The Effect of Globalization on the Performance of Real Estate Companies: A Post-Mortem of the Great Recession

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The Effect of Leverage on the Performance of Real Estate Companies: A Pan-European Post-Crisis Perspective of EPRA/NAREIT Index

Author: Karoline Jostov

Abstract (SSE Thesis)

The purpose of this paper is to study the effect of openness on the real estate securities' returns on an international sample of 16 countries.

The paper utilizes 707 publicly traded real estate companies from 16 countries all over the world and is based on panel data to control for the fixed effects of the explanatory variables. Seven factors, such as local market return, size, market-to-book ratio, turnover, GDP growth rate, interest rate spread and openness, are included to study the determinants of returns over 2004 to 2014.

Openness is significantly negatively related to the returns of real estate vehicles. The local market return is confirmed as a prevalent factor in determining the returns, while Fama-French factors such as size and value are supported in some of the regression specifications. Other variables of interest such as turnover and GDP growth are also corroborated as important.

The paper relies on a recent dataset of 11 years capturing at least one full economic cycle to measure the effect of goods market openness on the returns of publicly traded real estate vehicles.

Abstract (Bocconi Thesis)

This thesis investigates the impact of leverage on the total shareholder return of European publicly traded real estate vehicles.

This thesis uses a sample of EPRA/NAREIT Developed Europe index companies over a period from 2007-2014. The effect of leverage is studied separately in three periods: the downturn (2007-2009), rebound (2009-2014) and over a full economic cycle (2007-2014). Cross-sectional analysis is used and the leverage effect on the performance is controlled for 7 other independent variables (local market risk premium, size, book-to-market, short-term debt, cash); moreover, regional differences are accounted for.

It is established that during the crisis of 2007-2009 leverage levels are negatively associated with the performance of European listed real estate vehicles. This relationship also holds throughout the whole time frame of 2007-2014, implying that for real estate securities the cost of financial distress is bigger than the potential gain from taxation. In addition, the Fama-French three factors such as size, book-to-market and local market risk premium are found to be relevant, consistent with the bulk of literature.

There is sizeable body of literature on determinants of leverage and determinants of asset returns. However, there is little work done on how leverage affects the returns of European real estate companies. In addition, this thesis takes advantage of observing a full economic cycle and the possible effects of the crisis period.

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Keywords: Openness, Real Estate, Returns, Financial Crisis

JEL Classifications: G01, G10, G12, G23

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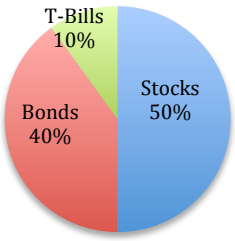
1. Introduction

The real estate industry has historically been considered as one of the largest "non-tradable" sectors in the economy and it is characterized by small market participants, fragmented ownership, and illiquidity of investments. Real estate investment used to be more local and highly specialized geographically as well as sector-wise than it is now (Bardhan, Edelstein and Tsang, 2008). The collection of data for the property market in aggregate is often difficult as trading occurs infrequently and the underlying asset (the property) is not homogeneous. Historically, real estate has been considered to be a non-tradable good that only local specialized investors can dabble in; however, publicly listed vehicles such as real estate investment trusts (REITs) and mutual funds have enabled a wider base on investors to diversify their holdings into real estate (Morri, 2014a).

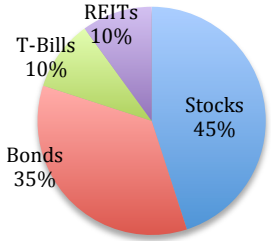
Figure 1. Portfolio allocation strategies for stock, bonds and REIT investors, 1972-2004[1]

Stocks and Bonds



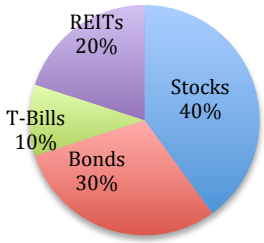
Return	10.9%
Risk	10.6%
Sharpe Ratio	0.44

With 10% REITs



Return	11.2%
Risk	10.3%
Sharpe Ratio	0.49

With 20% REITs



Return	11.6%
Risk	10.1%
Sharpe Ratio	0.53

Source: Morri, 2014b

The diversification into real estate substantially increases the performance of portfolios as can be seen from the graph (Figure 1) above. The Sharpe Ratio is

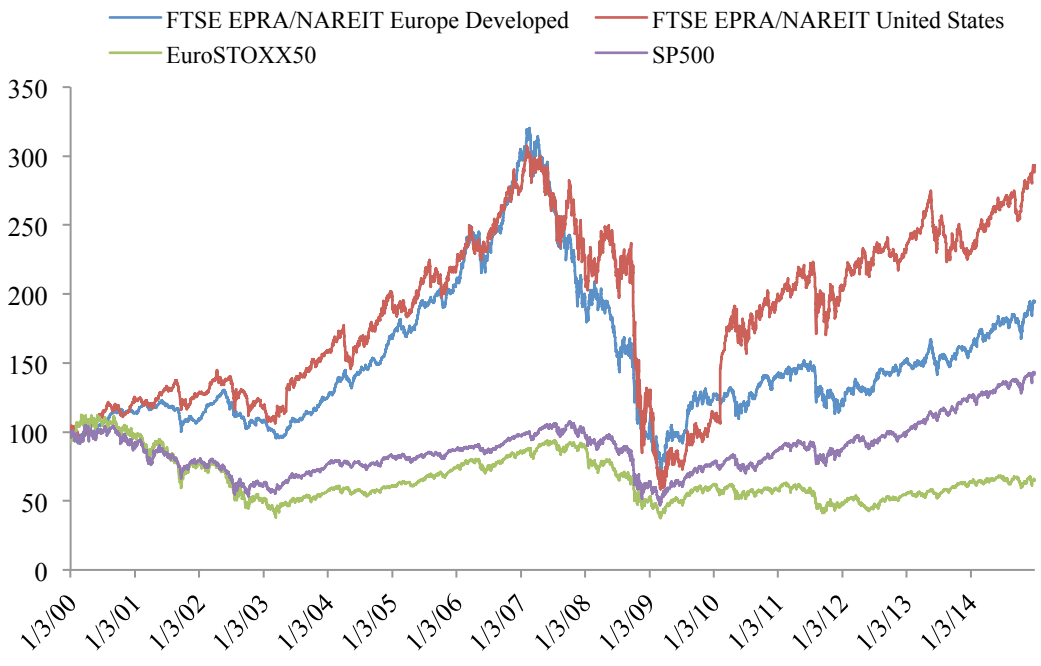
[1] Stocks — Standard & Poor's 500;
Bonds — 20-year U.S. Government Bond;
Treasury Bills — 30-day U.S. Treasury Bill;
REITs — National Association of Real Estate Investment Trusts® (NAREIT) Equity REIT Index.

estimated to increase from 44% to 49% when just allocating 10% of investments to real estate, while it jumps further to 53% when the investment in REITs is doubled to 20% (Morri, 2014b).

In addition, there has been a significant development towards more open and integrated markets worldwide – e.g. the EU that enhances free movement of goods and people, not to mention the wide adoption of the euro that ideally should reduce the cost of capital for companies. There are international Treaties in place to promote capital mobility, free trade and ease the investment flows. This sort of openness should have an effect on the rates of return of all companies.

The crisis periods have shown that during downturn different asset classes become more correlated compared to "normal" periods. The Great Recession of 2007-2009 was a global shock – a kind of which not just the financial markets but the whole economy had not seen since the 1929. It started with the bursting of the real estate bubble (the so-called subprime crisis) in the US, but evolved into an unprecedented freeze in the financial markets worldwide.

Figure 2. US and Europe EPRA/NAREIT and broad equity market indexes



Source: Created by the author, data by EPRA and Yahoo! Finance

For instance, Europe and the US have experienced quite different development since the crisis as can also be seen from the graph (Figure 2) above. The graph depicts the returns for listed real estate vehicles (EPRA/NAREIT) and broad equity market indices in both regions. The returns are indexed to 100 starting from the year 2000. It is interesting to note that up until 2007, the returns for real estate indices moved in a similar manner, showing the same boom characteristics. Since the 2007 Great Recession, the US market has rebounded – the stock market as well as real estate market indices have achieved their pre-crisis peaks, while the European real estate market keeps lagging behind. The S&P500 has even soared to levels beyond those seen during the last boom. In addition, it can be noted, that the real estate index returns in both regions have fluctuated on a significantly larger scale than the stock market ones, implying that they are more sensitive and thus more unstable than the corresponding equity markets. This; however, is contrary to the general belief of the relative security achieved with real estate investments.

The latest financial crisis was very much related to real estate securities and the world economy. The financial markets have become more and more integrated, thus closely following the much earlier study by Bardhan, Edelstein and Tsang (2008), it would be interesting to see what has been the effect of the increased globalization in the setting of the Great Recession on the rates of returns of real estate securities worldwide?

This paper tests if and how the effect of economic and financial integration on publicly traded real estate companies has changed during the last financial crisis. The paper capitalizes on the model by Bardhan et al. (2008), which examines the effect of trade openness on real estate securities, where globalization is measured as the integration of the goods market.

The paper is divided into four broader sections. It starts out with a comprehensive overview of the available literature – firstly, on the drivers of real estate stock returns, and secondly, globalization is linked with the real estate sector. The subsequent section outlines the data and methodology employed for the empirical analysis. This is followed by regression results and their interpretation. The final part sums up the findings.

1.1. Relevance

While Bardhan, Edelstein and Tsang (2008) were among the first to study the effect of openness on real estate securities using a sample from 1995 to 2002, this paper relies on a more recent and longer series of data (2004-2014), which covers at least one full economic cycle. In addition, the data includes the Great Recession, which as mentioned before, was very much a time of crisis in real estate. Thus it provides a good test bed for experiment to see if and how the effect of openness has changed.

In addition, this paper controls for the effect of such macroeconomic variables as openness and interest rates, which remains a relatively unchartered territory. The research so far has more concentrated on traditional asset pricing models in studying the returns of real estate companies or to international correlations and diversifications.

2. Literature review

In order to study the effect of openness on the real estate securities' returns; first, the existing literature will be examined to gain perspective on the necessary explanatory variables that are known to drive the returns of real estate companies. Therefore, the literature review is divided into two broad categories. The first part will concentrate on the most prevalent theories out there about the factors that affect the returns of real estate companies. The second part will focus on the work done in the field of globalization and its interaction with the real estate industry.

2.1. Drivers of stock returns for real estate companies versus the general stock market

Given its liquidity and availability of market data, the US has been the main base for the ample body of literature on the determinants and performance of real estate company stock returns. Generally, the cornerstone of most research papers is the testing of the most well known asset pricing theory – the Capital Asset Pricing Model

('CAPM') by Sharpe (1964), Lintner (1965), and Black (1972). While the CAPM, which relies on Markowitz's (1959) mean-variance efficient portfolio frontier, stipulates that a stock return should be dependent on the risk-free rate and on the covariance with the worldwide market risk, already in 1991 McIntosh, Liang and Tompkins (1991) find that small real estate investment trusts (REITs) outperform the larger ones. They utilize data from 1974 to 1988 and show that the risk adjusted returns of small REITs are superior compared to their larger counterparts.

The second most tested theory on determinants of returns for publicly listed entities is the three factor model by Fama and French (1992, 1993, and 1996), who add size and book-to-market ratios to the market risk premium as important factors. In the setting of publicly traded real estate companies, Fama-French three factor model is corroborated as important determinant of equity REIT returns in a study by Peterson and Hsich (1997), who base their analysis on data from 1976 to 1992. While they find that all three factors (market risk, size, and book-to-market ratio) have an impact on equity REIT returns, the study by Chen, Vines and Chiou (1998) only confirms size as the most powerful determinant. This directly contrasts the findings in the study by Davis, Fama and French (1999) exploring the general US equity market and establishing that the value effect, i.e. book-to-market ratio is prevalent while the size effect is much less significant.

When juxtaposing the CAPM and the Fama-French three factor model, the research on equity REITs by Chiang, Lee and Wisen (2004 and 2005) establishes that indeed the single factor of market risk has less explanatory power on the returns than the three-factor version. In addition, Serrano and Hoesli (2007), basing their study also on equity REITs, conclude that the Fama-French model is more applicable when determining returns. However, it should be noted that Serrano and Hoesli (2007) also find that the importance of these factors varies through time – while size is always the predominant factor, the book-to-market ratio increases in significance only in the later part of the dataset, namely after the early 1990s. On the other hand, the aforementioned study by Davis et al. (1999), who utilizing data on US equity market, claim that the monthly average book-to-market effect is 0.43% for 1963-1997 and 0.50% for 1929-1963, while the size effect is less certain and amounts to 0.20% on average per month over the entire time frame of 1929-1997. In addition, Serrano and

Hoesli (2010) directly explore if and how the foreseeability of returns of securitized real estate companies and common stocks diverge in the period from 1990 to 2007. They establish that in general the returns for real estate are more predictable than those for the real estate securities.

When it comes to more specific industries, then for instance, Fama and French (1997) also advocate that it may be important to check whether industry-specific loadings and risk premia are varying through time. Taking this into consideration one may reach a conclusion that utilizing only the traditional factors may not be sufficient when studying the determinants of expected returns of real estate securities.

Research by Karolyi and Sanders (1998) argues the risk premium on REITs is not fully captured by the betas in the traditional asset pricing model, while for common stocks the overall stock market return (CAPM) is highly relevant. They investigate not only the real estate market, but also the stock and bond markets and establish that the predictability of returns for real estate stocks and real estate is similar (Karolyi and Sanders, 1998). For example, in a study of REIT returns comprising the pre- and post-1990 era, Chui, Titman and Wei (2003) claim that in pre-1990s size as well as momentum, turnover, and analyst coverage determined the returns, while momentum only became the essential determinant later on. Interestingly, the momentum phenomenon exhibits higher level of robustness for larger REITs as well as for more liquid REITs (Chui et al., 2003).

2.2. Globalization and real estate securities

Most of the empirical research still relies on the traditional asset pricing models; however, there is an ongoing debate about whether global or rather local factors are more significant. Bond, Karolyi and Sanders (2003) base their study on public real estate vehicles in 14 countries and find evidence that actually both of these factors are important, while it differs from the other studies, observing that other Fama-French factors such as size and value are insignificant. A more international research by Ling and Naranjo (2002), utilizing a vast dataset from 1984 to 1999 and incorporating over 600 real estate firms from 28 countries, demonstrates that both the global and the

local market risk factors have explanatory power in determining returns. Hamelink and Hoesli (2004) arrive at a similar conclusion, demonstrating that the local country-specific risk factor is the main determinant of real estate securities, while size also is found to be important. The size effect, however, is negatively related to returns, a finding opposite to the Fama-French model, where small companies outperform the larger ones. In addition, the pure country effect is also found to be important (Hamelink and Hoesli, 2004). A Pan-European review carried out by Schulte, Dechant and Schaefers (2011) corroborates the effect of local market specific risk factor, book-to-market, and size.

Goetzmann and Watcher (1995) argue that the slump in real estate prices that occurred in 1990s spread around the world. Despite the best efforts of the investors, diversification did not save them from the plunge in 1991 and 1992; therefore, Goetzmann and Watcher (1995) claim that this phenomenon comes from the dependence on global GDP. The correlation of the property market to the stock market and GDP is confirmed by the research conducted by Quan and Titman (1998). Case, Goetzmann and Rouwenhorts (1999) utilizing 11 years of international data establish that the changes in real estate values in different markets are quite highly correlated. They argue that this stems from the fact that the property market is partly driven by the global GDP (the "equal-weighted index of international GDP changes"). However, for some regions local factors are more relevant than global ones, concluding that there are significant benefits in favour of diversification (Case, Goetzmann and Rouwenhorts, 1999).

2.2.1. Openness and publicly traded real estate vehicles

Bardhan, Edelstein and Tsang (2008) are one of the first to directly study the effect of globalization and financial integration on the return of real estate securities. They claim that there are two ways through which globalization impacts the real estate industry and they use *(exports + imports)/GDP* as the measure of openness, i.e. the effect of the goods and services market.

On the one hand, globalization brings along economic openness and competition in all areas of life. More open economies have higher levels of trade, and

thus higher competition, which in turn increases specialization and productivity as resources are put to more efficient use. For instance, the international trade model by Melitz (2003) shows that a higher level of international trade will lead to the thriving of more productive firms, so that more effective firms enter the export market and the weaker ones are forced out of the market. All in all, the increased productivity will result in higher welfare (Melitz, 2003). With more productivity and a higher level of output, the demand for real estate will also go up. However, in the real estate sector, it takes some time before supply can meet increased demand, thus for a while there will be an upward pressure on the real estate rents and prices (Bardhan et al, 2008).

In addition, there is the well-recognized Harrod-Balassa-Samuelson effect (Kakkar, 2002; Gente, 2006) that states that if borders open up, firstly, the prices in tradable goods sector will equalize across borders, and then through that, the non-tradable sector will catch up as well. As with free movement of people, capital and goods, wages in both sectors will go up – thus it can be deduced that when borders open up (meaning there is globalization and openness) the non-tradable sector, in this case, the real estate sector, will catch up with the increase in prices. Bardhan, Edelstein and Leung (2004) demonstrate that openness positively influences rents in residential real estate.

Bardhan et al. (2008) employ an exhaustive dataset from 1995 to 2002 comprising of 946 firms from over 16 countries. The authors establish that openness and the returns of publicly traded real estate vehicles have a negative relationship, which remains robust even when controlling for different factors such as national and global CAPM, Fama-French factors as well as several other company- and country-specific effects. They hypothesize that, as financial integration deepens, the law of one price will kick in and the no arbitrage condition will lead to lower excess returns for real estate vehicles (Bardhan et al, 2008).

Liow and Webb (2009) study 142 publicly traded real estate vehicles and establish that there are more common drivers of real estate securities' returns within a country rather than across the four markets of the US, UK, Hong Kong, and Singapore. Furthermore, they argue that the economies in question are much more connected than their real estate markets. The authors also claim that the established

correlations among real estate markets stem rather from economic globalization, not the financial integration in these markets, thus indicating that diversifying a portfolio internationally still has benefits even for real estate securities. Yunus (2009) studying the data from 1990s to 2007 shows that real estate in Australia, US, Japan, Hong Kong, and UK is much more related than that of France and the Netherlands, suggesting that the latter two yield larger benefits for diversification.

