INVESTMENTS IN EUROPEAN SECURITIZED REAL ESTATE

performance evaluation through factor-mimicking portfolios

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Preface

This thesis is written with Professor Ole Gjølberg as our supervisor. He has been very helpful and guided us in the right direction, but still challenged our skills and encouraged us to individual thinking. Professor Gjølberg has also provided us with access to raw data through Thomson Datastream. Moreover, we will also like to thank Trond Thomson and Knut Johan Arnholdt at Edge Capital Asset Management for suggesting the theme of the thesis, as well as providing us with information in the early stage of the process.

Oslo, May 12, 2010.

Stig Børtnes　　　　　　　　Erlend Høie

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Executive Summary

This thesis applies factor models in explaining common variations in returns within the European securitized real estate sector. The three risk factors suggested by Fama & French (1993), the market, size and B/M ratio, have become known as a state-of-the art framework for various applications within the financial research. We explore these factors in a three-factor model before we include two additional factors, liquidity and momentum into a five-factor model. We investigate how the factors explain common variations in returns within the securitized real estate sector in Europe from 2000 to 2009. The models are explored on portfolios both categorized by firm characteristics and country of origin.

Surprisingly, we find that on average, big companies significantly outperform small companies. Contradicting previous asset pricing literature, we find that big companies can expect higher average returns. We suggest two possible explanations for the higher average returns. One, there exists a higher risk premium in big-capitalized companies. Two, by holding stocks from big-capitalized companies, an investor can yield higher returns without being exposed to higher risk, and thus, an arbitrary opportunity may exist.

However, as expected, there exists a significant value premium, value stocks outperform growth stocks. This premium accounts for 14.5 % annually, being significant at the 5 % level. Thus, as expected and in line with previous findings, high book-to-market equity companies carry a risk premium, providing opportunities for the mean-variance efficient investor.

The three-factor model by Fama & French (1993) provides an informal description of the cross-sectional variation in returns in the investigated sector, where the model yields robust results for the European securitized real estate markets during the first decade of the millennium. Compared to the traditional capital asset pricing model (CAPM), the three-factor model yields higher explanatory power in all portfolios investigated, where all slopes except one being significant at the 5 % level.

The five-factor model includes two additional factors, namely liquidity and momentum. This model provides relatively vague results. Even though both factors provide positive premiums, neither show significance, which we address as the reason for the spurious results. Finally, an

international six-factor model developed by Griffin (2002) is implemented. The model yields highest significant explanatory power for Belgian real estate stocks. This result suggests that Belgian real estate companies' returns are most integrated to the rest of the world. Caution, however, needs to be taken, as the economic implementation of this result is a troublesome business.

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1. Introduction

This thesis seeks to identify which factors that are important as drivers for the common variations in returns for stocks grouped in the European real estate sector. By utilizing priced risk factors suggested by earlier literature, we create a set of multifactor models. Next, we evaluate each model and ascertain if, and to what extent, the different factors can explain the cross-sectional variations in this particular group of stocks, and whether the risk factors can be categorized as priced. The purpose of this thesis is to explore whether these well-known asset pricing factors can yield significant explanatory power for the common variations in returns for stocks listed on the FTSE EPRA/NAREIT Europe Index (from now on called the EPRA Europe Index) during the period of 2000-2009.

Does the traditional capital asset pricing model (CAPM) explain all the variations in the returns of a group of stocks from a particular sector? Fama & French (1993) argue that there are other risk factors, i.e. the company's size and B/M value, which explain the variations in the returns of stocks, in addition to the market's excess return. Many researchers suggest other factors as proxies for systematic risk as well, i.e. liquidity and momentum (Eckbo & Norli, 2005). "Where is our competition?" asks Andrew Cain, Chief Executive of "Dimensional Fund Advisors", Texas, in a Financial Times article dated March 10, 2010. He enlightens the readers of how his company outperforms their competitors by investing in stocks based on Fama & French's hypotheses. Mr. Cain emphasizes his beliefs in the efficient market hypothesis; "Other managers tear themselves apart because they don't have the same beliefs in efficient markets". "Dimensional Fund Advisors" utilizes the fact that small-capitalized companies have outperformed big-capitalized companies in both the US and the UK since 1926 and 1955, respectively. Furthermore, value stocks (High B/M value) have outperformed growth stocks (Low B/M value) over the past decade in the same markets. In addition, he mentions these companies' capability to perform over periods, thus, there exists a momentum effect in these types of stocks. "You will leave something on the table if you ignore momentum", says Mr. Cain (Johnson, 2010).

This thesis applies financial theory (CAPM) combined with researchers' hypotheses (i.e. Fama & French). Utilizing data from companies listed on the EPRA Europe Index, we look into which of the models and factors that explain the most of the variations, and provide the most significant explanatory power in the returns of the European securitized real estate sector. As far as we know, a European real estate sector-based asset pricing model has not yet been conducted, thus, implementing such a model will hopefully provide interesting results to existing literature.

The results from our research may be used in applications for i.e. financial management to calculate expected returns such as cost of capital, portfolio performance analysis, as well as risk analysis. Factor models are also utilized within the investment management industry. Moreover, investors struggle to produce superior returns when investing actively. The results from our factor models may provide a helping hand in order to receive the desirable risk characteristics in the investor's portfolio. It will therefore be crucial, both for the investor and the academic researcher, to identify which factors that best capture the systematic variations in special sectors' returns. Due to lack of earlier studies on the European real estate sector, our results cannot be directly compared to similar studies. We will therefore compare our results to original theories and previous comparable studies from other parts of the world.

The objective of this thesis is three-fold. First, we create factor models and run regressions with our constructed explanatory variables on portfolios based on the original theory by Fama & French (1993). Second, we explore our models on constructed country indices. This is done to examine for regional differences within the European securitized real estate sector. Third, we investigate an international six-factor model developed by Griffin (2002), in order to look into whether some of the international factors can explain the respective country indices' returns, thus, whether the European countries' real estate sectors are integrated with the rest of the world.

We utilize the three-factor model created by Fama & French (1993). This model suggests different risk factors that explain companies' returns; the excess market return, the excess return from holding stocks containing small-capitalized companies over big-capitalized companies (size effect), as well as the excess return from holding stocks with high B/M ratio over stocks with low B/M ratio (value effect). Another factor that will be explored is the liquidity factor, which builds on the notion that companies with high stock turnover yield lower returns than those with low stock turnover (liquidity effect). The final factor is named the momentum factor, which expresses the hypothesis that companies which have performed well in the recent past, will perform well in the recent future as well (momentum effect). Each factor can be represented by a portfolio that exactly replicates the return or pay-off to that factor. By constructing the models consisting of these factors, we attempt to establish whether the factors are useful for both researchers and the investment practitioner. We emphasize the fact that these factors are constructed as ad-hoc factors that are not theoretically anchored, but rather factors that work "surprisingly well" in explaining stock returns.

The interpretations of the results are strongly debated. According to Hou et al. (2006:1), our results can be ascribed to three stories; (a) Rationale asset pricing in which multiple systematic risk factors are priced, (b) Irrational asset pricing where premiums representing size effects, value effects, liquidity effects or momentum effects can be utilized by creating arbitrary opportunities, and (c) Spurious results. The fact that previous research has been conducted using the same variables in other settings makes it easier to exclude alternative (c). The two remaining alternatives represent two different schools within finance. We follow the view of Fama & French (1993), meaning that the extra factors are risk factors which capture variations in returns that the excess market return does not compensate for. By being exposed to this higher risk, the investors can also expect higher average returns.

In order to explore the variations in returns, we utilize constructed factors which are created to express a quantitative reasoning for the underlying theory. To further examine how the factors affect each portfolio specifically, we use statistical quantitative tools and run regression models in Excel which provide information on how these incorporated models work. This information will be based on regression output and descriptive statistics calculated on different sets of portfolios in the European securitized real estate market.

2. Background

2.1. Facts about REITs (Real Estate Investment Trusts)

In the 1960's the first REITs were established in the US. It was an investment vehicle where the goal was to give investors a chance to own a stake in real estate while at the same owning a stake in a traditional trust. It was an attempt at creating a perfect investment tool by combining the risk of real estate ownership with trusts. It also allowed individual real estate investors the opportunity to pool their money together for the same benefits as traditional real estate owners (Gordon, 2008:20).

The property investment information portal "Reita" explains that real estate investment trusts, or REITs, can be a convenient way for the average investor to profit without the hassle of direct property acquisition. A REIT is, by definition, a company that's listed on a regulated investment exchange and which owns income-producing property – either commercial or residential. Furthermore, "Reita" emphasizes that there are several benefits for investors holding REITs. The introduction of REITs means small investors are now able to invest indirectly in a truly diversified property portfolio, getting access to property investment in a variety of sectors and geographical locations. Instead of having to purchase entire properties, investors can buy easily tradable REITs at a low cost. A major advantage of REITs is their tax-efficient nature. Investors avoid the double taxation that any investor in property companies shares faces, as tax won't be payable on rental or capital gains earned within a REIT. Investors will only be liable for the tax due on income received as dividends. There are other benefits for investors holding REITs as well, for instance like easy liquidation features. It is very simple to sell or buy REITs and turn them into cash whenever you like, which is a huge advantage compared to owning direct property. Furthermore, REITs can also give potentially high-yield returns just like direct property. An investor can build a highly diversified portfolio, because REITs represent a strong source of diversification for a wide range of investment portfolios by increasing return and decreasing risk. This is because REITs work as a hedge against the volatility and underperformance of other securities, like for instance equities and bonds. The last benefit of REITs is that they have high corporate governance, meaning that this is reflected in higher valuations, that is, companies that have high governance ratings are also those that tend to have higher valuations in the marketplace as well as stronger total returns. The major concern about investing in REITs is their correlation to equities. This works, as mentioned above, as a hedge against uncertain earnings, but also gives investors worries. Since REITs are stock market listed companies, the returns of their shares are unavoidably affected by the performance of the overall stock market. In the short-term, over periods of less than 18 months, the performance of REITs shares is likely to be more closely correlated to that of other shares than it is to that of commercial property. Nevertheless, both direct and indirect commercial property, should be considered for long-term investment rather than short-term speculation. Like any investment, the value of a REIT can go down as well as up, and past performance isn't necessarily an indicator of future performance[1].

According to Block (2002:52) every REIT must pass these four tests annually in order to retain its special tax status:

1. The REIT must distribute at least 90 percent of its annual taxable income, excluding capital gains, as dividends to its shareholders.
2. The REIT must have at least 75 percent of its assets invested in real estate, mortgage loans, shares in other REITs, cash, or government securities.
3. The REIT must derive at least 75 percent of its gross income from rents, mortgage interest, or gains from the sale of real property. At least 95 percent must come from these sources, together with dividends, interest and gains from securities sales.
4. The REIT must have at least 100 shareholders and must have less than 50 percent of the outstanding shares concentrated in the hands of five or fewer shareholders.

2.2. Why do Stock Prices Move?

In order to explain what factors that explain the most of the sector's returns, we need to address the reason why stock prices move in the first place. Another question is whether all types of stocks move because of the same reasons. In this section we will explain what moves stock prices and whether or not real estate stocks can be viewed in the same way.

In financial theory, the price of a stock is determined by its future dividends. Therefore, there are only two factors that can affect prices: expectations regarding discount rates, and expectations regarding future cash flows. According to Sadka (2007), the finance literature studies the

[1] www.reita.org – Property Investment Information Portal

determinants of stock price volatility with two different methodologies. The first is a so-called "level" methodology, which is based on the decomposition of the dividend-price ratio into two components, expected returns and expected cash flow. The result of this method suggests that aggregate expected cash flow does not generate aggregate price volatility. The second methodology is a "flow" methodology that studies the volatility of stock returns rather than dividend-price ratios. These studies similarly document that cash flows do not generate significant volatility in aggregate stock returns. However, Hecht & Vuolteenaho (2006) explain that this is because stock prices are not a function of expected cash flows or expected returns, but rather a function of changes in expected cash flows and changes in expected returns.

Looking at expected future dividends as the measure for how the stock price will move is not a good indicator. Sadka (2007) suggests that dividends are high when companies have a higher cash component in their assets and expect to spend less of their earnings on subsequent capital expenditures. This conclusion is consistent with the work by Miller & Modigliani (1961), who show that when earnings are given and taxes ignored, dividend policy is irrelevant. This is because the dividend is a result of company policy and its shareholders' preferables, and therefore not a performance measure. Hecht & Vuolteenaho (2006) also suggest reasons for why the stock prices fluctuate as much as they do and that there is a negative correlation between expected returns and expected earnings. Sadka (2007) exemplifies this with a recession. During a recession, the investors expect a higher risk premium, and at the same time lower earnings, hence, the discount rate goes up and the cash flow goes down. The high volatility is therefore explained by the fact that the two components of price (returns and earnings) constantly vary in different directions.

2.2.1 Do Real Estate Stocks and Common Stocks have the same Features?

Real estate stocks do have many of the same characteristics as common stocks. However, because of the unusual characteristics of the companies, especially Real Estate Investment Trusts (REITs), background information regarding the commonalities between real estate stocks and common stocks is useful and necessary.

REITs are very special when it comes to dividend policies compared to regular corporations. REITs are unique because they typically pay out almost all of their funds from operations as dividends. This dividend regime comes from their legal obligation to pay out at least 90 % of their taxable income as dividends. Due to the relatively large amount of depreciation and low level of capital expenditures, the cash flow of a REIT generally exceeds its taxable earnings (Kallberg et al. 2003).

Historically, real estate stocks move together with common stocks in some periods, but not all. Sebastian & Schätz (2009) suggest that real estate companies are exposed to two risk factors. On one hand, they are exposed to market risk generated by stock market trends. On the other hand, the core business of listed real estate companies remains the long-term management of property. Sebastian & Schätz (2009:4) ask; "Which hand is the strongest?"

Even though the company policies differ between real estate companies and other companies, it is interesting to compare how the real estate stocks move compared to common stocks. An early study by Gilberto (1990) addresses that equity REITs correlate with the common stock market, even though the correlation has declined up until 1990. This suggests a presence of a common factor (or factors) in both sets of returns. The implications of this kind of research will be that investors can invest in real estate, only that they must deal with the same volatility as for common stocks. Ling & Naranjo (1999) investigate the integration between real estate stocks and the stock market as a whole between 1974 and 1998. They receive the same results as Gilberto (1990) with a slightly different method. They find that the integration is present and increasing after 1990.

Li & Wang (1995) explore the hypothesis that real estate stocks and common stocks are affected by the same factors. They investigate the US REITs and common stocks during the period of 1971-1991. By using a multifactor asset pricing framework, they find that REITs are integrated with the general stock market. In addition, no evidence can be found that REIT returns are more predictable than the returns for common stocks.

Ghosh et al. (1996) compare US real estate stocks and common stocks in several ways. They find that the correlation between REITs and common stocks has declined up until the mid 90's. Furthermore, REITs appear to be less liquid than other stocks with the same size characteristics measured with multiple liquidity measures. Finally, institutional investments in REITs are growing, but still low compared to institutional investments in common stocks.

Regarding international studies, Eichholtz (1996) investigates several of the most capitalized markets for publicly listed real estate companies from 1985-1994. More specifically, he looks into whether international returns from real estate securities differ from the returns of international common stocks and bonds. He finds that property share returns are less strongly internationally correlated than common stocks. This indicates that the returns on international real estate securities and common stocks cannot be viewed in the same manner. Investigating specifically the EPRA Europe Index, Bond & Glascock (2006) find that during the period of 1990-2006, European real estate securities performed better than common stocks in the major markets after adjusting for risk. Another interesting attribute is that the real estate securities seem to perform well when the market performs badly. Compared to the large stock markets, the authors find that the EPRA Europe Index is correlated with major equity markets, but to such a small extent that this index has the ability to reduce risk combined with other assets in a well-diversified portfolio. Lenkkeri et al. (2006) extend the research regarding the day-of-the-week effects towards European listed real estate indices, between 1990 and 2003. As part of their statistics they report that the correlation between the stock index return of a country and its real estate index in their sample ranges from -0.96 % for Belgium to 32.08 % for Sweden. The reasoning behind these numbers clearly states that stock market indices and securitized real estate indices do not move together.

