
t-statistics of regressors
over time

(3) SIZE follows predictions stated by the TOM: although the positive coefficient is not impressively high, its stability and significance is a clear signal of the way it acts. Bigger firms are expected to have less volatile earnings due to more diversified sources of cash flows. This theory works well for companies that are able to follow a diversification strategy like RECs companies. Results are also confirmed for REITs, where the benefits deriving from the diversification of cash flow's sources are not properly realised due to regulatory constraints.

(4) PROFIT is the variable that more heavily influences LEVERAGE: negative relationship confirming the predictions stated by the POT. More profitable firms prefer to finance new investment opportunities by using retained earnings rather than issuing costly debt. The high payout requirement at which REITs are enforced does not allow them to finance future positive NPV investments by using retained earnings, even though REITs' LEVERAGE behaves on the same way as the REC's LEVERAGE for what concerns the profitability issue.

(5) GROWTH, COST OF DEBT and OWNERSHIP STRUCTURE are not orienting factors in explaining LEVERAGE. GROWTH, although not statistically significant, when assuming constantly negative values, is closer to TOM's predictions: firms characterised by high expected growth rates have for a lower need of the disciplining effect of debt payments to control free cash-flows. COST, being positive but not statistically significant, is closer to the theory predicting an increase in LEVERAGE, due to a stock market fall when central banks increase the cost of borrowing. OWNERSHIP STRUCTURE, being either slightly positive or slightly negative, but always very close to zero, suggests the inability of big blockholders to influence the choices of the management team and thus of the amount of LEVERAGE carried on.

(6) The business and the international diversification do not add value when investigating on the factors influencing debt.

The analysis has shown some results consistent both with the POT and with the TOM, but this empirical research assigns the TOM and thus the Modigliani and Miller original theory a greater effectiveness in explaining the capital structure choices of property companies that belong to the EPRA NAREIT European Index.

Notes

1. In the remaining part of the paper standard property companies will also be defined as "REC".
2. In the remaining part of the paper the pecking order theory will be defined as "POT".
3. The existence of personal taxes could imply a fiscal disadvantage on the use of debt at investor level but this issue has been neglected because it is assumed to be country specific for the scope of this work.
4. In the remaining part of the paper the trade off model will be defined as "TOM".
5. Models based on the trade off of tax benefits of debt and on the costs of financial distress predict a positive relation between leverage and profitability. In a trade off framework high past profitability is viewed as a proxy for higher future growth opportunities, which are intangible assets that could be severely damaged in a situation of financial distress. For further explanation see Smith and Watts (1992).

6. The "Too Big to Fail" theory currently appears to be out of fashion considering the Lehman Brother and AIG cases.
7. On 5th November 2007.
8. All data refer to the annual report 2006 or to the presentations to the financial community. For companies allowed to issue the annual report relating to periods different from January 2006 to December 2006 (typically from March 2006 to March 2007), the last available annual report has been used.
9. On 2006 annual reports 2006 of the 60 RECs companies. When revenues breakdown has not been available, others proxy have been used (i.e. income deriving from domestic activities or if the company had as major activity the investment property business the proportion of asset portfolio held abroad).
10. This reclassification, according to the diversification of the business, has used the set of data that were available in the segment breakdown of each company. The proxy to implement this analysis has been revenues. When the revenue breakdown has not been available, the following proxies have been used: operating profit, net profit, gross profit.
11. As in the previous case, when the property segment breakdown (calculated as market value) has not been available the segment breakdown of rental income or the segment property breakdown (calculated as a percentage of rentable area, generally sq metres) have been used as a proxy for the diversification of assets.
12. This classification has been possible by analysing all the 2006 annual reports of the 37 REITs belonging to the index. Whenever the property geographical breakdown (calculated as market value) was not available, the international breakdown of rental income or the international property breakdown (calculated as a percentage of rentable area, generally sq metres) have been used as a proxy for the internationality of assets.
13. Appendices present results and statistics deriving from a time breakdown, each year has been surveyed separately in order to check for consistency during different time periods.
14. It is a good indicator of the past financing decision and it is also consistent with the capital employed theory.
15. He demonstrated that there is a strong cross-sectional correlation between the book value and the market value of debt. In case of a regression analysis, the independence is expected to be particularly strong when the cross-sectional differences among the two values are not correlated with the independent variables used to run the analysis itself. Consequently, empirical researches can use either the book value either the market value without having a substantial difference in their results. Also Fama and French (2002) prefer a book value approach by stating that most of the theoretical predictions apply to book leverage.
16. The debt to equity ratio (calculated at market value) is the ratio that is considered to be the better proxy for leverage and thus, it is used in the empirical part of this work.
17. Calculations are made by using E-views.
18. Multicollinearity will be tested by analysing the correlation matrix among regressors, by using the set of auxiliary regressions suggested by Klein's rule and by observing the values of R^2 and t-statistic of the ordinary least square method.
19. Whenever the model has been found to be affected by heteroskedasticity, further procedures have been used in order to verify if heteroskedasticity actually influences results. The White Heteroskedasticity-Consistent Variances Standard Errors and the Newey-West HAC Standard Errors and Covariance are the two implemented models to verify whether heteroskedasticity adds bias to the results coming from the linear regression model.

21. The autocorrelation of residuals will be verified by implementing both the Jarque-Bera test and the spatial autocorrelation analysis, while the White heteroskedasticity test will be performed to check for the existence of different variances.
21. According to Datastream the beta levered is calculated as a coefficient based on 23 to 35 consecutive month end price percent changes and their relativity to a local market index.
22. Country corporate tax rate is the tax rate applied on various countries during the 2002-2006 period. It refers to the tax rate that enables the company to deduct interest expenses. For example in the Italian case, the tax rate of IRAP (Imposta Regionale Attività Produttive, the regional tax on productive activities) has not been counted because it does not enable the deductibility of interest expenses.
23. Data on income tax rate come from "KPMG's Corporate Tax Rate Survey, An international analysis of corporate tax rates from 1993 to 2006".
24. REITs are characterized by favourable tax regimes and for this reason the tax rate utilized in order to find the unlevered beta is assumed to be zero. In Germany, Belgium and the Netherlands all profits gained by REITs are actually taxed at zero rate. In Greece, France and UK also it also exists a favourable taxation even though the tax rate is slightly higher than zero. In France and UK profits coming from the rental business and capital gains resulting from disposal of assets or participations belonging to the eligible activities are taxes exempt. Other no core activities are taxed respectively at 35.43 and 30 per cent. Actually the rule that prevents French and English REITs from carrying on rental income activities for more than 20 and 25 per cent of their overall profit will reduce the maximum payable tax rate to around 7 per cent of their profits. Given that it is impossible to have a breakdown of income by core and non-core activities and given that the value of the unlevered beta will not change by using 0 or 7 per cent tax rate, unless after the third decimal, a zero tax rate has been used. In the case of Greece the problem is even more negligible with tax rates of REITs companies included from 1 to 2 per cent.
25. The membership to the REITs sample has been captured by using a dummy variable. Should the dummy variable show to be a significant factor in explaining leverage, two additional multiple regressions will be run, one for REITs companies and one for REC. Thanks to data decomposition it will be easier to find how different independent variables in turns affect REITs and RECs.
26. The choice of certain explanatory variables has been made because they are believed to not be a linear function of any others. Should this assumption be violated and multicollinearity exist, the OLS would fail.
27. Although 477 is the theoretical number of observations, the software has been able to use only 374 observations because of some data missing (reverse survivorship bias effect): whenever data refer to periods back in time the sample size has decreased, due to the fact that some companies that today belong to the index did not exist or were not listed a few years before.
28. Appendix 1 shows the results about the spatial autocorrelation test, the White heteroskedasticity test and the Jarque-Bera test.
29. For further explanations and evidences about this topic please refer to Appendix 1. White's Heteroskedasticity-Consistent Variances Standard Errors and Newey-West HAC Standard Errors and Covariance test show that the model is affected by heteroskedasticity but this issue does not affect results.
30. In their research Rajan and Zingales run a regression for each country present in their sample.
31. By running the White and the Newey West HAC models the significance of explanatory variables keeps being the same except for the cost proxy, whose p value changes from 0.0474

to 0.328 for the Newey West and 0.3283 for the White analysis. Using this result the explanatory variable cost loses its significance and it approaches the results obtained for the same proxy in the overall and in the RECs sub-sample analysis (Appendix 3).

32. As usual, data relating to the spatial autocorrelation test, to the white heteroskedasticity test and to the Jarque-Bera test will be presented in appendices.
33. The White heteroskedasticity test shows the presence of variable variances. In this case, as well as in the previous one, when more elaborate models are used to check for the power of heteroskedasticity to influence the ordinary least square results, negligible differences in p-values have been found, confirming the goodness of the standard OLS model. For further explanations and evidences about this topic please refer to Appendix 2.
34. The following table returns all the coefficients and their significance level in order to check for the explanatory power of the model along different time periods.
35. In order to collect qualitative data on the international and on the business diversification of every company, each annual report has been analysed and used to find relevant information. Thanks to the uniformity of international standards in the real estate industry, especially for what concerns REITs, it has been possible to build up a common database. The transformation of qualitative information into quantitative one has been done by employing the Herfindahl Hirschman Index, also known as concentration index. It is calculated as the sum of the squared product of a set of factors representing the whole: $\alpha = \sum_{i=1}^{n} s_i^2$. Intuitively, if total revenues are divided according to their geographical origin, transformed in percentage values and employed in the formula, as soon as the value of α is closer to 1 the diversification is going to be lower. By assuming that there is a company that is not diversified at all, it is expected to have a Herfindahl Index equal to one.
36. 24.4776 is the upper percentage point at 25 per cent probability of a chi square distribution with 30 degrees of freedom.

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Appendices

The following Appendices will show the set of statistical tests implemented in order to check the existence of multicollinearity, heteroskedasticity and autocorrelation. Each Appendix contains the overall set of statistics for each regression that was carried out.

The existence of multicollinearity will be monitored by running a set of Pearson correlations coefficients among regressors and, only for the main regression presented in chapter 4, by running an auxiliary test. The auxiliary test, also called Klein's test, is performed by regressing each independent variable on the remaining explanatory elements. Whenever the R^2 obtained from the auxiliary regressions is higher than the one extracted from the main standard regression, it means that multicollinearity exists.

The presence of heteroskedasticity will be checked by using the White's test; its probability will immediately show whether the variables variance issue affects the model. Should the model be heteroskedastic, two further analyses will be carried out, namely the White Heteroskedasticity-Consistent Standard Error and Covariance and the Newey-West Hac Standard Errors and Covariance tests. The results of these tests will display whether the variable variance problem affects empirical findings or not.

Eventually, the behaviour of the disturbance terms ε_t will be first checked by a Jarque-Bera test and later on by a graphical spatial correlation analysis. The graphical representation of residuals will show whether and how ε_t are spatially correlated, while the Jarque-Bera will detect whether disturbance terms are distributed according to a normal standard distribution.

Appendix 1

Statistical tests for the comprehensive regression

Please refer to Tables AI-AVIII.

