What factors affect the capital structure of real estate firms?

An analysis between listed firms on the European market

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Abstract

This thesis examines what factors that affect the capital structure of 84 listed real estate firms within the European Union for ten years during 2003-2012. To identify factors that affect capital structure a literature review is conducted to be able to analyse the regressions of the quantitative method. The dependent variable is leverage and the independent variables are size, return on equity, price-to-sales ratio, return, risk and one dummy variable for Real Estate Investment Trusts (REITs) and ten dummy variables for ten years. The theories from Modigliani and Miller, the trade off and the pecking order are presented and analysed along with the result from regressions in order to identify whether the variables affect the capital structure as foreseen by the theories. The sample is divided in REITs and Real Estate Operating Companies (REOCs) to be able to conduct the regressions. The result shows that return on equity (ROE) has a negative effect on leverage, price to sales ratio (PSR) has a negative effect on leverage and that risk has a positive effect on leverage for REITs. The variables; return on equity, price to sales ratio and risk are statistically significant. Hence, the expected outcome is as predicted and in line with the trade off model and the pecking order theory. The result for REOCs shows that PSR is significant. One of the models for REOCs suggests that leverage has decreased from the base year of 2003.

Table of Contents

1. Introduction

Capital structure refers to the relative proportion of equity and debt in the real estate investment (Miller & Geltner, 2005). Unlike other risks, such as systematic risk, the risk induced by leverage is one that an investor can control. The use of debt is commonly used within the real estate sector and real estates are famous as a source of collateral for major amounts of debt.

This thesis deals with factors that affect the capital structure of listed European real estate companies. Many factors need to be taken into account when establishing a company's capital structure (Titman & Wessels, 1988). Generally, firms that exhibit stable and high sales tend to utilize financial leverage more compared to firms with greater volatility of sales. Firms in the real estate sector do have stable and predicted income since the primarily income is rents. Consequently, real estate firms tend to experience higher leverage ratio compared to other sectors. Owusu-Ansah (2009) showed that real estate firms tend to have higher level of debt-to-total assets compared to firms in the IT and health care sector within Sweden.

A series of factors have been determined also called independent variables. Regression analysis on leverage has been accomplished in order to determine the importance of the variable of the choice between debt and equity. This report relies on market information such as profitability and stock price rather than balance sheet, income and financial statements. Hence, the firms included will be comparable which might not have been the case otherwise due to country-specific bias concerning law and fiscal policies. The sample is internationally relevant and the data constitutes of 84 firms. The index includes both Real Estate Operating Companies (REOC) and Real Estate Investment Trusts (REIT) (EPRA, 2014). The degradation between REOC and REIT allows considering the capital structure for both cases. This is relevant because REITs are tax-exempt and will therefor result in different debt-to-total asset ratio or leverage. Morri and Cristanziani (2009) argue that REIT firms are less leverage than non-REIT firms. They claim it depends on the importance of tax-exempt in the choice of capital structure. However, the tax-exempt will not specifically be analysed in this report.

1.1 Background

The real estate industry is different to several other industries. Due to the great deal of collateral that supports high level of debt, companies within the real estate industry have generally high level of leverage. Since real estate is a capital-intensive business, investments within this area for purchase of land and construction require major capital from external funds. Myers (2001) argues that a company is funded either of equity or debt, or both. Equity is stockholders invested capital and debt is bank loan, bonds and founding from credit institution etcetera. Equal for all debt is that a fee has to be paid as an interest rate. Due to the indebtness of real estate firms there is strong relation to the capital markets.

In 1958 Modigliani and Miller introduced their theoretical model in corporate finance (Modigliani & Miller, 1958). The model explained that in a capital markets free of taxes, free of transaction costs and free of other frictions, the market valuation should not be affected by the capital structure. Modigliani and Miller's model assumes that there are no taxes, which of course is not appropriate in the real world where almost every, if not all, company are paying taxes. Thus, Modigliani and Miller (1963) present a revised model that takes taxes in too consideration. Further, the trade-off theory seems to be more relevant. According to the trade-off theory, the optimal capital structure ratio is reach when tax advantages to borrow are balanced (Myers, 1984).

Nevertheless, there are several theories that try to explain the optimal capital structure. The question still remains; is there a perfect approach to reach optimal capital structure or does it change over time? This paper examines which factors affect capital structure in numerous of companies in the real estate industry. In order to accomplish the study, Morri and Cristanziani´s (2009) paper "What determine the capital structure of real estate?" has been used as a source of inspiration. Morri and Cristanziani (2009) analyse 37 real estate investment trust and 60 regular real estate companies of the European Public Real Estate Association (EPRA) NAREIT Europe Index. Their regression is conducted of seven independent variables; size, profitability, growth opportunities, cost of debt, ownership structure, risk and category. Morri and Cristanziani (2009) have used panel data set over a five years period. To be able to conduct a proper analysis a lot of inspiration has been conducted from Morri and Cristanziani (2009).

1.2 Purpose

The objective for this thesis is to investigate what factors that affect the capital structure of 84 listed real estate firms within the FTSE EPRA/NAREIT Europe index.

1.3 Sample selection

The FTSE EPRA/NAREIT Europe index from 2012 have been used to select companies, also called constituent name. These constituents are listed in Belgium, Czech Republic, Finland, France, Germany, Italy, Netherlands, Norway, Austria, Poland, Russia, Sweden, Switzerland, Turkey, and the UK. Some firms and countries have been excluded due to missing values or lack of data. The excluded countries are Czech Republic and Greece. Whereas 12 firms have been excluded in total. The index includes both REOCs and REITs. See appendix for firms included in the FTSE EPRA/NAREIT Europe index and the excluded firms.

The regression will be based from a data set during the time period of 2003-12-31 and 2012-12-31. The data will include the dependent variable leverage and independent variables such as size, return on equity, price to sales ratio, stock return and risk.

1.4 Research question

The following is this thesis reserach questions:

- What factors affect the capital structure the most?
- Over time, is there a significant change of the capital structure within real estate firms?

1.5 Outline of thesis

The thesis consists of 7 chapters. The initial chapter of this study is aimed to introduce the reader to the research that has been conducted. Chapter 1 covers the background, purpose and research questions. Further on, the theoretical background will be presented in chapter 2 and the method will be examined in chapter 3. The result will be presented in chapter 4, followed by the analysis in chapter 5. Finally the discussion will be drawn in chapter 6 and conclusion in chapter 7.

2. Theory

This section concerns previous studies regarding the subject. Moreover, several relevant theories about capital structure will be presented.