By reviewing all studies, we see that studies conducted before 1990 find correlations between securitized real estate and common stocks. However, this effect seems to decrease towards the millennium. We find the results from Lenkkerri et al. (2006) most relevant for our study, and view the securitized real estate market as independent compared to the market for common stocks, at least in the long-term.

2.2.2. Do Changes in House Prices Affect Returns on Real Estate Stocks?

What is the main influence on the price and direction of an investment exposure to listed real estate? In our thesis we want to find out if there are certain factors that can explain the stocks' returns. Before we do this, we need to get a better understanding of why real estate stocks move in the first place, and if there is any connection between real estate stocks and house prices. There have been several studies exploring this particular relationship.

A study by Nishigaki (2007) analyzes the long-term relationship between REIT returns and house prices in the US financial market. The relationship between REIT performance and house prices or other financial variables, represents important information for the risk management strategy for investors. Using a vector error correction model (VECM), the analyst finds that in the long-run, there exists a positive correlation between US equity REIT returns and house prices. The results reveal that if house prices in the US decline or the inflation rises, the REIT performance will drop in the long-term. Further on, the empirical results also indicate that in recent years, there appears to be a stronger positive correlation between US equity REIT returns and house prices. Tse (2001) has some of the same conclusions in an Asian survey. He studies the impact of residential and office property prices on stock prices in Hong Kong. The results, using annual data in the period of 1974-1998, indicate that changes in stock prices tend to move with residential and office property prices in the long-term. Thus, in an environment of declining real estate values, all investors would also have to reduce the share of securities investment, especially the real estate-related stocks. The findings also suggest that inflation expectations are also one of the important determinants of the change in stock prices. Tse's results suggest that while changes in expectations is an important determinant of the short-run correlation between property and stock prices, the long-run positive correlation is due to economic fundamentals that affect both property and stock prices.

Another study by Sebastian & Schätz (2009) investigates the US and the UK markets. They find that the medium to long-term performance of listed real estate correlates significantly with the development of direct real estate markets. However, in the short-term, performance is influenced by stock market movements. Thus, the longer time period under consideration, the stronger the influence from the direct real estate markets. On the other hand, Goodman (2003) investigates house price changes and the total returns on REITs in the US, and he finds that the correlation has been low over the ten most recent years, 1992-2001, and also the full 25 years since 1976, for which comparable data is available. This is quite contrary to the results of Sebastian & Schätz (2009). However, it seems clear that real estate stocks are affected by the overall market fluctuations in the short-term, and by the direct real estate market in the long-term.

2.3 EPRA/NAREIT Europe Index at a Glance

The EPRA Europe index tracks the performance of listed European real estate companies and REITs. In January 2010, there were 79 companies listed on the EPRA Europe Index, with a total market capitalization of Euro 79 billion (Feb, 2010). The index-listed companies are from 15 European countries, whereas the UK has the the highest number of listed companies (30), followed by France (10). Approximately fifty percent of the listed companies are involved in diversified real estate activities, while others are specializing in office buildings and retailing. The index consists of both REITs and standard real estate companies (RECs), where about 2/3 are RECs. The EPRA Europe Index was launched on the 21st of February 2005, and contains some of the largest real estate stocks in each European country. "In order to be eligible for inclusion in the index, companies must be publicly traded on an official stock exchange and meet specific standards, which demonstrate that the majority of earnings or bulk of total assets is the result of relevant real estate activity. These activities are further defined as the ownership, development, and sale of income-producing real estate" (Yang et al. 2005:899).

Moreover, the European Public Real Estate Association (EPRA) is a common interest group with a genuinely representative forum and policy-making body which aims to promote, develop and represent the European public real estate sector. The National Association of Real Estate Investment Trusts (NAREIT) is the worldwide voice of real estate investment trusts (REITs) and listed real estate companies with an interest in the US property and investment markets[2] .

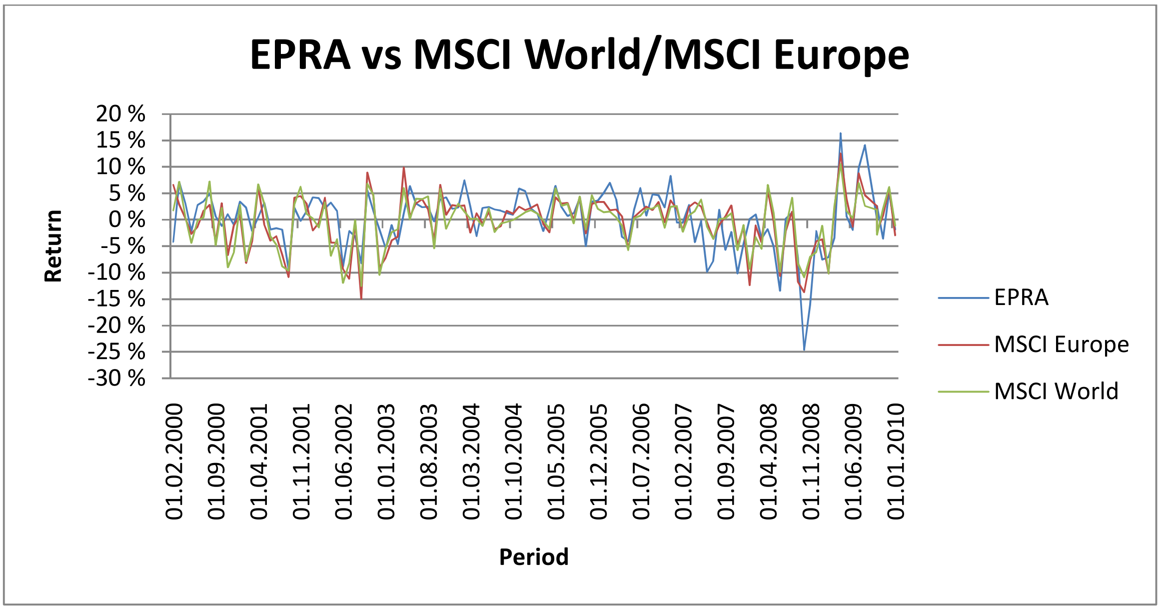
The EPRA Index value is calculated using the following formula:

$$Index\ value = \sum_{i=1}^{n} \frac{x_i * w_i * f_i * xr_i}{d}$$

where *n* is the number of securities in the index, x_i is the latest trade price of the *i*th component security (or the close price of the previous business day), w_i is the weight for the *i*th component stock (equal to the number of ordinary shares issued by the company), f_i is the free floating weighting adjustment, xr_i is the exchange rate of the *i*th component security (where applicable), and *d* is the total issued equity value of the index on the base date (Yang et al. 2005).

[2] Information gathered from the FTSE Factsheet, 2009.

Figure 1: *FTSE EPRA/NAREIT EUROPE Index performance compared to the MSCI World and the MSCI Europe Indices, 2000-2009, total returns in Euro*



According to figure 1, the EPRA Europe Index has performed very similar to the European Stock market as well as the world's stock market in the period of 2000-2009. However, between 2007 and 2009, the EPRA Europe Index has been more volatile than both the MSCI World and the MSCI Europe. The European stock market is represented by the MSCI Europe Index, which is the index of all companies resident and incorporated in Europe.

Table 1: *FTSE EPRA/NAREIT EUROPE Index performance and volatility, compared to MSCI Europe and MSCI World, 2000-2009*

	2000-2007			2000-2009		
	EPRA	MSCI World	MSCI Europe	EPRA	MSCI World	MSCI Europe
Return p.a.(%)	9,33 %	-2,87 %	0,04 %	2,35 %	-5,17 %	-3,87 %
St.dev (σ) p.a. (%)	14,01 %	14,92 %	15,00 %	18,71 %	16,26 %	17,18 %

According to table 1, the EPRA Europe Index has on average provided a higher return than both the European market and the World market between 2000 and 2009. The EPRA Europe Index has also been more volatile through the whole period. By looking at the sub-period 2000-2007, we see that the EPRA Europe Index has a higher return and lower volatility than both the MSCI Europe and the MSCI World.

Table 2: *The 10 largest companies listed on the FTSE EPRA/NAREIT EUROPE Index according to market capitalization (EUR)*[3]

Rank	Consistuent Name	Country	Property Sector	Net Market Cap (EURm)	Index Weight
1	Unibail-Rodamco	France	Diversified	8.151	18.65%
2	Land Securities Group	UK	Diversified	2.866	6.56%
3	British Land Co	UK	Diversified	2.628	6.01%
4	Corio	Netherlands	Retail	2.105	4.82 %
5	Hammerson	UK	Retail	1.901	4.35%
6	PSP Swiss Property	Switzerland	Office	1.484	3.40%
7	Liberty International	UK	Retail	1.405	3.21%
8	Klepierre	France	Retail	1.346	3.08%
9	Icade	France	Diversified	1.149	2.63%
10	Wereldhave	Netherlands	Diversified	1.111	2.54%
			Totals	24.145	55.26%

According to table 2, the French REIT Unibail-Rodamco is by far the largest company on the index, counting for almost 20 % of the total market capitalization. Furthermore, the rest of the largest companies are quite similar in market capitalization. It should also be pointed out that even though the three largest companies have a diversified business segment, many of the ten largest companies are specialized in either retailing or the office sector. The 10 largest companies account for over 50 % of the total weight of the EPRA Europe Index. Another thing to be aware of is that only four countries are present among these 50 %, in other words country-specific incidents in one of these (especially the UK and France) will have implications for the returns on the EPRA Europe Index. Another issue is the different currencies among the top 10 companies. Among the top 10, we have three different currencies present, namely the Pound sterling, the Swiss franc, and the Euro. Naturally, fluctuations in these local currencies will impact the index. In addition we have some Polish companies listed on the index, whose currency is denominated in Polish Zloty. Nevertheless, all returns are calculated in prices denominated in Euro.

[3] From the FTSE Factsheet, 2009.

Table 3: *Correlations between the FTSE EPRA/NAREIT Europe Index returns and other stock- and real estate indices' returns, 2000-2009*

Correlation 2000 - 2009					
	EPRA EUR	MSCI Europe	MCSI World	EPRA ASIA	EPRA N. AMC
EPRA EUR	1				
MSCI Europe	0,65	1			
MCSI World	0,62	0,94	1		
EPRA ASIA	0,47	0,44	0,48	1	
EPRA N. AMC	0,24	0,24	0,29	0,49	1

If we look at table 3, we see very low correlations between the EPRA Europe Index and other real estate indexes worldwide. The EPRA North America Index only correlates 0.24, while the EPRA Asia Index correlates somewhat more with 0.47. If we compare the EPRA Europe Index to other big common stock markets, we see that the EPRA Europe Index has positive correlation with both MSCI World (0.62), and MSCI Europe (0.65). Despite this, we have an indicator that for investors in any other stock market, both real estate and common stocks, the EPRA Europe Index will provide diversification benefits for the investor.

3. Theories and Literature Surveys on Selected Asset Pricing Factors

3.1 The Three-Factor Model by Fama & French

A large number of studies have examined the explanations of the CAPM in predicting asset returns. However, the CAPM has shown to have some limitations and does not in general explain the variation of an asset very well. This implies that there are risk factors that beta does not fully account for in predicting the return of an asset. The traditional CAPM formalizes the idea that the expected return of an asset should be higher the riskier the asset is. The model is based on a number of simplifying assumptions, i.e. that investors only live in one time period and do not have ordinary working salaries. The assumptions of the model state that the risk of an asset is given by the correlation between the return of the asset and the return of a market portfolio. An asset can be riskier or less risky than the market portfolio, but in the CAPM world it is always efficient since the unsystematic risk can be diversified away. In other words, the return you get is proportional to the risk you are willing to take.

Several studies try to incorporate variables and firm characteristics that capture variations in a company's or a portfolio's returns. Two of the most frequently mentioned variables are size and B/M ratio. Perhaps the most important studies regarding size and B/M ratio as explanatory variables are developed by Fama & French (1992 & 1993). In the studies from 1992 and 1993, Fama & French investigate how the two factors capture variations in stock returns together with the excess market return in a three-factor model. The explanatory variables concerning size and B/M ratio are created, thus, being ad-hoc factors.

The three-factor model states that the expected return on a portfolio in excess of the risk-free rate $[E(Ri - Rf)]$ is explained by the sensitivity of its return to three factors, 1) the excess return on the broad market portfolio $(Rm - Rf)$, 2) the difference between the return on a portfolio of small stocks and the return on a portfolio of big stocks (*SMB*, small minus big), and 3) the difference between the return on a portfolio of high book-to-market stocks and the return on a portfolio of low book-to-market stocks (*HML*, high minus low). This gives the following formula:

$$R_{pt} - R_{ft} = \alpha + b\left[R_{mt} - R_{ft}\right] + s[SMB_t] + h[HML_t] + \varepsilon_t$$

Where,

$R_{pt} - R_{ft}$ = the return of portfolio p at time t, less the risk-free rate at time t.

$R_{mt} - R_{ft}$ = the return on the market portfolio m at time t less the risk-free rate at time t, also known as the market premium.

SMB_t = the average return on small stocks at time t, minus the average return on big stocks at time t.

HML_t = the average return on stocks with high B/M value at time t, minus the average return on stocks with low B/M value at time t.

ε_t = the residuals following portfolio p at time t.

Comparing the three-factor model to the CAPM, Fama & French (1993) show that the three-factor model provides higher explanatory power. They emphasize that this may be because the SMB and HML factors do a good job in describing a wider set of risk factors that "just happens" to be well described by the market size and the B/M ratio. However, the ad-hoc specification of the set of priced factors weakens its appeal, since the authors ignore theoretical restrictions in a structural model (Lunden, 2007).

In order to measure the effect of adding more explanatory variables to a model, Fama & French (1993) utilize the R^2 term, which measures how much of the variance in the dependent variables which is explained by the independent variables (or the model). Furthermore, each explanatory variable's slope needs to be significant in order to statistically and economically draw conclusions that the respective variable improves the model, thus, increases the real explanatory power (R^2). In addition, the intercept value can be viewed as an indicator of how precise the model explains the independent variable. Fama & French (1993) state that the intercept term provides a simple return metric and a formal test of how well different combinations of the common factors capture the cross-section of average returns. Formally, an intercept statistically different from zero indicates that there are more to explain the model than the right-hand side variables predict. Thus, in the CAPM model, a zero intercept indicates that beta is the only determinant in explaining the excess return on an asset, or for our purpose, the excess return on a portfolio.

The three-factor model created a set-back for the earlier CAPM research. Malkiel (2003) suggests that the correct measure for risk according to the CAPM is the beta, that is, the extent to which the return of the stock varies with the return for the broad market portfolio. Furthermore, if the beta-measure of systematic risk is accepted as the correct risk measurement statistic, the "size effect" can be interpreted as an anomaly, and a market inefficiency. Despite of their findings, Fama & French (1993) suggest that size may be a better measure for risk than beta, and therefore that their findings should not be interpreted as indicating that markets are inefficient. vanDijk (2007) however, does not exclude the possibility that Fama & French's (1993) research was a result of data snooping.

In the article "Multifactor Explanations of Asset Pricing Anomalies", Fama & French (1996) summarize many studies on patterns in average stock returns. They explain that previous studies show that average returns on common stocks are related to firm characteristics like size, earnings/price, cash flow/price, book-to-market equity, past sales growth, long-term past return, and short-term past return. They explain that because these patterns in average returns are apparently not explained by the CAPM, they are called anomalies, which is defined as deviations from the normal orders. Fama & French (1996) argue that many of the mentioned anomalies are related, thus, captured by a smaller model, namely the three-factor model.