Table AI.
Correlations coefficients among regressors for the comprehensive sample

	SIZE	PROFIT	GROWTH	COST	OWNER	RISK	REIT
SIZE	1.0000						
	–						
PROFIT	0.1235	1.0000					
	2.4004	–					
GROWTH	0.1900	0.1068	1.0000				
	3.7319	2.0708	–				
COST	0.0264	0.1162	0.0832	1.0000			
	0.5090	2.2570	1.6097	–			
OWNER	−0.1221	−0.1940	−0.1345	0.0395	1.0000		
	−2.3737	−3.8143	−2.6179	0.7621	–		
RISK	−0.0654	0.1036	−0.0711	0.2832	−0.0335	1.0000	
	−1.2638	2.0082	−1.3754	5.6950	−0.6456	–	
REIT	0.1877	0.0724	−0.0081	0.0205	0.0292	−0.1476	1.0000
	3.6866	1.4009	−0.1555	0.3948	0.5627	−2.8778	–

Table AII.
Regression of size on the remaining explanatory variables

	Coefficient	Std. error	*t*-statistic	Prob.
C	5.966475	0.301439	19.79334	0.0000
LEVERAGE	1.480092	0.383557	3.858859	0.0001
PROFIT	3.410099	1.314639	2.593943	0.0099
GROWTH	0.070952	0.020594	3.445275	0.0006
COST	0.335572	2.287458	0.146701	0.8834
OWNERSHIP	−0.486819	0.204561	−2.379818	0.0178
RISK	0.101280	0.175403	0.577412	0.5640
REIT	0.547089	0.119989	4.559503	0.0000

R-squared	0.124932
Adjusted *R*-squared	0.108196
SE of regression	1.082305
Sum squared resid	428.7262
Log likelihood	−556.2203
F-statistic	7.464775
Prob (*F*-statistic)	0.000000
Mean dependent var	7.096000
SD dependent var	1.146080
Akaike info criterion	3.017221
Schwarz criterion	3.101162
Hannan-Quinn criter.	3.050549
Durbin-Watson stat	1.997689

Notes: Dependent variable: SIZE; Method: Least Squares; Sample (adjusted): 1 477; Included observations: 374 after adjustments

		Coefficient	Std. error	*t*-statistic	Prob.
C		0.073758	0.016649	4.430242	0.0000
LEVERAGE		−0.092052	0.014646	−6.284949	0.0000
SIZE		0.005294	0.002041	2.593943	0.0099
GROWTH		0.000701	0.000824	0.850717	0.3955
COST		0.160893	0.089735	1.792969	0.0738
OWNERSHIP		−0.017790	0.008068	−2.204830	0.0281
RISK		−0.003519	0.006912	−0.509123	0.6110
REIT		−0.002882	0.004858	−0.593373	0.5533
R-squared	0.166733				
Adjusted *R*-squared	0.150796				
SE of regression	0.042643				
Sum squared resid	0.665540				
Log likelihood	653.2910				
F-statistic	10.46211				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.068277				
SD dependent var	0.046274				
Akaike info criterion	−3.450754				
Schwarz criterion	−3.366813				
Hannan-Quinn criter.	−3.417426				
Durbin-Watson stat	1.356376				

Notes: Dependent variable: PROFIT; Method: Least Squares; Sample (adjusted): 1 477; Included observations: 374 after adjustments

Table AIII.
Regression of profit on the remaining explanatory variables

		Coefficient	Std. error	*t*-statistic	Prob.
C		−1.109640	1.081918	−1.025622	0.3057
LEVERAGE		−1.209740	0.975366	−1.240293	0.2157
SIZE		0.442733	0.128504	3.445275	0.0006
PROFIT		2.816484	3.310720	0.850717	0.3955
COST		11.74273	5.681131	2.066970	0.0394
OWNERSHIP		−0.927736	0.512640	−1.809721	0.0712
RISK		−1.026057	0.435060	−2.358425	0.0189
REIT		−0.457876	0.307194	−1.490514	0.1370
R-squared	0.075018				
Adjusted *R*-squared	0.057327				
SE of regression	2.703575				
Sum squared resid	2675.211				
Log likelihood	−898.6107				
F-statistic	4.240490				
Prob (*F*-statistic)	0.000162				
Mean dependent var	1.146765				
SD dependent var	2.784569				
Akaike info criterion	4.848186				
Schwarz criterion	4.932127				
Hannan-Quinn criter.	4.881514				
Durbin-Watson stat	2.178851				

Notes: Dependent variable: GROWTH; Method: Least Squares; Sample (adjusted): 1 477; Included observations: 374 after adjustments

Table AIV.
Regression of growth on the remaining explanatory variables

		Coefficient	Std. error	*t*-statistic	Prob.
C		0.026858	0.009811	2.737534	0.0065
LEVERAGE		0.006411	0.008935	0.717558	0.4735
SIZE		0.000175	0.001194	0.146701	0.8834
PROFIT		0.054117	0.030183	1.792969	0.0738
GROWTH		0.000983	0.000475	2.066970	0.0394
OWNERSHIP		0.006673	0.004697	1.420663	0.1563
RISK		0.021870	0.003843	5.690148	0.0000
REIT		0.003423	0.002813	1.216834	0.2245
R-squared	0.107382				
Adjusted *R*-squared	0.090311				
SE of regression	0.024731				
Sum squared resid	0.223855				
Log likelihood	857.0462				
F-statistic	6.290006				
Prob (*F*-statistic)	0.000001				
Mean dependent var	0.052512				
S.D. dependent var	0.025930				
Akaike info criterion	−4.540354				
Schwarz criterion	−4.456413				
Hannan-Quinn criter.	−4.507026				
Durbin-Watson stat	1.791186				

Table AV.
Regression of cost on the remaining explanatory variables

Notes: Dependent variable: COST; Method: Least Squares; Sample (adjusted): 1 477; Included observations: 374 after adjustments

		Coefficient	Std. error	*t*-statistic	Prob.
C		0.426733	0.107699	3.962288	0.0001
LEVERAGE		0.321406	0.097785	3.286845	0.0011
SIZE		−0.031302	0.013153	−2.379818	0.0178
PROFIT		−0.736841	0.334194	−2.204830	0.0281
GROWTH		−0.009560	0.005282	−1.809721	0.0712
COST		0.821796	0.578460	1.420663	0.1563
RISK		0.015826	0.044490	0.355727	0.7222
REIT		0.060600	0.031117	1.947481	0.0522
R-squared	0.093795				
Adjusted *R*-squared	0.076463				
SE of regression	0.274442				
Sum squared resid	27.56658				
Log likelihood	−43.05217				
F-statistic	5.411715				
Prob (*F*-statistic)	0.000006				
Mean dependent var	0.370053				
SD dependent var	0.285577				
Akaike info criterion	0.273006				
Schwarz criterion	0.356948				
Hannan-Quinn criter.	0.306335				
Durbin-Watson stat	1.478954				

Table AVI.
Regression of ownership on the remaining explanatory variables

Notes: Dependent variable: OWNERSHIP; Method: Least Squares; Sample (adjusted): 1 477; Included observations: 374 after adjustments

		Coefficient	Std. error	*t*-statistic	Prob.
C		0.775523	0.122673	6.321881	0.0000
LEVERAGE		−0.772785	0.109327	−7.068594	0.0000
SIZE		0.008986	0.015563	0.577412	0.5640
PROFIT		−0.201120	0.395032	−0.509123	0.6110
GROWTH		−0.014590	0.006186	−2.358425	0.0189
COST		3.716265	0.653105	5.690148	0.0000
OWNERSHIP		0.021839	0.061391	0.355727	0.7222
REIT		−0.175530	0.035578	−4.933693	0.0000
R-squared	0.229617				
Adjusted *R*-squared	0.214883				
SE of regression	0.322384				
Sum squared resid	38.03893				
Log likelihood	−103.2673				
F-statistic	15.58406				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.579858				
SD dependent var	0.363837				
Akaike info criterion	0.595012				
Schwarz criterion	0.678953				
Hannan-Quinn criter.	0.628341				
Durbin-Watson stat	1.752825				

Notes: Dependent variable: RISK; Method: Least Squares; Sample (adjusted): 1 477; Included observations: 374 after adjustments

Table AVII.
Regression of risk on the remaining explanatory variables

		Coefficient	Std. error	*t*-statistic	Prob.
C		0.320915	0.183035	1.753294	0.0804
LEVERAGE		−1.009928	0.157182	−6.425199	0.0000
SIZE		0.098243	0.021547	4.559503	0.0000
PROFIT		−0.333429	0.561922	−0.593373	0.5533
GROWTH		−0.013177	0.008841	−1.490514	0.1370
COST		1.177179	0.967412	1.216834	0.2245
OWNERSHIP		0.169245	0.086904	1.947481	0.0522
RISK		−0.355261	0.072007	−4.933693	0.0000
R-squared	0.161612				
Adjusted *R*-squared	0.145577				
SE of regression	0.458640				
Sum squared resid	76.98824				
Log likelihood	−235.1102				
F-statistic	10.07886				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.433155				
SD dependent var	0.496175				
Akaike info criterion	1.300055				
Schwarz criterion	1.383996				
Hannan-Quinn criter.	1.333383				
Durbin-Watson stat	0.325369				

Notes: Dependent variable: REIT; Method: Least Squares; Sample (adjusted): 1 477; Included observations: 374 after adjustments

Table AVIII.
Regression of REIT on the remaining explanatory variables

White heteroskedasticity test
Please refer to Table AIX.

		Coefficient	Std. error	*t*-statistic	Prob.
F-statistic	5.635527				
Obs *R*-squared	135.0552				
Scaled explained SS	140.1125				
Prob. *F* (34,339)	0.0000				
Prob. Chi-Square (34)	0.0000				
Prob. Chi-Square (34)	0.0000				
Dependent variable: RESID^2					
C		0.153349	0.052725	2.908471	0.0039
SIZE		−0.039657	0.011680	−3.395289	0.0008
SIZE^2		0.002651	0.000868	3.055769	0.0024
SIZE*PROFIT		−0.073184	0.030652	−2.387574	0.0175
SIZE*GROWTH		0.001745	0.001355	1.287816	0.1987
SIZE*COST		−0.005987	0.072406	−0.082687	0.9341
SIZE*OWNERSHIP		−0.003910	0.004934	−0.792381	0.4287
SIZE*RISK		−0.000654	0.005307	−0.123301	0.9019
SIZE*REIT		0.001464	0.003083	0.474866	0.6352
PROFIT		0.464465	0.248565	1.868585	0.0625
PROFIT^2		−0.080640	0.426587	−0.189035	0.8502
PROFIT*GROWTH		−0.021249	0.039184	−0.542294	0.5880
PROFIT*COST		−1.188201	1.089857	−1.090236	0.2764
PROFIT*OWNERSHIP		0.278195	0.118686	2.343963	0.0197
PROFIT*RISK		0.108207	0.101041	1.070917	0.2850
PROFIT*REIT		0.097950	0.070927	1.380991	0.1682
GROWTH		0.003224	0.009114	0.353702	0.7238
GROWTH^2		−0.000284	0.000196	−1.450706	0.1478
GROWTH*COST		−0.060799	0.096049	−0.633002	0.5272
GROWTH*OWNERSHIP		−0.004569	0.007901	−0.578330	0.5634
GROWTH*RISK		−0.008342	0.004405	−1.893844	0.0591
GROWTH*REIT		−0.017138	0.006020	−2.846713	0.0047
COST		0.473377	0.618372	0.765521	0.4445
COST^2		4.066498	0.874439	4.650407	0.0000
COST*OWNERSHIP		−0.491785	0.276087	−1.781269	0.0758
COST*RISK		−0.591834	0.170719	−3.466724	0.0006
COST*REIT		−0.363209	0.153862	−2.360617	0.0188
OWNERSHIP		0.015333	0.041646	0.368174	0.7130
OWNERSHIP^2		0.022818	0.017536	1.301180	0.1941
OWNERSHIP*RISK		−0.013810	0.016802	−0.821924	0.4117
OWNERSHIP*REIT		0.034164	0.011043	3.093834	0.0021
RISK		−0.006360	0.042989	−0.147951	0.8825
RISK^2		0.021033	0.009380	2.242308	0.0256
RISK*REIT		0.019390	0.009996	1.939880	0.0532
REIT		−0.007937	0.024740	−0.320792	0.7486
R-squared	0.361110				
Adjusted *R*-squared	0.297033				
SE of regression	0.025280				
Sum squared resid	0.216656				
Log likelihood	863.1588				
F-statistic	5.635527				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.020457				
SD dependent var	0.030152				
Akaike info criterion	−4.428657				
Schwarz criterion	−4.061414				
Hannan-Quinn criter.	−4.282844				
Durbin-Watson stat	2.197256				

Table AIX.
White heteroskedasticity test for the comprehensive sample

According to the White Heteroskedasticity Test the model suffers of variable variances. Under the null hypothesis that there is not heteroskedasticity, the sample size (n) times the R^2 obtained from the auxiliary regression asymptotically follows the chi-square distribution with df equal to the number of regressors (excluding the constant term) in the auxiliary regression. That is: $n \times R^2 \approx \chi^2_{df}$, where df is the number of auxiliary regressors. If the chi-square value obtained exceeds the critical chi-square value at the chosen level of significance, the conclusion is that the model is affected by heteroskedasticity.