2.1 Previous studies

Morri and Cristanziani (2009) investigate what affecting the choice the capital structure of real estate companies. Their paper consists of an analysis of companies belonging to the EPRA/NAREIT Europe Index. The seven independent variables that were used in the regression were size, probability, growth opportunities, cost of debt, ownership structure, risk and category. The study was combined during a 5 years period. In the result Morri and Cristanziani (2009) argue that REIT firms are less leverage than non-REIT firms. They claim it depends on the importance of tax-exempt in the choice of capital structure. Moreover, results regarding the relationship between operating risk and leverage show that there is a negative relationship. The negative relationship implies that manager of riskier companies manage to decrease the total uncertainty of the firm by approach a less risky capital structure. Findings also submit that the size of a firm's assets effect the level of debt, which implies that debt is less expensive for larger firms. Further, conclusion also shows that more profitable companies have less recourse to leverage (Morri & Cristanziani, 2009).

Owusu-Ansah (2009) shows that real estate firms tend to have higher level of leverage compare to firms in the IT and health care sector within Sweden. Real estate is a capital-intensive industry due to expensive investments that have to be done to become a property owner. The trade off theory claim that greater collateral support higher levels of debt. Since the real estate industry have high collateral within the properties the higher ratio of debt is adequate. Other sectors that do not have that level of collateral also tend to have a lower level of debt. Firms with equity are able to adjust their capital structure by increase their level of debt. Indeed, new debt will adjust the tax shield. An increase in debt will probably increase bankruptcy costs as well. However, Morri and Cristianziani (2009) show that their results consist according to Pecking order theory and trade off theory. Bond and Scott (2006) also confirm information asymmetries drive firm choice of financing, which endorse Pecking order theory. Fama and French (2002) argue that the average leverage is decreasing even though the change is gradual and slow. Ozkan (2001) also argue that firm have target for the leverage but adapt debt objective quickly to have the optimal

structure during that time period. Leary and Roberts (2005) argues, like Ozkan (2001), that firms adjust their capital structure to be able to stay in the estimated optimal leverage ratio. Furthermore, Auerbach (1985), Opler and Titman (1994), Marsh (1982) and Taggart (1977) in one way or another confim Ozkan (2001) statement that finding an optimal leverage is an endless assignment. Feng, Ghosh and Sirmans (2007) argue that the pecking order theory explain the capital structure better for REIT firms where the cost of asymmetric information is greater than the cost of financial distress.

2.2 Theoretical framework of capital structure

The most relevant theories for the thesis and purpose will be presented in this chapter.

2.2.1 The Modigliani-Miller Theorem

Modigliani and Miller (1958) model shows the capital structure of debt and equity does not affect the value of a firm. They are assuming that a firm has a certain amount of expected cash flow. The firm then choose a ratio of debt and equity. Modigliani and Miller (1958) argue that all it does is to divide the cash flow amongst the shareholders. To make this hold there are several assumption that has to be fulfilled.

- Capital markets are frictionless, which implies that assets can be purchased and sold without any cost and instantly.
- It is possible to lend and borrow at the risk-free rate.
- There are no costs to bankruptcy.
- Corporations are operating in the same class of risk.
- Corporate and personal income tax does not exist.
- Cash flow is forever and there is no growth.
- Same information for corporate insiders and public is available.
- Agency cost does not exist and manager always maximise shareholders wealth.

Modigliani and Miller without taxes

If the assumptions are satisfied the equation $V_L = V_U$ holds (Equation 1). Where V_L is the value of the leverage firm. V_U is the value of the unleveraged firm. This is the first proposition of two. The second can be derive from the formula from Weighted average cost of

capital and look as follows; $R_E = R_E + \frac{D}{E}(R_E - R_D)$ (Equation 2). Where R_E is return on equity. D is debt. E is equity. R_D is return on debt (Modigliani & Miller, 1958).
Proposition 1 (Equation 1) explains that the choice of capital structure does not effect the market value of the firm. Proposition 2 (Equation 2) claims that excepted return of equity increase proportionate to an increase in level of leverage.

Modigliani and Miller with taxes

The Modigliani and Miller theorem without taxes faced a lot of critic for the allegation that taxes do not affect the capital structure. In 1963 Modigliani and Miller present a new theorem in the paper "Corporate Income Taxes and the Cost of Capital: A correction".
This approach includes tax affect in the choice of capital structure. Thus, the value of a leverage firm is equal to the value of an unleveraged firm plus the present value of a taxes shield.
$V_L = V_U + T_C * D$ (Equation 3). Where T_C is the tax rate and equation 3 is termed as proposition 1. Tax shield is the value of the tax reduction that achieves from tax deduction.
The second proposition is $R_E = r_0 + \frac{D}{E}(1 - T_C)(r_0 - r_D)$ (Equation 4) where r_0 is the firms cost of equity if the firm is not leverage and r_D is the required rate of return on debt.

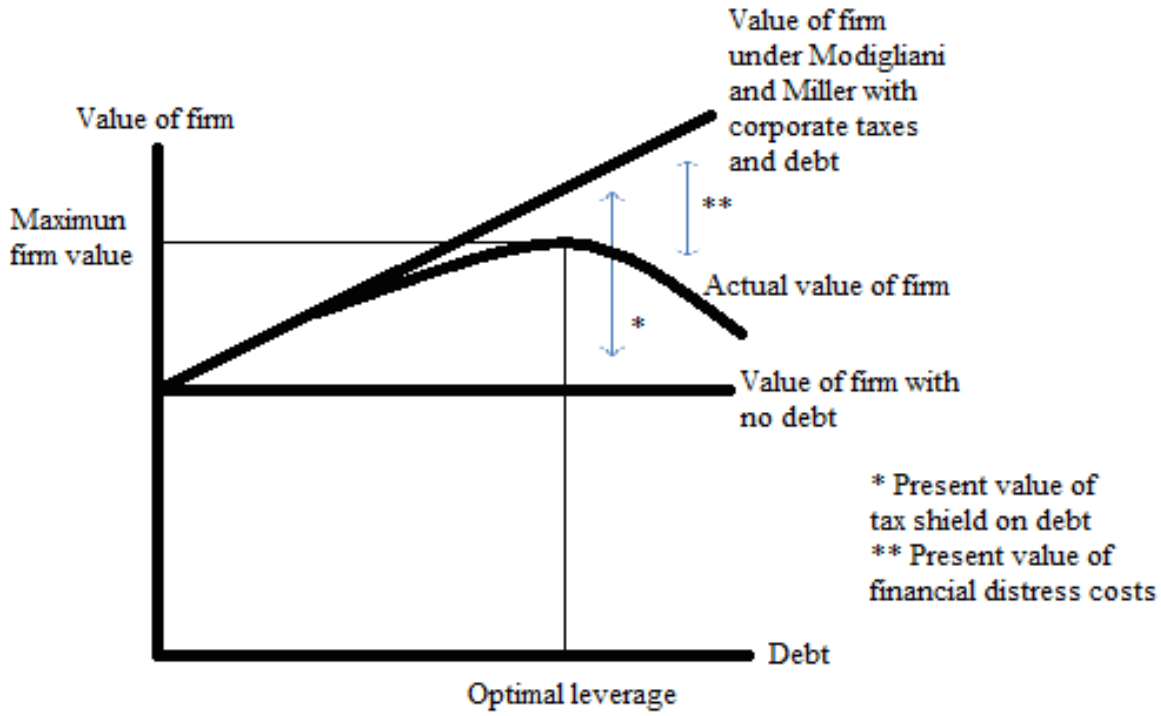
Proposition 1 (Equation 3) implies that a tax reduction gives the leverage firm a greater value than a non leverage firm since a larger proportion of the profit is left over and divided among the shareholders and lenders. Proposition 2 (Equation 4) shows that the weighted average cost of capital is no longer constant. This is explained by the value of the tax shield increase as the firm increase their leverage, which lower the cost of the debt and thus also the company's weighted average cost of capital.