Besides the US market, one should also be aware of some international evidence of size and value effects. Hawawini & Keim (1998) summarize many different studies similar to those conducted in the US. Some of the countries where size effect studies have been investigated are Belgium, Canada, France, Ireland, Japan, Mexico, Spain and the United Kingdom. Hawawini & Keim (1998) show that in all international equity markets (8 Asian and 8 European), the average monthly return for the portfolio of the smallest stocks is higher than for the largest stocks. However, the sample used in this study is shorter than the one used for the US markets.

Fama & French (1998) find international evidence that value stocks (high B/M) yield higher returns than growth stocks (low B/M). Indeed, they find that value stocks outperform growth stocks in 12 out of 13 markets from 1975 to 1995. This is also true regarding the size effect. The returns on small stocks tend to be higher than the returns on large stocks.

Griffin (2002) criticizes Fama & French (1998) because they do not compare their international model to a country-specific model. Griffin investigates how country-specific and global versions of Fama & French's three-factor model explain variations in international stock returns in the US, the UK, Japan and Canada. Griffin finds that the domestic factors explain a lot more than the international model. However, the dependent variables explain more, thus the explanatory power increases when the domestic model is broadened to include both the domestic Fama & French model and the international model. The model is statistically significant, but with an economically small increase in explanatory power. The model assumes that there exists one set of factors that explain the returns in all countries. Griffin's international model is given by:

$$R_{pt} - R_{ft} = \alpha + bd\left[R_{mt} - R_{ft}\right] + sd[SMB_t] + hd[HML_t]$$
$$+bf\left[R_{mt} - R_{ft}\right] + sf[SMB_t] + hf[HML_t] + \varepsilon_t$$

The terms *d* and *f* mark domestic and foreign factors, respectively.

Lunden (2007) investigates the Brazilian stock market between 1995 and 2005, and finds that the three-factor model does capture more of the variation in the returns of the Brazilian stocks than the CAPM. He finds that the returns are negatively related to size and positively related to B/M ratio. Furthermore, the author investigates the theory of Griffin (2002) and finds that the international six-factor model provides a higher R^2 than the domestic model, only that very few of the international Fama & French factors have significant impact on the Brazilian returns.

3.1.2. The SMB Factor, Small Companies Outperform Big Companies

The size effect in the cross-section of stock returns is one of the oldest and best known asset pricing anomalies. Banz (1981) investigates equity returns in the US from 1936 to 1975, and finds that small companies have considerably higher risk-adjusted returns than large companies, an effect Banz named "the size effect". van Dijk (2007) presents a summary of the literature concerning the size effect, and states that a possible size effect will have important implications for both practioners and academics. He also mentions that if the reason for higher returns on small stocks is due to a larger exposure to an underlying risk factor not incorporated in standard asset pricing models, companies should compute their cost of equity capital on the basis of an asset pricing model that takes this source of risk into account. Furthermore, van Dijk (2007) emphasizes that asset managements should be highly interested in whether small stocks yield higher returns than large stocks, and whether this is a compensation for risk or not.

If we look at some evidence for the size effect, several studies have been conducted, especially in the US. Banz (1981) was the first to present an empirical paper on the subject. He analyzes all common stocks listed at the NYSE in the period of 1936-1975, and reports that the smallest 20 % of the companies had a higher risk-adjusted return than the remaining companies of 0.4 % per month. Lameroux & Sanger (1989) find a risk-adjusted size premium of no less than 1.9 % per month over the period 1973-1985. Fama & French (1992) evaluate the size effect, investigating NASDAQ, AMEX and NYSE stocks. They find that the smallest deciles outperformed the largest deciles by 0.74 % per month from 1962 to 1989. Despite these findings, vanDijk (2007) acknowledges that several of the earlier empirical studies note that the size effects exhibits considerable fluctuations over time and is reversed during some periods.

In order to explain the size effect, we must know the heart of the rationale behind this, which is why small companies on average earn higher returns than traditional asset pricing models predict. One explanation is that the size premium is a compensation for trading costs and liquidity risk, since smaller companies do not have that much excess capital in the case of liquidity needs. The case of liquidity per se is discussed in another part of this thesis. VanDijk (2007) points out the last fundamental explanation, that investors are not fully rational. Several studies on investor behavior look at similarities in characteristics of stocks. Daniel & Titman (1997) point out that size and book-to-market value are characteristics as well as determinants of the returns on stocks. The fact that high book-market-valued stocks are viewed as value stocks makes them more attractive to investors. Finally, Chan & Chen (1991) discover the fact that small-capitalized companies have performed poorly in the past, and for this reason may be looked upon as value stocks.

Fama & French (1993) present the three-factor model and argue that a portfolio's systematic risk is affected by several risk factors, and that size is one of them. Fama & French (1993) construct mimicking portfolios for the underlying risk factors related to size and book-to-market, and argue that these factors capture the variations in returns. Companies are sorted into three book-to-market groups and two size groups, and six portfolios are created out of this. A small minus big portfolio (SMB) is constructed by substracting the average returns on three big stock portfolios from the average returns on three small stock portfolios. Furthermore, a high minus low portfolio (HML) is constructed by substracting the average returns on low B/M stocks from the average returns on high B/M stocks. Fama & French (1993) show that the SMB portfolio and the HML portfolio together with the excess market return, capture more of the variations in the returns of 25 stock portfolios formed on size and book-to-market over the period 1963-1991. According to Fama & French, the reason behind this is that size and book-to-market values are risk indicators which explain the risk even better than the traditional CAPM, and therefore receive a higher R^2 than the traditional CAPM. In a later paper, Fama & French (1996) also show that their three-factor model also captures variations in other multiples or anomalies, based on the same rationale as in the earlier studies. Yet again, Fama & French emphasize the possibility that size effects and book-to-market effects affect the variations in returns as indicators of risk. However, they leave the interpretation of why to future research.

There are other researchers who explain this risk on the basis of economic fundamentals as well. Chan & Chen (1991) take this a bit further and state that small companies have more underlying systematic risk, and also that small companies are companies that are marginal or "fallen angels" which have performed badly or not very efficient, and the reason why small companies provide higher returns is the fact that they are more risky. They also suggest that these small companies are not that big part of the broader market index which consists of several large companies. Therefore, the factors provided by Fama & French explain more than the original CAPM.

Daniel & Titman (1997) investigate whether the result pattern of characteristic-sorted portfolios are really consistent with a factor model at all. Contrary to the view of Fama & French (1993), they find that 1) there is no separate risk factor associated with high or low book-to-market companies, and 2) no return premium associated with any of the three factors identified by Fama & French (1993). Daniel & Titman (1997) further explain that the Fama & French factors are highly correlated with the average returns on common stocks. In contrast, they explain that it is the characteristics of the portfolios, rather than the covariance structures of returns, that appear to explain the cross-sectional variation in stock returns. Hence, this brings evidence against a financial distress interpretation of the SMB factor.

3.1.3. The HML Factor, Value Stocks Outperform Growth Stocks

Book-to-market value is calculated by dividing the value of the companies' book equity to the market value of the companies' market equity (share price times shares outstanding) or market capitalization. Value stocks are known as stocks with low prices relative to earnings, dividends, book assets, or other measures of fundamental value, while growth stocks have historically shown faster growth rates in sales, earnings and cash flow. Several studies argue that the characteristics of value stocks and growth stocks explain price movements in the equities market. Nevertheless, Fama & French (1992) argue that value stocks are more risky than growth stocks, and that the superior returns accociated with the value stocks are merely compensation for investors being exposed to higher risk.

Lakonishok et al. (1994:1547) ask a necessary question; "What is the B/M ratio really capturing?" They explain that a lot of different factors are included in this ratio. A low B/M ratio may describe a company with a lot of intangible assets, such as research and development (R&D), that are not reflected in the accounting book value because R&D is expenced. A low B/M ratio can also describe a company with attractive growth opportunities that do not enter the book value, but do enter the market price. Also, a natural resource company, such as an oil producer without good growth opportunities, but with high temporary profits, might have a low B/M after an increase in oil prices. A stock whose risk is low and future cash flows are discounted at a low rate would have a low B/M ratio as well. Finally, a low B/M may describe an overvalued glamour stock, which is a stock that attracts a large number of investors because of its continuous or dramatic price appreciation. The point of Lakonishok et al. (1994:1547) is simple, although the returns from the B/M strategy are impressive, B/M is not a “clean” variable uniquely associated with economically interpretable characteristics of the companies.

Lakonishok et al. (1994) state that these value strategies call for buying stocks with low prices relative to earnings, dividends, historical prices, book assets, or other measures of value. Contrary to Fama & French (1992), the authors further suggest that this observed value or growth effect cannot be explained by risk exposure, but merely because the value and growth stocks are mispriced. However, Lakonishok et al. (1994) also explain that value strategies might produce higher returns because they are contrarian to “naïve” strategies, which include extrapolating past earnings, overreacting to bad news, or to simply equating a good investment with a well-run company irrespective of price. Skinner & Sloans’ (2002) results indicate some of the same findings, that investors have an assymetric response to negative earnings surprises for growth stocks, and after controlling for this effect, there are no longer evidence for a return differential between growth and common stocks.

Fama & French (1995) confirm that as predicted by rational pricing models, B/M in earnings are related to persistent properties of returns. They explain that high B/M signals poor earnings, and low B/M signals high earnings, and this fact is expressed in the companies’ returns. High B/M stocks are less profitable (earnings) than low B/M stocks for four years before, and at least five years after ranking dates. Moreover, they explain that low B/M is typical for companies with high average returns on capital (growth stocks), whereas high B/M is typical for companies that are relatively distressed. This distress element contains a risk for the investor.

Chi & Tang (2007) explain that investors invest in distressed stocks because bad news can be good news for the company, due to the fact that a reorganization is necessary, which is good news, and will eventually lead to positive market reactions due to the positive events. On the other hand, Dichev (1998) demonstrates that companies with high bankruptcy risk earn significantly lower than average returns since 1980. This indicates that a risk-based explanation cannot fully explain the anomalous evidence. Daniel et al. (2005) present a theoretical asset pricing model based on the premise that some investors are overconfident about their abilities. This leads to mispricing since the HML factors are proxies for misvaluations. The authors suggest that a high HML loading implies that the sector loads heavily on an undervalued factor.

3.1.4. Earlier Studies of the Fama & French Factors for Real Estate Stocks

By looking at previous research we see that several authors have examined different markets for determinants which can explain the returns of real estate securities. We would like to concentrate on the factors we investigate ourselves, thus, earlier studies which fall out of our focus area will obviously not be interpreted in this literature review.

Already in 1990, Colwell & Park investigated REITs listed on the NYSE and the AMEX during the period of 1964 to 1986. Their main focus was to investigate whether there existed a size effect in the returns of these companies, and the relationship between the size effect and a potential January effect. They found evidence that a size effect does exist in these types of stocks. In months other than January, a reverse size effect existed for REITs specialized in mortage-related real estate. McIntosh et al. (1991) investigate the same market in an overlapping period (1974-1988), also providing evidence of a size effect. Interestingly, they find that small-capitalized companies outperform big-capitalized companies during the period, surprisingly, the small companies had the same or less volatility during the period as the large companies. This evidence suggests a possibility that the REIT market was not efficient, at least not in the US during this period.

Ooi & Liow (2004) examine the performance of listed real estate securities in seven developing markets in East Asia between 1992 and 2002. Their results suggest that factors like size and book-to-market value, as well as capital structure and market diversification, do have significant influence on the performance of real estate securities. Consistent with asset pricing literature, size and book-to-market ratio captured most of the cross-sectional variations in the real estate stock returns. More specifically, the size effect was significant in five out of seven markets (countries). As expected, they also found that market conditions and interest rates influenced the East Asian real estate stocks.

In a more recent study, Hamenlink & Hoesli (2004) investigate real estate securities in the ten most capitalized markets in the world, namely the US, Germany, the UK, Australia, France, Switzerland, the Netherlands, Canada, Hong Kong and Japan in the period from February 1990 to April 2003. They investigate the influence of size and value/growth, among other factors. The authors find that the two factors have an impact, and classify the factors' impact by providing a percentage-share impact out of absolute returns. The size factor has the third largest impact, after country-specific factors and property types, while the value/growth factor explains 9 % of the average absolute returns. This evidence can be compared somewhat in our study, due to the fact that two of the countries examined here account for a big part of the companies in our sample.

Ooi et al. (2007) investigate more specifically the differences in B/M value, that is how value and growth REITs listed at the NYSE, the AMEX and the NASDAQ perform during the period between 1990 and 2003. They find empirical evidence that during this period, value REITs provide superior results without exposing the investors to an additional higher risk. One of their explanations for this is the theory of mispricing and the possibility that growth REITs are subjected to less mispricing errors because they attract more institutional and sophisticated investors who can be regarded as more rationale investors.Value REITs, on the other hand, are held predominantly by small investors who tend to underestimate the future growth prospects for the firm because of the uncertain future fundamentals and sentiment regarding the firm.

Chiang et al. (2006) explore the three-factor model and create mimicking portfolios for the REIT industry in the US between 1993 and 2003. They compare their results to the broad factors created by Fama & French, where all industries are taken into account. Their empirical results show that using REIT-based mimicking portfolios considerably reduces the abnormal returns forecasted by the broad Fama & French numbers. Furthermore, their use of REIT-based mimicking portfolios also provides nearly twice the explanatory power in terms of R^2 relative to the size and book-to-market factors created personally by Fama & French. The sector-based three-factor model works very well in explaining returns.

3.2. The LMH Factor, Low Turnover Stocks Outperform High Turnover Stocks

There are several studies exploring theories concerning liquidity, and how an asset's liquidity affects the asset's returns. Pastor & Stambaugh (2003) find it reasonable that investors might require higher expected returns on illiquid assets. For an investor, holding illiquid assets, this leads to increasing risk. In the event of insolvency, the investor may find it necessary to liquidate some of his assets to increase his solvency. Since he holds assets which are illiquid, he should expect higher returns because the assets are harder to turn into cash, thus, the assets are more risky to hold. However, there is little or no consensus how to measure this liquidity factor.

Regarding the conception liquidity, there exist several dimensions of what liquidity actually is. We have a cost dimension (what the cost of a trade is), a time dimension (how fast you can trade) and a quantity dimension (how much you can trade). There is no framework investigating the risk of liquidity per se, but several studies show that liquidity risk is pervasive and thus may be priced (Eckbo & Norli, 2002). As for the expression "liquidity effect", this is known as the phenomenon where stocks which are illiquid outperform those which are liquid.

Eckbo & Norli (2002) investigate the American stock market from 1963 to 2000, and test different liquidity measures, and explore which of them that are priced. First, they investigate the "bid-ask spread", which is the relative difference between the daily bid and ask price. The higher the difference, the less liquid is the asset. Second, they utilize the daily share turnover as a liquidity measure. The higher the turnover, the more liquid is the asset. Third, is the "price impact of trade". This implies that the higher the price impact for a given trade, the less liquid is the stock. Fourth, is the cross-section liquidity measure, known as the "factor aggregation measure", which is a scaled measure consisting of the already mentioned measures for each firm. Their results show that bid-ask spread and stock turnover are exhibit commonality in explaining returns. Furthermore, they add the liquidity measure to the Fama & French (1993) three-factor model and find significant betas for all measures besides the "factor aggregation measure". At last, the authors emphasize that the simple to compute "low-minus-high" turnover factor, constructed by the share turnover measure, appears to work just as good as any other measure.

Several other authors have examined many of the same measures in the recent years. Pastor & Stambaugh (2003) focus on systematic liquidity risk in returns and find that stocks whose returns are more exposed to marketwide liquidity fluctuations command higher expected returns. Another element they find is that smaller stocks are less liquid, according to their measure, and that the smallest stocks have high sensitivities to aggregate liquidity.