Schindler (2011) employs the cointegration technique by Engle and Granger (1987) to study the benefits of diversification in the long run for the public real estate vehicles in such regions as Europe, North America, and Asia-Pacific. In the paper, he establishes that in the long run the real estate markets experience stable relationships, while it is weaker across the three continents than within them.

To sum up, there are still some benefits from international diversification in real estate markets, but these benefits are reduced due to increased correlations globally. Thus, as Bardhan et al. (2008) suggest, globalization and financial integration may as well decrease the risk premium on publicly traded real estate vehicles. The theories on the law of one price and no arbitrage conditions indicate that as economies open up, when one takes into account the currency and country risks, the excess returns on real estate should also be experiencing a downward pressure (Bardhan et al., 2008).

2.2.2. Credit and publicly traded real estate vehicles

The bursting of the real estate bubble in 2007 resulted in an unrivalled freeze of all financial markets. Already the underlying assets of real estate securities experienced a plunge in prices, but the global meltdown also manifested itself as a liquidity freeze in the interbank market, affecting the credit availability for all firms.

Glick and Lansing (2010) argue that the extended time period for which cheap credit available coupled with low standards for underwriting fuelled the housing bubble. This is corroborated by Pavlov and Wachter (2009), who provide evidence for temporary inflation in asset prices driven by extended availability of lending instruments, which all in all, amplifies the boom and bust cycle in the real estate

sector. On the other hand, Goetzmann, Peng and Yen (2012) demonstrate that previous upward price expectation in the housing market affect credit availability as forecasts mainly include the long-run appreciation in the real estate sector, inflating collateral valuations. Favilukis, Kohn, Ludvigson and van Nieuwerburgh (2012) establish that strong fluctuations in house prices over the study period of 1992-2010 were driven by the fluctuations in financial markets caused by its liberalization and the following reversal. Credit supply is the predominant explanatory variable for the trends is house prices, while international capital flows are found to be unimportant.

In order to test the effect of openness on the returns of publicly traded real estate vehicles, this paper will employ panel data analysis and control separately for the CAPM, Fama-French factors, additional firm-specific factors as well as credit spread as these items have been proven to be important drivers of real estate securities returns.

3. Methodology

3.1. Sample

The sample of the publicly traded real estate vehicles is drawn from Datastream for the period of 2004 to 2014 for 16 countries from 5 different regions (Europe, Asia, Americas, South-Pacific, and Africa). According to Datastream, the real estate companies included are comprised of "real estate services providers, development companies, investment companies, REITs, but excluding pure construction companies" (Bardhan, et al., 2008). The sample includes the following countries:

-) Europe: UK, France, Germany, Italy, Sweden, Netherlands, and Denmark;
-) Asia: China, Hong Kong, Singapore, and Japan;
-) Americas: USA and Canada;
-) Australasia: Australia and New Zealand;
-) Africa: South Africa

This paper utilizes a balanced sample of 707 listed real estate companies that existed throughout 2004 to 2014. As Datastream provides data only as of firms that

existed in 2014, that may cause a survivorship bias since it does not represent fully all the companies that have existed over the time period. The data was cleaned for preferred shares and also for B class of shares. The largest part of sample comes from US with 162 firms, followed by Hong Kong and China with 111 and 110 companies, respectively.

3.2. Data sources

The primary source for company level data is Datastream – market value, book value, turnover, but Datastream is also used for the country-level market rate. Country-level information about risk free rate, interest rate and the exchange rates is obtained from Bloomberg. The rest of the data for macroeconomic variables, such as GDP growth, inflation, household consumption, population growth, lending interest rate and statistics for export and import, is obtained from the World Bank Database.

The 'absolute' metrics such *Size* and *Turnover*, are adjusted by currency - all values across the sample are converted to US Dollars using the respective exchange rate on the 31st of December in the particular year.

3.3. Variables

The main regression is the following multi-factor model:

$$TSR_{it} - R_{ft} = D_t + \beta_1 * \left[\left(R_{ct} - R_{ft}\right)\right] + \beta_2 * \left[\frac{M}{B_t}\right] + \beta_3 * LnSize_t + \beta_4 * LnTurnover_t + \beta_5 * LocalGDPchange_t + \beta_6 * Local\ credit\ spread_t + \beta_7 * Openness_t + v_{it}$$

$TSR_{it} - R_{ft}$: The dependent variable used is *Total Shareholder Return* ('TSR'-cumulative share price return adjusted for dividends) for firm i at time t adjusted for the relevant risk free rate.

TSR is used as it reflects the actual returns that investors would achieve through share price movements as well as the dividend return as the latter is assumed to be re-

invested. As per Bardhan et al. (2008) the local rather than exchange rate controlled returns are employed to study the data. This gives the advantage of escaping from making assumptions about the residency of the investor while it infers that there exist possibilities for perfect hedging (Bardhan et al., 2008).

The TSR shows the theoretical compounded total return over a certain time period by assuming that dividends received are used to buy additional shares in that particular stock using the market closing price as of ex-dividend date (Datastream, 2015).

$(R_{ct} - R_{ft})$ is defined as: Stock market return less relevant risk free rate

The country-specific effects are taken into account through applying the most well known model of the Capital Asset Pricing Model (CAPM). According to the CAPM, a particular stock's return is influenced by the interplay of risk free rate and a beta of the equity risk premium (i.e. stock market return less the risk free rate):

$$R_i - R_f = \beta * (R_m - R_f)$$

$R_i - R_f$ (i.e. $TSR_i - R_f$) represents the excess return, the equity premium, over the risk free rate and it also can be considered as the opportunity cost. The R_f is proxied by using the appropriate 3-month rate returns for each country in the sample. The proxy used for market return, R_m, is the local most widely tracked stock market index's return.

The following indexes are used:

-) UK: FTSE All-Share;

-) France: SBF-250 (CAC All-Tradable as of 2011);

-) Germany: CDAX;

-) Italy: FTSE Italia All-Share Index;

-) Sweden: Affarsvarlden General Index (OMX AFGX as of 2009);

-) Netherlands: AEX All-Share;

-) Denmark: OMX Copenhagen Index;

-) China: Shanghai Stock Exchange Composite;

-) Hong Kong: Hang Seng;
-) Singapore: FTSE ST All-Share Index;
-) Japan: Nikkei 500;
-) USA: S&P 500;
-) Canada: S&P/TSX Composite Index;
-) Australia: ASX All-Ordinaries;
-) New Zealand: NZ Ordinaries All Index;
-) South Africa: FTSE/JSE Africa All Share Index

The time periods are consistent throughout the regressions, i.e. TSR, R_m, and R_f are always used in the same time frame. The local country returns are used as per Bardhan et al. (2008). As highlighted earlier in the Literature Review section, both global and local market factors are found to be important, while Hamelink and Hoesli (2004) show the local country-specific risk factor as the main determinant of real estate securities.

M/B is defined as: Market value (Market Capitalization) divided by Book value of Equity

It is essential to control for the book value effects since, as discussed earlier, the Fama-French three-factor model (Fama and French, 1993) contains the market-to-book item as a relevant determinant of returns. This paper uses the same definition as Bardhan et al. (2008) for including the value effect.

Market value is defined as the share price times the number of ordinary shares outstanding. The Book value of Equity is already provided on per share basis, thus the figure captures the effects of secondary offerings, dilution via share options, and other potential changes in the number of shares outstanding (Datastream, 2015)

LnSize is defined as: Natural logarithm of Market Capitalization

Size effect is the third determinant of returns according to the Fama-French three-factor model (Fama and French, 1993). Size mostly turns up as an essential factor in explaining the returns. For instance, the research conducted by Chen, Vines and Chiou (1998) corroborate size as the foremost powerful determinant of returns.

This paper follows the example by Bardhan et al. (2008) who use the natural logarithm of market capitalization as a proxy for size in order to increase the comparability among public real estate vehicles.

LnTurnover is defined as Natural Logarithm of the company's yearly trading volume

Turnover is used as a proxy for measuring the liquidity of the firm as per Bardhan et al. (2008). Also, as stated in the literature review section, Chui, Titman and Wei (2003), for instance, found turnover to be an important determinant of REIT returns in the pre-1990s era. The natural logarithm is used for the turnover measure as it was for the size measure – to increase the comparability among the publicly traded real estate companies.

Local GDP change is the local country's annual GDP change through 2004 to 2014

According to Bardhan et al. (2008) the local country's GDP change is the primary force behind the demand dynamics for space in commercial and residential property markets. The argument goes as follows: when the demand in real estate goes up, it will firstly be reflected in the prices and values of free space and through that in the returns for real estate companies, since the supply in this market will always be lagging behind the changes in demand. Therefore, as country's GDP increases, it can be assumed that the wealth of people becomes larger, which implies that also the demand for goods will go up.

GDP change is inferred from GDP calculated by World Bank that uses the gross value added by resident agents plus any product taxes and less any subsidies (World Bank, 2015a). The annual GDP change is applied in the model.

Local credit spread is defined as the difference between the 10-year and 3-month government bond yields

The credit spread is a proxy for estimating the cost of credit and its accessibility as per Bardhan et al. (2008). As stated in the literature review section cheap and easily available credit (Glick and Lansing, 2010; Pavlov and Watcher, 2009) as well as its supply (Favilukis, Kohn, Ludvigson and van Nieuwerburgh, 2012) is very important in shaping the housing market, thus it is necessary to control for this factor.

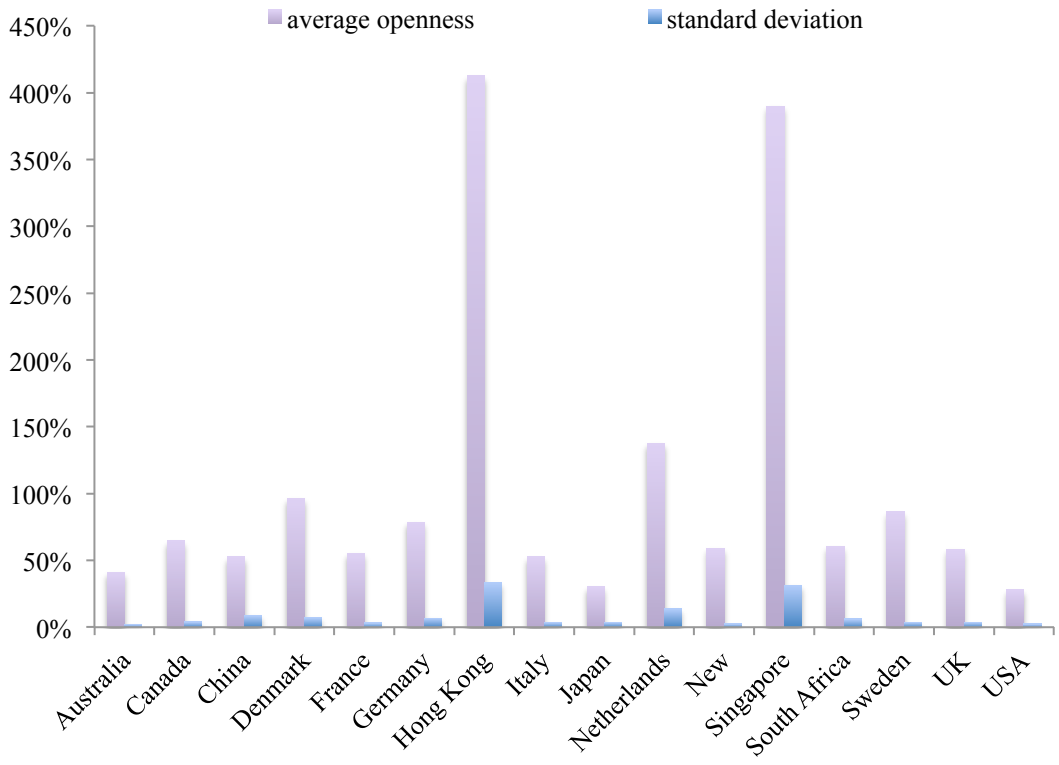
The proxy is derived from calculating the difference between the long-term 10-year and short-term 3-month government bond yield. As real estate companies typically have long-term rent agreements with their tenants, they would need to match the income streams with long-term loan contracts to reduce the rollover risk. The larger the spread, the more expensive it is to borrow money long-term.

Openness is defined as: the aggregate exports and imports divided by the gross domestic product; (Exports + Imports) / GDP

This paper relies on the definition by the National Bureau of Economic Research (NBER) and Penn World Table compiled by the University of Pennysylvania's Center of International Comparisons for measuring country's openness, this is also used by Bardhan et al. (2008). As defined by World Bank the indicator includes exports and imports of all goods and services, factoring in the price of the good or service itself together with the associated auxiliary costs such as transport, insurance, etc (World Bank, 2015b).

As depicted in Figure 3 below, from 2004 to 2014 on average the goods market openness is the highest in Hong Kong and Singapore. The third most open economy is the Netherlands though with a significantly lower indicator. It is worth noting that the three are relatively small countries who are also known for their transit and re-export capabilities. This is in contrast to large economies such as the US and China, who have a much lower openness indicator. Overall, the US and Japan have the lowest average openness indicators for the sample period.

Figure 3. Openness, (Exports+Imports)/GDP, by Country



Source: Created by the author, data by World Bank (2015b)

3.4. Summary statistics

The table below (Table 1) outlines the descriptive statistics for the publicly traded real estate vehicles – the mean and standard deviation of each variable. These numbers represent the averages and standard deviations from raw data. The Total Shareholder Return ('TSR') is the annualized return investors are expected to have gained if they had invested in the stock and also re-invested the dividends obtained. For the period of 2004 to 2014 the average annual total shareholder return for the whole sample is 22.61% with a standard deviation of 110.07%. This is a quite high number considering the more than a decade of data. It is interesting to note that if outliers are accounted for (the TSR being winsorized at 5% level), the average annual TSR drops significantly to around 15%, indicating the existence of few large outliers. Comparing to Bardhan et al. (2008), who relied on a similar data from 1995 to 2002, they obtained a smaller mean (13.10%) but a lot higher standard deviation (187.43%). The sample without the US yields in 24.52% for shareholder return, showing that the US has on average a bit lower return than the rest of the sample.

France has the highest average return for the 2004 to 2014 period - the country yielded in a whopping 59.04% average annual return. However, it is also interesting to note, that France has the highest standard deviation (356.13%) for its returns, which demonstrates that there exists a large dispersion also within the publicly traded real estate vehicles in France. Italy, on the other hand, performs the weakest with its 0.35% average annual realized return. Again, it should be noted that the standard deviation amounts to 50.04% referring that not all publicly traded real estate vehicles did so badly over the entire time frame. In comparison with Bardhan et al. (2008) it should be noted that they also retain a rather high shareholder return figure for France (30.42%), but in contrast with this paper, their sample yields Italy 28.91% though with a very large standard deviation of 114.81%. Interestingly, Hong Kong has an average return of -10.11% for the period of 1995-2002 (Bardhan et al., 2008), while the current paper exhibiting data for 2004-2014 shows that Hong Kong has turned its fortune and on average yields 28.20% for its investors in real estate.

Table 1. Descriptive Statistics*, Real Estate Securities, 2004-2014

	TSR	**MV/BV****	**LnSize, USD**	**Turnover by Volume, USD**	**Nr of Firms**
Total Sample	22.61 110.07	3.85 24.26	5.51 2.23	182,641.01 533,280.45	707
Total Sample, w/o US	24.52 120.88	4.17 26.56	5.37 2.05	181,671.83 525,433.88	545
By Country					
Australia	21.45 68.37	1.21 1.76	5.30 2.23	375,586.27 1,211,938.25	36
Canada	21.66 54.13	1.51 19.24	5.04 2.37	17,326.98 28,072.41	41
China	23.03 96.47	5.99 11.84	5.94 1.27	351,742.59 504,920.98	110
Denmark	12.53 67.76	1.50 1.18	4.10 1.64	1,317.80 3,288.61	6
France	59.04 356.13	2.55 8.29	4.68 2.20	10,737.79 39,605.84	39
Germany	13.43 91.21	5.03 19.00	3.58 2.18	412.87 951.85	35
Hong Kong	28.20 88.97	0.55 11.74	5.36 2.07	196,285.67 551,597.26	111
Italy	0.35 50.04	1.89 3.42	5.15 1.61	328,058.35 621,576.03	8
Japan	18.71 63.06	16.25 71.89	5.82 1.86	1,854.13 4,808.51	53
Netherlands	8.20 26.78	1.11 1.18	6.09 1.54	19,403.92 19,171.45	6
New Zealand	11.51 19.01	0.97 0.18	6.07 0.95	177,533.47 177,986.40	8
Singapore	27.31	1.08	6.20	334,800.61	22

	58.37	0.86	1.96	617,193.57	
South Africa	27.07 79.71	10.78 44.23	4.49 2.43	20,825.08 33,106.82	16
Sweden	27.67 43.50	2.12 2.75	6.11 1.56	12,389.95 16,272.88	14
UK	16.90 54.04	1.17 1.84	5.50 2.23	292,398.23 544,654.27	40
US	16.17 60.17	2.74 13.80	5.95 2.69	185,876.88 557,679.70	162
By Continent* **					
Americas	17.29 59.02	2.50 15.05	5.77 2.65	151,818.75 502,868.01	203
Australasia	19.64 62.47	1.17 1.60	5.44 2.08	339,427.25 1,100,759.37	44
Africa	27.07 79.71	10.78 44.23	0.84 0.34	20,825.08 33,106.82	16
Europe	26.52 190.26	2.48 9.88	4.84 2.25	102,027.57 347,630.02	148
Asia	24.49 86.00	5.42 32.63	5.72 1.78	228,990.06 502,703.05	296
By Year					
2004	35.41 67.36	2.76 139.54	4.92 2.00	77,700.07 205,760.47	707
2005	32.51 192.44	5.74 31.27	5.04 2.06	77,065.00 248,717.07	707
2006	47.27 192.78	5.00 24.37	5.35 2.07	108,627.90 299,330.32	707
2007	78.61 124.45	5.32 21.33	5.87 2.15	183,089.14 469,933.94	707
2008	-9.08 95.35	3.70 23,03	5.67 2.12	199,045.64 493,847.35	707
2009	-29.61 31.52	2.31 8.71	5.25 2.16	258,018.40 615,001.57	707
2010	29.93 71.42	2.76 11.68	5.50 2.24	292,980.12 899.051.80	707
2011	22.67 65.61	2.71 9.75	5.69 2.30	221,412.79 556,687.25	707
2012	-6.87 41.72	2.45 11.08	5.58 2.35	196,193.57 504,600.36	707
2013	37.16 62.16	3.31 17.51	5.80 2.44	193,353.46 425,521.58	707
2014	10.77 68.94	1.65 14.08	5.80 2.41	212,987.68 708,882.19	707

*This table presents the statistics from the raw data; mean value in the first row and standard deviation presented in the second row of the cell.