2.2.2 The Trade-off theory

Based on the Modigliani and Miller theory of capital structure, Kraus and Litzenberger (1973) designed the trade off theory. The trade off theory implies that the optimal leverage gives a trade-off between tax benefits of debt and the deadweight costs of bankruptcy. Myers (1984) argues that a firm, which follow the trade-off theory, set a target for the debt and then tries to achieve their ambition by slowly change the ratio towards the target. The trade-off theory indicates that there is a theoretical optimal capital structure for each firm when taxes, expenses and financial distress are taken into account. Further, the model describes how a firm can maximize their

market value by use the tax advantages from debt to be able to reach optimal capital structure. Increasing debt results in increased value of the tax shield, which raise the market value of the firm (Morri & Cristanziani, 2009). Figure 1 describes the relationship between the firm value and debt/equity-ratio. The two lines illustrates different set up of the debt/equity-ratio and hence the cost financial distress. As the debt/equity-ratio increases there is a trade-off between the tax shield and bankruptcy costs. The line of a levered firm can be compared to the perpendicular line of an unlevered firm. At the peak of the curve the optimal debt/equity-ratio is shown.

Figure 1 – The Trade-off theory of capital structure. Inspired by (Miller, 1977).



Further, Breadly, Jarrell and Kim (1984) argue that increased debt will increase the risk for bankruptcy. The optimal level of capital structure is then find by identifying the balance between financial distress and debt. In other words, increased debt may be good to a certain level. However, if bankruptcy costs seems to be to high in comparison to the tax advantages the advantages disappear. Further, the trade-off theory states that the optimal capital structure is different for every firm.

2.2.3 The Pecking order theory

The pecking order theory is an old existing theory that has been modified by Myers (1984). The theory states the order of which way a firm choose to bring new capital for investments. Assumption to fulfil the theory is a perfect capital market with exception for asymmetric information between managers and investors. Managers are supposed to have more information regarding the firm value, profile of risk and future prospect. Managers strive to shape the capital structure to minimize expenses for shareholders (Morri & Cristanziani, 2009). Therefore management of firms use the less risky alternative to fund investments (Myers, 1984). Hence, the order of fund investment is:

1. Internal financing
2. Issue new debt
3. Issue new equity

According to Myers and Majluf (1984) the pecking order theory also include dividend policy and argue that it is "sticky", meaning that firms almost always tries to retain a constant dividend. This is done to keep the share price stable over a period with variation in the current profits.

3. Methodology

In this chapter, the research strategy for this investigation is presented. In addition to the quantitative method a literature review was conducted within the framework of the paper's purpose. The aim for the literature review was primarily to understand the subject and secondarily to get a theoretical basis to be able to analyse and interpret collected data and result from the regression.

The analysis is conducted by using unbalanced panel data linear regression. The dependent variable is leverage during the time period of 2003-12-31 and 2013-12-31. By using panel data it allows to consider if the variables affecting the capital structure are the same in the early 21th century as ten years later. The regressions and tests performed will be explained more in detail in chapter 3.2.

3.1 Determinants of capital structure

This section presents the framework of the key variables that affect the leverage or the debt-to-total asset ratio. In other studies, such as Titman and Wessel (1988), they included variables such as asset structure, non-debt tax shields, growth, uniqueness, industry classification, size, earnings volatility and profitability. Morri and Cristanziani (2009) included size, profitability, growth, cost of debt and operating risk. The following variables have been chosen in this thesis; leverage, size, return on equity (ROE), price-to-sales ratio (PSR), return, risk and one dummy variable for REIT and 10 dummy variables for years.

All data used to conduct the various variables have been collected through the Bloomberg database. In some cases, certain variables how been adjusted to fit what was offered by the Bloomberg database. This is for example the case for the variable "Return on Common Equity" (ROE), which was chosen instead of return on equity.

Each independent variable will be tested for significance solely in order to easier analysis the significance of the model. Variables that present statistical significance will then be run in a multiple regression test. The model below includes 16 independent variables where 11 of them are dummy variables depending on year and if the firm is a REIT or not. The dummy variable for year 2003 (D_{2003}) is the benchmark year. Hence, it will be excluded in the regression.

$$LEVERAGE_{i,t} = \alpha + \beta_1 * Size_i + \beta_2 * ROE_i + \beta_3 * PSR_i + \beta_4 * Return_i + \beta_5 * Risk_i + \beta_6 * Reit_i + \beta_7 * D_{2003} + \beta_8 * D_{2004} + \beta_9 * D_{2005} + \beta_{10} * D_{2006} + \beta_{11} * D_{2007} + \beta_{12} * D_{2008} + \beta_{13} * D_{2009} + \beta_{14} * D_{2010} + \beta_{15} * D_{2011} + \beta_{16} * D_{2012} + e_{i,t}$$

Leverage

$$Leverage_{i,t} = \frac{Shot\ term\ borrowing_{i,t} + Long\ term\ borrowing_{i,t}}{Total\ assets_{i,t}}$$

Leverage represents the capital structure of a firm. Leverage is measured in percentage.