In this case: 135.0552 > 24.4776[36]. In order to check if the heteroskedasticity problem impacts on the efficiency of ordinary least square estimators and on the validity of least-square inference, two further analyses have been run: the White Heteroskedasticity-Consistent Standard Error and Covariance and the Newey-West Hac Standard Errors and Covariance (Tables AX and AXI).

The ordinary least square methodology, when corrected for the heteroskedasticity problem, provides the same set of coefficients but also a very similar set of p-values. Actually, the level of significance of the explanatory variables displayed to affect leverage is the same in the ordinary least square methodology, in the White Heteroskedasticity-Consistent Standard Error and Covariance and in the Newey-West Hac Standard Errors and Covariance tests. The result clearly shows that even though the model is affected by heteroskedasticity, it does not impact on the set of empirical results observed.

Jarque-Bera test
Please refer to Figure A1.

Spatial autocorrelation
Please refer to Figure A2.

		Coefficient	Std. error	*t*-statistic	Prob.
C		0.438762	0.062003	7.076482	0.0000
SIZE		0.026414	0.008090	3.265160	0.0012
PROFIT		−1.058227	0.181658	−5.825367	0.0000
GROWTH		−0.003460	0.003084	−1.121728	0.2627
COST		0.219123	0.536437	0.408478	0.6832
OWNERSHIP		0.089205	0.030610	2.914230	0.0038
RISK		−0.155436	0.025795	−6.025746	0.0000
REIT		−0.100366	0.015855	−6.330376	0.0000
R-squared	0.309542				
Adjusted *R*-squared	0.296336				
SE of regression	0.144584				
Sum squared resid	7.651030				
Log likelihood	196.6377				
F-statistic	23.44038				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.460885				
SD dependent var	0.172360				
Akaike info criterion	−1.008758				
Schwarz criterion	−0.924816				
Hannan-Quinn criter.	−0.975429				
Durbin-Watson stat	1.704933				

Notes: Dependent variable: LEVERAGE; Method: Least Squares; Sample (adjusted): 1 477; White Heteroskedasticity-Consistent Standard Errors and Covariance

Table AX.
White Heteroskedasticity Consistent Standard Errors and Covariance test for the comprehensive sample

		Coefficient	Std. error	*t*-Statistic	Prob.
C		0.438762	0.064831	6.767749	0.0000
SIZE		0.026414	0.008080	3.268966	0.0012
PROFIT		− 1.058227	0.186206	− 5.683096	0.0000
GROWTH		− 0.003460	0.003140	− 1.101702	0.2713
COST		0.219123	0.524039	0.418142	0.6761
OWNERSHIP		0.089205	0.031161	2.862695	0.0044
RISK		− 0.155436	0.027642	− 5.623088	0.0000
REIT		− 0.100366	0.018238	− 5.503122	0.0000
R-squared	0.309542				
Adjusted *R*-squared	0.296336				
SE of regression	0.144584				
Sum squared resid	7.651030				
Log likelihood	196.6377				
F-statistic	23.44038				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.460885				
SD dependent var	0.172360				
Akaike info criterion	− 1.008758				
Schwarz criterion	− 0.924816				
Hannan-Quinn criter.	− 0.975429				
Durbin-Watson stat	1.704933				

Table AXI.
Newey-West HAC Standard Errors and Covariance test for the comprehensive sample

Notes: Dependent variable: LEVERAGE; Method: Least Squares; Sample (adjusted): 1 477; Newey-West HAC Standard Errors and Covariance

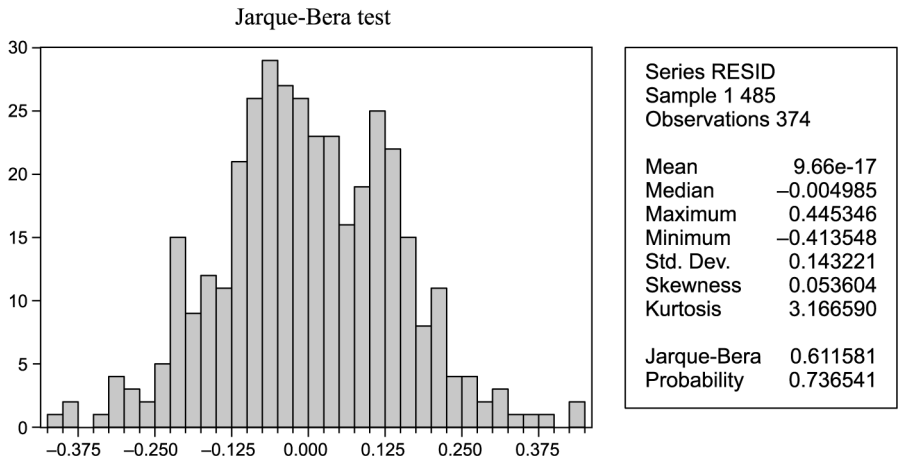

Figure A1.
Jarque-Bera Test for the comprehensive sample

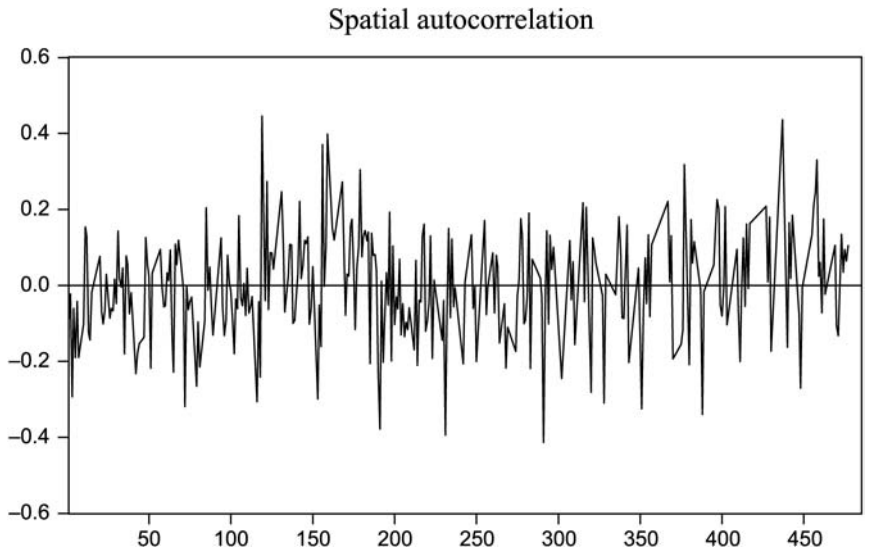

Figure A2.
Graph of residual's distribution for the comprehensive sample

Appendix 2

Statistical tests for the REC regression

Please refer to Table AXII.

	SIZE	PROFIT	GROWTH	COST	OWNER	RISK
SIZE	1.000000					
	–					
PROFIT	− 0.002440	1.000000				
	− 0.035353	–				
GROWTH	0.320446	0.132815	1.000000			
	4.902205	1.941883	–			
COST	− 0.074237	0.159322	0.136044	1.000000		
	− 1.078767	2.338666	1.989960	–		
OWNER	− 0.081088	− 0.149306	− 0.161192	0.053566	1.000000	
	− 1.178965	− 2.188171	− 2.366849	0.777364	–	
RISK	− 0.196529	0.193655	− 0.090443	0.158190	− 0.008324	1.000000
	− 2.904614	2.860476	− 1.316036	2.321620	− 0.120631	–

Table AXII.
Correlations coefficients among regressors for the REC sample

White heteroskedasticity test

Please refer to Table AXIII.

Even in this case the model is affected by heteroskedasticity. By checking the relevance of the issue by running the White Heteroskedasticity-Consistent Standard Error and Covariance and the Newey-West Hac Standard Errors and Covariance tests, it is possible to conclude that the heteroskedasticity does not affect the results given that the *p*-values have the same level of significance as in the ordinary least square methodology (Tables AXIV and AXV).

		Coefficient	Std. error	*t*-statistic	Prob.
F-statistic	2.843007				
Obs *R-squared	62.40718				
Scaled explained SS	51.72523				
Prob. *F* (27,184)	0.0000				
Prob. Chi-Square (27)	0.0001				
Prob. Chi-Square (27)	0.0000				
Dependent variable: RESID^2					
C		0.177131	0.148354	1.193975	0.2340
SIZE		−0.037928	0.033875	−1.119647	0.2643
SIZE^2		0.001907	0.002184	0.873127	0.3837
SIZE*PROFIT		−0.056180	0.076922	−0.730356	0.4661
SIZE*GROWTH		1.05E − 05	0.001748	0.006028	0.9952
SIZE*COST		0.034714	0.129243	0.268596	0.7885
SIZE*OWNERSHIP		0.011972	0.008348	1.434133	0.1532
SIZE*RISK		0.003033	0.008073	0.375734	0.7075
PROFIT		0.475397	0.564273	0.842494	0.4006
PROFIT^2		−0.565606	0.551670	−1.025261	0.3066
PROFIT*GROWTH		0.012574	0.052293	0.240447	0.8103
PROFIT*COST		−4.426753	2.466699	−1.794606	0.0744
PROFIT*OWNERSHIP		0.266401	0.164778	1.616734	0.1076
PROFIT*RISK		0.239094	0.133653	1.788920	0.0753
GROWTH		0.009298	0.012562	0.740131	0.4602
GROWTH^2		−0.000111	0.000255	−0.432994	0.6655
GROWTH*COST		−0.013084	0.121589	−0.107608	0.9144
GROWTH*OWNERSHIP		0.007443	0.010039	0.741436	0.4594
GROWTH*RISK		−0.013776	0.005290	−2.604302	0.0100
COST		0.530880	1.161944	0.456890	0.6483
COST^2		2.020222	2.848169	0.709306	0.4790
COST*OWNERSHIP		−0.130680	0.381641	−0.342417	0.7324
COST*RISK		−0.654503	0.272658	−2.400453	0.0174
OWNERSHIP		−0.156101	0.070568	−2.212061	0.0282
OWNERSHIP^2		0.041320	0.024128	1.712503	0.0885
OWNERSHIP*RISK		0.005588	0.020591	0.271367	0.7864
RISK		−0.028701	0.066465	−0.431817	0.6664
RISK^2		0.016079	0.011892	1.352111	0.1780
R-squared	0.294374				
Adjusted *R*-squared	0.190830				
SE of regression	0.026984				
Sum squared resid	0.133973				
Log likelihood	480.0554				
F-statistic	2.843007				
Prob (*F*-statistic)	0.000019				
Mean dependent var	0.022476				
SD dependent var	0.029997				
Akaike info criterion	−4.264674				
Schwarz criterion	−3.821351				
Hannan-Quinn criter.	−4.085493				
Durbin-Watson stat	2.386653				

Table AXIII.
White heteroskedasticity test for the REC sample

		Coefficient	Std. error	*t*-statistic	Prob.
C		0.570557	0.107303	5.317270	0.0000
SIZE		0.009727	0.013752	0.707322	0.4802
PROFIT		−1.195687	0.253611	−4.714640	0.0000
GROWTH		−0.001080	0.002773	−0.389299	0.6975
COST		0.141703	0.585978	0.241823	0.8092
OWNERSHIP		0.083761	0.039991	2.094481	0.0374
RISK		−0.162316	0.028957	−5.605373	0.0000
R-squared	0.296596				
Adjusted *R*-squared	0.276008				
SE of regression	0.152459				
Sum squared resid	4.764953				
Log likelihood	101.4867				
F-statistic	14.40663				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.494391				
SD dependent var	0.179178				
Akaike info criterion	−0.891384				
Schwarz criterion	−0.780553				
Hannan-Quinn criter.	−0.846589				
Durbin-Watson stat	1.660893				