** The market-to-book ratio (MV/BV) is the market capitalization divided by the book value of the company (book value per share multiplied by the number of shares).

***Continents are compiled as following: Europe consists of Denmark, France, Germany, UK, Italy, the Netherlands and Sweden; Americas is the US and Canada; Australasia is made up from Australia and New Zealand; Asia includes Singapore, Hong Kong, China and Japan; and Africa is South Africa.

In general, comparing the data continent-wise, Africa, which is represented by South Africa only, has the highest return of 27.07%. That is not very different from Europe with its 26.52% nor Asia's 24.49%. While Europe was the best performer with 19.46% for Bardhan et al. (2008), Asia returned -3.35% in that period. This

difference can be explained by the difference in the time frames used, as the data in Bardhan et al. (2008) includes the Asian financial crisis of 1997 while the current paper doesn't.

The yearly distribution of returns is a testament of the impact of the Great Recession in 2007. It can be seen that from 2004 to 2007 the average annual TSRs increase from 35.41% to 78.61% respectively just to plummet in the subsequent two years – 9.08% in 2008 and 29.61% in 2009. It demonstrates that the bursting of the real estate bubble had a global effect. It is noteworthy that after that, the real estate market experiences an interesting fluctuation – it rebounds throughout 2010 and 2011 just to decline again in 2012 to 6.87% and recover in 2013 and 2014 to 37.16% and 10.77%, respectively. In addition, this trend is in line with the EPRA/NAREIT indices movements in Figure 2 in the Introduction section.

The summary statistics of the market data can be found in the Appendix 1 (Table 2). Average annual openness for Singapore stands at 389.52% of GDP, for Hong Kong 412.48% and for Netherlands 137.41%. While for Japan it is just 30.36% and the US 27.91%. The highest GDP growth has been in China 18.36%, Singapore 11.34% and Australia 11.65%. Japan has seen a meager average growth of 0.95%.

3.5. Regressions

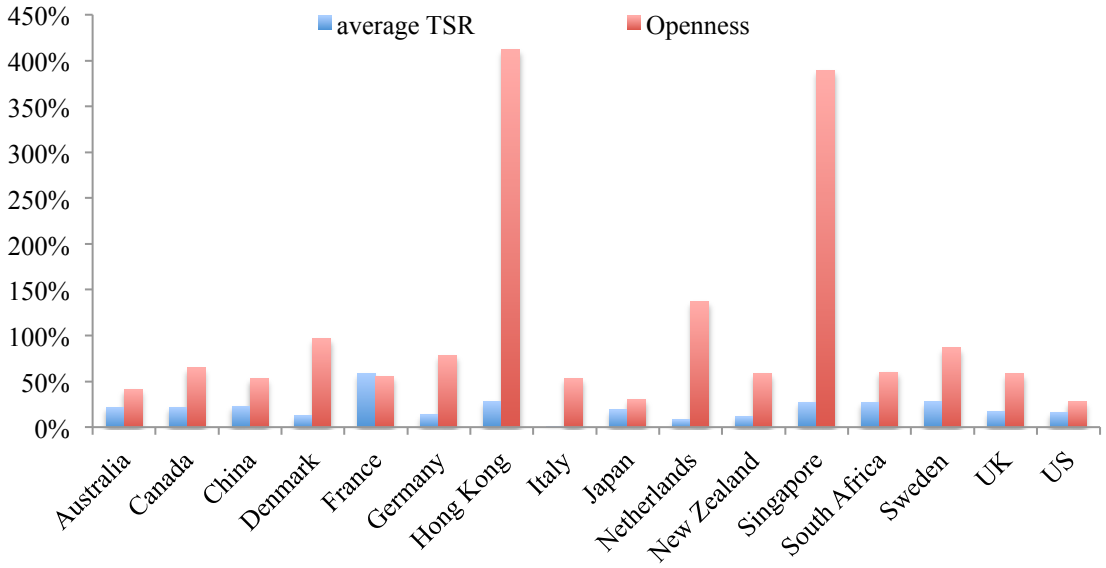
In order to study the effect of openness on the real estate securities' returns, panel data analysis is used as per Bardhan et al. (2008). As mentioned earlier, strongly balanced data from 2004 to 2014 is used for a total of 707 companies. Panel data allows controlling for unobservable fixed effects or also for time-dependent variation. The advantages of applying panel data include "more accurate inference of model parameters; …; greater capacity for capturing the complexity of … behavior than a single cross-section or time series data; …; controlling the impact of omitted variables; …; generating more accurate predictions…" (Hsiao, 2006). Utilizing panel data enables to check for the effect of openness on the publicly traded real estate vehicles over time, while controlling for the firm-specific factors that otherwise might

affect the returns. The White estimator is employed for correcting standard errors for heteroscedasticity.

4. Empirical results and analysis

The empirical part is divided in two. Firstly, the six different regression specifications are run on the entire time frame of the panel data to see the effect of openness on the returns of the publicly traded real estate vehicles. This part controls for different variables outlined as potential determinants of returns in the Literature Review section. The second part consists of various robustness checks in order to validate the findings. Also, the findings are compared across raw data and the winsorized (at 5%) version as well as to the corresponding figures in Bardhan et al. (2008).

Figure 4. Average Return versus Openness, by Country



Source: Created by the author, data by Datastream (2015) and World Bank (2015b)

The graph above (Figure 4) depicts the annual average total shareholder returns (TSR) coupled with the average openness by country over the 11 years included in the sample. It can be seen that Hong Kong and Singapore are the most open (measured by *(Exports+Imports)/GDP*) countries, whereas their TSR levels remain modest.

4.1. Regression results

The table (Table 3A) below outlines the results for the effect of openness on the publicly traded real estate vehicles relying on raw data (i.e. not winsorized). The paper first tests for the CAPM, here based on the local market return. The coefficient on the excess market return $(R_m - R_f)$ is positive and significant in all six specifications as expected. It is noteworthy that the sensitivity coefficient on the local market return factor always remains larger than one, which implies that the publicly traded real estate securities in this sample are very sensitive to the movements in overall market making them more risky than the latter. This finding contradicts the traditional thinking as well as Bardhan et al. (2008) conclusion that the real estate market is more stable than the overall equity market. As this paper utilizes the data from 2004 to 2014, a period which has seen the one of the most extreme fluctuations in real estate, it can be concluded that the severe economic recession has changed the perception of real estate vehicles which are now seen as more speculative investments than the local equity market. In addition, this corresponds to the behavior of EPRA/NAREIT indices shown in Figure 2 in the Introduction section.

Turning to the second most tested theory - the Fama French three-factor model, the results indicate that size and market-to-book effect is not present in this data. In the regressions the coefficient on size is positive but insignificant, size becomes significant only in regression [3]. This (regression [3]) refers that large publicly traded real estate vehicles might be outperforming smaller ones. Perhaps larger companies are more stable, have a smaller probability of financial distress and lower costs for it, as they are more able to diversify their sources for funding and roll over debt (Bardhan et al., 2008). Also, Bardhan et al. (2008) argue that this finding might actually not be opposing to the Fama and French (1992) one, where the latter state that smaller firms yield in a better investment strategy than the large ones. Publicly traded real estate companies, for instance, in Bardhan et al. (2008) sample, have as large market capitalizations as the small ones in Fama and French (1992). They claim that the effect from investing in small firms may cease to exist when dealing with small companies. Usually the data is truncated to exclude very small companies, which may be too tiny and illiquid so that the risk of investing in them

becomes much higher (Bardhan et al., 2008). The results in this paper are also based on raw data.

As with the size effect, market-to-book is also found to have a positive coefficient, but it remains insignificant most of the time. This is consistent with Bardhan et al. (2008). Value effect shows up as significant only in regression [6], implying that over the 2004 to 2014 period, growth stocks have yielded better results than value stocks. It could be explained by the fact that the period was very volatile, thus growth stocks were able to gain more during the boom cycles than value stocks. Also, as mentioned earlier, the data may exhibit some sort of survivorship bias, as it does not contain all the stocks that existed during the 2004-2014 period, but the ones that existed for the entire time frame. In addition, the coefficient on market-to-book ratio is statistically significant only in one regression specification but not so much economic interpretation wise.

While the reference paper by Bardhan et al. (2008) finds size a prevalent factor, the market-to-book remains insignificant also for them. Thus this paper falls more in line with the research by Bond et al. (2003), who establish the local market factor as well as the global factor as important, but their sample of real estate vehicles from 14 countries does not exhibit significance in terms of size or value effects. Moreover, as also mentioned in Literature Review section, Hamelink and Hoesli (2004) confirm the local market factor as an important determinant of returns, but also the size effect.

Table 3A. Fixed Effects Regression Results

This table shows regressions of total shareholder return (TSR) adjusted for the country-specific risk-free rate on all the outlined independent variables. The R^2 and number of observations are also provided. T-statistics are provided in the parentheses below. *, **, and *** denominate significance levels at 10%, 5%, and 1% accordingly.

Independent variables:	[1]	[2]	[3]	[4]	[5]	[6]
$(R_m - R_f)$	1.43 (28.80)***	1.44 (28.84)***		1.44 (28.71)***	1.46 (28.79)***	1.42 (26.44)***
Ln Size			3.93 (2.63)***	.52 (.39)	1.13 (.83)	1.17*10 (0.09)
Market to Book			$8.29*10^{-2}$ (1.32)	$.06*10^{-2}$ (1.51)	$6.19*10^{-2}$ (1.53)	$2.27*10^{-1}$ (3.18)***
Ln Turnover						4.27 (2.87)***

GDP growth						.50 (3.65)***
Spread						-1.20 (-.99)
Openness		-.22 (-3.73)***			-.24 (-3.89)***	-.25 (-3.98)***
Observations	7737	7516	7475	7475	7268	7190
R^2	.19	.20	.08	.20	.20	0.21
F-test	909.27***	456.50***	4.31**	310.29***	235.17***	158.09***

Turning to the variable of utmost interest, openness, it can be seen that openness is negatively and significantly related to returns in regressions [2], [5], and [6], implying that the more open an economy is the lower are the returns for real estate securities. Hereby, it should be noted, that this paper refers to openness as openness of goods and services market, since the measure is *(exports+imports)/GDP*. This in line with the results by Bardhan et al. (2008), who reason, as described in Literature Review, that if economies open up, the financing condition will take effect. The returns for listed companies in those countries go down, since they will become more liquid and the effects of law of one price and no arbitrage conditions will apply. Also, as the data captures the Great Recession, it might be that since the most open economies are smaller economies such as Singapore, Hong Kong, the Netherlands, Denmark, and Sweden, there was an overall flight to safety in the capital markets when the recession hit, and therefore, increased demand for US dollar assets, but the US happens to be a large and much less open economy in the goods market sense.

The last regression [6] includes three additional factors, such as GDP growth, credit spread, and turnover. GDP growth as well as turnover factors are statistically significant and positively related to the excess returns of the publicly traded real estate vehicles. The GDP growth proxies the local demand effect, implying that when the GDP grows, thus the demand for space goes up, also the return for real estate securities will increase. As Goetzmann and Watcher (1995) as well as Quan and Titman (1998) argued, the global GDP affects the real estate securities. Case et al. (1999) claim that global GDP is one of the drivers of the property market. The turnover is assumed to measure the liquidity of the real estate vehicles. The positive sign of the coefficient indicates that if trading activity increases, so does the return for

these companies. The coefficient on interest rate spread is negative but insignificant, consitently with Bardhan et al.'s (2008) overall regression results.

4.2. Robustness Analysis

In order to validate the findings, robustness checks are carried out. First, the results are compared to the same regressions on a winsorized sample. Secondly, additional regressions are carried out by adding different specifications of variables and dividing the dataset differently.

4.2.1. Comparison with winsorized regression

Firstly, to analyze the regression results obtained in Table 3A, same regressions are run on a dataset where the firm excess returns are winsorized at a 5% level to account for the extreme outliers. The winsorized results are presented in Table 3B in Appendix 2. It can be seen that winsorizing the dataset increases the R-squared from around 20% in the initial regressions to around 40% for the winsorized version, showing that the explanatory power of the model improves significantly for the latter.

The local market return remains significant throughout all regression specifications also for the winsorized sample. However, it is interesting to note that the coefficient is positive but a bit less than one. This suggests that the real estate securities market is almost as risky as the local stock market in general. As the non-winsorized sample indicated higher level of riskiness for the real estate stocks, winsorized regressions indicate that the sample consists of a few small but extreme outliers driving up the total returns. Nevertheless, the highly significant and positive relation is apparent in both specifications.

Turning to Fama-French factors, the winsorized version also results in positive relations of size and value effects to the excess returns. In addition, in this specification the two variables mostly exhibit quite large explanatory power, while the regressions relying on raw data found these variables predominantly non-significant. This can most likely be merited to the aspect that often the data used for regressions in other research papers is either trimmed or winsorized to account for the

outliers. In addition, size is often found to be prevalent factor in determining returns, for instance, by Chen et al.'s (1998) finding that performance of real estate companies is mainly influenced by size or by Serrano and Hoesli (2007) who show that size always has an effect, while the importance of other factors vary with time.
Thus, this is consistent with the previous findings, for instance, by Peterson and Hsich (1997) – also in the real estate setting the traditional asset pricing factors matter. The regression specifications confirm that the three-factor model has more explanatory power than the single factor one as suggested by Chiang, Lee and Wisen (2004 and 2005) and Serrano and Hoesli (2007). It can be seen that the R-squared increases from 38% to 39% (Appendix 2, Table 3B) when adding the size and market-to-book effects to the market factor.

In terms of the measure of openness, the winsorized version (Appendix 2, Table 3B) corroborates the main regression finding (Table 3A above) that openness is significantly and negatively related to the excess returns of publicly traded real estate vehicles in all the regression specifications. Furthermore, the coefficients are very similar fluctuating around -0.20 for both of the versions. The more open the goods market is the smaller the returns for publicly traded real estate vehicles.

The additional control factors such as turnover and GDP growth are again positively and significantly related to the excess returns of real estate securities in the winsorized sample (Appendix 2, Table 3B, regression [6]) as was the case for the main regression in Table 3A above (regression [6]). The coefficient for GDP growth is around 0.50 for both of the regressions while the coefficient for turnover is double the size for the main regression. The credit spread does not exhibit any significance for the winsorized sample, nor did it for the main regression.

All in all, it can be seen that the results for the winsorized sample are quite close to the main regression specifications using raw data. The main variable of interest, openness, is significantly negatively related to the excess return of real estate securities with a coefficient of around -0.20.

4.2.2. Additional regressions

To further analyze the findings, additional regression specifications are carried out. The table below (Table 4A) includes regressions such as the main regression (Table 3A, regression [6]) sub-divided into the years leading up to the boom (regression [2004-2007]) and the subsequent bust period up until 2014 (regression [2008-2014]). This is done in order to disentangle the effect that the Great Recession might have had on the sample. The third specification excludes the US as per Bardhan et al. (2008). The three last specifications add or change some of the control variables. The same regressions run on a winsorized sample can be found in Appendix 2 (Table 4B).

Table 4A. Regression

This table shows regressions of total shareholder return (TSR) adjusted for the country-specific risk-free rate on all the outlined independent variables. The R^2 and number of observations are also provided. T-statistics are provided in the parentheses below. *, **, and *** denominate significance levels at 10%, 5%, and 1% accordingly.

Independent variables:	[2004-2007]	[2008-2014]	[Exclude US]	[Size & $Size^2$]	[Turnover/Size]	[Additional controls]
$(R_m - R_f)$	1.48 (14.67)***	1.09 (18.65)***	1.42 (24.45)***	1.42 (26.67)***	1.40 (26.00)***	1.49 (29.21)***
Ln Size	6.03 (1.20)	2.50 (1.51)	1.33 (.91)		1.20 (0.88)	-.53 (-.50)
Market to Book	.38 (3.99)***	0.24 (1.76)*	.28 (2.94)***	.27 (3.17)***	$6.36*10^{-2}$ (1.56)	.23 (3.46)***
Ln Turnover	16.08 (3.47)***	5.39 (3.52)***	4.72 (2.76)***	4.39 (2.91)***		4.89 (3.33)***
GDP growth	-.74 (-.87)	.38 (2.46)**	.45 (3.30)***	.50 (3.65)***	.56 (4.04)***	-.53 (-1.37)
Spread	.95 (.57)	4.66 (4.71)***	-1.81 (-1.20)	-1.16 (-.97)	-.32 (-.27)	1.93 (2.12)**
Openness	-.45 (-1.35)	.20 (3.78)***	-.25 (-3.84)***	-.25 (-3.90)***	-.25 (4.00)***	-.21 (-2.76)***
Size				$-1.90*10^{-3}$ (1.86)*		
$Size^2$				$4.20*10^{-8}$ (1.58)		
Turnover/Size					$-1.11*10^{-5}$ (-8.61)***	
Lending interest rate						1.44 (2.14)**
Population growth						4.16 (1.71)*
Consumption growth						0.86 (2.28)**
Observations	2723	4673	5657	7191	7197	6333
R^2	0.34	0.26	0.21	0.21	0.20	0.31
F-test	84.86***	130.38***	135.27***	138.55***	150.85***	132.55***

To begin with, when comparing the period leading up to the boom to the one starting with the bust (regressions [2004-2007] and [2008-2014], respectively), it can be seen that the local market return is highly significant in both. It seems that the extreme fluctuation of real estate securities stems from the boom period – the coefficient is similar to the main regressions in Table 3A, i.e. around 1.40. Also, if to look at the winsorized results (Appendix 2, Table 4B) it can be noted that more extreme values/outliers stem from that period. The size factor does not exhibit any explanatory power in the two sub-periods as was the case for the main regression, while the value effect is positive and significant at 1% level for the boom period and at 10% for the bust cycle, as it was for regression [6] in the main regression (Table 3A).