Size

$$Size_i = \ln (Total\ assets)$$

Firm size can be measured by many figures e.g. the amount of total assets, the number of people employed and the amount of sales. However, since real estate firms are considered the number of people employed would not be relevant. Therefor the proxy of firm size is given by the natural logarithm of total asset reported on the balance sheet. Previous studies, such as Rajan and Zingales (1995) and Morri and Cristanziani (2009) argue for a positive effect on leverage. The variable total asset is transformed into log-form.

Return on common equity (ROE)

$$ROE_{i,t} = \frac{Net\ income\ avalible\ for\ common\ shareholers_{i,t}}{Average\ total\ common\ equity_{i,t}}$$

Return on Common Equity measures of a firm's profitability by revealing how much profit a company generates with the money shareholders have invested. Return on Common Equity is measured in percentage. Profitability and leverage are uncorrelated according to Huang and Song (2006). Hence, profitable firms tend to exhibit lower leverage.

Price to sales ratio (PSR)

$$PSR_{i,t} = \frac{Share\ price_{i,t}}{Sales\ per\ share_{i,t}}$$

The price to sales ratio compares a firm's stock price to its revenues or sales. This ratio is relevant when comparing firms within the same sector. The lower ratio the better investment since the investor is paying less for each unit of sales.

Stock Return (Ret)

$$Stock\ return_{i,t} = \left(\frac{Stock\ price_{i,t+1} - Stock\ price_{i,t}}{Stock\ price_{i,t}}\right) * 100$$

I order to analyse Stock return annual, it is calculated from the last trading day of the year available. Return is measured in percentage. The debt ratio dynamics can be explained by 40 percent of the stock return over one- to five-year horizons (Welch, 2004).

Risk

$$Risk_{i,t} = \sqrt{\frac{\sum_{i,t}(Monthly\ stock\ return_{i,t} - Average\ monthly\ stock\ return_{i,t})^2}{12}}$$

Many authors argue that a firm's optimal debt level is a decreasing function of volatility of the earnings (Titman & Wessels, 1988). Hence, increased leverage result in increased risk. Due to homogenous capital structure, operating risk for firms within the same industry are generally the same (Bradley, Jarrell, & Kim, 1984). The Risk variable will consider the volatility, i.e. the standard deviation of the stocks. Risk is measured in percentage.

REITs and Year dummies

REIT is a dummy variable to explain whether a firm is a Real Estate Investments Trust or a regular real estate firm. If it is a REIT the dummy takes the value 1 and if it is not a REIT the dummy takes the value 0. REITs were established in the US and approved by the Congress in 1960 (Dawson, 1961). REITs are tax-exempt and will therefor result in different debt-to-total asset ratio or leverage. Morri and Cristanziani (2009) argue that REIT firms are less leverage than non-REIT firms. Therefore, REIT is expected to affect leverage negative.

Each year of collected data has a dummy variable to represent that specific year. The year dummy takes the value 1 if it represents the current year and 0 if it is another year.

3.2 Hypothesis

In order to test if β_i of each independent variable are statistically significant on leverage a hypothesis test was conducted for each β_i (Wooldridge , 2013). The hypothesis was stated as

$$H_0 = \beta_i$$
$$H_1 \neq \beta_i$$

If it is possible to reject the null hypothesis (H_0) then the β_i has a significant impact on the dependent variable. If it is not possible to reject the null hypothesis the independent variable can still have an impact on the dependent variable but it is not possible to prove that is the case.

Since, it is not possible to be 100 % sure if the null hypothesis is true or not two errors can be made. The first is a Type 1 error. It is done when one rejects the null hypothesis and the null hypothesis is true. The second error is a Type 2 error. It is made when one fails to reject the null hypothesis and the null hypothesis is wrong. The probability of making a Type 1 error is the statistically significance that is selected by the researcher.

Below are the hypotheses presented:

Size (total assets)

$$H_{0SIZE} = The\ variable\ size\ does\ not\ effect\ the\ leverage\ positive$$
$$H_{1SIZE} = The\ variable\ size\ does\ effect\ the\ leverage\ positive$$

Return on common equity (ROE)

$$H_{0ROE} = The\ variable\ ROE\ does\ not\ effect\ the\ leverage\ negative$$
$$H_{1ROE} = The\ variable\ ROE\ does\ effect\ the\ leverage\ negative$$

Price to sales ratio (PSR)

$$H_{0PSR} = The\ variable\ PSR\ does\ not\ effect\ the\ leverage\ negative$$

$$H_{1PSR} = The\ variable\ PST\ does\ effect\ the\ leverage\ negative$$

Stock Return (Ret)

$$H_{0RET} = The\ variable\ RET\ does\ not\ effect\ the\ leverage\ negative$$
$$H_{1RET} = The\ variable\ ROE\ does\ effect\ the\ leverage\ negative$$

Risk

$$H_{0RISK} = The\ variable\ RET\ does\ not\ effect\ the\ leverage\ negative$$
$$H_{1RISK} = The\ variable\ RET\ does\ not\ effect\ the\ leverage\ negative$$

The expected outcome of how the variable will affect leverage is presented below:

Table 1 – Variables and expected effect on leverage

Variables	Expected effect
Size	Positive
ROE	Negative
PSR	Negative
Return	Negative
Risk	Positive
REIT	Negative

3.3 Reliability and validity

Reliability and validity are crucial factors in order to establish and assess the quality of the research for the qualitative and quantitative researcher (Bryman & Bell, 2008). The reliability refers to if the data or measurements are consistent (Hernon & Schwartz, 2009). The validity seeks to determine to which extent the findings can be generalized to a population. The REOCs and REITs in this study have not been chosen randomly. Instead, they form the index issued by EPRA. By using the index, the selection is diversified to different firms and countries. Since the methodology relies on historical market information rather than financial statements the thesis obtains higher accuracy when comparing firms from different countries. This is because different countries use different legislation and fiscal policies.

4. Result

This chapter is divided into two parts. The first part will present the most relevant findings and the second part will describe how the statistics were performed.

4.1 Findings

This chapter present the most relevant result from the regressions. Below in table 2 the total statistics is presented. In total, 666 observations are included in the model. The leverage for the firms included range between 6.39 % and 80.89 %, with the mean of 44.79 %, which indicates a great difference among the choice of capital structure. The variable size is not relevant to consider here since it is the logarithm of total asset. The ROE shows wide spread between - 91.39 % to + 59.87 %. The PSR also illustrates a large variety between 0.18 and 62.09. Furthermore, the variable return and risk also present a large difference, from - 96.19 % to 449.22 % and 0.01 % and 398.33 % respectively.