Notes: Dependent variable: LEVERAGE; Method: Least Squares; Sample (adjusted): 1 292; White Heteroskedasticity-Consistent Standard Errors and Covariance

Table AXIV.
White heteroskedasticity consistent standard errors and covariance test for the RECs sample

		Coefficient	Std. error	*t*-statistic	Prob.
C		0.570557	0.103761	5.498752	0.0000
SIZE		0.009727	0.012422	0.783053	0.4345
PROFIT		−1.195687	0.268089	−4.460037	0.0000
GROWTH		−0.001080	0.002883	−0.374446	0.7085
COST		0.141703	0.605075	0.234191	0.8151
OWNERSHIP		0.083761	0.039774	2.105922	0.0364
RISK		−0.162316	0.031430	−5.164356	0.0000
R-squared	0.296596				
Adjusted *R*-squared	0.276008				
SE of regression	0.152459				
Sum squared resid	4.764953				
Log likelihood	101.4867				
F-statistic	14.40663				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.494391				
SD dependent var	0.179178				
Akaike info criterion	−0.891384				
Schwarz criterion	−0.780553				
Hannan-Quinn criter.	−0.846589				
Durbin-Watson stat	1.660893				

Notes: Dependent variable: LEVERAGE; Method: Least Squares; Sample (adjusted): 1 292; Newey-West HAC Standard Errors and Covariance

Table AXV.
Newey-West HAC Standard Errors and Covariance test for the RECs sample

Jarque-Bera test
Please refer to Figure A3.

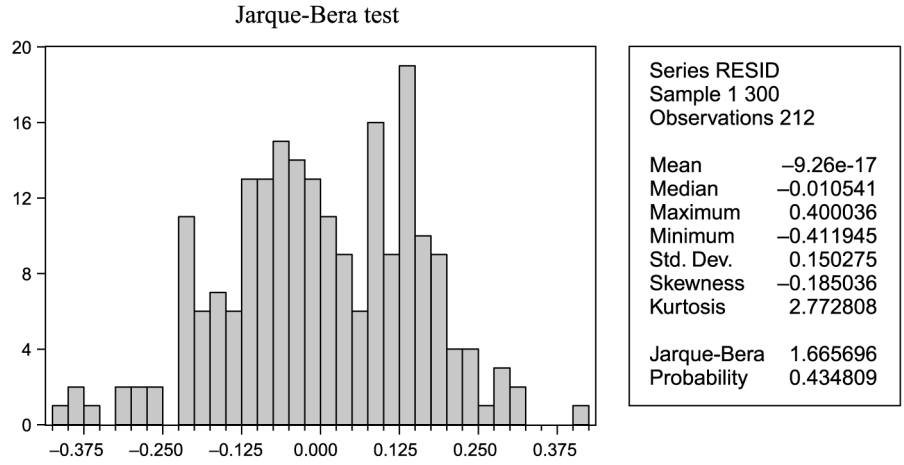

Figure A3.
Jarque-Bera Test for the RECs sample

Spatial autocorrelation
Please refer to Figure A4.

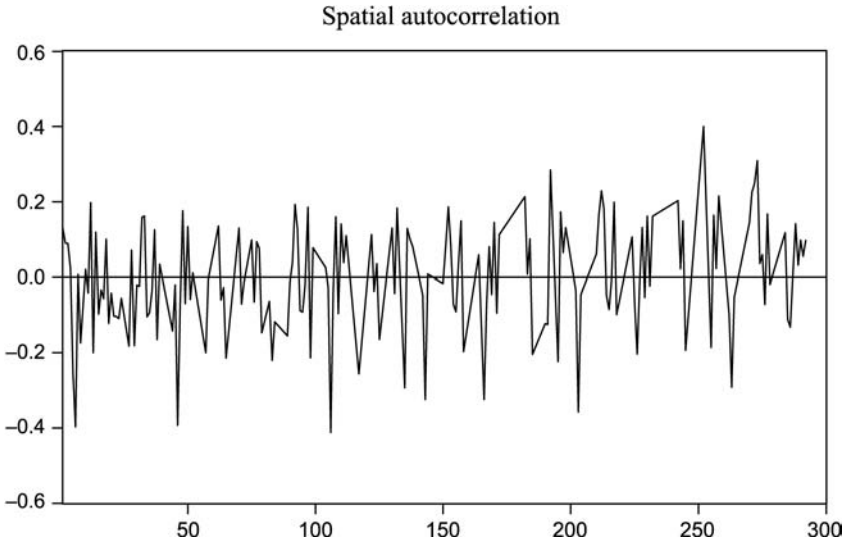

Figure A4.
Graph of residual's distribution for the RECs sample

Appendix 3

Statistical tests for the REIT regression
Please refer to Table AXVI.

White heteroskedasticity test
Please refer to Table AXVII.

	SIZE	PROFIT	GROWTH	COST	OWNER	RISK
SIZE	1.000000					
	–					
PROFIT	−0.002440	1.000000				
	−0.035353	–				
GROWTH	0.320446	0.132815	1.000000			
	4.902205	1.941883	–			
COST	−0.074237	0.159322	0.136044	1.000000		
	−1.078767	2.338666	1.989960	–		
OWNER	−0.081088	−0.149306	−0.161192	0.053566	1.000000	
	−1.178965	−2.188171	−2.366849	0.777364	–	
RISK	−0.196529	0.193655	−0.090443	0.158190	−0.008324	1.000000
	−2.904614	2.860476	−1.316036	2.321620	−0.120631	–

Table AXVI.
Correlations coefficients among regressors for the REITs sample

		Coefficient	Std. error	*t*-statistic	Prob.
F-statistic	5.283537				
Obs*R-squared	83.74711				
Scaled explained SS	135.5459				
Prob. *F* (27,135)	0.0000				
Prob. Chi-Square (27)	0.0000				
Prob. Chi-Square (27)	0.0000				
Dependent variable: RESID^2					
C		0.103067	0.070831	1.455113	0.1480
SIZE		−0.026651	0.014919	−1.786388	0.0763
SIZE^2		0.002476	0.001121	2.208752	0.0289
SIZE*PROFIT		−0.059898	0.035259	−1.698792	0.0917
SIZE*GROWTH		−0.004707	0.004289	−1.097402	0.2744
SIZE*COST		−0.151834	0.098888	−1.535409	0.1270
SIZE*OWNERSHIP		0.002478	0.007488	0.331011	0.7411
SIZE*RISK		0.007515	0.008619	0.871997	0.3848
PROFIT		0.237372	0.430621	0.551231	0.5824
PROFIT^2		−0.127520	0.979231	−0.130224	0.8966
PROFIT*GROWTH		0.225874	0.232158	0.972930	0.3323
PROFIT*COST		1.689331	2.786060	0.606351	0.5453
PROFIT*OWNERSHIP		−0.086831	0.200809	−0.432407	0.6661
PROFIT*RISK		−0.125796	0.207221	−0.607064	0.5448
GROWTH		−0.018458	0.045444	−0.406163	0.6853
GROWTH^2		0.015041	0.007622	1.973404	0.0505
GROWTH*COST		0.521125	0.480181	1.085268	0.2797
GROWTH*OWNERSHIP		0.020957	0.024732	0.847345	0.3983
GROWTH*RISK		−0.074844	0.036669	−2.041062	0.0432
COST		0.584247	0.851615	0.686045	0.4939
COST^2		2.986287	1.464507	2.039107	0.0434
COST*OWNERSHIP		−1.404527	0.528535	−2.657397	0.0088
COST*RISK		−0.316040	0.394941	−0.800222	0.4250
OWNERSHIP		0.024733	0.062068	0.398478	0.6909
OWNERSHIP^2		0.046012	0.027865	1.651266	0.1010

(*continued*)

Table AXVII.
White heteroskedasticity test, for the REITs sample

		Coefficient	Std. error	*t*-statistic	Prob.
OWNERSHIP*RISK		−0.039678	0.034273	−1.157687	0.2490
RISK		0.003862	0.081447	0.047416	0.9623
RISK^2		0.046915	0.027652	1.696620	0.0921
R-squared	0.513786				
Adjusted *R*-squared	0.416543				
SE of regression	0.022356				
Sum squared resid	0.067471				
Log likelihood	403.5829				
F-statistic	5.283537				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.015521				
SD dependent var	0.029268				
Akaike info criterion	−4.608379				
Schwarz criterion	−4.076937				
Hannan-Quinn criter.	−4.392619				
Durbin-Watson stat	1.836204				

Table AXVII.

The model is affected by heteroskedasticity. By running the White and the Newey-West Hac tests, similar results to the ordinary least square are obtained, even though in this case the significance of the explanatory variable cost is much weaker than previous results (0.0474 vs 0.3280 and 0.3283). Nonetheless, the comprehensive explanatory power of the OLS model continues to be absolutely high (Tables AXVIII and AXIX).

		Coefficient	Std. error	*t*-statistic	Prob.
C		0.331620	0.078336	4.233319	0.0000
SIZE		0.033150	0.008834	3.752473	0.0002
PROFIT		−0.701844	0.237605	−2.953833	0.0036
GROWTH		−0.069850	0.026306	−2.655288	0.0087
COST		0.796420	0.812134	0.980652	0.3283
OWNERSHIP		−0.004655	0.045195	−0.103003	0.9181
RISK		−0.159623	0.049696	−3.211970	0.0016
R-squared	0.269457				
Adjusted *R*-squared	0.241359				
SE of regression	0.127347				
Sum squared resid	2.529885				
Log likelihood	108.2075				
F-statistic	9.589942				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.403082				
SD dependent var	0.146208				
Akaike info criterion	−1.241810				
Schwarz criterion	−1.108949				
Hannan-Quinn criter.	−1.187870				
Durbin-Watson stat	1.887616				

Table AXVIII.
White heteroskedasticity consistent standard errors and covariance test for the REITs sample

Notes: Dependent variable: LEVERAGE; Method: Least Squares; Sample (adjusted): 1 185; White heteroskedasticity-consistent standard errors and covariance

		Coefficient	Std. error	*t*-statistic	Prob.
C		0.331620	0.086090	3.852011	0.0002
SIZE		0.033150	0.008967	3.696713	0.0003
PROFIT		−0.701844	0.239742	−2.927499	0.0039
GROWTH		−0.069850	0.026761	−2.610141	0.0099
COST		0.796420	0.811698	0.981178	0.3280
OWNERSHIP		−0.004655	0.045819	−0.101599	0.9192
RISK		−0.159623	0.049047	−3.254484	0.0014
R-squared	0.269457				
Adjusted *R*-squared	0.241359				
SE of regression	0.127347				
Sum squared resid	2.529885				
Log likelihood	108.2075				
F-statistic	9.589942				
Prob (*F*-statistic)	0.000000				
Mean dependent var	0.403082				
SD dependent var	0.146208				
Akaike info criterion	−1.241810				
Schwarz criterion	−1.108949				
Hannan-Quinn criter.	−1.187870				
Durbin-Watson stat	1.887616				

Notes: Dependent variable: LEVERAGE; Method: Least Squares; Sample (adjusted): 1 185; Newey-West HAC standard errors and covariance

Table AXIX.
Newey-West HAC standard errors and covariance test for the REITs sample

Jarque-Bera test

Please refer to Figure A5.