Turnover as a factor shows up highly important (significance at 1% level) for both of the sub-periods in the regression analysis, while it is 3-times the size for the sample leading up to the boom when compared to the one starting out with the bust (regressions [2004-2007] and [2008-2014], respectively; Table 4A above). GDP growth and credit spread variables only turn up as significant from 2008 to 2014. In the main regression (Table 3A, regression [6]) GDP growth explained some of the variation in the dependent variable, while the interest rate spread did not have any explanatory power. These findings are also in line with the ones attained in a winsorized sample (Appendix 2, Table 4B).

Openness is negatively, but insignificantly related to returns in 2004 to 2007 (Table 4A above). The same applies to the winsorized sample (Appendix 2, Table 4B). More interestingly, openness is positively and significantly (at 1% level) related to returns in the 2008 to 2014 regression (both in Table 4A as well as Table 4B in Appendix 2). This implies that the more open the goods markets become, the higher the returns for real estate securities in the period starting out with the bust in 2008. This is the complete opposite to the main finding in the overall regressions.

The regression excluding the US does not significantly differ from the main regression (namely the corresponding regression [6] in Table 3A). It confirms the explanatory power of local market return, the market-to-book ratio, GDP growth,

turnover, and most importantly the openness factor. The winsorized version (Table 4B, Appendix 2) only adds size to the list, as was the case with the winsorized main regression (Table 3B, Appendix 2).

Turning to the different specifications for size and turnover variables, it can be seen that size shows up as significant at 10% level for the *Size* factor (regression [Size & $Size^2$] in Table 4A) while turnover maintains its importance (regression [Turnover/Size] in Table 4A). As for the other factors in these regressions, the excess market return is still an essential determinant of returns exhibiting similar coefficients of 1.42 and 1.40, respectively. The GDP growth is also prevalent in both while the interest rate spread is not in either of the specifications. The value effect turns up in regression [Size & $Size^2$] just to lose all significance in regression [Turnover/Size]. Most importantly, openness is highly significant (at 1% level) in both with a same coefficient of -0.25.

The last specification includes additional control factors such as *Lending interest rate*, *Population growth* and *Consumption growth.* The negative effect and high importance of openness remains the same also in this regression (regression [Additional controls] in Table 4A, this also applies to the winsorized version shown in Table 4B, Appendix 2). Also, the effects of the local market return, market-to-book ratio, and turnover factor remain in line with the main regression in Table 3A. However, in contrast with the main regression, GDP growth loses its explanatory power while interest rate spread gains significance. In addition, the three extra control factors added in this specification all manifest their importance – lending interest rate and consumption growth are significant at 5% level, while population growth is significant at 10% level. Furthermore, the R-squared increases from around 20% in the main regression to 31% with additional determinants.

4.2.2.1 Annual regressions

Lastly, a set of annual Ordinary Least Squares regressions are run (Table 5 in Appendix 3). Again, the local market excess return shows up as relevant determinant of returns in all the regressions for different years from 2004 to 2014 with the exception of the years 2008 and 2009, where the market return loses its explanatory

power. These represent the bust years where the real estate market hit rock bottom declining 9% and 30%, respectively (Table 1). Therefore, it might be that the general stock market reacted quicker to the Great Recession than the real estate securities one. In addition, the Great Recession started out with the subprime crisis in the US with the NINJA loans and unexpected correlation among defaults – this might also be a reason why the relationship with the local stock market returns broke down for these two years.

Size shows up as relevant only in 2009 with a positive coefficient – meaning that larger companies fared the crisis better. This looks reasonable since the larger the asset base of a company, the clearer its value in turbulent times is. Value effect comes out only in 2007, 2008, and 2010, while GDP growth and turnover are significant in the majority of years. Turning to openness, the measure is significant only in 2007, 2008, and 2010 with a small but positive coefficient, and in 2009, with a small negative beta value.

5. Conclusion

This paper tested for the effect of the goods market openness on the returns of the listed real estate vehicles, while controlling for the local market return, value (book-to-market), and size effects as well as a set of additional variables. The main findings can be summarized as follows:

- The local market return is a relevant factor in determining the returns for publicly traded real estate vehicles throughout all different regression specifications. For raw data, the local market return is more than a unity, implying that the real estate market is more risky than the general stock market. However, for winsorized data, the local market factor is less than one. This stems from the fact that the raw data include few very small outliers.
- The Fama-French factor size does not display much significance in the main regression using raw data, while it becomes important in the winsorized model. Interestingly enough the coefficient on size is positive, implying that larger companies outperform smaller ones.

- The last Fama-French factor, value, also does not exhibit strong explanatory power in the main regression using raw data, while in the sub-period regressions as well as the ones with winsorized data it becomes significant. Again, the beta is positive, meaning that growth stocks outperform value stocks.
- Goods market openness defined as *(Export+Import)/GDP* is significantly and negatively related to the returns of publicly traded real estate vehicles. Therefore, the more open a country becomes, i.e. the higher its exports and imports level, the smaller are the returns for real estate securities.
- Turnover and GDP growth are also found to be significant determinants of returns for publicly traded real estate companies. Both of the variables are positively related to returns, implying that the more a country's economy grows, the better the returns and if the trading volume of shares increases, the higher their returns.

All in all, this paper confirms that openness has a significant negative effect on the returns of real estate securities while controlling for the CAPM and Fama-French factors as well as other variables.

5.1. Limitations and suggestions for further research

For a deeper understanding and analysis of the determinants of returns of publicly traded real estate vehicles it would also be interesting to check for the effect of the openness of financial markets. This paper uses the goods and services market as a proxy for openness, but it may be interesting to construct a proxy for openness using net capital flows instead. Another potential proxy would be gauging the FDI flows that a country is able to attract.

The research could also be carried out using unbalanced data by including companies that not only existed throughout 2004 to 2014, but firms that ceased to exist and/or were floated during this period.

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Appendix 1

Table 2. Country-level Descriptive Statistics, Real Estate Securities, 2003-2014

	Rf	Rm	Interest Rate spread	GDP growth	Inflation	Exchange rate	Household Consumption growth	Lending Interest rate	Population growth	Openness
Australia	4.61 1.52	7.70 19.39	0.10 0.85	11.65 13.42	3.36 2.04	1.17 0.16	11.17 13.56	7.69 1.29	1.52 0.41	41.12 2.15
Canada	1.79 1.39	8.85 17.53	1.31 0.96	6.91 8.86	2.26 1.68	1.09 0.09	7.05 7.07	3.82 1.29	1.05 0.11	64.68 4.07
China	5.94 0.63	9.76 50.73	-2.63 1.14	18.36 6.95	4.61 3.03	6.96 0.79	15.79 10.02	5.94 0.63	0.52 0.04	52.64 8.74
Denmark	2.08 1.77	13.81 22.05	0.88 0.83	4.42 7.43	2.08 1.15	5.60 0.36	4.66 7.24	N/A N/A	0.41 0.10	96.63 7.22
France	1.36 1.50	7.63 22.29	1.76 1.04	4.20 7.58	1.39 0.80	0.75 0.05	4.28 7.30	6.60 0.00	0.56 0.12	55.51 3.30
Germany	1.19 1.50	11.52 22.37	1.55 0.87	4.24 7.31	1.23 0.56	0.75 0.05	3.77 6.30	N/A N/A	-0.18 0.53	78.66 6.88
Hong Kong	1.35 1.66	10.62 19.66	1.17 1.20	5.55 3.13	1.11 2.26	7.76 0.02	6.95 3.58	5.66 1.16	0.67 0.25	412.48 33.50
Italy	1.52 1.40	2.17 23.81	2.90 1.36	3.14 7.80	1.69 0.70	0.75 0.05	3.32 7.44	5.29 0.79	0.62 0.48	52.77 3.65
Japan	0.17 0.19	8.30 29.72	0.97 0.34	0.95 8.42	-0.93 0.99	100.51 15.74	2.09 8.25	1.60 0.23	-0.04 0.12	30.36 3.88
Netherlands	1.67 1.47	6.61 21.70	1.25 0.92	4.18 7.94	1.28 0.67	0.75 0.05	3.15 7.49	2.85 1.16	0.35 0.12	137.41 13.74
New Zealand	4.61 1.47	4.18 16.04	0.48 1.80	7.60 10.61	2.76 1.32	0.74 0.07	7.42 10.00	6.98 1.22	1.03 0.30	58.85 2.53
Singapore	1.30 1.18	10.75 24.30	0.32 2.10	11.34 8.09	1.68 2.16	1.41 0.15	9.90 6.24	5.35 0.03	2.63 1.30	389.52 31.29
South Africa	7.38 2.29	19.99 21.33	0.55 2.35	7.15 12.78	6.70 1.20	8.01 1.86	7.18 13.51	10.75 2.05	1.44 0.09	60.17 6.16

Sweden	2.01 1.28	11.65 20.43	0.81 1.09	5.53 10.00	1.58 0.91	7.03 0.58	5.41 8.53	3.66 0.49	0.72 0.18	86.38 3.86
UK	2.51 2.25	7.27 17.05	0.85 1.55	4.27 9.67	2.42 0.56	0.60 0.06	4.29 9.41	2.45 2.23	0.72 0.08	58.02 3.82
USA	1.33 1.91	6.37 18.34	1.00 1.21	3.86 2.44	2.04 0.80	1.00 0.00	3.65 2.55	4.65 1.92	0.86 0.09	27.91 2.47

Appendix 2

Table 3B. Fixed Effects Regression Results

This table shows regressions of total shareholder return (TSR) adjusted for the country-specific risk-free rate on all the outlined independent variables. The Excess firm returns are winsorized at 5%. The R^2 and number of observations are also provided. T-statistics are provided in the parentheses below. *, **, and *** denominate significance levels at 10%, 5%, and 1% accordingly.

Independent variables:	[1]	[2]	[3]	[4]	[5]	[6]
$(R_m - R_f)$	.94 (52.67)***	.96 (53.47)***		0.95 (52.16)***	0.96 (53.21)***	.94 (48.51)***
Ln Size			3.34 (4.29)***	1.08 (1.75)*	1.60 (2.48)**	1.14 (1.73)*
Market to Book			$3.73*10^{-2}$ (0.15)	$2.51*10^{-2}$ (1.95)*	$2.38*10^{-2}$ (2.05)**	$8.25*10^{-2}$ (3.55)***
Ln Turnover						2.24 (3.47)***
GDP growth						.48 (5.96)***
Spread						.33 (.81)
Openness		-.19 (-6.18)***			-.20 (-6.39)***	-.20 (-6.35)***
Observations	7737	7516	7475	7475	7268	7190
R^2	.38	.39	.07	.39	.40	0.42
F-test	4069.32***	2048.22***	11.30***	1358.77***	1027.44***	726.81***

Table 4B. Regression

This table shows regressions of total shareholder return (TSR) adjusted for the country-specific risk-free rate on all the outlined independent variables. The Excess firm returns are winsorized at 5%. The R^2 and number of observations are also provided. T-statistics are provided in the parentheses below. *, **, and *** denominate significance levels at 10%, 5%, and 1% accordingly.

Independent variables:	[2004-2007]	[2008-2014]	[Exclude U.S.]	[Size & $Size^2$]	[Turnover/Size]	[Additional controls]
$(R_m - R_f)$	.83 (33.01)***	.95 (27.87)***	0.91 (45.41)***	0.94 (48.75)***	.93 (44.94)***	0.99 (49.81)***
Ln Size	-.06 (-.04)	3.50 (3.41)***	1.78 (2.30)**		1.74 (2.67)***	1.22 (1.71)*
Market to Book	.02 (3.15)***	.16 (2.88)***	$8.57*10^{-2}$ (3.47)***	$8.31*10^{-2}$ (3.55)***	$2.58*10^{-2}$ (2.18)**	$7.88*10^{-2}$ (3.67)***
Ln Turnover	6.36 (5.89)***	1.82 (3.09)***	2.71 (3.68)***	2.42 (3.79)***		2.39 (3.39)***
GDP growth	.27 (1.44)	.33 (3.67)***	.45 (5.60)***	.48 (5.91)***	.49 (6.07)***	.96 (4.18)***
Spread	.77 (1.08)	5.12 (9.05)***	.20 (.41)	.32 (0.80)	.63 (1.62)	1.00 (1.93)*

Openness	-.21 (-1.31)	0.14 (4.15)***	-.19 (-6.00)***	-.19 (-6.17)***	-.20 (-6.45)***	-.19 (-5.14)***
Size				$-.18*10^{-3}$ (-.42)		
$Size^2$				$1.77*10^{-9}$ (0.15)		
Turnover/Size					$-1.38*10^{-5}$ (-18.24)***	
Lending interest rate						.10 (0.24)
Population growth						.03 (.02)
Consumption growth						-.64 (-2.95)***
Observations	2828	4949	5657	7191	7197	6333
R^2	0.54	0.37	0.42	0.42	0.41	0.46
F-test	598.15***	269.97***	665.82***	629.12***	607.28***	510.43***

Appendix 3

Table 5. Annual Regressions

This table shows regressions of total shareholder return (TSR) adjusted for the country-specific risk-free rate on all the outlined independent variables. The R^2 and number of observations are also provided. T-statistics are provided in the parentheses below. *, **, and *** denominate significance levels at 10%, 5%, and 1% accordingly.

Independent variables:	[2004]	[2005]	[2006]	[2007]	[2008]	[2009]	[2010]	[2011]	[2012]	[2013]	[2014]
($R_m - R_f$)	1.67 (4.74)***	1.33 (6.40)***	1.07 (5.51)***	1.43 (8.91)***	.24 (1.44)	.13 (1.53)	1.76 (4.63)***	.45 (2.05)**	.41 (2.45)**	.99 (2.94)***	.46 (2.38)***
Ln Size	1.41 (1.06)	2.00 (0.68)	.97 (0.75)	.65 (0.48)	2.64 (1.00)	1.30 (2.41)**	-.34 (-.37)	-.39 (-.38)	.66 (.94)	.42 (.38)	.21 (.28)
Market to Book	.19 (3.65)***	-.10 (-1.13)	.21 (.85)	.43 (1.70)*	.20 (1.70)*	.05 (.23)	.31 (3.18)***	.37 (.89)	.08 (.74)	-.07 (-.82)	.09 (.97)
Ln Turnover	1.80 (2.26)**	-1.32 (-.41)	-.30 (-.17)	1.97 (1.90)*	-2.12 (-1.82)*	-.30 (-.97)	3.10 (3.63)***	1.03 (1.43)	-1.37 (-3.63)***	2.62 (3.66)***	-1.54 (-2.93)***
GDP growth	1.05 (1.94)*	-1.30 (-2.20)**	1.04 (0.73)	1.27 (1.26)	.57 (2.65)***	.08 (.36)	.56 (1.54)	-.29 (-.59)	1.27 (2.36)**	-1.61 (-2.33)**	.89 (2.64)***
Spread	4.46 (3.42)***	5.05 (1.53)	14.75 (1.68)*	-1.66 (-.22)	5.18 (3.32)***	-5.16 (-5.75)***	2.04 (.79)	-1.01 (-.67)	5.84 (2.90)***	-2.37 (-1.28)	.46 (.25)
Openness	.02 (.61)	-.01 (-.27)	.02 (0.64)	.08 (2.82)***	.05 (2.75)***	.01 (1.23)	-.02 (-1.37)	.03 (1.08)	-.03 (-3.49)***	.05 (2.96)***	.01 (.41)
Observations	667	684	686	686	682	675	685	680	677	669	605
R^2	0.19	0.03	0.01	0.43	0.02	0.12	0.07	0.02	0.07	0.18	0.03
F-test	44.39***	67.18***	6.10***	51.46***	4.53***	13.45***	8.64***	2.57**	8.67***	19.31***	3.57***

The Effect of Leverage on the Performance of Real Estate Companies: A Pan-European Post-Crisis Perspective of EPRA/NAREIT Index

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Abstract

This thesis investigates the impact of leverage on the total shareholder return of European publicly traded real estate vehicles.

This thesis uses a sample of EPRA/NAREIT Developed Europe index companies over a period from 2007-2014. The effect of leverage is studied separately in three periods: the downturn (2007-2009), rebound (2009-2014) and over a full economic cycle (2007-2014). Cross-sectional analysis is used and the leverage effect on the performance is controlled for 7 other independent variables (local market risk premium, size, book-to-market, short-term debt, cash); moreover, regional differences are accounted for.

It is established that during the crisis of 2007-2009 leverage levels are negatively associated with the performance of European listed real estate vehicles. This relationship also holds throughout the whole time frame of 2007-2014, implying that for real estate securities the cost of financial distress is bigger than the potential gain from taxation. In addition, the Fama-French three factors such as size, book-to-market and local market risk premium are found to be relevant, consistent with the bulk of literature.