Table 2 – Statistics for all firms

VARIABLES	Observations	Mean	Std. Dev.	Min	Max
Lev	666	44.794	14.081	6.392	80.900
Size	666	7.819	1.285	3.232	11.690
ROE	666	6.223	16.485	-91.391	59.867
PSR	666	6.26	4.860	.182	62.091
Return	666	7.979	46.183	-96.187	449.221
Risk	666	38.726	52.737	.014	398.323

Since the dispersion of REITs and REOCs the statistics of these are relevant to examine separately. Below, as table 3 illustrates, the maximum leverage of a REIT is 74.99 % and the PSR is between 0.48 and 62.09.

Table 3 – Statistics for Real Estate Investment Trusts

VARIABLES	Observations	Mean	Std. Dev.	Min	Max
Lev	338	41.141	11.604	6.392	74.999
Size	338	7.605	1.210	3.232	10.291
ROE	338	7.322	16.420	-91.391	58.235
PSR	338	7.580	5.024	.480	62.091
Return	338	4.930	31.530	-77.298	134.610
Risk	338	35.490	49.092	.0144	324.572

Below the statistics for REOCs are presented (Table 4). The maximum leverage is 80.89 % for REOCs and the PSR is between 0.18 and 36.79.

Table 4 - Statistics for Real Estate Operating Companies

VARIABLES	Observations	Mean	Std. Dev.	Min	Max
Lev	328	48.560	15.377	8.722	80.899
Size	328	8.040	1.324	4.952	11.689
ROE	328	5.090	16.501	-82.766	59.866
PSR	328	4.896	4.284	.182	36.791
Return	328	11.121	57.388	-96.187	449.221
Risk	328	42.062	56.126	.093	398.329

The correlation between the variables is presented below in table 5. The positive correlations have been observed between; leverage and size (0.19) and risk (0.14). The negative correlations are between; leverage and ROE (-0.18), PSR (-0.47) and return (-0.07). PSR has the highest negative correlation with leverage. The variable size also indicates positive correlation to ROE (0.03), return (0.02) and risk (0.14). However, the variable size indicates a negative correlation to PSR (-0.17). The variable ROE shows positive correlation to PSR (0.26) and return (0.14) but negative correlation to risk (-0.10). The variable PSR indicate positive correlation to return (0.14) but negative to risk (-0.20). The variables return and risk are positive correlated (0.20).

Table 5 - Correlation between the variables

	Lev	Size	ROE	PSR	Ret	Risk
Lev	1.000					
Size	0.198	1.000				
ROE	-0.183	0.030	1.000			
PSR	-0.471	-0.173	0.259	1.000		
Return	-0.074	0.019	0.370	0.143	1.000	
Risk	0.143	0.045	-0.101	-0.202	0.195	1.000

In table 6 below, the three models REOC for fixed effect, REOC for robust effect and REIT for random effect is presented. In the first model; REOC for fixed effect, only two of the variables are significant i.e. PSR and Size. However, six out of nine dummy variables are still significant. In the second model; REOC for robust, only PSR is significant of the independent variables and none of the dummy variables are significant. In the third model; REIT for random effect, ROE

and PSR are significant but none of the dummy variables. The R-squared are 0.223, 0.223 and 0.306 for the first, second and third model respectively.

Table 6 - Summarized models of table 9 and 10

VARIABLES	REOC Fixed Lev	REOC Robust Lev	REIT Random Lev
Size	3.353**	3.353	1.065
	(1.346)	(2.828)	(0.987)
ROE	-0.051	-0.051	-0.097***
	(0.033)	(0.040)	(0.029)
PSR	-0.501***	-0.501**	-0.492***
	(0.137)	(0.228)	(0.100)
Return	-0.010	-0.010	-0.017
	(0.012)	(0.011)	(0.021)
Risk	0.000	0.000	0.046**
	(0.015)	(0.014)	(0.022)
Year2004	-0.722	-0.722	-0.551
	(1.958)	(2.198)	(1.664)
Year2005	-2.874	-2.874	-1.324
	(1.953)	(2.458)	(1.828)
Year2006	-6.434***	-6.434*	-0.063
	(2.160)	(3.474)	(1.875)
Year2007	-6.341***	-6.341*	-2.436
	(2.125)	(3.423)	(1.955)
Year2008	-3.756*	-3.756	0.163
	(2.223)	(3.217)	(1.916)
Year2009	-4.727**	-4.727	-1.059
	(2.374)	(3.451)	(2.083)
Year2010	-4.785**	-4.785	2.730
	(2.164)	(3.557)	(1.767)
Year2011	-5.915***	-5.915*	2.301
	(2.136)	(3.479)	(1.717)
Year2012	-7.262***	-7.262*	0.375
	(2.198)	(3.826)	(1.858)
Constant	29.04***	29.04	34.05***
	(10.21)	(21.12)	(7.472)
Observations	328	328	338
Number of firms	41	41	43
R-squared	0.223	0.223	0.306

1. Standard errors in parentheses
2. Significant level at *** p<0.01, ** p<0.05, * p<0.1

4.2 Descriptive statistics

To be able to fulfil the purpose of the thesis a quantitative method is used. Panel data allows for control of variables that varies over time and across companies. Panel data has to approach either the fixed effect or the random effect. The fixed effect model does not allow for variables that do not vary over time. However, the random effect model does consider not time-vary variables. Furthermore, a Hausman test decides whether one should use a fixed effect or a random effect. Basically, a Hausman test will test if the unique errors are correlated with the regressors.

The independent variables are at first controlled individually. This is done through a simple regression model for each variable in order to confirm the significance of each variable. As a result, see below in table 7, the variables are all highly significant and therefore relevant to test in a multiple regression analysis.