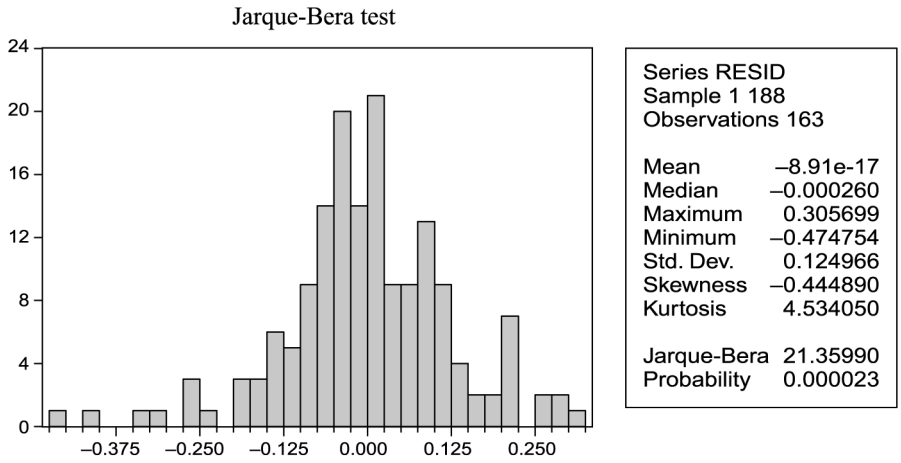

Figure A5.
Jarque-Bera Test for the REITs sample

Spatial autocorrelation
Please refer to Figure A6.

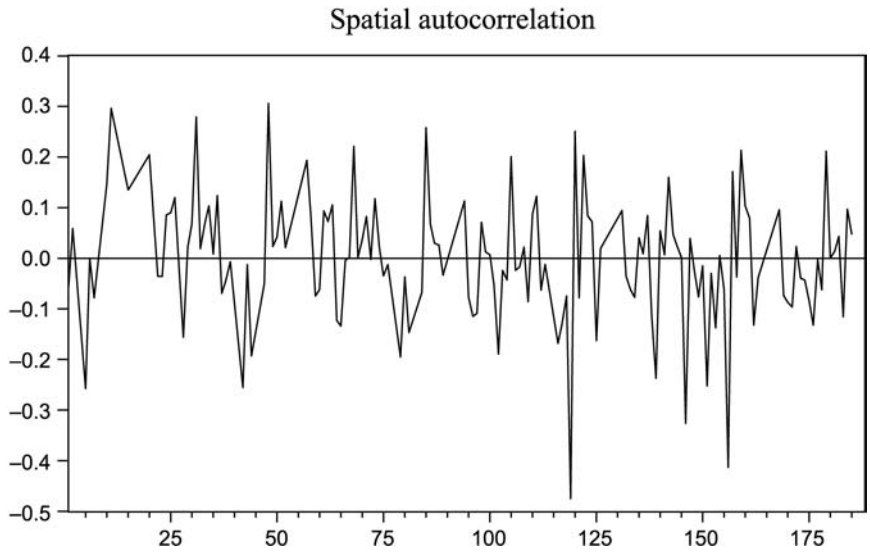

Figure A6.
Graph of residual's distribution for the REITs sample

Appendix 4

Statistical tests for the 2006 regression
Please refer to Table AXX.

	SIZE	PROFIT	GROWTH	COST	OWNER	RISK	REIT
SIZE	1.000000						
	–						
PROFIT	0.051759	1.000000					
	0.475017	–					
GROWTH	−0.133440	−0.062410	1.000000				
	−1.234031	−0.573114	–				
COST	−0.012294	0.317679	−0.076360	1.000000			
	−0.112688	3.070641	−0.701898	–			
OWNER	−0.075807	−0.232597	0.166453	−0.241255	1.000000		
	−0.696785	−2.191902	1.547153	−2.278441	–		
RISK	0.000817	0.273763	0.081419	0.488905	−0.204421	1.000000	
	0.007486	2.608745	0.748706	5.136652	−1.913967	–	
REIT	0.147027	0.334403	−0.250509	−0.062293	−0.021597	−0.137054	1.000000
	1.362330	3.252077	−2.371574	−0.572032	−0.197986	−1.268086	–

Table AXX.
Correlations coefficients among regressors for the 2006 sample

White heteroskedasticity test
Please refer to Table AXXI.

		Coefficient	Std. error	*t*-statistic	Prob.
F-statistic	0.978454				
Obs*R-squared	33.95143				
Scaled explained SS	34.02763				
Prob. *F* (34,51)	0.5192				
Prob. Chi-Square (34)	0.4701				
Prob. Chi-Square (34)	0.4664				
Dependent variable: RESID^2					
C		−0.123116	0.175666	−0.700853	0.4866
SIZE		0.033239	0.033462	0.993331	0.3252
SIZE^2		−0.002265	0.002264	−1.000773	0.3217
SIZE*PROFIT		0.079523	0.085887	0.925904	0.3589
SIZE*GROWTH		−0.005131	0.005348	−0.959472	0.3418
SIZE*COST		0.026551	0.271670	0.097731	0.9225
SIZE*OWNERSHIP		−0.004099	0.013924	−0.294417	0.7696
SIZE*RISK		0.002061	0.012240	0.168353	0.8670
SIZE*REIT		−0.005417	0.008068	−0.671456	0.5050
PROFIT		−0.599387	0.778375	−0.770048	0.4448
PROFIT^2		0.527839	1.355116	0.389516	0.6985
PROFIT*GROWTH		−0.087099	0.140388	−0.620414	0.5377
PROFIT*COST		−1.961645	6.165168	−0.318182	0.7516
PROFIT*OWNERSHIP		−0.076029	0.389578	−0.195156	0.8460
PROFIT*RISK		0.200246	0.242811	0.824699	0.4134
PROFIT*REIT		−0.132544	0.201203	−0.658759	0.5130
GROWTH		0.046545	0.053337	0.872657	0.3869
GROWTH^2		−0.001996	0.002846	−0.701066	0.4864
GROWTH*COST		0.255365	0.389855	0.655024	0.5154
GROWTH*OWNERSHIP		−0.005240	0.020477	−0.255898	0.7991
GROWTH*RISK		−0.002658	0.010812	−0.245874	0.8068
GROWTH*REIT		0.003393	0.012356	0.274624	0.7847
COST		0.451480	2.459741	0.183548	0.8551
COST^2		−3.126592	4.843598	−0.645510	0.5215
COST*OWNERSHIP		−0.944733	0.754728	−1.251753	0.2164
COST*RISK		−0.087210	0.515203	−0.169273	0.8663
COST*REIT		−0.173088	0.638060	−0.271273	0.7873
OWNERSHIP		0.129427	0.112953	1.145842	0.2572
OWNERSHIP^2		−0.053286	0.043869	−1.214656	0.2301
OWNERSHIP*RISK		0.008638	0.042907	0.201331	0.8412
OWNERSHIP*REIT		0.022635	0.031780	0.712221	0.4796
RISK		−0.084293	0.099178	−0.849918	0.3993
RISK^2		0.031625	0.021834	1.448460	0.1536
RISK*REIT		0.004547	0.028897	0.157357	0.8756
REIT		0.049972	0.070797	0.705855	0.4835
R-squared	0.394784				
Adjusted *R*-squared	−0.008693				
SE of regression	0.022419				
Sum squared resid	0.025634				
Log likelihood	227.0533				
F-statistic	0.978454				
Prob (*F*-statistic)	0.519202				
Mean dependent var	0.014217				
SD dependent var	0.022323				
Akaike info criterion	−4.466356				
Schwarz criterion	−3.467493				
Hannan-Quinn criter.	−4.064360				
Durbin-Watson stat	1.936012				

Table AXXI.
White heteroskedasticity test for the 2006 sample

Jarque-Bera test
Please refer to Figure A7.

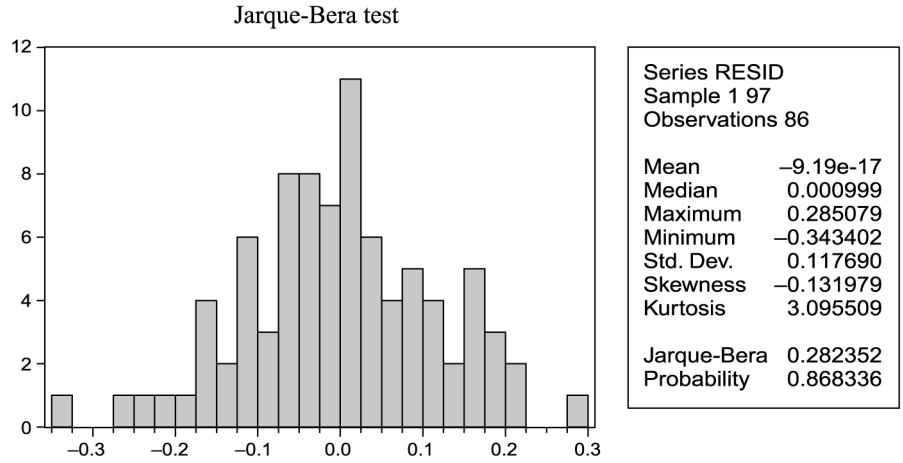

Figure A7.
Jarque-Bera Test for the 2006 sample

Spatial autocorrelation
Please refer to Figure A8.

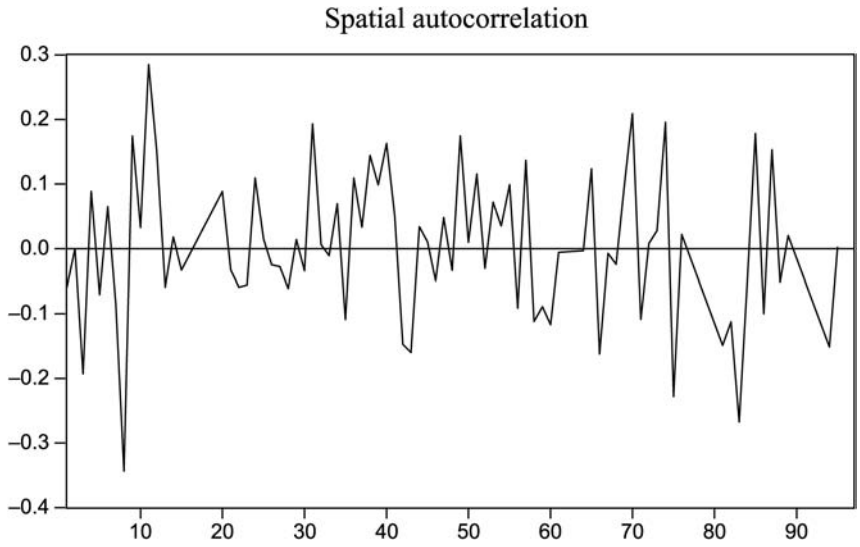

Figure A8.
Graph of residual's distribution for the 2006 sample

Appendix 5
Statistical tests for the 2005 regression
Please refer to Table AXXII.

	SIZE	PROFIT	GROWTH	COST	OWNER	RISK	REIT
SIZE	1.000000						
	–						
PROFIT	0.099876	1.000000					
	0.875078	–					
GROWTH	−0.281103	0.097009	1.000000				
	−2.553563	0.849710	–				
COST	−0.099957	−0.157643	−0.074462	1.000000			
	−0.875794	−1.391704	−0.650953	–			
OWNER	−0.169928	0.026606	0.005087	−0.008208	1.000000		
	−1.503260	0.232031	0.044348	−0.071557	–		
RISK	−0.095838	0.037783	0.344138	0.376549	−0.068872	1.000000	
	−0.839364	0.329616	3.195293	3.543486	−0.601843	–	
REIT	0.197184	0.017432	−0.158006	0.062704	−0.041918	−0.183877	1.000000
	1.753439	0.151995	−1.394984	0.547722	−0.365755	−1.630806	–

Table AXXII.
Correlations coefficients among regressors for the 2005 sample

White heteroskedasticity test
Please refer to Table AXXIII.