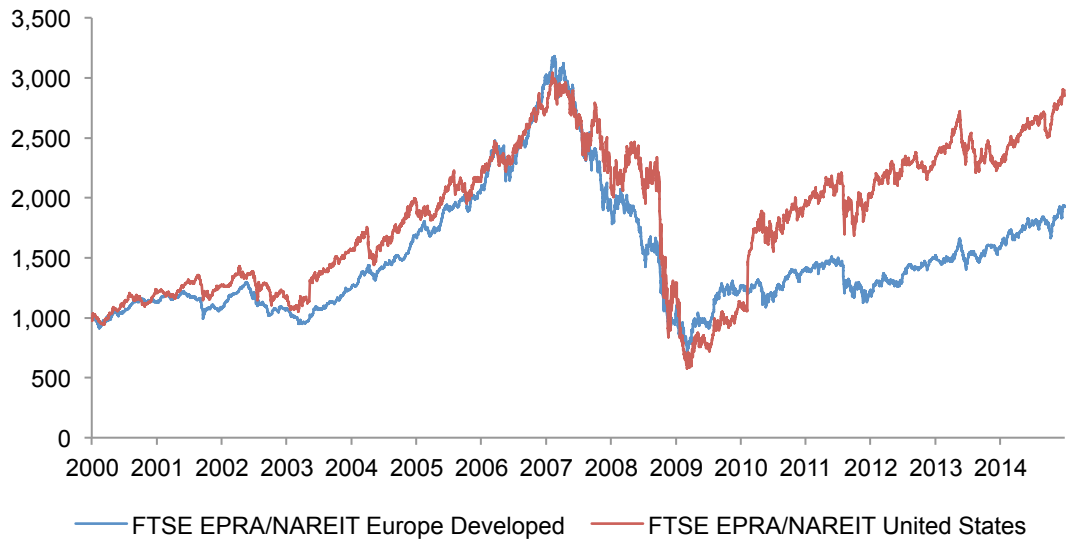
There is sizeable body of literature on determinants of leverage and determinants of asset returns. However, there is little work done on how leverage affects the returns of European real estate companies. In addition, this thesis takes advantage of observing a full economic cycle and the possible effects of the crisis period.

Table of Contents

1. Introduction

The financial crisis of 2007-2009 was very significant in many aspects. The Great Recession was not just a result of a real estate bubble bursting, but it also evolved into an unprecedented liquidity freeze in the financial markets. Therefore, the importance of looking at what happened in terms of debt financing of real estate companies (RECs and REITs) is two-fold: there was a downward price pressure in the real estate market (the underlying asset of RECs/REITs), and it was a crisis of liquidity in the interbank market affecting the debt financing of all companies.

Figure 1. US and Europe EPRA/NAREIT index returns



Source: Created by the author, data by EPRA (2015a)

The graph above demonstrates the development of real estate index returns in Europe and the US. It can be seen that up until 2007, the evolution of public real estate vehicles was quite similar in both regions. Real estate security values in both markets plummeted as a result of the recession; however, the US market has rebounded, whereas the European one has thus far experienced a much weaker growth.

The real estate industry has historically relied on debt as a source of external capital as the industry is characterized by small market participants, fragmented ownership,

and illiquidity of investments. This kind of structure used to explain why real estate was more reliant on debt financing. In contrast, public real estate structures are designed to provide a way for a wider range of equity investors to diversify their investments into real estate assets, which implies that less leverage is needed as they can easily tap into public markets for equity capital. Moreover, investors can tailor the desirable leverage level (i.e. the risk-return profile) in their personal portfolio, so in theory, the public real estate structures, especially REITs, could be purely equity-financed.

According to the seminal corporate finance theory in a perfect world the capital structure of the company does not affect the value of the firm (Modigliani and Miller, 1958). However, with later revisions, two important exceptions, namely taxes and costs of financial distress, are argued to affect the optimal leverage ratio. On the one hand, for an ordinary company, leverage creates a tax shield, i.e. a positive effect on returns due to tax-deductible interest payments, which in turn increases enterprise value. On the other hand, leverage makes the business more volatile and risky, increasing the costs of financial distress.

In EPRA/NAREIT Developed Europe index, many companies are REITs. REITs are tax-exempt; and therefore, cannot gain through tax shields. However, the potential cost of financial distress remains when using leverage. Moreover, even if a full-scale bankruptcy does not occur during a downturn, a highly-leveraged REIT (or REC, for that matter) may be forced to liquidate part of the portfolio at a discount on creditors' demands, thereby generating losses. It would also miss out on capitalising on the downturn by acquiring properties at attractive valuations, an option for public real estate structures that have entered the cycle with minimal leverage.

Thus, the jury is still out there on the optimal leverage for public real estate companies and how it affects their performance over a business cycle.

The crisis provided a good test bed to see if and how the capital structure of public real estate structures influenced their performance. Therefore, the Research Question is as follows: ***"How did leverage levels going into the Great Financial Crisis***

influence public European real estate companies' returns in the following periods?"

1.1. Relevance

There is ample literature available on the determinants of choosing the capital structure for REITs and which factors have the best explanatory power for their performance. However, the literature is less abundant on how leverage affects the shareholder returns for real estate companies.

Moreover, the thesis contributes to the small number of Pan-European studies on the matter, also benefitting from timing as enough time has passed from the Great Financial Crisis to study effects over a full economic cycle.

1.2. Hypotheses supporting the Research Question

As higher leverage should lead to higher returns to compensate for the risk taken, one would expect to see that public real estate vehicles with relatively more debt are more volatile.

Hypothesis 1: More levered EPRA/NAREIT index companies' returns decline relatively more during period of crisis (i.e. 2007 – 2009).

Hypothesis 2: More levered EPRA/NAREIT index companies' returns rebound quicker during the subsequent recovery (i.e. 2009 – 2014).

The recent financial crisis led to the bursting of a real estate bubble as well as an unprecedented freeze in the financial markets, resulting in a situation where debt financing became less available. It could be expected that rolling over debt that matured during the bust period was more expensive or potentially not possible at all, disadvantaging more aggressively leveraged companies by forcing them into fire sales and/or issuing equity at steep discounts.

Hypothesis 3: EPRA/NAREIT index companies with higher levels of short-term debt at the start of the crisis underperformed their peers.

In conjunction with previous hypotheses, cash is the most liquid asset and can be used to reduce debt. Generally, in finance cash is considered risk-free and to compensate for the level of debt. The financial crisis, especially the liquidity squeeze that followed demonstrated the importance of a cash buffer.

Hypothesis 4: EPRA/NAREIT index companies with higher levels of cash fared better during the crisis.

2. Literature review

The *Literature review* and previous findings on the topic of leverage affecting total shareholder return (TSR) can broadly be divided into two categories—one dealing with the determinants of leverage in real estate companies (REITs included), i.e. the capital structure literature, and the other focusing more on the performance of companies. The two are combined henceforth.

2.1. Theories on capital structure and their empirical findings in the REIT industry

Modigliani and Miller can be considered the grandfathers of literature on capital structure, their seminal papers have showed that under certain assumptions, namely perfect and complete capital markets, no taxes, symmetric information, and not costly bankruptcy, the capital structure decision is irrelevant (1958, 1963). In order to take into account the taxes and tax benefits of debt, the costs of financial distress, information asymmetry and conflicts of interest between different stakeholders, other theories on capital structure have evolved.

The two most prominent theories on leverage are the trade-off theory and pecking order theory.

2.1.1. Trade-off theory and pecking order theory

According to the idea of the trade-off theory, developed by Kraus and Litzenberger (1973), a manager of the company needs to strike a balance between having an

infinitely high level of leverage (thus higher returns thanks to debt tax shield) and the costs associated with higher leverage—higher probability and costs of financial distress. The trade-off theory proposes that more profitable firms are better-suited to take on debt and use the tax shield, while having lower costs of financial distress. This suggests a positive relationship between leverage and profitability.

As REITs are tax-exempt, they do not benefit from debt tax shield and theoretically thereby should favour equity financing over debt as they are in a relatively worse position to compete for debt (Howe and Shilling, 1988). Building on this argument, Shilling (1994) goes on to argue that theoretically a REIT is the most valuable when it is being 100% equity-financed. Then again, contrary to the aforementioned reasoning by Howe and Shilling (1988) and Schilling (1994), Jaffe (1991) argues for the proposition by Modigliani and Miller (1958, 1963) that REITs' value should not change when leverage changes.

Consistent with the theory of Howe and Shilling (1988), both Morri and Cristanziani (2009) and Niskanen and Falkenbach (2012), find that European REITs are significantly less leveraged than European RECs, i.e. REIT counterparts that are structured as typical limited liability companies and do not enjoy the tax-breaks available to REITs. Thus, the authors conclude that ceteris paribus (i.e. companies with a similar asset base, but with different legal structures) REITs choose lower leverage due to the absence of debt tax shield.

Adding to the empirical literature on the trade-off theory, Ghosh, Nag, and Sirmans (1997) find that REITs prefer secondary equity offerings to debt when raising fresh capital. Brown and Riddiough (2003) conclude that REITs tend to target a certain optimal leverage level, which is one of the implications of the trade-off theory. Interestingly enough, this optimal level seems to be driven by the fact that REITs tend to hold a rating about a notch above the junk level to avoid the high cost of non-investment grade issue of bonds. Boudry, Kallberg, and Liu (2010) find that trade-off theory has some explanatory power in determining the leverage in REITs - in periods when bankruptcy costs are high (large difference between the company's interest rate and the BBB rating one), REITs prefer equity to debt. REITs in this case rather use preferred equity unless they are already highly geared. Harrison, Panasian, and Seiler

(2011) establish that REITs' leverage has a positive correlation to market-wide risk aversion, negative correlation to firm-specific borrowing costs and positive correlation to cash flow generated by REITs' investments, which according to the authors provide strong backing for the trade-off theory.

The pecking order theory stipulates that in an imperfect world (i.e. under asymmetric information), companies prefer to finance themselves through internal resources, followed by debt, and equity as a last option as the different choices signal superior managerial knowledge to the market (Myers, 1984; Myers and Majluf, 1984). In support of the pecking order theory, according to which one would expect that more profitable firms prefer to use internal resources for financing and thereby have less leverage, Gaud, Jani, Hoesli and Bender (2005) in an empirical study of 104 listed Swiss companies in the period of 1991 – 2000 find that profitability and leverage are negatively correlated. Similarly, Fama and French (2002) show that more profitable firms are less levered, supporting the pecking order theory.

However, in the case of REITs the funding is limited to either debt or equity because of the special requirements of cash distribution for REITs (i.e. they are obliged to pay out a certain level, e.g. 90%, of their free cash flow in order to maintain their tax benefits); therefore, issuing debt or equity in case of REITs might be considered more of a necessity than managerial optimization (Chikolwa, 2009), i.e. all the internally generated cash has been already distributed as dividends to meet the REIT requirements. To illustrate this, Ott, Riddiough, and Yi (2005) show that of the investments made by REITs only 7% are financed through internal resources. Also, according to this theory, leverage just indicates the current need for external financing rather than predicts its optimal level.

Boudry, Kallberg, and Liu (2010) test the pecking order theory, but do not find support for it—the authors argue that the result is intuitive as the REIT industry is transparent (since REITs are bundles of real estate properties) and thus the asymmetric information assumption does not hold. Moreover, there exists a cash distribution requirement, which means that cash flows and yields are relatively predictable for investors. On the other hand, Garmaise and Moskowitz (2004) studying the US commercial properties establish that asymmetric information is

important when making transactions as there is a tendency to avoid deals with the informed ones or deals that are difficult to evaluate and there is little information about. Han (2006) reasons that the information asymmetry issue is very relevant in real estate as it is illiquid and heterogeneous, both in terms of geography and type of property. Furthermore, Ling and Ryngaert (1997) attempt to measure the level of transparency of REITs and argue that property type is an important factor—office properties tend to have longer and more stable lease contracts, while retail properties often have a rent component that is linked to store sales, thereby making cash flows more volatile and increasing the information asymmetry. Moreover, Morri and Beretta (2008) find in the spirit of Rajan and Zingales (1995) that the better the operating performance of US REITs, the lower their gearing.

Numerous studies do find evidence for the pecking order theory when analysing market reactions to debt offering announcements. Howe and Shilling (1988) study share price reactions and as the "classic" pecking order theory argument find that debt raising announcements cause positive reactions, while equity raising announcements cause negative share price reactions. Following the path laid out by Howe and Shilling (1988), Ghosh, Nag, and Sirmans (1999) also find positive reactions to secondary debt offerings using a wider sample. Similarly, Brounen and Eichholtz (2001) replicate the study using European public real estate companies and arrive at the same conclusion. Contrary to these findings, Hsieh, Poon, and Wei (2000) do not find significant positive share price reactions to REIT debt offerings, but they do find significant negative reactions to convertible debt offerings. Interestingly though the market reaction to REIT convertible debt offerings does not differ from reaction to those of the control group, i.e. industrial companies.

2.1.2. Choice of debt maturity

Different levels of debt maturity that a company has chosen may affect overall performance. Mostly, the literature assumes that leverage and maturity choices by companies are made independently.

The two main risk categories stemming from a company's debt management are underinvestment and refinancing risks. If the maturity of liabilities and assets is the same (no maturity mismatch), there is a smaller chance for underinvestment (Myers,

1977). On the other hand, Barnea, Haugen and Senbet (1980) claim that the shorter the debt maturity the better it is to mitigate the costs raising from info asymmetry, as the cost of short-term debt is more stable and it is probably less undervalued than the debt whose maturity is equal to the assets. Hart (1993) puts forward that short-term debt helps to alleviate the underinvestment problem, as the higher the growth prospects for a company the more short maturity debt it tends to choose.

Barclay and Smith (1995) find empirical support for the theory of inverse relationship between growth opportunities and debt maturities as put forward by Hart (1993), i.e. companies with limited growth opportunities have more long maturity debt issued. Guedes and Opler (1996) also establish that companies with high market-to-book ratios (i.e. with higher growth opportunities) tend to issue debt at shorter maturities. Stohs and Mauer (1996), on the other hand, find only mixed evidence for Hart's proposition. They also establish that companies tend to match maturities, i.e. firms that have longer-term assets also tend to have longer-term debt. Albeit looking only at small firms, Scherr and Hulburt (2001) find little evidence that the growth prospects is a determinant of debt maturity choice. More recently, Billett, King and Mauer (2007) do establish the link between companies with high-growth potential using short-term debt maturity policies to tackle the underinvestment risk as posed by Myers (1977).

Flannery (1986) investigates theoretically how asymmetric information is reflected and signalled in the company's choice of debt maturity. Issuing short-term debt can indicate an insiders' superior knowledge of the company's high quality and it helps the company to tap into advantageous refinancing terms. The equilibrium is determined by the interplay of the underwriting costs for the debt and how the debt investors perceive the company's value.

Mitchell (1991), studying bond issues between 1982 and 1986, finds that companies that are not stock exchange listed issue relatively more short-term debt because of information asymmetries. On a similar note, Barclay and Smith (1995) find empirical support for the idea that higher info asymmetry leads companies to prefer short-term debt. Guedes and Opler (1996) find empirical proof that investment grade companies make use of both short and long maturities, whereas firms with lower credit ratings

position themselves in the mid-term maturities. Stohs and Mauer (1996) confirm that investment grade firms borrow using short-term debt, and, while contrary to Guedes and Opler (1996), their work predicts that also firms with very low ratings utilize short-term maturities. Scherr and Hulburt (2001), on the other hand, do not find evidence that information asymmetry affects the debt maturity choice with the caveat that the study only entails small companies.

The choice of maturity structure in REITs is a relatively less explored field. Howe and Shilling (1988) study the market reaction to new debt and equity issuance announcements using a sample of REITs. They establish proof for the signalling hypothesis as stock prices react positively to issuance of new debt and negatively to equity offerings, with most positive reactions corresponding to short maturity debt issues. Similarly, Allen and Rutherford (1992) find that stock prices of real estate companies react positively also to long maturity debt issues. Brown and Riddiough (2003) study different categories of financial claims and demonstrate that remaining in the investment grade is important for companies when issuing debt. Like Guedes and Opler (1996), they find confirmation that investment grade firms (here, REITs) issue long-term debt. On the contrary, Highfield, Roskelley, and Zhao (2007) test all four theories on the maturity structure—agency theory, personal taxes, signalling and liquidity risk— for REITs and they do not confirm signalling nor liquidity theories. However, they find that staying in at least the minimum investment grade category is important when issuing public debt. Giambona, Harding and Sirmans (2008) set out to test the Shleifer-Vishny hypothesis that the ease of asset liquidation influences the leverage choice on US REITs and find, inter alia, that REITs with more liquid assets choose longer maturity debt.

Alcock, Steiner, and Tan (2010) go further in studying the maturity structure in REITs and real estate companies and research the determinants of leverage and maturity jointly for a sample of U.S. listed entities. They establish that non-REITs' leverage is consistent with the trade-off theory whereas REITs follow the pecking order theory. Interestingly, they show that in real estate companies the interplay of leverage and maturity is such that leverage determines maturity, while it is the opposite for REITs. They motivate their findings by the special regulation of REITs (e.g. tax exemption) that allows REITs to take full advantage of more aggressive financing schemes.

2.2. Theories on performance and their empirical findings in the REIT industry

There can be found a large body of literature on the performance of real estate stocks and its determinants. Most of the studies are based on US market data, the broadest and most comprehensive dataset available. In general, most of the studies start out with using the oldest and most prevalent theory on asset performance developed separately by Sharpe (1964), Lintner (1965), and Black (1972) in the spirit of Markowitz's (1959) mean-variance efficient portfolio frontier CAPM. McIntosh, Liang and Tompkins (1991), studying the REIT data from 1974 – 1988, already show investing in small-cap REITs constitutes a more profitable trading strategy than investing large ones on a risk-adjusted basis, as the risk profile of small REITs at the very worst is the same as for the large REITs.

While the CAPM states that a particular share price return is a function of the risk-free rate and a proportion of the overall stock market premium (i.e. the beta), Fama and French (1992, 1993, and 1996) describe in addition size and book-to-market ratios as important common determinants of returns. However, Fama and French (1997) also argue that industry-specific loadings and risk premia vary a lot over time. This implies that the conventional factors may not suffice for a full estimation of expected returns of public real estate vehicles. Peterson and Hsich (1997), utilizing more than 15 years of data from 1976 to 1992, show that the Fama-French three factors of common equity (market risk, size and book-to-market ratio) do influence the returns of equity REITs. Chen, Vines and Chiou (1998) corroborate size as the single predominant determinant of equity REIT returns. Chiang, Lee and Wisen (2004 and 2005) find that the single factor model as proposed by Sharpe (1964) is less applicable than the three-factor model in equity REITs. In support of the previous findings, Serrano and Hoesli (2007) also show that Fama and French factors are superior in explaining the returns of equity REITs though the explanatory power of these factors varies a lot over time—size is always prevalent, while the importance of book-to-market becomes apparent only after the early 1990s.