Table 7 - Test of the variables individually

VARIABLES	Leverage	Leverage	Leverage	Leverage	Leverage
Size	2.911***				
	(0.715)				
ROE		-0.144***			
		(0.017)			
PSR			-0.711***		
			(0.071)		
Return				-0.031***	
				(0.006)	
Risk					0.018**
					(0.009)
Constant	22.04***	45.69***	49.24***	45.04***	42.98***
	(5.600)	(0.278)	(0.509)	(0.270)	(1.571)
Observations	666	666	666	666	666
R-squared	0.028	0.108	0.148	0.045	0.004
Number of firms	84	84	84	84	84

1. Standard errors are presented in parentheses
2. Significant level at *** p<0.01, ** p<0.05, * p<0.1

Since, panel data is used one should decide whether fixed effect or random effect are appropriate. Regressions for fixed effect and random effect are shown in table 8. The model for this regression will be:

$$LEVERAGE_{i,t} = \alpha + \beta_1 * Size_i + \beta_2 * ROE_i + \beta_3 * PSR_i + \beta_4 * Return_i + \beta_5 * Risk_i + \beta_6 * Reit_i + \sum_{t=7}^{16} \beta_t * D_t + e_{i,t}$$

Table 8 - Regressions and hausman test

VARIABLES	Fixed effect Lev	Random effect Lev
Size	2.034**	1.501**
	(0.958)	(0.687)
ROE	-0.074***	-0.067***
	(0.022)	(0.022)
PSR	-0.437***	-0.507***
	(0.082)	(0.079)
Return	-0.019*	-0.020**
	(0.010)	(0.009)
Risk	0.010	0.013
	(0.012)	(0.011)
REIT	-	-6.575***
	-	(2.411)
Year2004	-0.321	-0.240
	(1.263)	(1.287)
Year2005	-1.413	-1.183
	(1.296)	(1.307)
Year2006	-2.912**	-2.420*
	(1.448)	(1.409)
Year2007	-3.269**	-2.861**
	(1.415)	(1.359)
Year2008	-0.954	-0.568
	(1.492)	(1.426)
Year2009	-2.153	-1.990
	(1.610)	(1.523)
Year2010	-0.080	0.277
	(1.415)	(1.348)
Year2011	-1.118	-0.727
	(1.405)	(1.322)
Year2012	-2.472*	-2.310*
	(1.485)	(1.372)
Constant	33.37***	39.84***
	(7.172)	(5.586)
Observations	666	666
Number of firms	84	84
R-squared	0.227	0.226

1. Standard errors in parantheses
2. Significant level at *** p<0.01, ** p<0.05, * p<0.1***

Hausman test: Chi2 = 408.01 Prob>chi2 = 0.000

The Hausman test in table 8 indicates that the null hypothesis is possible to reject. When the null hypothesis can be rejected the fixed effect should be used. Fixed effect does only consider variables that do vary over time. As a result, this approach is not relevant to use in this case due to the dummy variable for REIT.

Therefore the sample has been divided into two new samples. The first sample consists of REITs and the other one of REOCs. Based on the two samples two new regressions where conducted. Now, the dummy variable for REITs is excluded. The model for these two regressions will look like:

$$LEVERAGE_{i,t} = \alpha + \beta_1 * Size_i + \beta_2 * ROE_i + \beta_3 * PSR_i + \beta_4 * Return_i + \beta_5 * Risk_i + \sum_{t=6}^{15} \beta_t * D_t + e_{i,t}$$

The regressions, based on fixed effect and random effect for REITs, are presented in table 9. The Hausman test for REITs indicates that random effect is the proper model to use.

Table 9 - Regressions for the REIT sample

VARIABLES	REIT Fixed effect Lev	REIT Random effect Lev
Size	1.691	1.065
	(1.430)	(0.987)
ROE	-0.087***	-0.097***
	(0.0285)	(0.029)
PSR	-0.432***	-0.492***
	(0.108)	(0.100)
Return	-0.024	-0.017
	(0.0211)	(0.021)
Risk	0.066**	0.046**
	(0.027)	(0.022)
Year2004	-0.670	-0.551
	(1.630)	(1.664)
Year2005	-1.847	-1.324
	(1.833)	(1.828)
Year2006	-0.652	-0.063
	(1.944)	(1.875)
Year2007	-3.145	-2.436
	(2.038)	(1.955)
Year2008	-0.422	0.163
	(2.044)	(1.916)
Year2009	-2.302	-1.059
	(2.288)	(2.083)
Year2010	2.175	2.730
	(1.876)	(1.767)
Year2011	2.108	2.301
	(1.860)	(1.717)
Year2012	0.110	0.375
	(2.074)	(1.858)
Constant	30.35***	34.05***
	(10.54)	(7.472)
Observations	338	338
Number of firms	43	43
R-squared	0.309	0.306

1. Standard errors in parantheses
2. Significant level at *** p<0.01, ** p<0.05, * p<0.1***

Hausman test: Chi2 = 22.79 Prob>chi2 = 0.0638

Breusch and Pagan test: Chibar2 =363.61 Prob>chibar2=0.000

Further, a Breusch and Pagan Lagrangian multiplier test for random effects is conducted to ensure that random effect is the correct test to perform and not the one least square (OLS) estimator. Since it is possible to reject the null hypothesis the Breusch and Pagan Lagrangian multiplier test for random effects table 9 indicate that random effect is the most relevant estimator.

The regressions on fixed effect and random effect for REOCs are shown in table 10. In this case the Hausman test implies that fixed effect should be used. Since, fixed effect is the proper model, a Breusch and Pagan test for heteroscedasticity is conducted in order to decide whether heteroscedasticity has to be taken into consideration. However, the Breusch and Pagan test indicates that it is possible to reject the null hypothesis, which implies heteroscedasticity in the model. To correct for heteroscedasticity a robust regression is conducted, presented in table 10 together with the fixed and random effect model.

Table 10 – Regressions for the REOC sample

VARIABLES	REOC Fixed Lev	REOC robust Lev	REOC random Lev
Size	3.353**	3.353	2.446**
	(1.346)	(2.828)	(0.983)
ROE	-0.051	-0.051	-0.033
	(0.033)	(0.040)	(0.033)
PSR	-0.501***	-0.501**	-0.604***
	(0.137)	(0.228)	(0.136)
Return	-0.010	-0.010	-0.013
	(0.012)	(0.011)	(0.012)
Risk	0.000	0.000	0.005
	(0.015)	(0.014)	(0.014)
Year2004	-0.722	-0.722	-0.476
	(1.958)	(2.198)	(2.002)
Year2005	-2.874	-2.874	-2.377
	(1.953)	(2.458)	(1.988)
Year2006	-6.434***	-6.434*	-5.479**
	(2.160)	(3.474)	(2.133)
Year2007	-6.341***	-6.341*	-5.418***
	(2.125)	(3.423)	(2.066)
Year2008	-3.756*	-3.756	-2.840
	(2.223)	(3.217)	(2.152)
Year2009	-4.727**	-4.727	-4.288*
	(2.374)	(3.451)	(2.293)
Year2010	-4.785**	-4.785	-3.927*
	(2.164)	(3.557)	(2.085)
Year2011	-5.915***	-5.915*	-4.971**
	(2.136)	(3.479)	(2.033)
Year2012	-7.262***	-7.262*	-6.433***
	(2.198)	(3.826)	(2.069)
Constant	29.04***	29.04	35.61***
	(10.21)	(21.12)	(7.773)
Observations	328	328	328
Number of firms	41	41	41
R-squared	0.223	0.223	0.219

1. Standard errors in parantheses
2. Significant level at *** p<0.01, ** p<0.05, * p<0.1***

Hausman test: Chi2 = 408.01 Prob>chi2 = 0.000

Test for Heteroskedasticity: Chi2 = 3138.12 Prob>chi2 = 0.000

5. Analysis

In this chapter the presented result will be analysed. The first part will focus on analysing the tables of the firm statistics. Furthermore, the correlations between variables with emphasize on leverage will be analysed. The three different models; Real Estate Operation Companies, fixed effect model, Real Estate Operating Companies, robust fixed effect model and Real Estate Investment Trusts, random effect model will be analysed. Insignificant variables will not be considered because these seem irrelevant.