In a more recent paper, Eckbo & Norli (2005) investigate the impact of the liquidity factor in a multifactor model, together with the Fama & French (1993) three-factor model, and Carhart's (1997) momentum factor. They investigate the impact of this model in explaining returns on US stocks during the period from 1972 to 1998 on NASDAQ intial public offerings (IPOs), as well as seasoned equity offerings (SEOs). They follow their earlier research (2002) and construct a liquidity factor, the "low minus high" factor, which consists of the returns of low volume stocks minus the returns on high volume stocks. They explore the model on 25 portfolios with the similar characteristics as Fama & French (1993), and find that the liquidity factor prices both the IPO and the SEO portfolios in the sense of producing significant liquidity betas.

Korajczyk & Sadka (2006) state that since authors have chosen a number of different measures of liquidity, it is difficult to determine from the previous results whether a number of different liquidity premiums exist or whether there is a single liquidity premium. The authors estimate latent factor models for each set of measures of liquidity and a measure of global, across-measure systematic liquidity by estimating a latent factor model pooled across a large number of measures. They find that there is commonality across assets for each individual measure of liquidity, and that these common factors are correlated across measures of liquidity. In other words, aggregate systematic liquidity is a priced factor. This result seems robust to a number of specifications, such as using a CAPM benchmark or a four-factor benchmark. There is mixed evidence about the relation of the absolute level of assets' liquidity characteristics and their expected returns. The pricing of the "Amihud measure" and turnover is consistently significant when they are included as characteristics.

Cheng & Roulac (2007) investigate US REITs during the period from 1994 to 2003, and find that stock turnover is a significant determintant for stock returns during three sub-periods within their sample. They also explore how companies' stock turnover is related to being a winner or a loser stock, and find that the winners are the stocks with the lowest trading volume. The method they used were average monthly turnover per share.

3.3. The MOM factor, Previous Winners Continue to Outperform Previous Losers

Momentum is one of the strongest and most puzzling asset pricing anomalies. Momentum refers to a tendency in the price of a stock to move in the same direction for several months after the first introductory movement. The price momentum is the most interesting momentum effect, since it is the one which is hardest to explain by using rationale asset pricing models. The reason why momentum is puzzling is the fact that prices are not even weak-form efficient. Thus, momentum strategies exploit the positive autocorrelation in short-term returns and generate higher returns by buying past winners, and short-selling past losers. Contrarian strategies are opposite, and exploit long-term negative autocorrelation and generate profit by utilizing a short position in previous winners and taking a long position in previous losers. The latter is discovered by i.e. De Bondt & Thaler (1985, 1987). We will focus on the so-called momentum strategies in our research.

There exist disagreements concerning the length of the momentum effect. Two of the leading researchers within the momentum-profession, Jegadeesh and Titman (1993), show that past winners continue to outperform past losers over horizons of 3-12 months. For example, from 1965 to 1989, stocks in the top 12-month return decile outperformed stocks in the bottom decile by 6.8%, on average, during the following six months. These findings confirm the earlier study by Jegadeesh (1990), where he proves that there is momentum in stock prices. Stocks which perform well one month continue to perform well the next month, and vice versa.

Carhart (1997) broadens Fama & French's (1993) three-factor model to a four-factor model, where an additional risk factor are taken into account. The risk factor is, as many other studies, based on the studies by Jegadeesh & Titman (1993), with a one year momentum anomaly. However, Carhart emphasizes that this factor is meant to explain returns, and leave the risk implementation to the reader and future research. Carhart investigates mutual funds listed on the US stock exchanges NYSE, AMEX and NASDAQ. He finds that by adding a fourth factor to Fama & French's (1993) three-factor model, more variation are captured without experiencing multicollinearity. Eckbo & Norli (2002) exploit Carhart's (1997) methodology and investigate the stock universe during the period of 1973-2000 on the same American stock exchanges. By regressing the four-factor model together with a fifth factor, liquidity, they investigate the effects on 25 portfolios sorted by size and B/M ratio, somewhat following Fama & French (1993).They find that the momentum factor does provide significant betas for approximately 50 % of their portfolios, but almost all slopes have negative values.

In order to explore momentum differences across markets, Rouwenhorst (1998) examines 12 different markets between 1978-1995. He reports that the momentum strategy provides significant positive returns in all markets investigated, except for Sweden. These results indicate that the momentum profit is not a "one-market phenomenon".

Considering momentum effects in Europe, Nijman et al. (2002) investigate the presence of country and industry 6-month momentum effect in Europe between 1990 and 2000, and adress the question whether individual stock momentum is a result of country or industry factors. Their results suggest that the positive expected excess returns of momentum strategies in European stock markets are primarily driven by individual stock effects, while industry momentum plays a less important role, and country momentum is even weaker. These results point out that for adding the momentum factor to a sector-based model will be highly influenced by the independent companies in the respective portfolios.

Balsara et al. (2006) also investigate all stocks listed on the NYSE, the AMEX and the NASDAQ. It is reported that buying low volume (or low volatility) past losers and short-selling low volume (or low volatility) past winners generates a positive net return across the entire sample period, and especially during bear markets. Second, buying high volatility past winners and short-selling high volatility past losers generates a positive net return, especially during bear markets.

Another issue is how these strategies work in the market for real estate stocks. A highly interesting study by Chui et al. (2003) investigate the US REITs listed on the NYSE, the AMEX and the NASDAQ between 1984 and 2000. They examine both the pre- and post-1990 periods, since the structure of the REIT market changed substantially around 1990. The determinants of expected returns differ between the two subperiods. In the pre-1990 subperiod, momentum, size, turnover and analyst coverage predict stock returns. In the post-1990 period, momentum is the dominant predictor of REIT returns. Given the strength of the momentum effect in the post-1990 period, they examine it in great detail. For the whole period, and the post-1990 period, where the momentum profit is strongest, their evidence is generally consistent with the studies on common stocks other than REITs. The only striking exception is that momentum is stronger for the largest REITs rather than for the smallest REITs. In the multiple regressions that include the characteristics as well as interactions between past returns and firm characteristics, the turnover-momentum-interaction effect provides the most significant results. More specifically, momentum effects are stronger for more liquid REITs.

Hung & Glascock (2008) show that momentum returns on REITs are higher during up markets. They investigate all the REITs identified on the National Association of Real Estate Investment

Trusts (NAREIT), and listed on the NYSE, AMEX and NASDAQ, during the period of 1972-2000. The study finds that winners' dividend/price-ratios are higher than those of losers, and momentum returns are positively correlated with the difference between winners' and losers' dividend/price ratios. In sum, results of this study suggest that momentum returns on REITs can be jointly explained by a time-varying factor (market state) and a cross-sectional variance in dividend yields.

Another follow-up study by Hung & Glascock (2009) examine the relation of time-varying idiosyncratic risk and momentum returns in REITs using a GARCH-in-mean model and incorporate liquidity risk in the asset pricing model. They find that momentum returns display asymmetric volatility, i.e., momentum returns are higher when volatility is higher. In addition, they find evidence that REITs with lowest past returns (losers) have higher idiosyncratic risk than those with highest past returns (winners), and that investors require a lower risk premium for holding losers' idiosyncratic risks. Therefore, although losers have higher levels of idiosyncratic risk, their low risk premium cause low returns, which contribute to momentum. At last, they find a positive relation between REITs' momentum returns and turnover.

Furthermore, it is necessary to know the reasoning behind the momentum effect. According to Barberis, et al. (1998), investors exhibit conservatism. They are slow to update their prior beliefs in the event of good (bad) news. Therefore, prices do not adjust completely to new information at first, but will adjust later if confirming news arrives. The result is short-term continuation. Either of these mechanisms could induce momentum at the industry level or the stock level. If investors focus on industry signals for big-capitalized companies and company-specific signals for small-capitalized companies, then return continuation will be at the industry level for large companies and at the stock level for small companies. Another suggestion is explained by Daniel & Titman (2006). They find that investors react appropriate to information from financial statements (tangible information), but overreact to intangible information. The intangible information could be copying other invesors' trading patterns, or buying stocks with high returns the previous days. Thus, some investors discover that the price increases, and run towards the market. Liu et al. (1999) find an opposite reason, namely that the market underreact to firm-specific information. They investigate the UK stock market and conclude that a momentum strategy gives significant excess returns, even after controlling for systematic risk, size, price, B/M value, and profit/price.

Daniel et al. (1998) build a model based on non-rational investors who have great confidence in their own analytical abilities. This leads to the idea that the positive returns are results of the investors' abilities to pick the right investments, thus, their analytical skills. However, if some stocks in their portfolio do not perform, they blame bad luck. As a result of this, investors get confident about the winners, thus keep buying past winners and sell past losers. Stock prices will be overvalued due to the investors' confidence, hence, past winners will continue to do well, and past losers will not.

3.4 The Reasoning behind Factor Modeling

Factor models are designed to combine several views in one model and disentangle the effects of multiple variables acting simultaneously. Furthermore, factor models provide the portfolio manager with information needed to control portfolio exposures so that only intentional bets are placed (Menchero, 2010:2). This does not mean to avoid risk, but rather to avoid risk which is not compensated for. Factor models also explain how the performance and risk of a portfolio is attributed to the underlying return drivers (i.e. size, B/M value, share turnover, momentum). Factor returns are typically estimated by cross-sectional regressions, where each factor can be represented by a portfolio that exactly replicates the return or pay-off to that factor. Menchero (2010) distinguishes between simple and pure factor portfolios, where simple factor portfolios treat the single factor independently, while pure factor portfolios investigate numerous factors simultaneously. Combined, the simple factor portfolios act as support to better understand the pure factor portfolios. In our thesis, we construct mimicking portfolios which are intended to replicate exact pay-offs from the underlying vision of the different factors.

MacKinlay & Pastor (2000) explain that the evaluation of factor models has generally taken the form of constructing groups of stocks (often dynamically), and then examine whether the factors can explain the cross-section of average returns. The Fama & French factors i.e. essentially assume long positions in positive α-stocks and short positions in negative α-stocks, so when added as factors in addition to the excess market return, they bring the factor model regression intercepts closer to zero than in the simpler excess return market model alone. The fact is that factor models can play an important role in finance despite their apparent imperfections (MacKinlay & Pastor, 2000:911).

Chan et al. (1998) further explain that at each portfolio formation date, they sort all eligible stocks in a portfolio on the basis of its rank. The attribute is directly observable and may be, for example, firm size or the ratio of book value to market value of equity. Moreover, examining the difference between the returns on two portfolios of stocks helps to isolate the impact of the relevant factor while justifying the effect of other common factors (as the market).

4. Data Description

4.1 Preliminaries

When utilizing the CAPM, as well as shifting towards more sophisticated econometric models, some issues are encountered. First of all, a risk-free rate is needed. Normally, government bonds are utilized as a proxy for the risk-free rate. However, when dealing with companies from several different countries, an appropriate common risk-free rate is impossible to find in the jungle of government bonds. Nevertheless, since all prices are denominated in Euro, we use the 3-month EURIBOR (Euro Interbank Offered Rate), which is the rate at which Euro interbank term deposits are being offered by one prime bank to another within the EMU zone. The EURIBOR rate is also named as the benchmark for the euro zone money market[4].

Regarding the market portfolio, several possibilities are discussed. Ooi et al. (2007) investigate the US REIT market between 1990 and 2003. They utilize the NAREIT Index (National Association for Real Estate Investment Trusts) as their benchmark, which is the general index for all the listed real estate companies in the US. For our purposes, the EPRA Europe Index will be suitable as our market proxy. Another possibility would be to utilize the entire European stock market, making i.e. the MSCI Europe the proxy for the market portfolio. Nevertheless, we follow the approach of Ooi et al. (2007), only that we use the general index for Europe instead of the US.

The time-series regressions are conducted with data from 2000 to 2009. This time period is chosen for several reasons. First, in order to test these theories with a sufficient number of companies in each portfolio, an adequate number of companies need to be encountered in the sample. Actually, there were fewer publicly listed European real estate stocks before the beginning of the 21th century. Using this sample would have resulted in fewer stocks from the EPRA Europe Index, hence, making the sample smaller and the results less reliable. Third, the period chosen deals with some years involving unstable economic conditions, making the results useful for dealing with another possible future depression.

[4] http://www.euribor.org/

4.2 The Data

In theory, all securities can be investigated. However, this is a rather tangled estimation procedure, which is avoided through construction of portfolios. Following Lunden (2007), equally-weighted portfolios are constructed to analyze the returns on groups of securities rather than individual stock returns. The European real estate companies' weekly stock prices, annual B/M values and annual market capitalization numbers are downloaded from Thomson DataStream. The market return is given by the EPRA Europe Index and the risk-free rate is the 3-month EURIBOR rate. Returns are calculated in logarithmic terms, since the logarithmic returns most likely provide more delicate statistical qualities, as normality. All returns are calculated using the following formula:

$$r_t = \ln \left[\frac{price_t}{price_{t-1}}\right]$$

Where,

r_t is the return for week t

$price_t$ is the price at time t (Today)

$price_{t-1}$ is the price at time *t-1* (One week ago)

The weekly return r_t is calculated between 2000 and 2009, a period of 521 weeks. All prices are computed into Euro, and all returns are calculated on the basis of prices in Euro.

4.2.1 Constructing the Fama & French Factors

When constructing the SMB and HML factors, all stocks are first being divided into two groups according to their market value (market capitalization), from December, year *t-1*. The two equally large groups are named and classified after the size of the firm, namely small and big. Furthermore, the groups are divided once more into a total of six groups according to their book value divided by market value at time *t-1*, using data from the last fiscal year. Thus, the companies' returns from i.e. year 2000 are sorted on the basis of their market capitalization and B/M ratio from December 1999. This approach follows Lunden (2007), but differs somewhat from the original Fama & French (1993) article which uses book-to-market value from December *t-1*, but the market capitalization from June *t* to divide according to size. They also calculate the returns from July of year *t* to June *t*+1 because the companies they analyze have different fiscal year-end. Anyhow, we use last fiscal year's B/M ratio to ensure that we analyze the returns we want to analyze, with the right preliminaries, thus, the book values are known before the returns they are meant to explain. These groups are formed at the 30^{th}- and 70^{th}-percentile, meaning that the smallest 30 percent are grouped as low B/M, and the highest 30 percent as high B/M. All stocks must have an observed market capitalization, book value and weekly return to enter into the dataset each year. The returns utilized are the returns of year *t*, based on the portfolio formation requirements from December, *t-1*. After the returns are found, the equally-weighted 52-week portfolio returns are calculated, and this process is repeated annually. In the end, the weekly returns are calculated for the entire period. The six portfolios are divided in the following way:

1) Small size, low B/M
2) Small size, medium B/M
3) Small size, high B/M
4) Big size, low B/M
5) Big size, medium B/M
6) Big size, high B/M

Small and big refers to the size of the companies' market capitalization, and low, medium and high refers to the value of their book-to-market ratio. Comparing this to the method by Fama & French (1993), this method divides into six equally large groups, while Fama & French's method divides according to independent firm characteristics. Thus, the Fama & French portfolios are constructed from sorting the companies according to size and B/M ratio characteristics, making the portfolios unequal in size. We utilize the method of equally-weighted portfolios because for some years, some of the portfolios would have contained a very small number of companies if following Fama & French's (1993) approach.

The weekly SMB (small minus big returns) is calculated in the following way:

SMB = 1/3 (Small value + small medium + small growth)

- 1/3 (Big value + big medium + big growth)

The weekly HML (high minus low returns) is calculated in the following way:

HML = ½ (Small value +big value) – ½ (Small growth + big growth)

The SMB factor is constructed of the returns on three small portfolios, minus the returns on three big portfolios, so the excess returns of small companies will be investigated. Furthermore, the HML factor is constructed of the returns on two portfolios with high B/M value (value portfolios) minus the returns on two portfolios with low B/M value (growth portfolios). The intermediate portfolios are excluded to investigate more thoroughly on the pure value and growth effects.

Taking the approach a bit further, dependent variables are constructed on stock returns into nine equally-weighted portfolios formed on size and book-to-market ratio. This is done in order to capture factors in stock returns related to size and book-to-market equity.