Nevertheless, Karolyi and Sanders (1998) reach a conclusion that the traditional asset pricing models utilizing multiple betas do not fully explain the risk premium on REITs. Chui, Titman and Wei (2003) study the pre- and post-1990 era of REIT returns and conclude that during the pre-1990 period, in addition to size, also momentum, turnover, and analyst coverage determine the returns, while momentum becomes the predominant predictor in the post- period. Bond, Karolyi and Sanders (2003) examine the risk-return profile on a sample of publicly traded real estate companies in 14 countries and find that both country risk and global market risk prevail, while, contradictory to other research, size and value factors are not significant for the US market. As mentioned earlier, McIntosh *et al*. (1991) prove the small-firm effect on REITs.

Most of the studies focus on the US REIT market, while European or international studies tend to be less common. An extensive international study capturing more than 600 real estate firms in 28 countries from 1984 to 1999 shows that cross-sectional returns can be explained by both a global market factor and local country-specific risk factor (Ling and Naranjo 2002). Moreover, Bond *et al.* (2003), as noted, confirm the findings of Ling and Naranjo (2002) using a sample spanning 14 countries. Hamelink and Hoesli (2004) corroborate the previous finding and show that the most important factor behind public real estate vehicle returns is the local country risk factor, but size is also a relevant factor with a negative coefficient, in line with the bulk of literature on Fama-French three factor model testing. The first Pan-European study on the matter was conducted by Schulte, Dechant and Schaefers (2011). Their research of real estate securities confirms the local market, book-to-market, and size factor effects, albeit the latter displays a reversed coefficient compared to US studies, i.e. large cap stocks tend outperform small cap ones.

In terms of exploring direct relationship between leverage and subsequent REIT returns, De Francesco (2007) finds that in the Australian A-REIT market companies' higher leverage leads to lower risk-adjusted returns. Similarly, Sun, Titman and Twite (2013) examine the leverage effect on US REIT returns after the Great Financial Crisis ('GFC') of 2008 – 2009 and conclude that high leverage when entering the crisis affects the returns negatively in the downturn period, but also during the rebound period, implying certain financial costs are realised even if no actual

bankruptcy occurs (e.g. opportunity cost of not being able to acquire properties at fire-sale prices). Giacomini, Ling and Naranjo (2014) perform a similar study for 8 countries in the period of 2002 to 2011. Further corroborating previous studies, they also arrive at the conclusion that high leverage in the lead up to Great Financial Crisis is associated with relatively worse returns in the downturn period.

As the leverage effect on the returns of real estate securities returns is relatively unexplored in Europe, this thesis intends to fill the gap in the respective literature. Moreover, the timing of the thesis can be considered an advantage, as a sufficient amount of time from the Great Financial Crisis has passed to evaluate the subject over a full economic cycle.

3. Methodology

3.1. Sample

The sample of listed European real estate companies is drawn from the European Public Real Estate Association ('EPRA') webpage that together with FTSE compiles relevant indices, which are widely followed and considered as 'best practice'. According to index inclusion requirements, the real estate company needs to derive at least 75% of its EBITDA from "the ownership, trading and development of income-producing real estate" (EPRA, 2015b). This ensures that the companies included in the sample are either REITs or REIT-like entities (i.e. companies that resemble REITs in terms of assets and operations, but do not have the explicit legal REIT structure) and do not include companies with significant auxiliary revenue streams such as construction, real estate maintenance, etc.

Due to the relative immaturity of the Eastern European REIT markets (only a handful of listed names coupled with low trading activity), the FTSE EPRA/NAREIT Developed Europe index was chosen.

As of March 2015, the index consisted of 85 listed European real estate companies / funds. However, the list was manually cleaned to:

- Omit companies that have IPO-d recently and therefore do not have the financials or trading history in the necessary time frame;
- Exclude exchange traded mutual funds investing in real estate as their financials are not comparable to traditional REITs.

The remaining sample consists of 65 real estate companies, which provides a comfortable sample size for empirical analysis as according to the Central Limit Theorem the sample size should be at least 30 observations.

The full list of companies included in sample is detailed in Table 6 in the Appendix 1. Out of 65 companies 20 are headquartered in UK, 9 in Sweden, 7 in France, 7 in Belgium, 5 in Germany, 4 in Netherlands, 3 in Switzerland, 3 in Finland, 2 in Italy, 2 in Austria, 1 in Greece, 1 in Spain, and 1 in Norway.

Table 1. Summary statistics for countries

The Table represents the Mean Cumulative Adjusted Returns for all the countries present in the sample. The Total Shareholder Return variables are adjusted for the respective country's risk-free rate (TSR-r_f).

Country	Obs.	Mean Cumulative Adjusted Return 2007-2014	Mean Cumulative Adjusted Return 2007-2009	Mean Cumulative Adjusted Return 2009-2014
UK	20	-.07984765	-1.0103066	3.6081098
Sweden	9	1.08107944	-.6728273	4.09930606
France	7	-.06767648	-.7451818	1.67697987
Belgium	7	.05969716	-.3977353	0.97686492
Germany	5	-.07544377	-.7930289	2.02015645
The Netherlands	4	-.7778811	-.6631999	0.50291726
Switzerland	3	.09402462	-.37351	0.80403667
Finland	3	-.9273962	-.8901742	1.70868761
Italy	2	-1.2798586	-.8045016	-0.0462928
Austria	2	-.970921	-.9279983	3.50077647
Greece	1	.64745396	-.514557	1.64627687
Spain	1	-1.7871209	-1.094287	-1.4283351
Norway	1	-1.4722307	-1.0870181	1.33068637

Source: Created by the author, data by Bloomberg (2015)

It can be seen from summary statistics above that the adjusted cumulative returns vary significantly across countries and time periods. In terms of local bond return risk-adjustment, it should be noted that Greece was the only country that had negative cumulative government bond return during both 2009-2014 and 2007-2014, driven by

its sovereign debt crisis. However, mostly local government bonds delivered solid returns during this period of turmoil as they experienced a flight to safety phenomenon, while the return of real estate securities was generally disappointing. For example, Norwegian government bonds returned 67% during the period of 2007-2014, while the share price of the Norwegian Property, the only local real estate company that is included in the sample fell by 80%. One can also find examples on the other extreme, e.g. in Sweden where real estate securities declined a lot during the crisis and rebounded significantly afterwards.

3.2. Data sources

The primary source for data is Bloomberg (2015), both for returns and key financials for the companies. Whenever a certain data point was missing while others for the respective year were present, the data was checked from the respective company's Investor Relations webpage and manually filled in if the data was available. The source for country stock indices returns is Yahoo! Finance (2015).

Prices in the sample are denominated in 5 different currencies: mainly in Euros and British Pounds, but also in Swiss Francs, Swedish Kronor, and Norwegian Kroner. The variables are usually constructed as a ratio of balance sheet data, e.g. *Cash* represents *Cash / Total Assets*; thus, they are comparable across currencies without any adjustments.

The only 'absolute' metric, however, is *SizeLn*, which is adjusted by currency - all values across the sample are converted to Euros using the respective exchange rate on the 31st of December in the particular year. The source for foreign exchange rates is Google Finance (2015).

3.3. Variables

The dependent variable used is *Total Shareholder Return* ('TSR'- cumulative share price return adjusted for dividends). As real estate securities typically pay out large dividends, TSR is needed to measure the actual returns to investors through both share price appreciation (or depreciation) and dividend returns.

The time frame for REC/REIT returns is divided into two. First, from 1st of January 2007 to 9th of March 2009. This corresponds to the boom-to-bust cycle as equities peaked in late 2007 and 9th of March 2009 represented the bottom for world markets. This can also be seen from Figure 1 depicting US and Europe FTSE EPRA/NAREIT index returns in the *Introduction* section. 1st of January 2007 is chosen for continuity as financial data for constructing independent variables dates to 31st of December 2006.

Second period ranges from 9th of March 2009 to 31st of December 2014 to capture the broad-based recovery in equity markets. In addition, a combination of both periods is used, ranging from 1st of January 2007 to 31st of December 2014.

The returns are measured in local currency, rather than being exchange rate adjusted, underpinned by the assumption of perfect hedging availability. The rationale of this approach is that there is no need to assume the domicile of investors (Bardhan, Edelstein and Tsang, 2008). The method follows Bardhan *et al*. (2008) and Stevenson (2001).

Independent variables date to year-end 2006 (last full-year financials before the markets peaked) and are as follows:

Leverage is defined as: Total interest bearing debt divided by Market value (Total Debt plus Book value of preferred stock plus Market Capitalization) following the paper by Sun *et al.* (2013).

This definition is used for instance by Homaifar, Zietz and Benkato (1994). In literature leverage is also measured as long-term debt divided by the market value of assets (Datta, Iskandar-Datta, and Raman, 2005) or, for instance, Hammes and Chen (2004) employ the capital ratio (i.e. total debt over total equity).

Total interest bearing debt however, best reflects the financial debt, as public real estate vehicles in this sample typically do not hold large cash balances. Overall,

Leverage relates directly to the Research Question that studies the effect of leverage on returns.

LnSize is defined as: Natural logarithm of Total Assets

There is a need to control for size effects as it can be a relevant factor in explaining returns according to various asset pricing models, e.g. Fama-French three-factor model (Fama and French, 1993). Size has often turned up as an important determinant of returns as highlighted in the *Literature review* section.

Total assets is commonly used as a proxy for taking into account the effect of firm size, and in order to make the real estate securities more comparable and alleviate the difference stemming from the absolute amount, the natural logarithm is traditionally taken from the total assets as in studies by Cristanziani and Morri (2009), Fama and French (2002), Homaifar *et al*. (1994). Alternatively, Hammes and Chen (2004) use the logarithm of firm turnover as a proxy for size.

Q is defined as: Market value (Market Capitalization + Total Assets – Book value of Equity) divided by Total Assets

There is a need to control for book value effects as it can be a relevant factor in explaining returns according to various asset pricing models, e.g. Fama-French three-factor model (Fama and French, 1993).

This thesis uses the definition of market-to-book following Sun *et al*. (2013) and Hammes and Chen (2004), where the market value (defined by market cap plus total assets minus the book value of equity) is divided by the cost of substituting its assets (total assets).

Cash is defined as: Cash and cash equivalents over Total Assets

High outstanding cash position on the balance sheet before entering the downturn could make the company more resilient and increase the chances of surviving and/or using the downturn to buy assets at a discount, boosting the TSR when the economy

recovers. On the other hand, since real estate securities typically pay large dividends, they are less able to tap into growth opportunities utilizing internal resources.

StDebt is defined as: Short-term interest-bearing debt over Total interest-bearing debt

As discussed in the *Literature review* the debt maturity structure can be relevant bearing in mind that the Great Financial Crisis also manifested as a severe credit crunch. Thus, companies that had more short-term debt would be more likely to face difficulties in rolling over their debt.

$(R_m - R_f)$ is defined as: Stock market return less relevant risk free rate

Compared to Sun *et al.* (2013) study of US REITs return, the REITs/RECs in the European sample are domiciled in different European countries. Thus, a geographical component needs to be added to the list of independent variables, as it might be that the poor performance of, say, a Spanish REIT stems from the dismal overall performance of the Spanish economy and stock market, not from the choice of leverage in the particular company. This is important given the well-known divergence in European economies during the Eurozone sovereign debt crisis in the period of 2009 – 2012.

In order to factor in the country effects, the classic form of the Capital Asset Pricing Model (CAPM) is applied. According to the CAPM, a particular stock's performance is determined by the country's risk free rate and a particular factor (i.e. beta) of the equity risk premium (i.e. stock market return less the risk free rate):

$$R_i = R_f + \beta * (R_m - R_f)$$

Rearranging:

$$R_i - R_f = \beta * (R_m - R_f)$$

Where $R_i - R_f$ (i.e. $TSR_i - R_f$) can be seen as the excess return over the risk free rate that represents the opportunity cost for the investor. The proxy for R_f is the actual realised return for the country's 10Y bond, factoring in both the coupon received and capital appreciation or depreciation, making it directly comparable to TSR. The proxy for R_m is the local stock market index's return, using the most widely tracked index, e.g. FTSE100 for UK, DAX for Germany, CAC40 for France, etc. The full list of indices used is listed in Table 7 in Appendix 1.

The approach of using local country stock market index returns and local country risk-free rates has been for instance adopted by Bardhan *et al.* (2008).

The time periods are consistent throughout the regressions, i.e. TSR, R_m, and R_f are always used in the same time frame.

Dummy variables: *UK, Sweden, SouthEurope, Other*

Dummy variables are also added to the regression to take into consideration the effects of different regions. The financial crisis of 2007-2008 might have had a different effect on shareholder returns depending on the region in Europe.

- *UK* is traditionally separated from the continental Europe, also it has common law legal system and separate currency; therefore, it is reasonable to control for UK.
- *Sweden* is also not part of the Eurozone, it is also one of the countries that has not adopted a REIT system at all and is known for large family ownership and dual class share holdings; therefore, this thesis also controls for Sweden.
- *Southern Europe* is often considered as a region that suffered most from the crisis. This variable includes such countries as France, Italy, Spain and Greece
- *Other* includes all other countries represented.

Overall, the full model can be expressed as:

$$TSR_i - R_f = \beta_1 * Leverage + \beta_2 * LnSize + \beta_3 * Q + \beta_4 * Cash + \beta_5 * StDebt + \beta_6 * (R_m - R_f) + \beta_7 * UK + \beta_8 * Sweden + \beta_9 * SouthEurope$$

3.4. Summary statistics

The summary statistics of the aforementioned variables for the 65 sample companies is detailed in Table 2 below.

Table 2. Summary statistics

The Table represents the summary statistics for the independent variables as well as the main dependent variables used in regressions. The number of observations, mean values, standard deviation and minimum and maximum values of each variable are provided.

Variable	Obs.	Mean	St. Dev.	Min	Max
Leverage	65	.3768816	.1645427	.0048644	.7708041
LnSize	65	7.436416	1.083514	5.187008	10.24517
Q	65	1.164399	.1994088	.8172011	1.940705
Cash	65	.0258043	.0440153	0	.2429758
StDebt	65	.1893756	.2451596	0	1
TSR_07_09	65	-.6042203	.2331448	-.9812523	-.1191108
TSR_09_14	65	2.815706	2.747343	-.8314712	14.20697
TSR_07_14	65	.2554368	.9659181	-.9953166	5.648381
$(TSR - R_f)\_07\_09$	65	-.7820285	.2680243	-1.241912	-.2326631
$(TSR - R_f)\_09\_14$	65	2.396017	2.769186	-1.428335	13.85317
$(TSR - R_f)\_07\_14$	65	-.416255	1.005345	-1.787121	5.03595
$(R_m - R_f)\_07\_09$	65	-.6984421	.0477506	-.8156063	-.6243385
$(R_m - R_f)\_09\_14$	65	.6091199	.3653365	-.089031	1.296248
$(R_m - R_f)\_07\_14$	65	-.6912200	.3017226	-1.316606	-.1407530

Source: Created by the author

The average market leverage for the sample companies stood at 37.7% as of 2006 year-end, which is closely comparable to the US companies' average leverage level of 38.2% (Sun *et al.*, 2013). Also, Morri and Cristanziani (2009), studying the 37 REITs from the FTSE EPRA NAREIT Europe Index, get an average level of debt to total assets of 35% and total debt to capital (debt + equity) of 30.9% in 2006 versus 46.6% and 40.8% in case of European non-REITs. It can be seen that leverage choice varies significantly for companies as the standard deviation equals to 16.5%. However, the large variability comes from a few extreme outliers — there are 4 securities with almost 100% equity financing (less than 10% leverage with a minimum level of 0.5%) and 1 REC (the Swedish Fastighets AB Balder) with the maximum level of 77.1%. This is broadly in line with the findings of Morri and Cristanziani (2009) who find a minimum level of leverage of 1% and a maximum of 62% (at market values)

for REITs, and 10.5% and 70.6%, correspondingly, for non-REITs.

Most public real estate vehicles favour long-term debt over short-term debt—56 out of 65 have a short-term debt to total debt ratio of less than 40%. There are 3 securities whose total debt practically comprises of short-term debt; however, one of these REITs actually has extremely low levels of leverage (i.e. Wereldhave Belgium) with 2.5% leverage. While the other two, Warehousing & Distribution De Pauw has a 98.7% share of short-term debt and a leverage of 27.6% and TAG Immobilien correspondingly has 87.8% of short-term debt and 50.6% of leverage.

The Q ratio (a proxy for market-to-book) shows that on average the public real estate companies trade at a 16% premium; however, the vast majority of them trade between 0.8 and 1.4 times the NAV. Only 1 security trades at a 80% premium. As expected the vast majority of RECs/REITs have an extremely low cash level—90% have a cash to total assets of 5% or less. Only 1 has more than 20% of cash.

The mean return for the companies in the sample during the downturn period of 2007 – 2009 was deeply negative at around -60%. The best performer from the sample still showed a negative return of 12%, while the worst suffered a decline of 98%. The mean return in the recovery period was around 280%; however, the returns are much more dispersed, ranging from -83% up to 1,420%, while two securities had returns over 1,000%. The total shareholder return for the 2007 – 2014 period was 25.5%, with one entity returning 565%.

The Pearson correlations between variables are outlined in Table 8 (Appendix 2) with P-values shown in italic (values that are significant at 5% level are highlighted in bold). Solely looking at the Pearson correlation coefficients indicates that *Leverage* is negatively correlated with *Q*, suggesting that smaller market-to-book value companies have higher leverage. *Sweden* is positively correlated to *Leverage* implying that perhaps Swedish companies are a bit different than other in terms of their capital structure.

LnSize is negatively correlated with the adjusted TSR in the 2007 – 2009 period (as well as in 2007 – 2014), suggesting that larger companies posted worse returns

relative to smaller companies. This would be consistent with Fama and French's finding that smaller companies tend to perform better.

The adjusted TSR is significantly and positively correlated with the equity market premium in the 2007 – 2014 as well as in the 2009 – 2014 period, suggesting evidence in favour of the Capital Asset Pricing Model.

The Pearson correlation coefficients also indicate that there should not be multicollinearity issues between independent variables as the correlations are low. The dependent variable *TSR_07_14* is closely correlated to *TSR_07_09* and *TSR_09_14* as it is a function of the latter two; however, it is not a problem as dependent variables are regressed one at a time.