Statistics

The mean leverage differ between REITs (41.14%) and REOCs (48.56%), which can be seen in table 3 and 4. Consequently, the overall average for leverage is 44.79 %, which can be seen in table 2. Hence, REOCs tend to employ more debt compared to REITs. In contrast, the mean ROE for REITs (7.32%) has been higher compared to ROE for REOCs (5.09%). This means that the return on the shareholder equity in average has been higher for REITs then to REOCs.

The average PSR for REITs (7.58) and REOCs (4.90) differ and tells that investors have valued REITs higher than REOCs. This could be due to a greater diversification REITs are able to achieve compared to REOCs. REOCs are mainly concentrated to certain areas or countries whereas REITs have the possibility to divers investments over several countries and areas. Moreover, another reason could be due to high interest expenses that affect the result and consequently the stock return of REOCs.

The average stock return for REITs (4.93%) and REOCs (11.12%) also indicates a great difference of how investors perceive the firms. The standard deviation of return for REITs (31.53%) and REOCs (57.39%) tells that the volatility of the stock return has been greater for REOCs then for REITs.

Correlation

The correlation table (Table 5) indicates a positive correlation between leverage and size and risk. The positive risk correlation seems highly reasonable since increased amount of debt will increase the leverage. Surprisingly, the strongest positive correlation is between leverage and size. One reason could be because larger firms employ more debt due to better terms and conditions compared to smaller firms.

The correlation between leverage and ROE, PSR and return is negative. PSR has the highest negative correlation with leverage. One explanation is that a profitable firm could choose to pay off its liabilities. The market would value a less risky asset higher. The increased value of the asset would affect the price to sales ratio positive. This argument could be the same for ROE, which also has negative correlation to leverage. The correlation between return and leverage is also negative which seems perfectly reasonable since the risk increases when debt is employed to a firm.

Real Estate Operation Companies, fixed effect model

The variable PSR is significant and has a negative effect (-0.50) on leverage (Table 6). It means that if the price to sales ratio increases i.e. price per stock increases or sales per stock decreases, then the PSR would increase and decrease the leverage. This seams reasonable since the market value less leverage firms higher since it implies less risk for investors. The rest of the variables; ROE, return and risk are not significant.

Six of the nine year dummies show significance for the REOC fixed effect model; Year2006 (-6.43), Year2007 (-6.34), Year2009 (-4.73), Year2010 (-4.79), Year2011 (-5.92) and Year2012 (-7.26). The dummies for year 2006 and 2007 indicate the most negative impact on leverage except for year 2012. Due to the overall boom market in 2006 and 2007 before the financial crises, is could be interpreted as that the total assets increased in value over this time. Since a boom increase value of assets the level of leverage decrease. Hence, the booked value increased. The overall trend for the firms indicate a negative trend of leverage compared to the base year 2003 which means this year dummy is omitted in the regression.

From the result it is possible to reject the following null-hypotheses for the fixed effect model:

Size (total assets)

$$H_{0SIZE} = The\ variable\ size\ does\ not\ effect\ the\ leverage\ positive$$
$$H_{1SIZE} = The\ variable\ size\ does\ effect\ the\ leverage\ positive$$

Price to sales ratio (PSR)

$$H_{0PSR} = The\ variable\ PSR\ does\ not\ effect\ the\ leverage\ negative$$
$$H_{1PSR} = The\ variable\ PST\ does\ effect\ the\ leverage\ negative$$

Real Estate Operating Companies, robust fixed effect model

The robust fixed effect model for REOCs resulted in one significant variable (Table 6); PSR (-0.50). Hence, PSR gave the same result in this model as in the fixed effect model. The R-square (0.223) for this model indicates that the variables included explain the model to 22.3 %.

From the result it is possible to reject the following null-hypotheses for the robust fixed effect model:

Price to sales ratio (PSR)

$$H_{0PSR} = The\ variable\ PSR\ does\ not\ effect\ the\ leverage\ negative$$
$$H_{1PSR} = The\ variable\ PST\ does\ effect\ the\ leverage\ negative$$

Real Estate Investment Trusts, random effect model

The random effect model (Table 6) resulted in three significant variables; ROE (-0.10), PSR (-0.49) and Risk (0.05). Hence, none of the dummies were significant. The R-square for the

random effect model is 0.31. Thus, the variables explain this model better compared to the two previous. From the result it is possible to reject the following null-hypotheses for the random effect model:

Return on common equity (ROE)

$$H_{0ROE} = The\ variable\ ROE\ does\ not\ effect\ the\ leverage\ negative$$
$$H_{1ROE} = The\ variable\ ROE\ does\ effect\ the\ leverage\ negative$$

Price to sales ratio (PSR)

$$H_{0PSR} = The\ variable\ PSR\ does\ not\ effect\ the\ leverage\ negative$$
$$H_{1PSR} = The\ variable\ PST\ does\ effect\ the\ leverage\ negative$$

Risk

$$H_{0RISK} = The\ variable\ RET\ does\ not\ effect\ the\ leverage\ negative$$
$$H_{1RISK} = The\ variable\ RET\ does\ not\ effect\ the\ leverage\ negative$$

6. Discussion

This study has investigated what factors that affect the capital structure of 84 real estate firms within Europe, both REITs and REOCs. Due to high level of leverage the real estate sector is greatly influenced by the capital markets. Real estate firms have large amount of collateral, i.e. the actual properties, which is used to support high levels of debt. From the trade-off perspective, this means that the costs of financial distress or costs are probably lower.