		Coefficient	Std. error	*t*-statistic	Prob.
F-statistic	1.830482				
Obs*R-squared	46.12889				
Scaled explained SS	48.34625				
Prob. *F* (34,43)	0.0307				
Prob. Chi-Square (34)	0.0802				
Prob. Chi-Square (34)	0.0526				
Dependent variable: RESID^2					
C		−0.128843	0.268062	−0.480646	0.6332
SIZE		0.030436	0.051170	0.594809	0.5551
SIZE^2		−0.001265	0.002995	−0.422207	0.6750
SIZE*PROFIT		0.079983	0.096996	0.824595	0.4142
SIZE*GROWTH		−0.016481	0.012284	−1.341695	0.1867
SIZE*COST		−0.089902	0.309311	−0.290653	0.7727
SIZE*OWNERSHIP		−0.004654	0.017950	−0.259270	0.7967
SIZE*RISK		0.011375	0.018875	0.602672	0.5499
SIZE*REIT		0.004936	0.008762	0.563366	0.5761
PROFIT		−0.074630	0.837562	−0.089104	0.9294
PROFIT^2		−0.529263	1.596707	−0.331472	0.7419
PROFIT*GROWTH		−0.035184	0.381302	−0.092273	0.9269
PROFIT*COST		−13.73395	5.243799	−2.619083	0.0121
PROFIT*OWNERSHIP		−0.017972	0.401218	−0.044794	0.9645
PROFIT*RISK		0.395777	0.245661	1.611073	0.1145
PROFIT*REIT		−0.063420	0.182540	−0.347429	0.7300
GROWTH		0.093028	0.116907	0.795746	0.4306
GROWTH^2		−0.001254	0.007424	−0.168913	0.8667
GROWTH*COST		1.079704	0.660385	1.634962	0.1094

(*continued*)

Table AXXIII.
White heteroskedasticity test for the 2005 sample

		Coefficient	Std. error	*t*-statistic	Prob.
GROWTH*OWNERSHIP		0.038276	0.048692	0.786080	0.4361
GROWTH*RISK		−0.032635	0.025436	−1.282986	0.2064
GROWTH*REIT		0.018210	0.029373	0.619976	0.5385
COST		1.244703	2.583685	0.481755	0.6324
COST^2		−2.107374	3.620446	−0.582076	0.5636
COST*OWNERSHIP		−1.634878	0.934922	−1.748678	0.0875
COST*RISK		−0.151118	0.436596	−0.346128	0.7309
COST*REIT		−0.600364	0.415235	−1.445840	0.1555
OWNERSHIP		0.075271	0.160420	0.469212	0.6413
OWNERSHIP^2		4.40E-05	0.043755	0.001005	0.9992
OWNERSHIP*RISK		−0.023307	0.047462	−0.491055	0.6259
OWNERSHIP*REIT		0.007243	0.035229	0.205593	0.8381
RISK		−0.182631	0.153618	−1.188867	0.2410
RISK^2		0.072261	0.035903	2.012675	0.0504
RISK*REIT		0.046273	0.032539	1.422081	0.1622
REIT		−0.062544	0.074064	−0.844457	0.4031
R-squared	0.591396				
Adjusted *R*-squared	0.268314				
SE of regression	0.022967				
Sum squared resid	0.022681				
Log likelihood	206.8968				
F-statistic	1.830482				
Prob (*F*-statistic)	0.030658				
Mean dependent var	0.016536				
SD dependent var	0.026850				
Akaike info criterion	−4.407611				
Schwarz criterion	−3.350114				
Hannan-Quinn criter.	−3.984276				
Durbin-Watson stat	2.072018				

Table AXXIII.

Jarque-Bera test

Please refer to Figure A9.

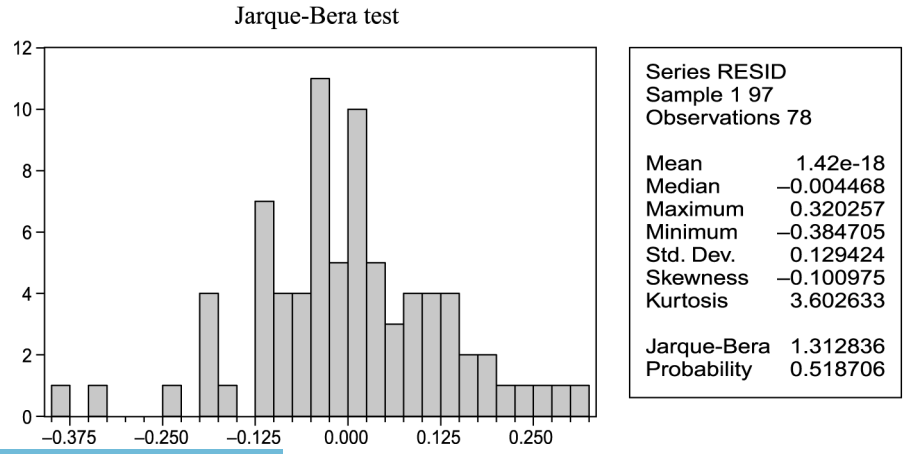

Figure A9.
Jarque-Bera Test for the 2005 sample

Spatial autocorrelation
Please refer to Figure A10.

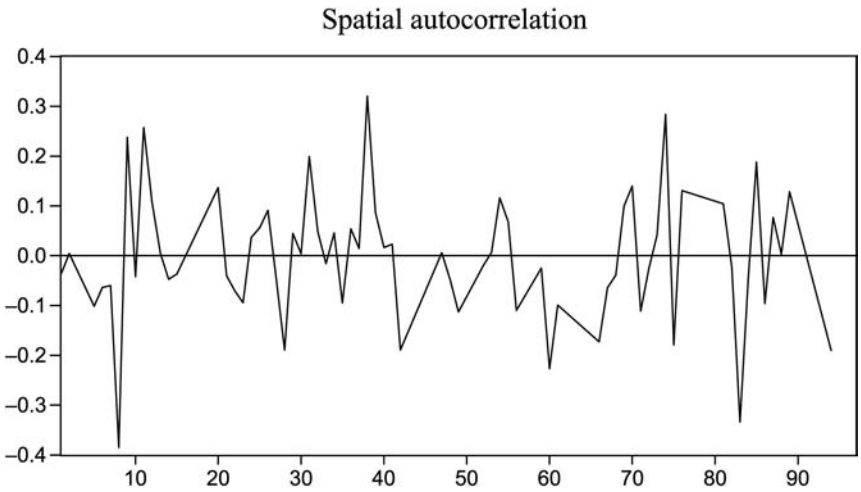

Figure A10.
Graph of residual's distribution for the 2005 sample

Appendix 6

Statistical tests for the 2004 regression
Please refer to Table AXXIV.

	SIZE	PROFIT	GROWTH	COST	OWNER	RISK	REIT
SIZE	1.000000						
	–						
PROFIT	0.122326	1.000000					
	1.031196	–					
GROWTH	−0.352250	0.011422	1.000000				
	−3.148965	0.095569	–				
COST	0.107309	0.379880	−0.059842	1.000000			
	0.903027	3.435869	−0.501570	–			
OWNER	0.021901	0.052345	−0.242961	0.199190	1.000000		
	0.183278	0.438555	−2.095550	1.700626	–		
RISK	−0.067004	0.222897	0.198668	0.322462	0.191616	1.000000	
	−0.561856	1.913021	1.695986	2.850156	1.633443	–	
REIT	0.208323	0.083153	−0.079442	0.038450	−0.032753	−0.111122	1.000000
	1.782055	0.698122	−0.666768	0.321935	−0.274176	−0.935511	–

Table AXXIV.
Correlations coefficients among regressors for the 2004 sample

White heteroskedasticity test
Please refer to Table AXXV.

		Coefficient	Std. error	*t*-statistic	Prob.
F-statistic	1.292900				
Obs *R-squared	39.09429				
Scaled explained SS	31.52742				
Prob. *F* (34,37)	0.2223				
Prob. Chi-Square (34)	0.2516				
Prob. Chi-Square (34)	0.5894				
Dependent variable: RESID^2					
C		−0.099013	0.208359	−0.475206	0.6374
SIZE		−0.013108	0.046262	−0.283339	0.7785
SIZE^2		0.002349	0.003144	0.747324	0.4596
SIZE*PROFIT		−0.231745	0.245530	−0.943854	0.3514
SIZE*GROWTH		−0.002324	0.010473	−0.221862	0.8256
SIZE*COST		0.144202	0.219470	0.657048	0.5152
SIZE*OWNERSHIP		−0.008070	0.023050	−0.350109	0.7282
SIZE*RISK		−0.005901	0.019869	−0.296978	0.7681
SIZE*REIT		−0.013522	0.008025	−1.684994	0.1004
PROFIT		1.150236	2.076473	0.553937	0.5830
PROFIT^2		−2.191045	4.529992	−0.483675	0.6315
PROFIT*GROWTH		−0.392615	0.693427	−0.566195	0.5747
PROFIT*COST		−1.105608	16.99150	−0.065068	0.9485
PROFIT*OWNERSHIP		1.259712	0.947755	1.329154	0.1919
PROFIT*RISK		0.358531	0.864314	0.414816	0.6807
PROFIT*REIT		0.658394	0.517163	1.273087	0.2109
GROWTH		0.140493	0.113069	1.242543	0.2219
GROWTH^2		−0.014046	0.011696	−1.200912	0.2374
GROWTH*COST		0.340515	0.654370	0.520371	0.6059
GROWTH*OWNERSHIP		−0.053453	0.059766	−0.894374	0.3769
GROWTH*RISK		−0.028748	0.055759	−0.515574	0.6092
GROWTH*REIT		−0.025733	0.019471	−1.321602	0.1944
COST		−0.670086	2.119505	−0.316152	0.7537
COST^2		0.276615	11.21799	0.024658	0.9805
COST*OWNERSHIP		1.385453	1.096797	1.263181	0.2144
COST*RISK		−0.899471	0.764228	−1.176966	0.2467
COST*REIT		−0.798160	0.550429	−1.450070	0.1555
OWNERSHIP		−0.005337	0.159792	−0.033401	0.9735
OWNERSHIP^2		0.052814	0.059688	0.884820	0.3820
OWNERSHIP*RISK		−0.092077	0.074460	−1.236591	0.2240
OWNERSHIP*REIT		−0.004579	0.035137	−0.130328	0.8970
RISK		0.055463	0.146354	0.378963	0.7069
RISK^2		0.052293	0.035103	1.489696	0.1448
RISK*REIT		0.019924	0.033819	0.589126	0.5594
REIT		0.116746	0.064043	1.822917	0.0764
R-squared	0.542976				
Adjusted *R*-squared	0.123008				
SE of regression	0.022288				
Sum squared resid	0.018380				
Log likelihood	195.6695				
F-statistic	1.292900				
Prob (*F*-statistic)	0.222337				
Mean dependent var	0.016542				
SD dependent var	0.023800				
Akaike info criterion	−4.463043				
Schwarz criterion	−3.356330				
Hannan-Quinn criter.	−4.022457				
Durbin-Watson stat	2.548904				

Table AXXV.
White heteroskedasticity test for the 2004 sample

Jarque-Bera test
Please refer to Figure A11.

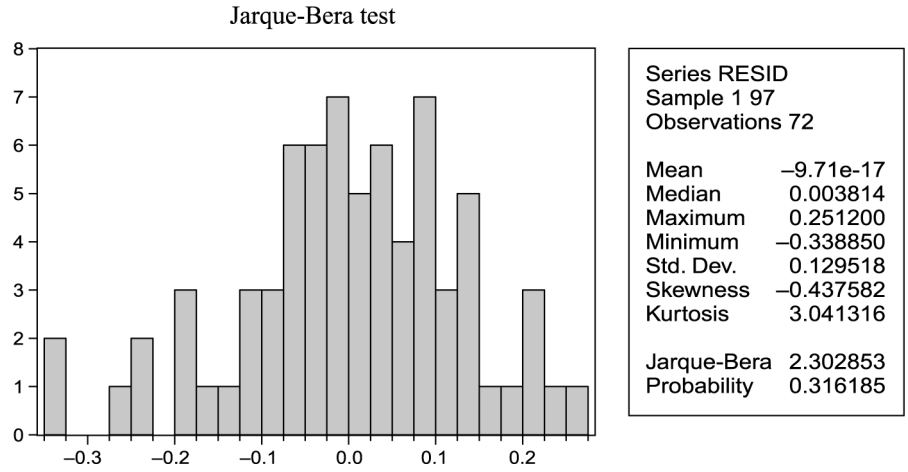

Figure A11.
Jarque-Bera Test for the 2004 sample

Spatial autocorrelation
Please refer to Figure A12.