3.5. Regressions

In order to study the effect of the leverage in 2006 on the total shareholder return, Ordinary Least Squares (OLS) regressions are used as per Sun *et al.* (2013). As mentioned in the Variables section, the independent variables are retrieved from the last full year right before entering the crisis (i.e. the "shock" event), while the dependent variables are returns in the subsequent periods. To simplify, the rationale is to measure what effect leverage and other fundamental metrics today will have on shareholder returns tomorrow.

In order to correct for outliers in cumulative returns, the variables are windsorised at the 2% level (Sun *et al.*, 2013). White estimator is used to correct standard errors for heteroscedasticity.

In addition to looking at Pearson pair-wise correlation coefficients, a variance inflation factor (VIF) is computed after each regression, showing that there are no multicollinearity issues (Appendix 2). Also, the regression is checked for specification issues (Appendix 3) and the residuals are checked for normality (Appendix 4).

4. Empirical results and analysis

The empirical results and analysis section of the thesis is split into three: first, the relations in the crisis period of 2007 to 2009 are examined; secondly, the subsequent rebound period of 2009 to 2014; and finally in the whole period of 2007 to 2014.

4.1. Performance in the crisis period

The regression results for the period of January 2007 to March 2009 are presented in Table 3 below.

Table 3. Regression results in the Jan 07 – Mar 09 period

This table shows regressions of cumulative total shareholder return (TSR) adjusted for the country-specific cumulative risk-free rate on all the outlined independent variables. The adjusted cumulative total shareholder returns are winsorised at 2%. The R^2 and number of observations are also provided. T-statistics are provided in the parentheses below. *, **, and *** denominate significance levels at 10%, 5%, and 1% accordingly.

Independent variables:	[1]	[2]	[3]	[4]	[5]	[6]
Leverage		-.56 (-3.81)***			-.67 (-4.57)***	-.65 (-4.58)***
LnSize				-.08 (-3.95)***	-.06 (-2.92)***	-.08 (-3.98)***
Q				-.12 (-0.81)	-.37 (-2.98)***	-.49 (-3.78)***
Cash						-1.96 (-2.99)***
StDebt						-.01 (-.10)
$(R_m - R_f)$			-.05 (.06)	-.19 (.24)	-.34 (.47)	.86 (1.33)
UK	-.35 (-5.25)***	-.38 (-5.86)***	-.35 (-5.09)***	-.30 (-4.18)***	-.36 (-5.24)***	-.36 (-5.66)***
Sweden	-.02 (-.23)	.05 (0.74)	-.02 (-.22)	-.01 (-.12)	.05 (.59)	-.02 (-.28)
Southern Europe	-.09 (-1.08)	-.10 (-1.44)	-.09 (-1.06)	-.02 (-.03)	-.03 (-.43)	.01 (.19)
Constant	-.66 (-12.44)***	-.45 (-6.56)***	-.63 (-1.08)	.18 (.26)	.69 (1.14)	1.4 (2.54)**
Observations	65	65	65	65	65	65
R^2	.34	.45	.34	.43	.54	0.62
F-test	14.17***	12.42***	10.65***	10.27***	15.56***	15.54***

Overall, the public real estate securities plummeted during the crisis period. The results indicate that being located in the UK is significantly negatively related to the adjusted total shareholder return. UK public real estate vehicles returned about 36%

less [6] (adjusted for the risk-free rate) than other real estate securities during this period. This could be explained by the fact that the UK had the highest risk-free asset return during 2007 – 2009, amounting to 26%. Hence, it was much less lucrative to invest in real estate securities vis-à-vis the risk-free asset in the UK compared to other European economies. The continental Europe lived through the crisis differently compared to the UK as it took quite some time to coordinate the reaction to the burst of the credit bubble. Also, as mentioned earlier, the UK has a common law legal system, not to mention a separate currency.

When it comes to literature, the market (CAPM) is always tested for and considered important when assessing returns; therefore, the regressions controlled for the local market return proxy. However, in 2007 – 2009 period regressions, the proxy for the market risk, $(R_m - R_f)$, did not show up as significant. One explanation could be that this particular regression is quite short-term, and thus in the short run, there are other more relevant factors affecting returns. For instance, Peterson and Hsich (1997) utilize more than 15 years of data from 1976 to 1992 when showing that the Fama-French three factors for common equity (market risk, size and book-to-market ratio) influence the returns on equity REITs.

Size turns out to be significant across regressions [4], [5], and [6] at the 1% level. The beta of *LnSize* is negative, implying that the larger the real estate security measured by total assets the worse its return. This is consistent with the existing literature that also finds the same negative size effect: Chen *et al.* (1998) and Hamelink and Hoesli (2004) find that size is the predominant determinant of REIT returns with a negative coefficient, whereas the Fama-French three factor model arrives at same conclusion for a wide sample of companies from various industries.

However, the result for the size effect comes with a caveat. Firstly, Sun *et al.* (2013) arrive at a similar finding that larger REITs performed worse, which, as they highlight, is counterintuitive. Larger REITs should have more diversified funding sources and thereby less debt rollover risk and potentially lower costs of financial distress.

Sun *et al.* (2013) also offer a compelling speculative explanation to the size effect. It might have been the case that during such turbulent market conditions institutional portfolio managers were forced to sell more liquid positions first, suppressing the price of large cap stocks relative to small cap stocks.

The book-to-market ratio, is the last but not least among the three Fama-French factors. The proxy for book-to-market ratio, *Q* is significantly negatively related to the adjusted total shareholder return in regressions [5] and [6]. Thus consistent with the Fama-French three factor model: shares trading below book value tend to outperform shares trading at a premium.

These findings are in line with Chiang *et al.* (2004 and 2005) who show that the single factor model is less applicable than the three-factor model in equity REITs. Furthermore, Serrano and Hoesli (2007) confirm that the Fama-French factors are superior in explaining the returns on equity REITs though the explanatory power of these factors varies a lot over time—size is always prevalent while the importance of book-to-market becomes apparent only after the early 1990s.

Turning to the variable of utmost interest, *Leverage,* the results show that in regressions [2], [5] and [6] leverage explains the return of public real estate vehicles at the 1% significance level. The coefficient of -.65 (regression [6]) can be interpreted as every additional percentage point of leverage adding 0.65% to the decline in TSR. The negative sign of the coefficient confirms the hypothesis that higher leverage leads to worse returns, the economic significance of the coefficient is also rather important, e.g. one standard deviation higher leverage (16.5 percentage points) leads to around 11 percentage points worse return. This result is in line with the findings of Sun *et al.* (2013) who found that in the US market the total shareholder return of REITs during the recession period was negatively affected by the higher level of leverage. Thus in the European context, the same effect can now be verified. This is also in line with the notion that higher leverage means higher risk and during downturns it results in worse performance. All in all, the performance in the crisis period confirms *Hypothesis 1: More leveraged EPRA/NAREIT index companies' returns decline relatively more during period of crisis (i.e. 2007 – 2009)* as the coefficient on *Leverage* is negative and highly significant throughout all the regressions.

The extra control variables added were *Cash, Short-term debt, Sweden* and *Southern Europe* effects. *Hypothesis 3: EPRA/NAREIT index companies with higher levels of short-term debt when entering the cycle underperformed their peers* does not find support. While the coefficient indeed is negative, it is not significant. *Short-term debt, Sweden* and *Southern Europe* do not show up as significant; however, the variable *Cash* is significant at 1% level and with a negative coefficient in regression [6], implying that having more available cash during a downturn has a negative impact on the share's performance. Thus the evidence for the *Hypothesis 4: EPRA/NAREIT index companies with higher levels of cash fared the crisis better,* is the complete opposite. The economic significance of the coefficient is actually modest. While 1 percentage point higher cash position, i.e. cash over total assets, leads to about 2 percentage points worse return, it should be noted that around 90% of real estate securities in the sample have cash over total assets of less than 5%.

The negative *Cash* coefficient in regression [6] contradicts Sun *et al.* (2013) finding of a positive relation between cash balance and returns. A high cash position may indicate poor capital management—real estate securities are expected to provide a steady stream of dividends and be efficient in capital allocation. As in general the funding of REITs is limited to either debt or equity because of the special requirements of cash distribution for REITs, one might argue that it is better for REITs (and RECs for that matter) to pay all cash out as dividends and thus signal to the market that they are reputable and transparent entities, which in turn would decrease their financing cost later. As real estate securities invest in large, illiquid real estate projects, and have the requirement of paying out cash, they can seldom finance the whole investment through internal resources, thus making public real estate vehicles with large cash balances just bad at managing signaling effects. Likewise, Ott *et al.* (2005) show that only 7% of the investments made by REITs are financed through internal resources.

4.2. Performance in the rebound period

The regression results for the period of March 2009 to December 2014 are presented in Table 4 below.

Table 4. Regression results in the Mar 09 – Dec 14 period

This table shows regressions of cumulative total shareholder return (TSR) adjusted for the country-specific cumulative risk-free rate on all the outlined independent variables. The adjusted cumulative total shareholder returns are winsorised at 2%. The R^2 and number of observations are also provided. T-statistics are provided in the parentheses below. *, **, and *** denominate significance levels at 10%, 5%, and 1% accordingly.

Independent variables:	[1]	[2]	[3]	[4]	[5]	[6]
Leverage		1.83 (.97)			2.18 (.82)	2.32 (.87)
LnSize				-.05 (-0.18)	-.12 (-.38)	-.07 (-.20)
Q				-.74 (-.64)	.10 (.08)	.52 (.45)
Cash						5.12 (.49)
StDebt						.71 (.60)
$(R_m - R_f)$			-.40 (-.34)	-.35 (-.28)	-.56 (-.45)	-.73 (-.59)
UK	2.14 (2.77)***	2.24 (2.85)***	2.04 (2.52)**	2.08 (2.33)**	2.21 (2.34)**	2.25 (2.32)**
Sweden	2.39 (2.20)**	2.17 (2.31)**	2.50 (2.17)**	2.46 (2.10)**	2.32 (2.24)**	2.51 (2.58)**
Southern Europe	-.57 (-1.08)	-.54 (-.99)	-.83 (-.91)	-.69 (-.71)	-.80 (-.82)	-1.00 (-.93)
Constant	1.47 (4.43)***	.78 (1.07)	1.77 (1.91)*	2.91 (1.07)	1.80 (.76)	.68 (.27)
Observations	65	65	65	65	65	65
R^2	.21	.22	.21	.22	.23	.24
F-test	5.31***	3.98***	3.94***	3.49***	3.03***	3.12***

The results in the rebound period show that the potential relationships established in the crisis period have broken down. This can be explained by the extreme dispersion in the returns of the securities in the rebound period of 2009 – 2014. As highlighted in the Summary statistics section, the TSRs adjusted for R_f take values from -143% to 1,386% with a standard deviation of 277%. However, it should be noted that even though the variables have lost statistical significance, the magnitude of, for instance, leverage is drastically higher than during the recession. Therefore, evidence for *Hypothesis 2: More levered EPRA/NAREIT index companies' returns rebound quicker during the subsequent recovery (i.e. 2009 – 2014),* shows that there seems to

be a positive effect of leverage on returns during the recovery, but this effect is not statistically significant.

In this period, *Hypothesis 3: EPRA/NAREIT index companies with higher levels of short-term debt when entering the cycle underperformed their peers* does not find support. The coefficient in the rebound period for short-term debt is insignificant, but has a positive sign, implying that during recovery, more short-term debt might be associated with higher returns. Flannery (1986) investigates how asymmetric information is reflected and signalled in the company's choice of debt maturity. Issuing short-term debt can indicate insider's superior knowledge of the company's high quality and it helps to negotiate more advantageous refinancing terms. Thus it might be that companies that entered the crisis with a higher level of short-term debt, rebounded more strongly during the recovery, as these companies actually were of high quality.

Hypothesis 4: *EPRA/NAREIT index companies with higher levels of cash fared the crisis better* as they were able to use the cash buffer, does not find statistically significant support. However, when observing the coefficient it can be seen that higher levels of cash at the start of the crisis are positively associated with the adjusted total shareholder return. On the other hand, this is contradictory to the regressions in the other two periods that find statistically significant negative relationship between cash and returns.

In addition, it is interesting to observe that the *UK* and now also *Sweden* are significant at 5% level in all six regression specifications. The UK and Sweden regions experienced a strong rebound while, though not significant, the Southern economies kept declining during the recovery. As discussed earlier, the UK is a large economy with different legislative system as well as currency. Contrary to the crisis period, the UK now had a cumulative risk-free asset return among the lowest in the group (37%), amplifying its returns further relative to the other regions.

Sweden also had similarly low level of risk-free returns (35%). In addition, as assumed earlier, Sweden indeed seems to stand out, probably due to the fact that it is not part of the Eurozone, thus has its own established and widely traded currency;

Sweden has not adopted a REIT system and is well-known for its peculiarity and concentration of family ownership. Högfeldt (2004) establishes that the "dual-class share and pyramid structures" common in all large public Swedish companies help certain families to keep control of the companies for decades. Swedish companies and banks are interlinked through entrenched private ownership links, thus making them less reliant on capital markets for external financing.

4.3. Performance in the entire time frame

The regression results for the entire period of January 2007 to December 2014 are presented in Table 5 below.

Table 5. Regression results in the Jan 07 – Dec 14 period

This table shows regressions of cumulative total shareholder return (TSR) adjusted for the country-specific cumulative risk-free rate on all the outlined independent variables. The adjusted cumulative total shareholder returns are winsorised at 2%. The R^2 and number of observations are also provided. T-statistics are provided in the parentheses below. *, **, and *** denominate significance levels at 10%, 5%, and 1% accordingly.

Independent variables:	[1]	[2]	[3]	[4]	[5]	[6]
Leverage		-1.00 (-1.87)*			-1.43 (-2.59)**	-1.32 (-2.48)**
LnSize				-.20 (-2.90)***	-.15 (-2.41)**	-.19 (-2.76)***
Q				-.66 (-1.53)	-1.19 (-2.77)***	-1.38 (-2.85)***
Cash						-4.30 (-3.29)***
StDebt						.33 (1.34)
$(R_m - R_f)$			.25 (.61)	.21 (0.61)	.24 (0.87)	.61 (2.12)**
UK	-.30 (-1.77)*	-.35 (-2.12)**	-.32 (-1.82)*	-.18 (-.99)	-.30 (-1.72)*	-.25 (-1.47)
Sweden	1.21 (4.34)***	1.33 (4.36)***	1.49 (3.49)***	1.15 (4.00)***	1.27 (4.14)***	1.07 (3.61)***
Southern Europe	-.25 (-1.09)	-.27 (-1.34)	-.19 (-.72)	.00 (.01)	-.01 (-.02)	0.17 (0.69)
Constant	-.50 (-4.02)***	-.12 (-.48)	-.32 (-1.00)	1.80 (2.05)**	2.65 (3.37)***	3.42 (3.43)***
Observations	65	65	65	65	65	65
R^2	.40	.44	.41	.49	.54	.59
F-test	10.47***	7.94***	8.17***	9.94***	9.33***	9.19***

It is worthwhile noting that over the full period, i.e. 2007 – 2014, the local market equity premium (CAPM) becomes significant at the 5% level [6]. The coefficient is less than 1.00, implying that real estate securities are less volatile than the market overall. The fact that the CAPM is highly significant corroborates with the existing literature on both the US and European market. Peterson and Hsich (1997), relying on 15 years of data from 1976 to 1992, confirm that equity REITs are influenced by the three Fama-French factors of common equity (market risk, size and book-to-market ratio). In addition, Hamelink and Hoesli (2004) establish that in a cross-country analysis of 10 countries the single most important factor explaining real estate securities' returns is the local market return.

LnSize again displays strong significance at the 1% level as did in the crisis sub-sample; the coefficient is negative, implying that larger real estate securities have a smaller return. As elaborated previously in the *Performance in the crisis period* section, size has been a predominant factor determining return in other research papers; for instance, size is found to be the most critical factor by Chen *et al.* (1998). Furthermore, Fama-Frech three-factors are considered to be superior to the CAPM by Chiang *et al.* (2004 and 2005) who studied the returns of equity REITs.

Q, i.e. the trading premium to book value, is significant and with a negative coefficient in regressions [5] and [6] at the 1% level. The result is also consistent with Fama and French's three-factor model finding that shares trading below book value tend to outperform shares trading at a premium. Therefore, this implies that also European real estate securities that have a higher market value tend to return less. Moreover, Schulte *et al.* (2011) confirm the significance of local market, book-to-market, and size factor effects when studying the European market.

Over the full economic cycle *Leverage* again displays significance in all three regressions at the 10% significance level in regression [2] and 5% significance level in regressions [5] and [6]. Therefore, it can be concluded that leverage levels seems to have an effect on the total shareholder return also in Europe as was found by Sun *et al.* (2013) for the US market. This finding is also corroborated by De Francesco (2007), who, studying the Australian A-REITs, demonstrates that higher leverage leads to lower risk-adjusted returns, as well as with Giacomini *et al.* (2014), who

further corroborate previous studies and arrive at the conclusion that high leverage in the lead up to Great Financial Crisis is associated with relatively worse share returns in the downturn period.

Karolyi and Sanders (1998) reach a conclusion that the traditional asset pricing models that utilize multiple betas do not fully explain the risk premium on REITs. Thus, *Cash* and *StDebt* are added to regression [6] as additional control variables for studying the effect of leverage on the total shareholder return. The R^2 of regression [6] is at a reasonable level of 59%.

Cash, again, is highly significant, but with a reversed sign compared to the crisis period, implying that having more available cash during a downturn has a negative impact on the share's performance. The economic significance of the coefficient is less spectacular. While a 1 percentage point higher cash position, i.e. cash over total assets, leads to about 4.3 percentage points worse return, it should be noted that around 90% of real estate securities in the sample have cash over total assets of less than 5%. Therefore, a 1 percentage point movement in cash, is huge in relative terms. Therefore, Hypothesis 4: *EPRA/NAREIT index companies with higher levels of cash fared the crisis better* is rejected.