The formations of the nine portfolios are created very similar to the SMB and HML factors. At first, the stocks are divided into three groups according to their market value at time *t-1*, small, intermediate and large. Furthermore, these three groups are divided into nine groups according to the B/M value of the stocks at December *t-1*. Thus, we use the book value and market value from the last fiscal year, and the portfolios are rebalanced every year according to the formulas above. The portfolios' characteristics are as follows:

1. SL – Small market value, low B/M value
2. SM – Small market value, medium B/M value
3. SH – Small market value, high B/M value
4. IL – Intermediate market value, low B/M value
5. IM – Intermediate market value, medium B/M value
6. IH – Intermediate market value, high B/M value
7. BL – Big market value, low B/M value
8. BM – Big market value, medium B/M value
9. BH – Big market value, high B/M value

4.2.2. Constructing the Liquidity Factor

When constructing the liquidity factor (LMH), we follow the method by Eckbo & Norli (2005). We start in 1999 and form two portfolios based on a ranking of the end-of year market value of equity for all EPRA Europe Index stocks, but only on stocks that have fully observed values throughout the whole year. The next step is to form three portfolios, namely high, medium and low using EPRA Europe Index stocks ranked on stock turnover. These groups are formed at the 30^{th} and 70^{th} percentile, meaning that the smallest 30 percent are grouped as low turnover, and the highest 30 percent as high turnover. Next, six portfolios are constructed from the intersection of the two market value and the three turnover portfolios. Weekly equally-weighted returns on these six portfolios are calculated starting in January 2000. The portfolios are rebalanced in January every year using firm rankings from December the previous year, in year *t-1*. The return on the LMH portfolio is the difference between the equally-weighted average returns on the two portfolios with low turnover and the equally-weighted average returns on the two portfolios with high turnover. The liquidity factor is then a portfolio that is long in low-turnover stocks and short in high-turnover stocks, hence "low minus-high".

The LMH factor is calculated in the following way:

LMH = ½ * (Small Low Turnover + Big Low turnover) – ½ * (Small High turnover + Big High Turnover)

Furthermore, the impact of the LMH factor will be investigated in the following way:

$$R_{pt} - R_{ft} = \alpha + b\left[R_{mt} - R_{ft}\right] + v[LMH_t] + \varepsilon_t$$

Where,

$R_{pt} - R_{ft}$= the return on portfolio p at time t, less the risk-free rate at time t.

$R_{mt} - R_{ft}$ = the return on the market portfolio m at time t less the risk-free rate at time t, also known as the market premium.

LMH_t = the average return on stocks at time *t* with low turnover at time *t-1*, minus the average return on stocks at time *t* with high turnover at time *t-1*.

ε_t = the residuals following portfolio p at time t.

4.2.3. Constructing the Momentum Factor

When constructing the momentum factor (MOM), we once again follow the method by Eckbo & Norli (2005). We construct the momentum factor by calculating the return on a portfolio of the EPRA Europe Index stocks with the highest buy-and-hold return over the previous 12 months minus the return on a portfolio of the EPRA Europe Index stocks with the lowest buy-and-hold return over the previous 12 months. Our momentum factor approach differs somewhat from the method construction used by Eckbo & Norli (2005). While they use the one-third of the stocks, we use the top 10 stocks and the bottom 10 stocks to get an equal number in each portfolio, but also to get enough stocks in each portfolio, since there is some missing data from the early years. From each portfolio we calculate the average-weighted return starting in January 2000. Portfolios are rebalanced in January every year using annual return rankings from December the previous year, in year *t-1*. The return on the MOM portfolio is the difference between the equally-weighted average returns on the two portfolios with high returns and the equally-weighted average returns on the two portfolios with low returns.

The MOM factor is calculated in the following way:

MOM = (10 companies with highest return previous year) – (10 companies with lowest return previous year)

Furthermore, the impact of the MOM factor will be investigated in the following way:

$$R_{pt} - R_{ft} = \alpha + b\left[R_{mt} - R_{ft}\right] + m[MOM_t] + \varepsilon_t$$

Where,

$R_{pt} - R_{ft}$= the return on portfolio p at time t, less the risk-free rate at time t.

$R_{mt} - R_{ft}$ = the return on the market portfolio m at time t, less the risk-free rate at time t, also known as the market premium.

MOM_t = the average return on stocks at time *t* with high returns at time *t-1*, minus the average return on stocks at time *t* with low returns at time *t-1*.

ε_t = the residuals following portfolio p at time t.

4.3. Descriptive Statistics

4.3.1. The Portfolios/dependent variables

Table 4: *Descriptive Statistics for 9 stock portfolios sorted on B/M and size in the period of 2000-2009 and 2007-2009, annualized risk and return*

	2000-2007		2000-2009		2000-2009		
	Return	Risk	Return	Risk	Avg MV in Euro million		Avg. B/M-value
SL	-0,073	0,182	-0,174	0,264	SL	237,95	0,76
SM	0,004	0,127	-0,041	0,234	SM	221,78	1,08
SH	0,142	0,146	0,023	0,269	SH	215,98	1,60
Avg Small	0,024	0,152	-0,064	0,256			
IL	0,010	0,131	-0,037	0,212	IL	619,28	0,76
IM	0,055	0,130	0,010	0,230	IM	636,01	1,11
IH	0,126	0,170	0,073	0,245	IH	702,62	1,57
Avg Intm.	0,064	0,144	0,015	0,229			
BL	0,078	0,146	0,017	0,221	BL	2112,46	0,74
BM	0,048	0,144	-0,018	0,214	BM	2155,75	1,09
BH	0,071	0,181	0,048	0,241	BH	3689,47	1,40
Avg Big	0,065	0,157	0,016	0,225			

If we compare the two extremes within each group of portfolios formed on size, we see that higher risk demands higher returns, thus, the portfolio with highest return among i.e. the small portfolios also has the highest risk. However, if we compare the two periods at hand, we see that especially one portfolio has outperformed the other portfolios in the early period (2000-2007), namely the portfolio consisting of small stocks with high B/M values. The risk associated with this special portfolio is below the average risk of 2 out of 3 size portfolios during this period. This is interesting since you could have earned a higher average return without taking excess risk, by investing in this portfolio.

Table 5: *Average market value in percent of total market value, based on size and B/M value*

	Avg MV in % of total MV			
S	6 %		L	28 %
I	19 %		M	27 %
B	75 %		H	45 %
Total	100 %		Total	100 %

By looking at table 5 we see that 75 % of the total market capitalization is represented by the big companies. Even though the EPRA Europe Index contains the largest companies from countries in Europe, there still exist large differences in market values between the listed companies. Furthermore, sorted on B/M values, the largest share of market capitalization is represented by the companies with high B/M values. This is quite surprising, and opposite of Fama & French (1993), who found that the largest part of the market capitalization was present in the portfolio containing companies with big market capitalization and low B/M value. The only explanation for this must be that the big companies with high B/M values also have very high book values. As for the small and intermediate-sized portfolios, the tendency seems to be in line with the findings by Fama & French (1993), that the market value is very similar in the groups with intermediate and low size. One possible reason for this could be that Fama & French (1993) had a whole different number of companies in their sample, making their portfolios' descriptive statistics somewhat more accurate due to their nature.

4.3.2. The Explanatory Variables

Table 6: *Descriptive statistics: Annual excess return, standard deviation and correlation matrix for the explanatory variables used in the regressions in the tables 8 to 20: 2000-2009, 521 weeks*

	Annual premium	Std.Dev (σ)	CORRELATION	*Rm-Rf*	*SMB*	*HML*	*MOM*	*LMH*
Rm-Rf	-1,1 %	21,7 %	Rm-Rf	1				
SMB	-5,4 %	9,3 %	SMB	-0,054	1			
HML	14,5 %	11,9 %	HML	0,183	-0,062	1		
LMH	6,0 %	15,4 %	MOM	-0,342	-0,295	-0,168	1	
MOM	5,8 %	21,8 %	LMH	-0,527	-0,080	-0,272	0,256	1

The average annual market return over the risk-free rate (risk premium) on the EPRA Europe Index in the period of 2000-2009 was -1.1%, whereas the corresponding standard deviation was 21.7%. The negative excess market return is expected due to the overall market effects influencing the world economy in 2007, hence, also affecting the prices of real estate stocks. Surprisingly, the SMB premium was -5.4% p.a., indicating that there exists a "big size" effect on the EPRA Europe Index, meaning that in this period, big-capitalized companies earned higher returns than small ones. This is significant at the 10% level (t=-1.88). However, the negative

SMB premium confirms the critical discussion in earlier literature, and questions the existence of the small-size effect in the European real estate sector. Regarding the HML annual premium, this indicates that there actually is a value effect. We see a very high premium of 14.5% p.a. which confirms the findings, with a corresponding relatively low standard deviation of 11.9%. The HML is statistically significant at the 5% level (t=3.61), which means that companies with high B/M, so-called value companies, consistently outperform companies with low B/M, growth companies. This result is consistent with the findings by Fama & French (1992 & 1993), who also found a strong positive relation between average returns and book-to-market values. However, the liquidity factor LMH and the momentum factor MOM are not statistically significant either at the 5% or 10% level (t=1.19 & 0.81), even though they have relatively high positive risk premiums. MOM also provides the highest standard deviation, 21.8% annually. Even though the LMH and MOM factors are insignificant, the effects will be investigated, hence, with caution.

The correlations are important when implementing the factors in a multifactor regression model. Low correlations improve the model, preventing the possibility for multicollinearity. All factors have low correlations, below +/- 0.3, except the correlation between LMH and the excess market return, -0.53. However, the high negative correlation is not surprising since the LMH factor expresses buying the stocks with low turnover and shorting the stocks with high turnover. The high turnover stocks may typically be the ones that are very large, thus, more dominating on the value-weighted EPRA Europe Index.

As can be seen in table 7 regarding the SMB and HML factors, the big companies naturally have the largest market capitalization. What's a bit surprising is that the companies with high book values also show the highest market capitalization. The average B/M value is highest for the SH portfolio, indicating that smaller companies actually have higher B/M values than large companies. This can also be spotted when comparing BL and SL, where SL (small size, low B/M) have a slightly higher average B/M value than BL (big size, low B/M).

Furthermore, the table shows how the average daily turnover per share turned out for the six portfolios divided by size and share turnover. What is notable here is that the big high turnover (big market value, high turnover) portfolios only have slightly higher daily turnover than the small high turnover group, indicating that the companies with low market value on the EPRA Europe Index is almost as popular for stock traders as companies with high market value.

Moreover, the average annual returns for the best companies each year in the period 2000-2009, shows an average of about 33%, which is very solid. The worst companies each year in this period performed relatively poor with an average annual return of about -20%.

Table 7: *Average market values and B/M values, daily turnover per share, and annual returns previous year for the explanatory variables*

SMB & HML		
Avg MV in Euro million		Avg. B/M-value
SH	315,30	1,60
SM	314,19	1,08
SL	326,86	0,77
BH	2792,67	1,44
BM	1535,88	1,09
BL	1726,63	0,75

LMH	
Average Daily Turnover Per Share (Euro mill.)	
Small High Turnover	1,835
Small Medium Turnover	0,366
Small Low Turnover	0,077
Big High Turnover	1,958
Big Medium Turnover	0,546
Big Low Turnover	0,181

MOM	
Average Annual Return Previous Year	
High Return	33,41 %
Low Return	-19,62 %

5. Regression Model Estimations

As following, we present which explanatory variables we regress in each model. We examine (a) regressions that use the excess market return, Rm-Rf, to explain excess stock returns, (b) regressions that use SMB and HML, the mimicking returns for the size and book-to-market factors as explanatory variables, (c) regressions that use the three-factor model, Rm-Rf, SMB and HML, (d) regressions that use the SMB and HML factors independently, together with the excess market return, Rm-Rf. Furthermore, we investigate the impact of the liquidity factor and the momentum factor. This is examined through (e) a regression with the excess market return, Rm-Rf, and the LMH factor as the explanatory variables and (f) a regression with the excess market return Rm-Rf, and the MOM factor as the explanatory variables. In the end, we investigate whether a five-factor model explains common variations in the returns of our portfolios by examining, (g) regressions that use the excess market return, Rm-Rf as well as SMB, HML, LMH and MOM as the explanatory variables.

The purpose in all regressions is to examine the explanatory power of the right-hand side variables, together with the significant power of each explanatory variable's slope on each portfolio. We will also comment on the alpha values to provide information about the model specification. Together, this will enlighten us of whether the explanatory variables capture common variations in the different portfolios' returns or not.

5.1. The Market

In table 8, the results from the regression of the excess portfolio returns on the excess market return are given. The R^2 values vary between 0.54 and 0.86, indicating that the market has rather good explanatory power in the portfolios' excess returns. As expected, the R^2 terms are highest in the three big portfolios, which is natural because of their presence on the weighted EPRA Europe Index. Comparing the results to the original Fama & French (1993) article, we see that their R^2 values vary between 0.61 and 0.92, which is just a small proportion higher than in our model.

Furthermore, the beta values are positive and significant for all nine portfolios, with the least significant beta value being 24 standard errors from zero. The portfolio consisting of big companies with high B/M value has a beta value higher than one. This portfolio also has the most significant beta value, with a t-value being 55 standard errors from zero. The small companies have the least significant beta slopes, which are expected due to their presence of lesser extent on the EPRA Europe Index. Somewhat surprising, the companies with high B/M values happen to have the highest beta values, thus, being closest to one in this sample. These portfolios are also the only ones where the beta is not significantly different from one, indicating that the portfolios with high B/M value follow the market (table 21).

As seen in table 6, we estimated a negative risk premium. Naturally, this will decrease the expected return for investors due to the positive market beta values.

The alpha values in the model are not statistically different from zero in 7/9 portfolios at the 5 % level. In the SL and BH portfolios the alphas are different from zero, but to a very small extent. The high proportion of alphas equal to zero indicates a well-specified model.

Table 8: *Regressions of the excess portfolio returns on the excess market return (EPRA Europe Index), 2000-2009*

$$R_{pt} - R_{ft} = \alpha + \beta(R_{mt} - R_{ft}) + \varepsilon_t$$

	β	t-stat (β)	α	t-stat (α)	Adjust. R^2
SL	0,894	24,858	-0,003	-3,210	0,543
SM	0,836	28,074	-0,001	-0,695	0,602
SH	0,953	27,396	0,001	0,607	0,590
IL	0,807	33,816	-0,001	-0,774	0,687
IM	0,924	40,626	0,000	0,579	0,760
IH	0,950	35,869	0,002	1,959	0,712
BL	0,908	45,296	0,001	0,867	0,798
BM	0,889	47,969	0,000	-0,286	0,816
BH	1,026	55,968	0,001	2,043	0,858

5.2. The SMB and HML Factors

Table 9 shows how the SMB and HML factors capture variations in the portfolios' excess returns without including the market portfolio. The two factors do have significant influence in almost all of the portfolios. The R^2 term vary from 0.004 to 0.25, which is quite low compared to the CAPM model. The two factors capture the highest explanatory power in the returns on the portfolio consisting of small stocks with high book-to-market ratio. We see that the SMB factor shows significant positive loadings on the small portfolios and significant negative loadings on the big portfolios (at a 10 % level). However, the size effect is only significant in 6/9 (7/9) portfolios at the 5 % (10 %) level. Thus, the SMB slopes for all these portfolios are related to size. In every group of portfolios formed on size, the slope of the SMB factor decreases monotonically from small to big-sized portfolios. Naturally, this indicates that there exists a positive effect in the excess returns of the big-capitalized companies. Since the average size premium is negative, big companies can expect a higher average return, due to the negative slope and negative average risk premium. In contradiction to previous asset pricing literature, this may indicate that the big companies have more systematic risk than small companies. However, asset pricing literature focuses primarily on risk premiums concerning small-capitalized companies. This creates another alternative, holding stocks from big-capitalized companies may create arbitrary opportunities for investors. Nevertheless, a risk premium is likely to exist for big-capitalized companies as well, but the magnitude of this premium remains concealed. The slopes concerning the HML factor are systematically related to the book-to-market ratio. Within each group formed on size, the slope of the HML factor increases with higher B/M ratio. The positive HML slopes of high book-to-market equity companies raise their return variances and imply higher average returns, thus, these companies carry a risk premium due to the positive average value premium from table 6. The slopes are significant in 6/9 (7/9) portfolios at the 5 % (10 %) level. Looking at the R^2 values, the values are highest for the portfolios with the most significant HML slopes. This pattern cannot be observed on behalf of the SMB factor, indicating that within this model, the HML factor provides the highest explanatory power.