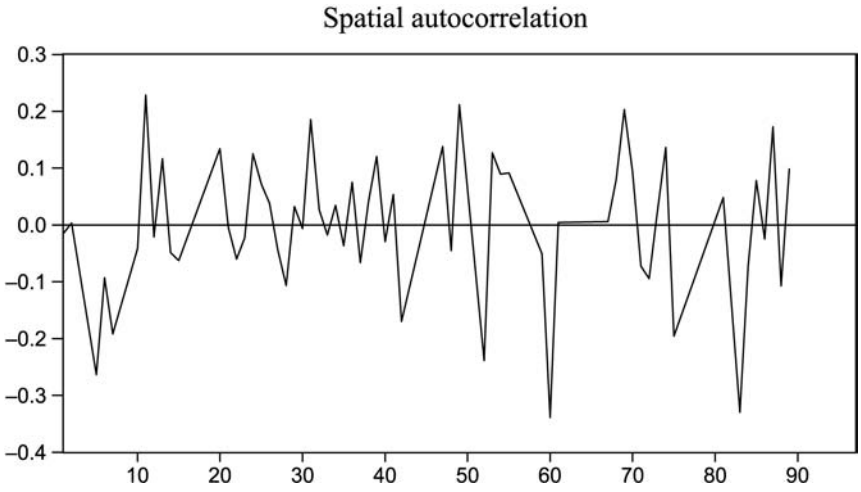

Figure A12.
Graph of residual's distribution for the 2004 sample

Appendix 7

Statistical tests for the 2003 regression

Please refer to Table AXXVI.

	SIZE	PROFIT	GROWTH	COST	OWNER	RISK	REIT
SIZE	1.000000						
	–						
PROFIT	0.013681	1.000000					
	0.113652	–					
GROWTH	0.461145	0.094608	1.000000				
	4.316975	0.789412	–				
COST	0.208791	0.250833	0.300834	1.000000			
	1.773431	2.152387	2.620301	–			
OWNER	−0.153505	−0.109138	−0.234541	0.065756	1.000000		
	−1.290403	−0.912018	−2.004149	0.547395	–		
RISK	−0.226967	0.113838	−0.337815	0.182706	0.065945	1.000000	
	−1.935849	0.951801	−2.981368	1.543651	0.548975	–	
REIT	0.206669	−0.034248	0.094709	−0.044855	0.026795	−0.179623	1.000000
	1.754600	−0.284653	0.790263	−0.372970	0.222652	−1.516729	–

Table AXXVI.
Correlations coefficients among regressors for the 2003 sample

White heteroskedasticity test

Please refer to Table AXXVII.

		Coefficient	Std. error	*t*-statistic	Prob.
F-statistic	1.283451				
Obs*R-squared	38.90451				
Scaled explained SS	29.87879				
Prob. *F* (34,36)	0.2309				
Prob. Chi-Square (34)	0.2584				
Prob. Chi-Square (34)	0.6699				
Dependent variable: RESID^2					
C		−0.078351	0.268447	−0.291867	0.7721
SIZE		0.017409	0.049039	0.354999	0.7247
SIZE^2		−0.000617	0.003132	−0.197152	0.8448
SIZE*PROFIT		−0.507467	0.224102	−2.264445	0.0297
SIZE*GROWTH		0.002734	0.018350	0.148983	0.8824
SIZE*COST		0.344675	0.369647	0.932444	0.3573
SIZE*OWNERSHIP		−0.003919	0.023401	−0.167453	0.8680
SIZE*RISK		−0.018305	0.024055	−0.760949	0.4516
SIZE*REIT		−0.002155	0.009847	−0.218818	0.8280
PROFIT		3.449850	1.666722	2.069842	0.0457
PROFIT^2		4.012651	8.046559	0.498679	0.6210
PROFIT*GROWTH		−0.871272	0.563558	−1.546021	0.1308
PROFIT*COST		5.788456	12.02147	0.481510	0.6331
PROFIT*OWNERSHIP		0.363750	0.936217	0.388531	0.6999
PROFIT*RISK		−0.710363	0.918651	−0.773267	0.4444
PROFIT*REIT		0.451737	0.388710	1.162143	0.2528
GROWTH		0.036891	0.158948	0.232096	0.8178
GROWTH^2		−0.000156	0.002129	−0.073191	0.9421

(*continued*)

Table AXXVII.
White heteroskedasticity test for the 2003 sample

		Coefficient	Std. error	*t*-statistic	Prob.
GROWTH*COST		0.343452	0.863534	0.397728	0.6932
GROWTH*OWNERSHIP		−0.161848	0.081292	−1.990946	0.0541
GROWTH*RISK		0.085631	0.072340	1.183726	0.2443
GROWTH*REIT		−0.060334	0.044536	−1.354728	0.1839
COST		−2.126468	3.372470	−0.630537	0.5323
COST^2		−6.355650	13.09549	−0.485331	0.6304
COST*OWNERSHIP		−0.487032	1.453411	−0.335096	0.7395
COST*RISK		0.566422	1.116747	0.507207	0.6151
COST*REIT		−0.636896	0.650388	−0.979256	0.3340
OWNERSHIP		0.106463	0.169501	0.628098	0.5339
OWNERSHIP^2		0.053991	0.057934	0.931931	0.3576
OWNERSHIP*RISK		0.023435	0.066160	0.354217	0.7252
OWNERSHIP*REIT		0.027430	0.037557	0.730371	0.4699
RISK		−0.011735	0.210112	−0.055853	0.9558
RISK^2		0.015427	0.044231	0.348793	0.7293
RISK*REIT		0.039030	0.044160	0.883818	0.3827
REIT		0.051358	0.094587	0.542973	0.5905
R-squared	0.547951				
Adjusted *R*-squared	0.121015				
SE of regression	0.025207				
Sum squared resid	0.022874				
Log likelihood	184.6913				
F-statistic	1.283451				
Prob (*F*-statistic)	0.230928				
Mean dependent var	0.019113				
SD dependent var	0.026886				
Akaike info criterion	−4.216657				
Schwarz criterion	−3.101251				
Hannan-Quinn criter.	−3.773095				
Durbin-Watson stat	2.570898				

Table AXXVII.

Jarque-Bera test

Please refer to Figure A13.

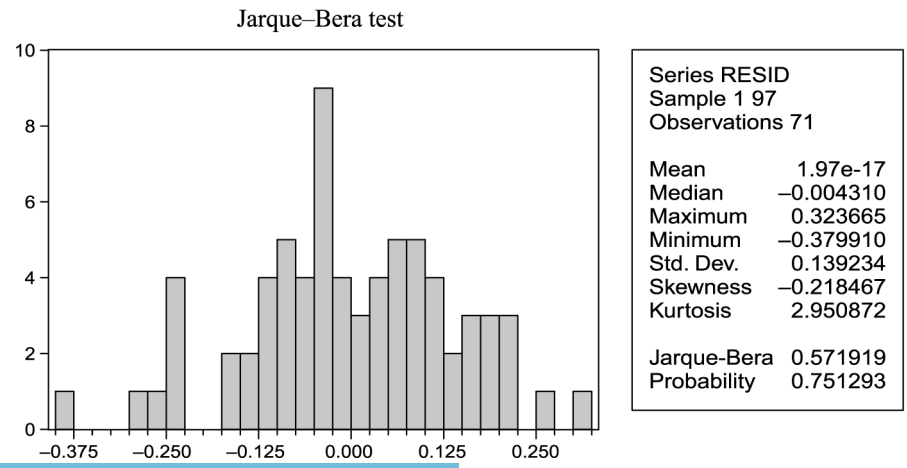

Figure A13.
Jarque-Bera Test for the 2003 sample

Spatial autocorrelation
Please refer to Figure A14.

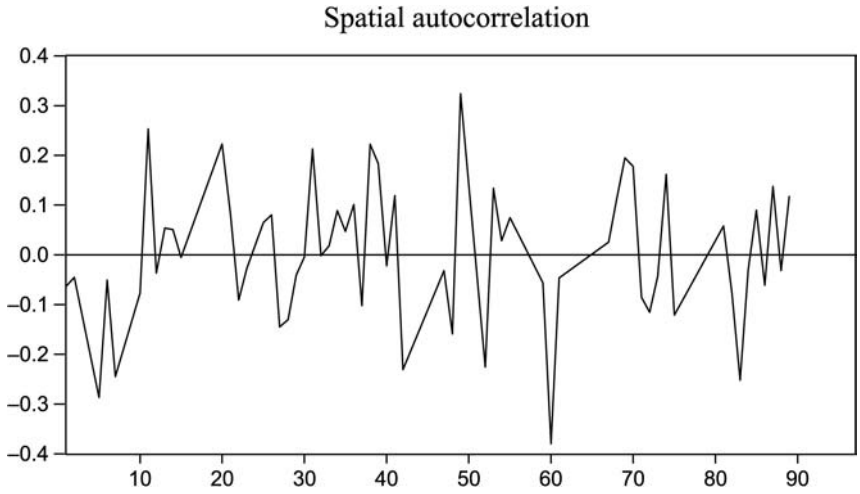

Figure A14.
Graph of residual's distribution for the 2003 sample

Appendix 8

Statistical tests for the 2002 regression
Please refer to Table AXXVIII.

	SIZE	PROFIT	GROWTH	COST	OWNER	RISK	REIT
SIZE	1.000000						
	–						
PROFIT	−0.048122	1.000000					
	−0.391398	–					
GROWTH	−0.162294	0.422520	1.000000				
	−1.336198	3.787227	–				
COST	0.062728	0.386870	0.013102	1.000000			
	0.510614	3.408338	0.106447	–			
OWNER	0.047335	−0.095702	−0.168124	0.022305	1.000000		
	0.384979	−0.781070	−1.385568	0.181249	–		
RISK	−0.049772	−0.037772	−0.019074	0.195188	−0.112475	1.000000	
	−0.404853	−0.307084	−0.154989	1.616816	−0.919590	–	
REIT	0.243927	−0.019410	−0.078516	0.046070	0.140587	−0.148403	1.000000
	2.043397	−0.157720	−0.639846	0.374675	1.153590	−1.219129	–

Table AXXVIII.
Correlations coefficients among regressors for the 2002 sample

White heteroskedasticity test
Please refer to Table AXXIX.