The negative *Cash* coefficient in regression [6] is different from the findings of Sun *et al.* (2013) who establish a positive relation between cash balance and returns. As mentioned earlier, one potential explanation would be that a high cash position indicates bad cash management as real estate securities are expected to provide a steady stream of dividends. Since the funding of REITs is limited to either debt or equity because of the special requirements of cash distribution for REITs, one might argue that it is better for REITs (and RECs for that matter) to pay out all cash as dividends and thus signal to the market that they are reputable and transparent entities, which in turn would decrease their financing cost later. As real estate securities invest in large, illiquid real estate projects, and have the requirement of paying out cash, they can seldom finance the whole investment through internal resources, thus making public real estate vehicles with large cash balances just bad at signaling performance.

StDebt is does not show up as significant, but has a positive coefficient. Based on Hypothesis 3 companies with high ratio of short-term debt when entering the crisis were expected to underperform, i.e. have a negative coefficient, due to refinancing risk, particularly in the crisis period of 2007 – 2009. The current positive coefficient applies for the whole economic cycle of 2007 – 2014. Thus, it can be explained by the proposition that short-term debt helps to alleviate underinvestment problem (Hart, 1993). Also, Flannery (1986) investigates how issuing short-term debt can indicate insider's superior knowledge of the company's high quality and it helps to tap into advantageous re-financing terms.

In terms of regional differences, it is interesting to note, that the UK does not show up as significant in the overall time frame regression from 2007 to 2014 (regression [6]), while it was significant both during the downturn of 2007-2009 as well as during the rebound of 2009-2014. This perhaps could be explained by the fact that during the crisis the UK real estate market crashed and during recovery it rebounded significantly, thus the two are cancelling each other out in the overall regression sample. This would also be consistent with the idea that European economies behave the same way in the longer run.

The Swedish real estate securities outperformed other regions over 2007-2014. This can be explained by the peculiarity of Sweden as also discussed in section *Performance in the crisis period*. Sweden seems to stand out, probably due to the fact that it is not part of the Eurozone, thus has its own currency, and has not adopted a REIT system. In addition, Sweden relies heavily on the dual-class share structures and pyramiding (Högfeldt, 2004) which enables certain families to keep control of the companies for decades. Swedish companies and banks are interlinked through entrenched private ownership networks, thus making them less reliant on capital markets for external financing. Also, the cumulative Swedish risk-free return was by far the lowest over the 2007-2014 period (with the exception of Greece) amounting to only 40%. This also helps to amplify the adjusted TSR of Swedish real estate securities compared to other regions.

5. Conclusion

This thesis tested for the effect of leverage on returns utilizing a sample of EPRA/NAREIT index companies in Europe. The main findings are:

- *Leverage* indeed has a negative impact on the adjusted *TSR*. This is true in the recession period of 2007 – 2009, where more leveraged real estate securities declined more, as well as in the overall period of 2007 – 2014, showing that the costs of financial distress outweighed the advantage of tax shields in the sample of EPRA/NAREIT index companies. This was expected as many of these real estate vehicles are structured as REITs and others that are structured as RECs are still taxed at low levels, implying that there is no tax advantage of having debt for these securities. However, *Leverage has low economic significance.* There are several potential explanations for this. Sun *et al.* (2013) discuss the potential endogeneity of leverage choice—REITs that are able to better cope with financial leverage are able to take on more leverage. Another explanation offered by Sun *et al.* (2013) is that legislation can be a potential determinant, where in a period of downturn REITs are allowed to substitute cash dividends with stock dividends. As Europe is much more heterogeneous in legislation when compared to the US, the latter can offer an interesting argument.
- The three Fama-French factors are also relevant for determining EPRA/NAREIT index companies' returns. While the size (*LnSize*) and book-to-market (*Q*) factors are significantly negatively related to *TSR* both in the recession period of 2007 – 2009 as well as the overall period of 2007 – 2014, the local market return ($R_m - R_f$) turns up as significant only in the overall time frame. This is consistent with the bulk of literature that find support for the Fama-French three factor model stating that larger companies and companies with higher market values perform worse. Therefore, these variables were controlled for in the regressions.
- Contrary to expectations, *Cash* is negatively related to the total shareholder return both in the bust period of 2007 – 2009 and the total time frame of 2007 – 2014. A high cash position may indicate bad cash management—real estate securities are expected to provide a steady stream of dividends. As real estate

securities invest in large, illiquid real estate projects, and have the requirement of paying out cash, they can seldom finance the whole investment through internal resources, thus making public real estate vehicles with large cash balances just bad at signaling performance.

- *StDebt* does not show up as significant, but has a positive coefficient in the overall regression. The positive coefficient might show that short-term debt helps to alleviate the underinvestment problem (Hart, 1993), indicates the insider's superior knowledge of the company's high quality (Flannery, 1986) and helps to tap into advantageous re-financing terms.
- *The UK* dummy shows up as significant in the bust period with a negative sign as well as in the rebound period with a positive sign. The result is expected as UK public real estate vehicles declined more than securities in other countries during the turmoil and return better during the recovery, making them much more volatile. The UK is a large economy with different legal system as well as currency. Also, it had a much higher risk-free asset return during the recession (26%) and a risk-free rate among the lowest levels (37%) during the rebound, amplifying its return relative to other regions.
- *The Sweden* dummy is significant in the rebound period as well as in the overall period of 2007 – 2014 indicating that Swedish real estate securities outperformed the other regions in these periods. The Sweden effect is probably due to the fact that it is not part of the Eurozone, thus it has its own currency. Also, Sweden has not adopted a REIT system. In addition, Sweden relies heavily on the dual-class share structures and pyramiding (Högfeldt, 2004) which enables certain families to keep control of the companies for decades. Swedish companies and banks are interlinked through entrenched private ownership networks, thus making them less reliant on capital markets for external financing. Also, the cumulative Swedish risk-free return was by far the lowest over the 2007 – 2014 period (with the exception of Greece) of only 40%. This also helped to amplify the adjusted TSR of Swedish real estate securities compared to other regions.

All in all, this study is consistent with Sun *et al.* (2013) and finds that leverage affects returns also for the EPRA/NAREIT Developed Europe index companies.

The study could be improved by adding other explanatory variables present in Sun *et al.* (2013):

- Firstly, there is no proxy for the underlying operational cash flow generation of the REIT (e.g. FFO yield) as the methodology of calculation differed from country to country, making the figures retrieved not comparable between each other.
- Secondly, there are no explanatory variables that would describe the asset characteristics of the REIT, either a classification of the asset type (e.g. residential, commercial, etc.) or quality (e.g. prime, secondary). Compared to the US, the European REIT market is currently less mature and the overall sample of companies is smaller but also they tend to be much more diversified and more difficult to categorise in one particular sub-group.

Thus, overcoming these limitations could improve the robustness of the study.

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Appendix 1

Table 6. Full list of companies in the sample

	Name	*Country*
1	Klepierre	France
2	Land Securities	UK
3	British Land	UK
4	Gecina	France
5	Hammerson	UK
6	Deutsche Wohnen	Germany
7	INTU Properties	UK
8	Fonciere des Regions	France
9	Icade Management	France
10	Swiss Prime Site	Switzerland
11	Derwent London	UK
12	SEGRO	UK
13	PSP Swiss Property	UK
14	Great Portland Estates	UK
15	Shaftesbury	UK
16	Hufvudstaden	Sweden
17	Castellum	Sweden
18	Deutsche EuroShop	Germany
19	Wallenstam	Sweden
20	Fastighets AB Balder	Sweden
21	Fabege	Sweden
22	Allreal Holding	Switzerland
23	Wereldhave	Holland
24	Mercialys	France
25	Inmobiliaria Colonial	Spain
26	Cofinimmo	Belgium
27	CA Immobilien Anlagen	Austria
28	Citycon	Finland
29	Workspace Group	UK
30	Eurocommercial Properties	Holland
31	Beni Stabili	Italy
32	Befimmo	Belgium
33	Wihlborgs Fastigheter	Sweden
34	TAG Immobilien	Germany
35	Unite Group	UK
36	St Modwen Properties	UK

37	Warehousing & Distribution De Pauw	Belgium
38	Big Yellow Group	UK
39	Daejan Holdings	UK
40	Kungsleden	Sweden
41	Mobimo Holding	Switzerland
42	Redefine International	UK
43	Conwert Immobilien Invest	Austria
44	VastNed Retail	Holland
45	Klovern	Sweden
46	Grivalia Properties	Greece
47	Wereldhave Belgium	Belgium
48	Norwegian Property	Norway
49	Quintain Estates and Development	UK
50	DIC Asset	Germany
51	Helical Bar	UK
52	Nieuwe Steen Investments	Holland
53	Aedifica	Belgium
54	Immobiliate Grande Distribuzione	Italy
55	Primary Health Properties	UK
56	Dios Fastigheter	Sweden
57	Leasinvest Real Estate	Belgium
58	Technopolis	Finland
59	ANF Immobilier	France
60	Hamborner REIT	Germany
61	Schroder Real Estate Investment Trust	UK
62	Development Securities	UK
63	Intervest Offices	Belgium
64	Affine	France
65	Sponda	Finland

Source: EPRA (2015a)

Table 7. Full list of indices used (in alphabetical order)

Symbol	*Name*	*Country*
AEX25	Amsterdam Exchange Index	Netherlands
ASE	Athens Stock Exchange Index	Greece
ATX	Austria Traded Index	Austria
BEL20	BEL20 Index	Belgium
CAC40	CAC 40 Index	France
DAX	XETRA DAX Index	Germany
FTSE100	FTSE 100 Index	UK
IBEX35	IBEX 35 Index	Spain
OMXH25	OMX Helsinki 25 Index	Finland
OMXS30	OMX Stockholm 30 Index	Sweden

SMI	Swiss Market Index	Switzerland

Appendix 2

This appendix will show the statistical tests carried out in order to screen for multicollinearity issues. Pearson correlation matrix is compiled to check the pair-vise correlations of each variable. For the main regression (regression [6]) in all the three periods tested, *vif* (variance inflation factor) test in stata is also carried out. A problem occurs when VIF > 10 or 1/VIF = 0

Table 8. Pearson correlations

The Table represents the full correlation matrix of the sample. The Total Shareholder Return variables are winsorized at 2% level. Also, the dummy variables representing regions are included: UK, Sweden, Southern Europe and Other. P-values are provided in italics.

	Leverage	*LnSize*	*Q*	*Cash*	*StDebt*	*(R_m – R_f)_07_09*	*(R_m – R_f)_09_14*	*(R_m – R_f)_07_14*	*(TSR – R_f)_07_09*	*(TSR – R_f)_09_14*	*(TSR – R_f)_07_14*	*UK*	*Sweden*	*Southern Europe*	*Other*
Leverage	1.0000														
LnSize	0.2232 *0.0738*	1.0000													
Q	**-0.4894** *0.0000*	-0.1679 *0.1812*	1.0000												
Cash	0.0207 *0.8702*	-0.2017 *0.1071*	-0.1467 *0.2437*	1.0000											
StDebt1	-0.0266 *0.8334*	-0.0730 *0.5633*	-0.0664 *0.5991*	-0.0052 *0.9675*	1.0000										
(R_m – R_f)_07_09	0.0448 *0.7233*	0.0550 *0.6634*	0.1101 *0.3828*	0.1422 *0.2584*	**-0.2499** *0.0447*	1.0000									
(R_m – R_f)_09_14	0.2027 *0.1054*	**-0.2584** *0.0377*	-0.0336 *0.7903*	0.0547 *0.6653*	-0.0183 *0.8847*	**0.5547** *0.0000*	1.0000								
(R_m – R_f)_07_14	0.0743 *0.5566*	-0.1428 *0.2564*	-0.0005 *0.9968*	0.2399 *0.0542*	-0.2406 *0.0536*	**0.8459** *0.0000*	**0.8094** *0.0000*	1.0000							
(TSR – R_f)_07_09	-0.1776 *0.1571*	**-0.4287** *0.0004*	-0.0008 *0.9952*	-0.1981 *0.1137*	0.1699 *0.1759*	-0.0702 *0.5786*	0.1592 *0.2052*	-0.0053 *0.9664*	1.0000						
(TSR – R_f)_09_14	0.1218 *0.3338*	0.0558 *0.6588*	-0.1256 *0.3186*	0.0336 *0.7905*	-0.0545 *0.6661*	0.1699 *0.1759*	-0.0702 *0.5786*	0.2137 *0.0874*	**-0.4683** *0.0001*	1.0000					
(TSR – R_f)_07_14	0.0171 *0.8924*	**-0.3028** *0.0142*	-0.1686 *0.1795*	-0.1570 *0.2117*	0.1272 *0.3127*	0.2137 *0.0874*	**0.3364** *0.0061*	**0.3430** *0.0052*	**0.6061** *0.0000*	**0.2012** *0.1081*	1.0000				
UK	-0.2087 *0.0952*	0.2201 *0.0781*	-0.0635 *0.6152*	0.0244 *0.8469*	**-0.2487** *0.0458*	-0.1487 *0.2371*	-0.1958 *0.1180*	0.0809 *0.5216*	**-0.5729** *0.0000*	**0.3165** *0.0102*	**-0.2900** *0.0191*	1.0000			
Sweden	**0.3020** *0.0145*	-0.0435 *0.7306*	-0.1012 *0.4223*	-0.1480 *0.2395*	-0.0293 *0.8165*	**0.3060** *0.0132*	**0.4604** *0.0001*	**0.4511** *0.002*	0.1660 0.1864	0.2285 *0.0671*	**0.6101** *0.0000*	**-0.2673** *0.0314*	1.0000		
Southern Europe	-0.0421 *0.7389*	0.1444 *0.2511*	0.1906 *0.1282*	0.0700 *0.5794*	0.0601 *0.6344*	-0.1616 *0.1985*	**-0.5906** *0.0000*	**-0.4034** *0.0009*	0.0505 0.6898	-0.2407 *0.0534*	-0.1604 *0.2018*	**-0.2843** *0.0217*	-0.1709 *0.1734*	1.0000	
Other	0.0152 *0.9041*	**-0.3261** *0.0080*	-0.0811 *0.5209*	0.0375 *0.7669*	0.2276 *0.0683*	-0.2369 *0.0574*	**0.3344** *0.0065*	-0.0671 *0.5954*	**0.4051** *0.0008*	**-0.2967** *0.0164*	-0.0324 *0.7980*	**-0.5270** *0.0000*	**-0.3169** *0.0101*	**-0.3371** *0.0060*	1.0000

Table 9. Multicollinearity tests

	Regression 2007-2009		Regression 2009-2014		Regression 2007-2014	
Variable	**VIF**	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**
Leverage	1.63	0.613049	1.67	0.597169	1.63	0.614113
SizeLn	1.36	0.737463	1.35	0.743484	1.33	0.749690
Q	1.58	0.634414	1.57	0.638253	1.53	0.652021
Cash	1.24	0.804325	1.21	0.826715	1.39	0.718423
StDebt	1.14	0.874902	1.11	0.901889	1.17	0.855614
UK	1.58	0.631239	1.72	0.581490	1.55	0.643686
Sweden	1.47	0.679418	1.47	0.682045	1.71	0.585677
SouthEurope	1.34	0.745912	2.38	0.419807	1.56	0.642663
ERP 07-09	1.38	0.723756				
ERP 09-14			2.55	0.392451		
ERP 07-14					1.95	0.513400
Mean VIF	**1.41**		**1.67**		**1.54**	

Appendix 3

This appendix will show the statistical tests carried out in order to screen for specification error in regressions. For the main regression (regression [6]) in all the three periods tested, *linktest* in stata is carried out. It examines whether the regression should have additional variables by regressing the dependent variable against new predicted values of the dependent variable (*_hat and _hatsq*) as they were independent regressors. Need to look at the p-value of *_hatsq*.
H_0: *No specification error*

Table 10. Specification error test for period 2007-2009

Source	SS	df	MS		
Model	2.86919865	2	1.43459932	Number of obs =	65
Residual	1.68391581	62	.027159932	F(2, 62) =	52.82
				Prob > F =	0.0000
Total	4.55311446	64	.071142413	R-squared =	0.6302
				Adj R-squared =	0.6182
				Root MSE =	.1648

TSR_adj_~9_w	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_hat	1.524447	.528176	2.89	0.005	.4686385	2.580256
_hatsq	.3391243	.3356334	1.01	0.316	-.3317972	1.010046
_cons	.1879079	.2021268	0.93	0.356	-.2161379	.5919537

Table 11. Specification error test for period 2009-2014

Source	SS	df	MS		
Model	104.950642	2	52.4753208	Number of obs =	65
Residual	336.588009	62	5.42883885	F(2, 62) =	9.67
				Prob > F =	0.0002
Total	441.53865	64	6.89904141	R-squared =	0.2377
				Adj R-squared =	0.2131
				Root MSE =	2.33

TSR_adj_09~w	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_hat	1.383421	1.209782	1.14	0.257	-1.0349	3.801742
_hatsq	-.0796331	.2467564	-0.32	0.748	-.5728921	.4136259
_cons	-.333537	1.20168	-0.28	0.782	-2.735661	2.068587

Table 12. Specification error test for period 2007-2014

Source	SS	df	MS	Number of obs =	65
				F(2, 62) =	45.98
Model	22.9906208	2	11.4953104	Prob > F =	0.0000
Residual	15.5018148	62	.25002927	R-squared =	0.5973
				Adj R-squared =	0.5843
Total	38.4924356	64	.601444306	Root MSE =	.50003

TSR_a~7_14_w	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
_hat	1.052012	.1198426	8.78	0.000	.8124503	1.291574
_hatsq	.1352093	.1513969	0.89	0.375	-.1674288	.4378473
_cons	-.0523634	.0981999	-0.53	0.596	-.2486622	.1439355

Appendix 4

This appendix will show the statistical tests carried out in order to screen for normality of error terms in regressions, an assumption behind OLS. For the main regression (regression [6]) in all the three periods tested, *Sharpio-Wilk W test for normal data* is carried out.
H_0: *Residuals are normally distributed*

Table 13. Shapiro - Wilk tests

Variable	Obs	W	V	z	Prob>z
Residuals 07-09	65	0.97804	1.273	0.523	0.30048
Residuals 07-09	65	0.89217	6.251	3.969	0.00004
Residuals 07-09	65	0.98568	0.830	-0.403	0.65638