Comparing our results to the findings by Fama & French (1993), we find both similarities and differences. First of all, their R^2 values are way higher, varying between 0.04 and 0.65. Moreover, their SMB slopes are significant in all portfolios at the 5 % level, while the HML slopes do not have that high significant value. These findings are opposite of ours. Furthermore, the systematic increases in slopes regarding the HML factor are found both in our data as well as in the original paper. However, the small-size effect is more visible in the original paper, since all slopes are positive and significant in all portfolios. In our findings, none of the intercepts (alphas) are statistically different from zero at the 5 % level.

Table 9: *Regressions of the excess portfolio returns on the SMB and HML factors, 2000-2009*

$$R_{pt} - R_{ft} = \alpha + s[SMB_t] + h[HML_t] + \varepsilon_t$$

	s	t-stat (s)	h	t-stat (h)	α	t-stat (α)	Adjust. R^2
SL	0,980	8,599	-0,448	-5,040	-0,001	-0,983	0,165
SM	0,804	7,650	0,105	1,283	0,000	-0,164	0,099
SH	1,022	9,276	0,876	10,183	-0,001	-0,535	0,254
IL	0,083	0,831	-0,131	-1,683	0,000	-0,231	0,003
IM	0,098	0,912	0,309	3,678	-0,001	-0,361	0,023
IH	0,394	3,643	0,693	8,203	0,000	-0,022	0,126
BL	-0,197	-1,890	0,039	0,476	0,000	0,011	0,004
BM	-0,210	-2,084	0,097	1,235	-0,001	-0,632	0,008
BH	-0,391	-3,700	0,682	8,276	-0,001	-0,938	0,140

5.3. The Three-Factor Model

Table 10 shows that when we include the two ad-hoc factors (SMB and HML) in addition to the excess market return (Rm-Rf), each of the three factors captures variations in returns. More specifically, the R^2 values increase for all portfolios compared to the CAPM model, and varies between 0.74 and 0.90. Not surprisingly, the excess market return captures variations in all of the nine portfolios, where all t-values are above 35. For the SMB factor, the significance varies a lot between the portfolios, but all SMB slopes are significant at the 5 % level. Furthermore, the HML slopes are all significant at the 5 % level as well, except for the portfolio without any extreme values, namely the one with intermediate size and medium B/M ratio. This indicates that if we view both the SMB and HML factors as independent within this model, both factors capture variations in returns which are left out by the excess market return alone. Given the strong significance of the slopes for practically all portfolios, it seems clear that adding the two return factors (SMB and HML) yield a higher explanatory power to the models, thus, a higher R^2.

By looking at the slopes more thoroughly, we see that the slopes for the SMB factor decrease with higher firm size, indicating that there is a clear systematic tendency in our results. Thus, the SMB factors have positive loadings on the small portfolios, and smaller (or negative) loadings on the big portfolios. As with the previous regression, due to the negative average size premium in table 6, big companies can expect higher returns due to negative size coefficients. Regarding the HML factor, the slopes have a similar pattern, where the slopes are all high and positive for the portfolios consisting of companies with high B/M values, and negative slopes for the portfolios consisting of companies with low B/M values. Naturally, this indicates that the excess return for value stocks over growth stocks causes positive expected returns in portfolios consisting of value stocks. These findings confirm the previous regression summarized in table 9. Big companies and companies with high B/M ratio can expect higher average returns, which is highly significant for the mentioned portfolios.

Comparing this model to the original model by Fama & French (1993), we find many similarities. Nevertheless, the R^2 values in the original paper varies between 0.83 and 0.97, indicating that the three factors capture more in the sample by Fama & French which deals with common stocks, than our sample which deals with stocks from a particular sector. However, we are cautious in drawing these conclusions due to the fact that we compare different markets and different time periods. The t-values of the original study are higher for both the SMB and the HML factor for all portfolios compared to ours. The slopes, however, are identical if we view the slopes as positive/negative compared to the left-hand side portfolios' characteristics. Moreover, in the original paper, the average size premium is significantly positive, opposite of our result. Our findings also confirm the findings by Fama & French (1996), who observe that low book-to-market equity companies have diminishing positive (or negative) slopes, and that high book-to-market equity companies have higher slopes on the HML factor.

Fama & French (1993) also address that the beta slopes for the two extreme portfolios SL and BH tend to become more similar in the three-factor model than in the traditional CAPM model. In our sample, the two beta values are 0.89 and 1.026 when estimated by the CAPM, and 0.997 and 0.983 when estimated by the three-factor model. Fama & French (1993) explain that this effect occurs due to correlation between the market, the SMB and the HML factors. Here, the SMB and HML are almost uncorrelated (-0.06), while the the market correlates with the SMB and HML factors at -0.05 and 0.18, respectively. All the intercepts (alphas) have extremely low values, where the highest value is 0.001. Thus, none of the intercepts are statistically different from zero at the 5 % level, which shows that the model works rather well in explaining expected returns.

Table 10: *Regressions of the excess portfolio returns on the excess market return (EPRA Europe Index) and the SMB and HML factors, 2000-2009*

$$R_{pt} - R_{ft} = \alpha + \beta\left[R_{mt} - R_{ft}\right] + s[SMB_t] + h[HML_t] + \varepsilon_t$$

	β	t-stat (β)	s	t-stat (s)	h	t-stat (h)	α	t-stat (α)	Adjust. R^2
SL	0,997	43,261	1,080	20,325	-0,776	-18,425	0,000	-0,409	0,819
SM	0,875	35,554	0,891	15,716	-0,182	-4,053	0,001	1,094	0,738
SH	0,922	36,217	1,114	18,985	0,573	12,308	0,000	0,419	0,789
IL	0,852	38,861	0,168	3,331	-0,411	-10,262	0,001	1,071	0,745
IM	0,928	40,504	0,191	3,619	0,004	0,101	0,001	0,857	0,765
IH	0,923	38,814	0,487	8,879	0,390	8,969	0,001	1,482	0,776
BL	0,933	48,216	-0,104	-2,329	-0,268	-7,573	0,001	1,921	0,818
BM	0,906	49,894	-0,119	-2,850	-0,201	-6,044	0,000	0,441	0,829
BH	0,983	63,704	-0,292	-8,220	0,359	12,740	0,000	-0,280	0,903

5.4. The SMB Model

From table 11, we see that the R^2 values vary between 0.69 and 0.87 for the nine portfolios. Moreover, if we compare these R^2 values to the traditional CAPM, we see that including the SMB factor does increase the explanatory power for all the nine portfolios. As expected, the largest increase is found in the SL portfolio, where the R^2 increase from 0.54 to 0.7. Yet again, the excess market return is highly significant in all portfolios. The SMB factor is significant in all portfolios at the 10 % level and in 8/9 portfolios at the 5 % level. As earlier stated, we find positive size effects in the portfolios consisting of big-capitalized companies. The original reasoning implies that small companies should have higher returns than big companies, due to the fact that they are more risky. However, from the descriptive statistics, we find that big companies outperform small companies in our sample, since the SMB factor is negative on average. Despite this fact, the reasoning behind the coefficient *s*, will therefore be that the SMB factor causes negative SMB coefficients for the big companies, thus, the loadings from the SMB factor are negative. For the small-capitalized portfolios, the slopes are significant and positive, ranging approximately 16 standard errors from 0, hence, highly significant at any level. This implies that the small companies can expect lower returns due to this factor. Regarding the alpha values, 3 out of 9 portfolios are statistically different from zero (5 %), but all of them have quite low values. Two of the portfolios in the smallest deciles have alpha values different from zero, meaning that there are other variables left out of the model which explain the variance in the portfolios' returns.

Table 11: *Regressions of the excess portfolio returns on the excess market return (EPRA Europe Index) and the SMB factor, 2000-2009*

$$R_{pt} - R_{ft} = \alpha + \beta\left[R_{mt} - R_{ft}\right] + s[SMB_t] + \varepsilon_t$$

	β	t-stat (β)	s	t-stat (s)	α	t-stat (α)	Adjust. R^2
SL	0,920	31,582	1,131	16,591	-0,002	-2,580	0,701
SM	0,857	34,886	0,904	15,721	0,000	0,462	0,730
SH	0,978	34,390	1,076	16,160	0,002	2,080	0,727
IL	0,812	34,331	0,196	3,541	0,000	-0,486	0,694
IM	0,929	41,233	0,191	3,623	0,001	0,884	0,766
IH	0,961	38,267	0,461	7,836	0,002	2,713	0,742
BL	0,906	45,234	-0,086	-1,833	0,000	0,714	0,799
BM	0,886	47,997	-0,106	-2,450	0,000	-0,489	0,817
BH	1,018	58,584	-0,316	-7,779	0,001	1,505	0,872

5.5. The HML Model

From table 12, we see that the R^2 values vary between 0.61 and 0.89, which is a larger interval than for the SMB factor. Thus, the model has lower explanatory power in some portfolios and higher in other portfolios. Comparing the R^2 values for the HML model and the CAPM, the explanatory power increases in all portfolios, some more than others. The slopes for the excess market return are still significant in all nine portfolios, with the lowest t-value ranging 27 standard errors from 0.

The slopes for the HML factor are all significant, except the portfolio without extreme characteristics, namely the intermediate-sized portfolio with medium book-to-market value. All the other slopes are significant at the 5 % level, which is an indicator of why the explanatory power increases when adding factors to a model other than the CAPM. The HML slopes indicate that the HML factor is loading positively on the portfolios with high B/M ratio, thus, the excess return on high B/M-valued companies over low B/M-valued companies cause positive effects in the returns of companies with high B/M value. We have a value effect in the high B/M portfolios. Therefore, the portfolios with low and medium B/M values have negative coefficients, *h*, indicating lower expected average returns for these portfolios. Moreover, we see that within each group of portfolios formed on size, the slopes change from negative to positive as the book-to-market value of the portfolios increases. Again, the portfolios with high B/M ratio carry a risk premium. This supports the proposition by Fama & French (1993), that relative profitability might be a source of a risk factor that in fact can explain the positive relationship between book-to-market ratios and returns.

Regarding the alpha values, they are as good as zero, with one portfolio (BL) being slightly statistically different from zero with a low intercept value of 0.001.

Table 12: *Regressions of the excess portfolio returns on the excess market return (EPRA Europe Index) and the HML factor, 2000-2009*

$$R_{pt} - R_{ft} = \alpha + \beta\left[R_{mt} - R_{ft}\right] + h[HML_t] + \varepsilon_t$$

	β	t-stat (β)	h	t-stat (h)	α	t-stat (α)	Adjust. R^2
SL	0,976	31,655	-0,821	-14,576	-0,001	-1,424	0,675
SM	0,858	28,741	-0,220	-4,030	0,000	-0,051	0,614
SH	0,901	27,220	0,526	8,695	-0,001	-0,753	0,642
IL	0,901	38,381	-0,418	-10,353	-0,001	0,820	0,740
IM	0,925	39,921	-0,004	-0,090	0,000	0,586	0,760
IH	0,913	35,864	0,369	7,934	0,001	0,775	0,743
BL	0,935	48,158	-0,263	-7,429	0,001	2,089	0,817
BM	0,908	49,725	-0,196	-5,861	0,000	0,648	0,827
BH	0,988	60,361	0,372	12,421	0,000	0,306	0,890

5.6. The LMH Model

From table 13, we see that the R^2 values range from 0.54 to 0.86. Comparing these results to the CAPM, we find very marginal increases in 8/9 portfolios, and one portfolio's R^2 value decreases by less than 0.01. By looking at the significance of the LMH factor, we find that it is significant only at the 10 % level in 6/9 portfolios, suggesting that the factor does not explain that much of the variations in the different portfolios' excess returns. If we look at the significance of the slopes, we see some connection between the book-to-market ratio and significant LMH slopes. Somewhat strange, all the medium B/M-rated portfolios have significant LMH slopes, and they are all positive. This implies that the portfolios with medium B/M ratios' returns are explained by the excess return on companies with low stock turnover over those with high stock turnover, thus, there might exist a risk premium in the portfolios with medium B/M ratio. Furthermore, the beta values for the excess market return are still highly significant in explaining the portfolios' returns. Comparing our results to the findings by Eckbo & Norli (2005), they find that the LMH factor is significant in 64 % of the portfolios with the same characteristics as ours, only that there is no pattern in either slope values or significant t-values. Generally speaking, the model explains somewhat more of the variations across the excess returns on the portfolios than the CAPM. However, the increase in explanatory power is not that high for neither the SMB nor the HML factor implemented in the models above. The alpha values are statistically different from zero in 3 out of 9 portfolios, indicating unexplained variations in these portfolios.

Table 13: *Regressions of the excess portfolio returns on the excess market return (EPRA Europe Index) and the LMH factor, 2000-2009*

$$R_{pt} - R_{ft} = \alpha + \beta\left[R_{mt} - R_{ft}\right] + v[LMH_t] + \varepsilon_t$$

	β	t-stat (β)	v	t-stat (v)	α	t-stat (α)	Adjust. R^2
SL	0,897	21,165	0,007	0,111	-0,003	-3,208	0,542
SM	0,907	26,266	0,192	3,937	-0,001	-0,928	0,613
SH	0,921	22,520	-0,087	-1,502	0,001	0,692	0,591
IL	0,898	33,152	0,242	6,347	0,001	-1,163	0,709
IM	0,953	35,699	0,076	2,027	0,000	0,465	0,762
IH	0,922	29,628	-0,076	-1,738	0,002	2,059	0,713
BL	0,972	42,196	0,169	5,206	0,000	0,590	0,807
BM	0,979	47,807	0,242	8,371	0,000	-0,780	0,837
BH	1,010	46,895	-0,041	-1,344	0,001	2,118	0,858

5.7. The MOM Model

In table 14, we see that the R^2 values range from 0.56 to 0.86. Compared to the CAPM, we see an increase in the explanatory power of the six portfolios with lowest market capitalization, and unchanged values in the three big-capitalized portfolios. Similarly, the MOM slopes, the mimicking returns for the momentum factor, are systematically related to size. The six lowest capitalized portfolios have significant MOM slopes at the 5 % level, which explain the differences in explanatory power as well. Surprisingly, the slopes for the six lowest capitalized portfolios are all negative, indicating that when the return for the MOM factor goes up, the excess return for the portfolios goes down, and vice versa. Economically, this tells us that the momentum factor loads negatively on the excess returns for small and intermediate-sized real estate stocks. This indicates that for these portfolios, a contrarian momentum strategy suggested by De Bondt & Thaler (1985, 1987) could provide positive loadings in this sample. Thus, going long in previous losers and short in previous winners, *could* explain higher average returns for the six lowest capitalized portfolios.

Regarding the excess market returns, the slopes are still highly significant, the lowest being 22 standard errors from zero. Comparing the momentum factor to the findings by Eckbo & Norli (2005), we do not find the similar pattern regarding the size characteristics of the respective portfolios. Furthermore, in the Eckbo & Norli (2005) study, less than 55 % of the MOM slopes are significant, indicating that the MOM factor might provide higher explanatory power in the European real estate stock market than the US common stock market. However, we emphasize the fact that we compare different markets and different time periods.

The alpha values are significantly different from zero in 3/9 portfolios, and their corresponding intercept values are quite low.