Morri and Cristianziani (2009) argue that according to both the trade off theory and the pecking order theory size is a good explanatory variable for leverage. In addition, the trade off theory clarify that a larger firm tend to be more diversify and therefore have more stable cash flow than minor firms and thus can easier raise debt. Subsequently, larger firms are more likely to have increase leverage. However, the pecking order theory claims that a greater firm have higher number of analysis and therefore are more intensively analysed by investors and stakeholders. Consequently the pecking order theory states that leverage is greater for minor firms (Morri & Cristanziani, 2009). Since the result of size is not significant for robust fixed effect or random effect it is not possible to argue weather for or against any of the theories. Nevertheless, in the regressions for REIT and REOC size approach a positive value, which might indicate that the trade off theory is proper on the relation for leverage and size. However, size is significant for the fixed effect for REOC. Also Morri and Cristianziani (2009) argue for a positive effect of size on leverage. Hence, the result is in line with the expected result.

The pecking order theory also says that firms' dividend policy is sticky according to Myers and Majluf (1984). It means that the firm tries to retain a constant dividend to keep the share price stable over time. Hence, if a firm increase sales and profit, the company could choose to pay off debt. The variable price to sales ratio (PSR) is significant for all three models and indicates a negative impact on leverage. This is in accordance to the expected results. The return on equity (ROE) could be interpreted the same way. The ROE also shows a negative impact on leverage, although the effect is not as large as for PSR. However, ROE is only significant for the REITs model.

7. Conclusion

This chapter identify the most relevant findings in order to answer the thesis research questions. Since all the independent variables are individually significant the authors argue that they all have more or less impact on leverage. Return on equity (ROE), price to sales (PSR) and risk affect the capital structure of REITs the most. Since robust fixed effect is used for REOCs, PSR is the only significant and one could claim it has the most impact on leverage. The correlation between leverage and PSR also indicates the strongest negative relationship. The fixed effect model for REOCs without consideration for heteroscedasticity shows that size also has a significant impact on leverage.

Over time it is possible to argue that leverage has exhibit a negative change since 2003. For REOCs, in the fixed effect model, six out of nine dummies are significant. However, the year dummies are not significant for the two other models; REOCs in the robust fixed effect model or REITs in the random model.

Other main findings can be summarised as follow:

- This thesis has shown that REOCs have in average more leverage than REITs (41.14% vs 48.56%)
- The variable size has a positive coefficient to leverage for the REOCs fixed effect model. It is also shown by the correlation between leverage and size. Thus, it is in line with the trade off model.
- The variable ROE has a negative coefficient to leverage for REITs in the random model. Thus, the measure for profit is in line with the pecking order theory.

In order to fully understand the drivers behind the capital structure one should need to include more variables. The authors argue that a variable such as stock price to booked value could be included to capture the growth rate of a firm. Furthermore, it would be relevant to include variables that capture macro economic affects. This variable could for example be a large stock index or a weighted inflation rate for the European countries.

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Appendix

Country	Company	
Belgium	Befimmo (Sicafi)	REIT
	Cofinimmo	REIT
	Wereldhave Belgium	REIT
	Intervest Offices & Warehouses	REIT
	Warehouses De Pauw	REIT
	Leasinvest-Sicafi	REIT
Czech Republic	Orco Property Group S.A.	Exluded
Finland	Citycon	REOC
	Sponda Oyj	REOC
	Technopolis	REOC
France	Silic	REIT
	Mercialys	REIT
	Icade	REIT
	ANF-Immobilier S.A.	REIT
	Fonciere Des Regions	REIT
	Gecina	REIT
	Affine	REIT
	Societe de la Tour Eiffel	REIT
	Klepierre	REIT
	Unibail - Rodamco	REIT
Germany	GSW Immobilien AG	Exluded
	Prime Office REIT-AG	Exluded
	Patrizia Immobilien	REOC
	DIC Asset AG	REOC
	Gagfah	REOC
	Alstria Office	REIT
	Ivg Immobilien	REOC
	Colonia Real Estate	REOC
	Deutsche EuroShop	REOC
	Hamborner REIT AG	REIT
	TAG Immobilien AG	REOC
	Deutsche Wohnen AG	REOC
Greece	Eurobank Properties Real Estate Investment Co	Exluded
Italy	Beni Stabili	REIT

	Igd - Immobiliare Grande Distribuzione	REIT
Netherland	EuroCommercial Ppty	REIT
	Vastned Retail	REIT
	Corio	REIT
	Wereldhave	Exluded
	Nieuwe Steen Inv	REIT
Norwegian	Norwegian Property ASA	REOC
Austria	Ca Immobilien	REOC
	Conwert Immobilien Invest	REOC
Poland	LC Corp SA	REOC
	Atrium European Real Estate	REOC
	Globe Trade Centre	REOC
Russia	PIK Group	REOC
	Immofinanz AG	REOC
Sweden	Wihlborgs Fastigheter	REOC
	Hufvudstaden A	REOC
	Castellum	REOC
	FABEGE	REOC
	Kungsleden	REOC
	Wallenstam AB	REOC
	Fastighets AB Balder B	REOC
	Klovern AB	REOC
Switzerland	Mobimo	REOC
	PSP Swiss Property	REOC
	Allreal Hld N	REOC
	Swiss Prime Site	REOC
Turkey	Akmerkez Gayrimenkul Yatirim	REIT
	Torunlar Gayrimenkul Yatirim Ortakligi	REIT
	Emlak Konut Gayrimenkul Yatirim Ortakligi AS	REIT
	Akfen Gayrimenkul Yatirim Ortakligi AS	Exluded
	Sinpas Gayrimenkul Yatirim Ortakligi	REIT
	Alarko G.Yat.Ort	Exluded
	Is Gayrimenkul Yatirim Ortak	REIT
United Kingdom	British Land Co	REIT

Daejan Hdg	ROEC
Great Portland Estates	REIT
Land Securities Group	REIT
Segro	REIT
Picton Property Income	Exluded
Hansteen Holdings	REIT
Hammerson	REIT
London & Stamford Property	REIT
Capital & Counties Properties	REOC
UK Commercial Property Trust	Exluded
Safestore Holdings	REOC
Primary Health Prop.	REIT
Capital Shopping Centres Group	REIT
Derwent London	REIT
Shaftesbury	REIT
Mucklow (A.& J.)Group	REIT
Quintain Estates and Development	REOC
Helical Bar	REOC
St.Modwen Properties PLC	REOC
Grainger	REOC
Workspace Group	REIT
Development Securities	REOC
Unite Group	REOC
Big Yellow Group	REIT
Standard Life Inv Prop Inc Trust	Exluded
IRP Property Investments	Exluded
Schroder Real Estate Investment Trust	REOC
F&C Commercial Property Trust	Exluded