		Coefficient	Std. error	*t*-statistic	Prob.
F-statistic	2.445339				
Obs*R-squared	48.67874				
Scaled explained SS	47.52911				
Prob. *F* (34,33)	0.0059				
Prob. Chi-Square (34)	0.0493				
Prob. Chi-Square (34)	0.0616				
Dependent variable: RESID^2					
C		0.305559	0.172853	1.767740	0.0864
SIZE		−0.084342	0.030601	−2.756168	0.0095
SIZE^2		0.005534	0.002210	2.503971	0.0174
SIZE*PROFIT		−0.184002	0.175446	−1.048766	0.3019
SIZE*GROWTH		0.000859	0.010973	0.078303	0.9381
SIZE*COST		−0.138988	0.221689	−0.626948	0.5350
SIZE*OWNERSHIP		0.020774	0.013054	1.591373	0.1211
SIZE*RISK		0.034108	0.018237	1.870274	0.0703
SIZE*REIT		−0.013260	0.006965	−1.903925	0.0657
PROFIT		1.281006	1.586399	0.807493	0.4252
PROFIT^2		0.770827	2.094487	0.368027	0.7152
PROFIT*GROWTH		−0.086431	0.783480	−0.110317	0.9128
PROFIT*COST		−2.117990	5.303989	−0.399320	0.6922
PROFIT*OWNERSHIP		0.435943	0.430690	1.012197	0.3188
PROFIT*RISK		−0.278434	0.396084	−0.702968	0.4870
PROFIT*REIT		0.156647	0.366269	0.427682	0.6717
GROWTH		−0.008758	0.074610	−0.117384	0.9073
GROWTH^2		−0.000422	0.010709	−0.039439	0.9688
GROWTH*COST		0.104054	1.170894	0.088867	0.9297
GROWTH*OWNERSHIP		2.19E-05	0.024431	0.000896	0.9993
GROWTH*RISK		0.009635	0.061743	0.156058	0.8769
GROWTH*REIT		0.007843	0.021963	0.357113	0.7233
COST		2.544528	1.847805	1.377055	0.1778
COST^2		−1.780545	5.198843	−0.342489	0.7342
COST*OWNERSHIP		−1.468676	1.095851	−1.340215	0.1893
COST*RISK		−0.699685	0.705975	−0.991091	0.3289
COST*REIT		−0.200577	0.458013	−0.437929	0.6643
OWNERSHIP		−0.195386	0.118134	−1.653934	0.1076
OWNERSHIP^2		0.059029	0.048942	1.206107	0.2364
OWNERSHIP*RISK		0.057223	0.055597	1.029248	0.3108
OWNERSHIP*REIT		0.007034	0.025698	0.273719	0.7860
RISK		−0.265844	0.147316	−1.804581	0.0803
RISK^2		0.032236	0.050695	0.635880	0.5292
RISK*REIT		0.012988	0.028268	0.459465	0.6489
REIT		0.073324	0.057779	1.269036	0.2133
R-squared	0.715864				
Adjusted *R*-squared	0.423118				
SE of regression	0.018569				
Sum squared resid	0.011379				
Log likelihood	199.1600				
F-statistic	2.445339				
Prob (*F*-statistic)	0.005860				
Mean dependent var	0.015323				
SD dependent var	0.024448				
Akaike info criterion	−4.828236				
Schwarz criterion	−3.685842				
Hannan-Quinn criter.	−4.375585				
Durbin-Watson stat	2.820264				

Table AXXIX.
White heteroskedasticity test for the 2002 sample

Jarque-Bera test
Please refer to Figure A15.

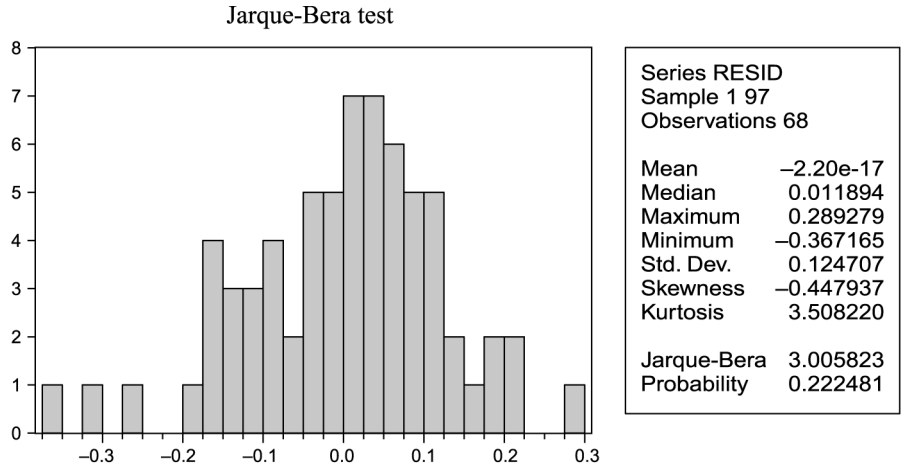

Figure A15.
Jarque-Bera Test for the 2002 sample

Spatial autocorrelation
Please refer to Figure A16.

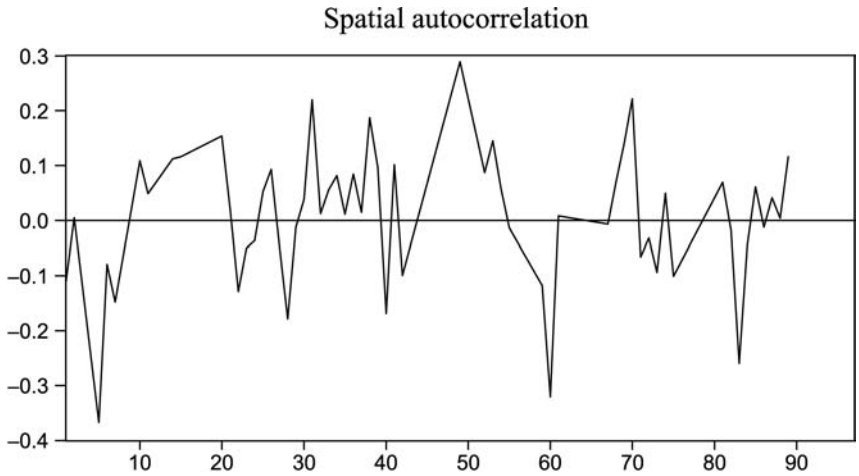

Figure A16.
Graph of residual's distribution for the 2002 sample

Appendix 9
Please refer to Table AXXX.

No.	Name	Country	Web site
REC			
1	TK Development	Denmark	www.tk-development.dk
2	Citycon	Finland	www.citycon.fi
3	Sponda Oyj	Finland	www.sponda.fi
4	Technopolis	Finland	www.technopolis.fi
5	Icade	France	www.icade.fr
6	Patrizia Immobilien	Germany	www.patrizia.ag
7	DIC Asset AG	Germany	www.dic-asset.de
8	Gagfah	Germany	www.gagfah.com/
9	Ivg Immobilien	Germany	www.ivg.de/en
10	Colonia Real Estate	Germany	www.cre.ag
11	Dt Euroshop Na	Germany	www.deutsche-euroshop.de
12	Vivacon AG	Germany	www.vivacon.de
13	Deutsche Wohnen AG	Germany	www.deutsche-wohnen.de
14	Lamda Develop/R	Greece	www.lamda-development.net
15	Babis Vovos International	Greece	www.babisvovos.gr
16	Aedes	Italy	www.aedes-immobiliare.com
17	Risanamento	Italy	www.risanamentospa.it
18	Beni Stabili	Italy	www.benistabili.it
19	Immobiliare Grande Distribuzione	Italy	www.gruppoigd.it
20	Norwegian Property ASA	Norway	www.norwegianproperty.no
21	Immofinanz AG	Austria	www.immofinanz.com
22	Sparkassen Immobilien	Austria	www.sparkassenimmobilienag.at
23	Ca Immobilien	Austria	www.caimmoag.com
24	Conwert Immobilien Invest	Austria	www.conwert.at
25	Sparkassen Immo Invest Genusscheine	Austria	www.sparkassenimmobilienag.at
26	Globe Trade Centre	Poland	www.gtc.com
27	Renta Corp Real Estate SA	Spain	www.rentacorporacion.com
28	Wihlborgs Fastigheter	Sweden	www.wihlborgs.se
29	Hufvudstaden A	Sweden	www.hufvudstaden.se
30	Castellum	Sweden	www.castellum.se
31	Fabege	Sweden	www.fabege.se
32	Kungsleden	Sweden	www.kungsleden.se
33	Klovern AB	Sweden	www.klovern.se
34	PSP Swiss Property	Switzerland	www.psp.info
35	Allreal Hld N	Switzerland	www.allreal.ch
36	Swiss Prime Site	Switzerland	www.swiss-prime-site.ch
37	Zueblin Immobilien Holding AG	Switzerland	www.zueblin.ch
38	Daejan Hdg	UK	www.daejanholdings.com
39	Mapeley	UK	www.mapeley.com
40	ING UK Real Estate Income Trust	UK	www.ingrealestate.com
41	UK Commercial Property Trust	UK	www.resolutionasset.com
42	Plaza Centers NV	UK	www.plazacenters.com
43	Marylebone Warwick Balfour Group	UK	www.mwb.co.uk
44	Minerva	UK	www.minervaplc.co.uk
45	Capital & Regional	UK	www.capreg.com
46	Quintain Estates and Development	UK	www.quintain-estates.com
47	Helical Bar	UK	www.helical.co.uk
48	CLS Holdings	UK	www.clsholdings.com
49	St Modwen Properties	UK	www.stmodwen.co.uk/
50	Grainger	UK	www.graingerplc.co.uk
51	Development Securities	UK	www.developmentsecurities.com
52	Unite Group	UK	www.unite-group.co.uk
53	ISIS Property Trust Ltd	UK	www.fandc.com

(*continued*)

Table AXXX.
List of surveyed companies, their country and their web site

No.	Name	Country	Web site
54	Assura	UK	www.assuragroup.co.uk
55	Standard Life Inv Prop Inc Trust	UK	http://retail.standardlifeinvestments.com
56	ISIS Property Trust 2 Ltd	UK	www.fandc.com
57	Invista Foundation Property Trust	UK	www.ifpt.co.uk
58	Invesco Property Income Trust	UK	www.invescopropertyit.com
59	Teesland Advantage Property Inc. Tst	UK	www.teeslandiog.com
60	F&C Commercial Property Trust	UK	www.fandc.com
REIT			
1	Befimmo (Sicafi)	Belgium	www.befimmo.be
2	Cofinimmo	Belgium	www.cofinimmo.be
3	Wereldhave Belgium	Belgium	www.wereldhavebelgium.com
4	Intervest Offices	Belgium	www.intervest.be
5	Warehouses De Pauw	Belgium	www.wdp.be
6	Leasinvest Sicafi	Belgium	www.leasinvest.be
7	Silic	France	www.silic.fr
8	Mercialys	France	www.mercialys.fr
9	Fonciere Des Regions	France	www.foncieredesregions.fr
10	Gecina	France	www.gecina.fr
11	Affine	France	www.affine-group.com
12	Société de la Tour Eiffel	France	www.societetoureiffel.com
13	Klepierre	France	www.klepierre.com
14	Acanthe Developpement	France	www.acanthedeveloppement.fr
15	Unibail – Rodamco	France	www.unibail-rodamco.com
16	Alstria Office	Germany	www.alstria.com
17	Eurobank Properties Real Estate Inv Co.	Greece	www.eurobankproperties.gr
18	ProLogis European Properties	The Netherlands	www.prologis-ep.com
19	Eurocommercial Properties	The Netherlands	www.eurocommercialproperties.com
20	Vastned Off/Ind	The Netherlands	www.vastned.nl
21	Vastned Retail	The Netherlands	www.vastned.nl
22	Corio	The Netherlands	www.corio-eu.com
23	Wereldhave	The Netherlands	www.wereldhave.nl
24	Nieuwe Steen Inv	The Netherlands	www.nsi.nl
25	British Land Co.	UK	www.britishland.com
26	Brixton	UK	www.brixton.plc.uk
27	Great Portland Estates	UK	www.gpe.co.uk
28	Land Securities Group	UK	www.landsecurities.com
29	Segro	UK	www.segro.com
30	Hammerson	UK	www.hammerson.com
31	Primary Health Prop.	UK	www.phpgroup.co.uk
32	Liberty International	UK	www.liberty-international.co.uk
33	Derwent London	UK	www.derwentlondon.com
34	Shaftesbury	UK	www.shaftesbury.co.uk
35	Mucklow (A&J) Group	UK	www.mucklow.com
36	Workspace Group	UK	www.workspacegroup.co.uk
37	Big Yellow Group	UK	www.bigyellow.co.uk

Table AXXX.

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