Table 14: *Regressions of the excess portfolio returns on the excess market return (EPRA Europe Index) and the MOM factor, 2000-2009*

$$R_{pt} - R_{ft} = \alpha + \beta\left[R_{mt} - R_{ft}\right] + m[MOM_t] + \varepsilon_t$$

	β	t-stat (β)	m	t-stat (m)	α	t-stat (α)	Adjust. R^2
SL	0,829	22,170	-0,189	-5,078	-0,003	-3,105	0,563
SM	0,783	25,270	-0,154	-5,001	0,000	-0,534	0,620
SH	0,821	24,920	-0,385	-11,750	0,001	1,096	0,676
IL	0,786	31,093	-0,061	-2,421	0,000	-0,692	0,690
IM	0,865	37,577	-0,171	-7,455	0,001	0,872	0,783
IH	0,931	33,117	-0,056	-1,993	0,002	2,034	0,714
BL	0,904	42,313	-0,014	-0,651	0,001	0,889	0,797
BM	0,883	44,753	-0,018	-0,907	0,000	-0,253	0,816
BH	1,030	52,771	0,012	0,626	0,001	2,019	0,857

5.8. The Five-Factor Model

Table 15 shows the five-factor model which is based on the three-factor model by Fama & French (1993), and somewhat comparable to the model by Eckbo & Norli (2005). The R^2 values do increase in 8/9 portfolios, ranging between 0.76 and 0.90. The only decreasing R^2 value is found in the BH portfolio. However, it is interesting to view the significant slopes for the respective portfolios compared to the three-factor model and the CAPM. First, the beta values are all still highly significant in this model. Second, the *s* coefficients are all significant at the 10 % level, and 8/9 at the 5 % level. Third, the *h* coefficients are significant for 8/9 portfolios at the 5 % level. Fourth, there are 6/9 portfolios with significant LMH slopes at the 5 % level. At last, the MOM factor shows significant slopes in 7/9 portfolios at the 10 % level, 5/9 at the 5 % level.

Table 15: *Regressions of the excess portfolio returns on the excess market return (EPRA Europe Index) and the SMB, HML, LMH and MOM factors, 2000-2009*

$$R_{pt} - R_{ft} = \alpha + \beta\left[R_{mt} - R_{ft}\right] + s[SMB_t] + h[HML_t] + v[LMH_t] + m[MOM_t] + \varepsilon_t$$

	SL	SM	SH	IL	IM	IH	BL	BM	BH
β	0,953	0,951	0,900	0,896	0,910	0,954	0,956	0,960	0,980
t-stat (β)	34,290	32,963	30,899	34,711	34,168	33,002	41,253	45,745	52,012
s	1,006	0,911	0,984	0,150	0,088	0,532	-0,123	-0,124	-0,300
t-stat (s)	17,833	15,548	16,636	2,864	1,624	9,064	-2,614	-2,903	-7,840
h	-0,806	-0,129	0,558	-0,381	-0,008	0,411	-0,252	-0,164	0,357
t-stat (h)	-18,714	-2,894	12,347	-9,525	-0,193	9,176	-7,011	-5,035	12,229
v	-0,041	0,256	0,138	0,196	0,107	0,041	0,119	0,209	0,001
t-stat (v)	-1,062	6,410	3,418	5,484	2,913	1,037	3,720	7,203	0,021
m	-0,087	-0,041	-0,209	-0,075	-0,165	0,049	-0,056	-0,060	-0,010
t-stat (m)	-3,429	-1,534	-7,823	-3,176	-6,752	1,849	-2,645	-3,119	-0,572
α	0,000	0,000	0,000	0,000	0,001	0,001	0,001	0,000	0,000
t.stat (α)	-0,222	0,653	0,399	0,750	0,858	1,340	1,722	-0,033	-0,263
Adjust. R^2	0,823	0,757	0,814	0,762	0,786	0,777	0,825	0,846	0,902

Looking back at the three-factor model, we have increasing R^2 values for all portfolios compared to the CAPM, and significant slopes for all the SMB factors, and in 8/9 portfolios for the HML factor. As for the five-factor model, we also get increasing R^2 values compared to the CAPM and the three-factor model, but not that many significant slopes in the respective portfolios with the two latter factors. This indicates that the LMH and MOM factors capture variations in returns to a lesser extent than the SMB and HML factors. The fact that neither the LMH nor the MOM premiums proved to be significantly different from zero (table 6), also lighten the red lamp considering implementing these results and models. However, we will not underestimate the significance of the two factors, at least for some of the portfolios where they turn out to be significant and increase the explanatory power compared to other models which we have tested. The respective portfolios are the SH, IL, BL and BM portfolios. When these portfolios are exposed to the five-factor model, the R^2 values increase compared to the three-factor model, and provide evidence that all factors are significant at the 10 % level.

Eckbo & Norli (2005) compare the results of the three-factor and the five-factor model. They find that the three first factors are not materially affected by adding the two latter factors into the model. However, in our model, adding the two factors does affect the significance of the SMB factor. In the three-factor model, all the SMB slopes are significant (5 %), while one of the slopes is insignificant in the five-factor model. The results are unchanged regarding the HML factor.

The alpha values are not statistically different from zero at the 5 % level.

6. Do the Models Explain More in some Countries than in Others?

6.1. Descriptive Statistics of Countries Represented on the EPRA Europe Index

In this section we have divided the respective companies from the EPRA Europe Index into different country indices, according to the companies' country of origin. We investigate if any regional differences exist when testing our explanatory variables on portfolios based on the respective companies' country of origin. Furthermore, we will provide descriptive statistics for each country regarding their annual returns with its corresponding risk. The indices' standard deviation will be divided into systematic (market risk) and unsystematic risk so we can build a more accurate picture of the countries' risk profiles. This is interesting due to the fact that the systematic risk is impossible to diversify, and therefore the only risk with monetary value.

The country indices are created as equally-weighted portfolios, where the number of companies varies between the different indices. The reason for creating the equally-weighted portfolios is to replicate an average portfolio from the respective country. In addition, a more precise weighting, i.e. weighting by market capitalization, is quite a comprehensive operation.

We created ten country indices which include the United Kingdom, France, the Netherlands, Sweden, Belgium, Italy, Finland, Austria and Switzerland. Despite their presence on the EPRA Europe Index, Germany and Poland was left out of this sample due to lack of data for these companies during the entire period of 2000-2009.

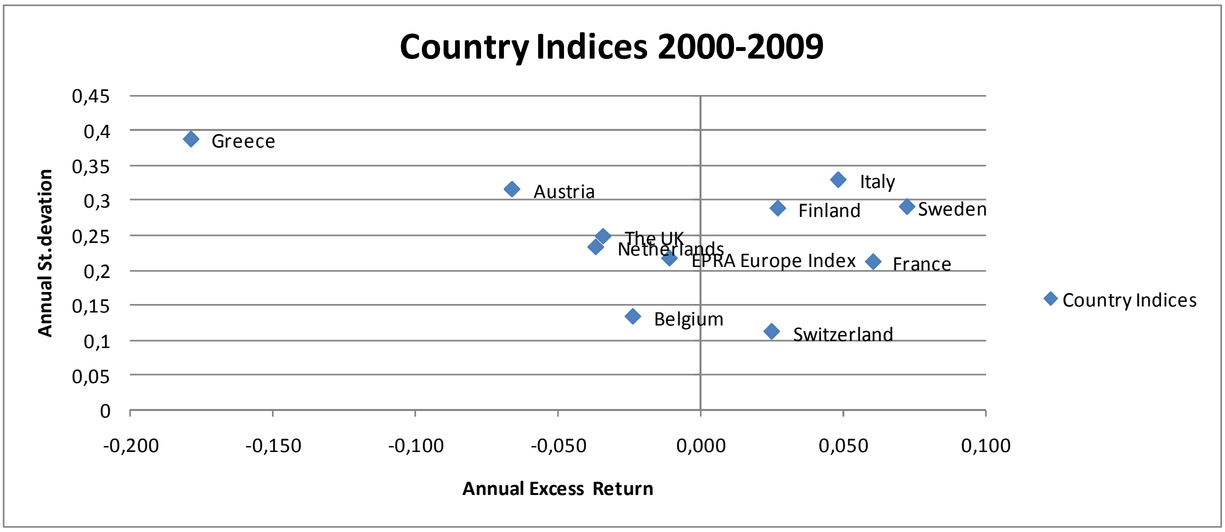
Table 16: *Descriptive statistics for the ten country indices, 2000-2009*

Country	UK	FRA	NED	SWE	BELG	ITA	SUO	AUT	GRE	SUI
Annual Return excess the riskfree rate	-0,034	0,060	-0,037	0,072	-0,024	0,048	0,027	-0,066	-0,179	0,025
Annual Std (σ)	0,248	0,212	0,233	0,291	0,133	0,330	0,289	0,316	0,388	0,112
Beta (β)	1,044	0,819	0,868	1,045	0,408	0,938	0,950	0,918	0,581	0,257
Systematic risk --> β^2*σm^2	0,051	0,032	0,036	0,052	0,008	0,042	0,043	0,040	0,016	0,003
Unsystematic risk --> σ^2-β^2*σm^2	0,010	0,013	0,019	0,033	0,010	0,067	0,041	0,060	0,135	0,009
Systematic risk (%)	84 %	70 %	65 %	61 %	44 %	38 %	51 %	40 %	11 %	25 %
Unsystematic risk (%)	16 %	30 %	35 %	39 %	56 %	62 %	49 %	60 %	89 %	75 %
Correlation with the EPRA Europe Index	0,91	0,84	0,81	0,78	0,66	0,62	0,72	0,63	0,33	0,50

During the period from 2000 to 2009, we see from table 16 that the Swedish companies have the highest average annual return in excess of the risk free rate of 7.2 %, with an additional high standard deviation of 29.1 %. Furthermore, Greece has the lowest annual return of -17.9 % with the highest standard deviation of 38.8 %. Switzerland has provided the lowest average standard deviation counting 11.2 % annually. Regarding risk, we divide total risk into systematic and unsystematic percentage shares of total risk. From the table, we clearly see that the higher correlation with the market, the higher percentage share of systematic risk, out of total risk. Naturally, the UK has the highest share of systematic risk. One reason for this is the British role in the European real estate market, thus, their dominance on the EPRA Europe Index regarding number of companies. Greece has the lowest share of systematic risk, hence, higher firm-specific movements in their returns.

Table 6 shows the excess market return, which annualizes a negative premium of -1.1 % with an additional standard deviation of 21.7 %. This is also illustrated in figure 2 where we see that on average, France and Switzerland have performed better than the market index during the period, with an additional lower standard deviation. It is interesting to see that Switzerland has very low systematic risk as well (25 %) compared to France (70 %).

Figure 2: *Country indices, risk and return profile, 2000-2009*



6.2. Regression Model Estimations – Country Indices

6.2.1. The Market

In table 17 the regressions of the excess country indices' returns on the excess market return from 2000-2009 are given. The R^2 values range from 0.84, which indicates quite high explanatory power for the UK, to an R^2 value of only 0.10 for Greece, a rather low explanatory power in the country indices' excess returns. Again, as expected, the R^2 terms are highest in the three country indices with the highest number of companies present on the EPRA Europe Index. By looking at the t-values for the market betas in all 10 countries, we conclude that all the betas are highly significant, with the least significant beta representing Greece, approximately 7.8 standard errors from zero. Not surprisingly, the UK has the most significant beta value. Naturally, this is due to the number of companies from the UK which is present on the EPRA Europe Index. Regarding the slope values, we see that the UK, Sweden and Finland are the countries with the highest loadings from the excess market return, with beta values almost identical to one. On the other hand, Switzerland has the lowest slope value, indicating that the Swiss companies' returns do not carry that much market risk, which can also be seen in table 16. Furthermore, when we investigate if the beta slopes are indistinguishable from one, thus, H_0=β=1 (table 22), we provide a more accurate picture of which indices follow the market as a whole. We find that for Finland, Italy, Sweden and Austria, the beta slope is not different from one, thus, they follow the market. None of the alpha values proved to be significantly different from zero.

Table 17: *Regressions of the country indices' excess returns on the excess market return (EPRA Europe Index), 2000-2009*

$$R_{pt} - R_{ft} = \alpha + \beta\left(R_{mt} - R_{ft}\right) + \varepsilon_t$$

	UK	FRA	NED	SWE	BELG	ITA	SUO	AUT	GRE	SUI
β	1,044	0,819	0,868	1,045	0,408	0,938	0,950	0,918	0,581	0,257
t-val (β)	51,358	35,190	31,372	28,452	20,264	17,913	23,310	18,544	7,846	13,095
α	0,000	0,001	-0,001	0,002	0,000	0,001	0,001	-0,001	-0,004	0,001
t-val (α)	-0,725	1,865	-0,639	1,419	-0,618	0,703	0,586	-0,749	-1,645	0,876
Adjust. R^2	0,835	0,704	0,654	0,609	0,441	0,381	0,511	0,397	0,104	0,252

6.2.2. The Three-Factor Model

Table 18 shows how the three-factor model captures variations in the country indices' excess returns. When adding the SMB and HML factors, the R^2 values increase compared to the CAPM model. The highest R^2 value increases from 0.84 to 0.88 (UK), and the lowest value shows an increase from 0.10 to approximately 0.20 (Greece). Not surprisingly, by looking at the beta values, the excess market returns capture variations in all of the ten portfolios from the different countries. The t-values range from a bit above 9 to 59, all highly significant. Moreover, for the SMB factor, the significance varies a lot, but almost all SMB slopes are significant at the 5% level, except for Italy, which is only significant at the 10% level, and the Netherlands, which is not significant at all. Furthermore, the HML slopes are significant at the 5% level in 8 of the 10 countries, with Finland being significant at the 10% level, and last Italy being insignificant. These numbers indicate that if we view both the SMB and HML as independent within this model, both factors capture variations in the country indices' excess returns, which are not taken into consideration by looking at the excess market return alone as the explanatory variable. Because of the strong significance of almost all slopes regarding the SMB and HML factors, it makes sense adding these two factors into the three-factor model, which clearly gives a higher explanatory power to the model, thus, higher R^2 values.

Next, we will study the slopes for the three factors more thoroughly, to see if we can spot any patterns in what characterizes the companies in different regions. Regarding the slopes for the SMB factor, Sweden, Italy and Switzerland show significant negative slopes (10 %). Greece shows the highest significant positive slope, with a value of 1.1, while the UK's positive slope is the most significant. This indicates that Sweden, Italy and Switzerland can expect higher average returns, due to the negative size premium (table 6), and these effects significantly explain some of the returns for the average companies in these countries. On the opposite side, the countries which show positive significant slopes (10 %), can expect lower returns, especially Greece with an *s* coefficient of 1.1. Considering the slopes for the HML factor, there are few positive significant slopes. The UK and Austria show significant positive loadings (1 %) on the HML factor. Fama & French (1998) find that in many countries, a global HML factor loads positively on country-specific portfolios consisting of high B/M companies. This indicates that in the UK and Austria, real estate stocks may carry risk premiums, thus higher returns, especially the companies with a high B/M ratio.

By looking at the alpha values, we see that except for France and Sweden, none of the values are statistically different from zero. This indicates that in these two countries, factors other than those estimated explain the country indices' respective returns.

Table 18: *Regressions of the country indices' excess returns on the excess market return (EPRA Europe Index) and the SMB and HML factors, 2000-2009*

$$R_{pt} - R_{ft} = \alpha + \beta\left[R_{mt} - R_{ft}\right] + s[SMB_t] + h[HML_t] + \varepsilon_t$$

	UK	FRA	NED	SWE	BELG	ITA	SUO	AUT	GRE	SUI
β	1,041	0,846	0,894	1,081	0,425	0,920	0,978	0,900	0,658	0,264
t-val (β)	59,484	37,078	32,441	29,939	21,412	17,313	24,706	18,477	9,226	13,327
s	0,559	0,158	0,016	-0,188	0,227	-0,221	0,642	0,594	1,123	-0,095
t-val (s)	13,842	3,000	0,250	-2,263	4,957	-1,806	7,031	5,291	6,831	-2,059
h	0,152	-0,235	-0,253	-0,398	-0,117	0,129	-0,126	0,321	-0,502	-0,090
t-val (h)	4,763	-5,624	-5,032	-6,034	-3,221	1,332	-1,741	3,608	-2,941	-3,857
α	0,000	0,002	0,000	0,002	0,000	0,001	0,002	-0,001	-0,001	-0,001
t-val (α)	-0,470	3,052	0,182	2,227	0,293	0,333	1,460	-0,906	-0,528	-0,537
Adjust. R^2	0,882	0,726	0,669	0,635	0,476	0,385	0,555	0,438	0,201	0,263

6.2.3. The Five-Factor Model

As for the five-factor model, we see that for the various countries the R^2 values vary between 0.21 for Greece to 0.92 for the UK. Comparing these numbers to the similar values for the three-factor model, we have that adding the two latter factors increase the explanatory power for all ten countries. Most of the R^2 values increase by 0.02-0.04, besides one extreme, namely Sweden with an increase of 0.11 after adding the liquidity and momentum factor into the model. However, increasing R^2 values are not interesting if the explanatory variables' slopes are insignificant. For Sweden, Austria and Switzerland, adding the two latter factors increase the explanatory power, with all five factors being significant at the 10 % level. However, Austria is the only country with significant slopes at the 5 % level. For the remaining countries, adding the two latter factors do not provide significant slopes for all five factors. This makes us neglect the assumption of a qualified five-factor model, at least compared to the more significant three-factor model. However, we see countries where the model works rather well in explaining returns.

Table 19: *Regressions of the country indices' excess returns on the excess market return (EPRA Europe Index) and the SMB, HML, LMH and MOM factors, 2000-2009.*

$$R_{pt} - R_{ft} = \alpha + \beta[R_{mt} - R_{ft}] + s[SMB_t] + h[HML_t] + v[LMH_t] + m[MOM_t] + \varepsilon_t$$

	UK	FRA	NED	SWE	BELG	ITA	SUO	AUT	GRE	SUI
β	0,889	0,963	0,932	1,293	0,499	1,056	1,118	0,931	0,608	0,292
t-val (β)	50,848	37,602	29,134	34,944	21,445	16,568	23,777	15,974	7,017	12,226
s	0,440	0,214	-0,045	-0,147	0,266	-0,145	0,761	0,509	1,151	-0,100
t-val (s)	12,197	12,406	-0,698	-1,955	5,625	-1,120	7,975	4,303	6,548	-2,050
h	0,048	-0,154	-0,227	-0,252	-0,066	0,223	-0,029	0,343	-0,537	-0,069
t-val (h)	1,766	-3,885	-4,577	-4,394	-1,828	2,256	-0,401	3,791	-3,998	-1,785
v	-0,372	0,344	0,247	0,728	0,213	0,383	0,327	0,260	-0,235	0,115
t-val (v)	-15,406	9,731	5,594	14,245	6,621	4,346	5,031	3,230	-1,966	3,457
m	-0,060	-0,015	-0,145	-0,134	-0,004	0,002	0,074	-0,180	0,099	-0,036
t-val (m)	-3,741	-0,629	-4,960	-3,961	-0,183	0,029	1,712	-3,374	1,245	-1,656
α	0,000	0,002	0,000	0,001	0,000	0,000	0,001	-0,002	-0,001	0,001
t-val (α)	0,802	2,524	-0,119	1,590	-0,233	-0,019	1,028	-1,083	-0,413	0,853
Adjust. R^2	0,921	0,767	0,700	0,742	0,515	0,404	0,577	0,458	0,206	0,281

Regarding the LMH factor, we have significant slopes in all countries at the 5 % level. Another interesting fact is that the LMH factor has more significant slopes than the HML factor when using both variables in one model. Furthermore, the MOM factor is significant in 4/10 (6/10) countries at the 5 % (10 %) level. The slopes for the excess market returns are highly significant in all countries. Regarding the SMB and HML slopes, the SMB factor is still significant in 8/10 countries, while the HML factor decreases the significance to 6/10 countries at the 5 % level. This effect propably occurs due to correlation within the explanatory variables. The LMH slopes tell us that the liquidity factor explains some of the excess returns in all countries. Thus, for 8/10 countries, we suggest that there exists a risk premium by holding stocks with low turnover, besides the UK and Greece, which have negative slopes. Considering the MOM slopes, only one of them is positive and significant at the 10 % level, namely in Finland, thus, a risk premium is present. For the UK, the Netherlands, Sweden, Austria and Switzerland, we have significant negative slopes, indicating that there is no risk premium regarding momentum stocks in these countries. The five-factor model works best in Austria, Sweden and Switzerland, where all factors are significant at the 10 % level, with increasing explanatory power compared to the CAPM and the three-factor model.

Considering the alpha values, all countries show intercept values indistinguishable from zero, besides France, which has a significant value of 0.002 (t=2.52).

6.2.4. The International Six-Factor Model

From table 20 we observe the results from the regression which investigates how European as well as international (US) factors work in explaining European real estate stocks' excess returns. The international factors are downloaded from Kenneth R. French's homepage[5]. As an estimate for international factors we use weekly factors from the US market, represented by all NYSE, AMEX and NASDAQ companies. The international factors are created in the same way as our domestic factors. However, some differences occur regarding when the factors are calculated. The SMB premiums are calculated from July of year *t* to June *t+1*, market equity data is from December of *t-1*, and book equity data is from *t-1*.

Compared to the three-factor model, we see that the R^2 values increase slightly for all the countries by maximum 0.02, now ranging between 0.21 (Greece) and 0.89 (the UK). As for the significance of the international factors, the international excess market returns have significant slopes in 8/10 countries at the 10 % level. Furthermore, the SMB slopes are significant in 3/10 countries, while the HML slopes are significant in 5/10 countries. The only country where all the international factors are significant at the 10 % level is Belgium. If we analyze the Belgian slopes, we see that besides the excess market return, we have significant positive loadings from the domestic SMB factor, the foreign excess market return and the foreign HML factor. The international model's explanatory power on Belgian returns increases the R^2 value by only 0.016. This is not a very high number, but it provides an indicator that from the European countries in our sample, Belgium is the one which is most integrated with the US. Griffin (2002) developed this international model, and he investigated this model in the US, the UK and in Japan. He found that the inclusion of the foreign factors adds almost zero explanation to the regressions. In Griffin's (2002) study, when adding the foreign factors, the explanatory power increases by 0.005 on average. Compared to this, our results are successful. Lunden (2007) get somewhat higher values than ours when investigating the Brazilian market, with increases ranging between 0.02 and 0.04.

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[5] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_factors.html

Table 20: *Regressions of the country indices' excess returns on the domestic and foreign excess market return (EPRA Europe Index and NYSE Index) and the domestic and foreign SMB and HML returns, 2000-2009*

$$R_{pt} - R_{ft} =$$

$$\alpha + \beta d[R_{mt} - R_{ft}] + sd[SMB_t] + hd[HML_t] + \beta f[R_{mt} - R_{ft}] + sf[SMB_t] + hf[HML_t] + \varepsilon_t$$

	UK	FRA	NED	SWE	BELG	ITA	SUO	AUT	GRE	SUI
βd	1,067	0,787	0,799	0,990	0,384	0,783	0,843	0,874	0,533	0,226
t-val (βd)	45,786	25,805	21,902	20,631	14,571	11,097	16,106	13,379	5,572	8,547
sd	0,545	0,150	-0,008	-0,229	0,232	-0,278	0,605	0,635	1,116	-0,107
t-val (sd)	13,349	2,799	-0,126	-2,727	5,031	-2,255	6,601	5,548	6,663	-2,294
hd	0,152	-0,234	-0,254	-0,393	-0,118	0,137	-0,128	0,321	-0,498	-0,094
t-val (hd)	4,792	-5,653	-5,135	-6,035	-3,306	1,434	-1,795	3,619	-3,835	-2,522
βf	-0,061	0,082	0,106	0,157	0,049	0,245	0,142	0,072	0,233	0,027
t-val (bf)	-2,648	2,742	2,944	3,314	1,898	3,535	2,757	1,115	2,470	1,008
sf	0,112	-0,035	-0,001	0,109	-0,088	0,139	0,012	-0,262	-0,130	0,009
t-val (sf)	2,937	-0,706	-0,019	1,382	-2,043	1,204	0,136	-2,444	-0,829	0,190
hf	0,007	0,088	0,219	-0,027	0,119	-0,060	0,333	0,009	0,008	0,139
t-val (hf)	0,193	1,893	3,953	-0,377	2,969	-0,564	4,188	0,094	0,054	3,442
α	0,000	0,002	0,000	0,002	0,000	0,000	0,001	-0,001	-0,001	0,000
t-val (α)	-0,710	2,841	-0,307	2,118	0,100	0,261	0,938	-0,715	-0,494	0,622
Adjust. R^2	0,885	0,729	0,680	0,645	0,492	0,403	0,571	0,442	0,206	0,277

In line with Griffin (2002), we agree that implementing any of the results with such a low increase in explanatory power, along with varying significant slopes, provides little or no economic value. The economic importance in the increase of the R^2 values is highly trivial, and we will not suggest reliance of this model over the domestic three-factor model. Thus, the three-factor model does a better job in explaining the excess returns from the different countries than the international-six factor model. One way of improving these results may be to use a more specific international model, including all parts of the world, not only the US as in this model. Another possibility would be to create international sector-based factors for i.e. the real estate sector.

7. Conclusions

The descriptive statistics show that there exists a negative premium for the SMB factor, -5.4 % annually. This is in conflict with the results from the original theory by Fama & French (1992 & 1993), where the small-capitalized companies outperformed the big-capitalized companies in the respective periods. Surprisingly, and quite contrary to this, in our sample big-capitalized companies outperform the small-capitalized companies, and this effect is significant at the 10 % level. This can be interpreted as a "big-size" effect. In contradiction to previous asset pricing literature, this may indicate that the big companies contain more systematic risk than small companies. However, asset pricing literature focuses primarily on risk premiums concerning small-capitalized companies. This provokes another alternative, that holding stocks from big-capitalized companies may create arbitrary opportunities for investors. Nevertheless, a risk premium is most likely to exist for big-capitalized companies as well, but the magnitude of this premium remains concealed, and we leave the concluding remarks of this discussion to future research. We acknowledge the fact that the smallest companies in our sample *might* be too large to fulfill the traditional explanations for the small size effect. Regarding the HML factor, we find a value effect, since on average, companies with high B/M ratio (value companies) outperform companies with low B/M ratio (growth companies) with a very high annual premium of 14.5 %. This premium is statistically significant at the 5 % level, a robust result. This is in line with Fama & French (1992 & 1993), who also found a strong positive relationship between average returns and book-to-market ratios. However, the evidence is not that strong concerning the LMH and MOM factors. Even though both factors have relatively high positive annual premiums (6 % and 5.8 %), they are not statistically significant at the 10 % level.

The three-factor model does increase the explanatory power in all portfolios compared to the CAPM. The CAPM provides R^2 values between 0.54 and 0.86, while the three-factor model provides R^2 values between 0.74 and 0.90. The increases in explanatory power are supported by significant slopes for all factors at the 5 % level, except for the HML slope in the portfolio without any extreme values, namely the one with intermediate size and medium B/M ratio. These results clearly point out that the SMB and HML factor does yield higher explanatory power compared to the CAPM. In other words, the three factors do capture more variations in returns than the excess market return alone. In line with Fama & French (1993 & 1996), the HML factor has high, positive slopes in portfolios with high B/M ratio, and the SMB factor shows negative slopes in portfolios consisting of big-capitalized companies. Based on previous literature we suggest that the companies with high B/M ratios carry risk premiums, thus, expect higher average returns. For the big-capitalized companies, we also suggest that they can expect higher average returns, based on the previous discussion. Thus, we leave the interpretation of why to future research. The two effects provide opportunities for mean-variance efficient investors. However, if we study the impact of the different factors, it seems clear that the HML factor provides more explanation to the three-factor model than the SMB factor. This results from the stronger significance of the factor, thus, a stronger effect of value stocks outperforming growth stocks.

Regarding the LMH model, we find marginal increases in the R^2 values. This results from significant slopes in 6/9 portfolios at the 10 % level, indicating that this factor does not explain that much of the variations in the different portfolios' excess returns. These findings are somewhat similar to Eckbo & Norli (2005). The MOM model shows that the six portfolios with the lowest market capitalization experience an increase in the explanatory power compared to the CAPM. Moreover, the six lowest capitalized portfolios are the only ones with significant MOM slopes as well at the 5 % level.

The five-factor model provides weaker results than expected. Compared to the three-factor model we have somewhat similar R^2 values. However, the fact that including two insignificant factors into a model with highly significant factors, without increasing the R^2 values or the significance of the slopes, tells us that the three-factor model works better in explaining variations in returns. The three-factor model works well in explaining the common variations in returns in the European securitized real estate sector, while the five-factor model, due to insignificance, may provide spurious results.

The constructed country indices' descriptive statistics show that Sweden has the highest annual return, while Greece has the lowest return and the highest standard deviation. Switzerland has provided the lowest standard deviation. Naturally, due to the high correlation with the EPRA Europe Index, the UK has the highest share of systematic risk. On the other hand, Greece has the lowest correlation with the market, hence, the lowest share of systematic risk. From an investor's point of view, we acknowledge that France and Switzerland have a higher average annual return than the market, but with a corresponding lower annual standard deviation.

For the country indices, the three-factor model does provide more explanatory power compared to the CAPM. The three-factor model has the highest explanatory power in the UK (0.88) and the lowest in Greece (0.20). Besides the Netherlands, the SMB slopes are significant in all countries (10 %) in the three-factor model. Regarding the slopes for the SMB factor, Sweden, Italy and Switzerland show significant negative slopes. This means that there exists a premium in these countries' real estate stocks due to the negative size premium (table 6), and these effects significantly explain some of the returns in the average companies in the mentioned countries. Greece shows a very high significant positive slope indicating high negative expected returns due to the negative size premium. Concerning the HML slopes, all countries show significant slopes, besides Italy. The UK and Austria show significant (1%), positive loadings on the HML factor. This can be explained by Fama & French (1998), which find that in many countries, a global HML factor loads positively on country-specific portfolios consisting of high B/M companies. This indicates that in the UK and Austria, real estate stocks carry risk premiums, thus higher returns, which especially derives from the companies with high B/M ratio.

When implementing the five-factor model, we find that the R^2 values increase for all ten countries, still explaining the most in the UK (0.92), and the least in Greece (0.21). Sweden has the highest increase in explanatory power by 0.11. By adding the two latter factors to the three-factor model, Austria, Sweden and Switzerland are the only countries with an increase in explanatory power, with all five factors being significant at the 10 % level. However, Austria is the only country where all the five factors are significant at the 5 % level.

When it comes to the international six-factor model, we find a marginal increase in explanatory power for all ten countries compared to the three-factor model. As for the significance of the slopes, we get somewhat varying results. The only country where all the international factors are significant at the 10 % level, is Belgium. This means that the international factors (US factors) do explain variations in Belgian returns, and according to these results, Belgium is the country which is the most integrated with the US of the European countries in our sample. Caution, however, needs to be taken due to the fact that the explanatory power only increases by 0.016.

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Appendix

Table 21: *Reported t-values (β) for all regressions where the excess market return is an explanatory variable.* $H_{0=}\beta=1$, $H_1=\beta\neq1$. *All values are t-values (β)*

	CAPM	THREE FACTOR	SMB	HML	LMH	MOM	FIVE FACTOR
SL	-2,94	-0,15	-2,74	-0,77	-2,44	-4,57	-1,70
SM	-5,52	-5,10	-5,84	-4,77	-2,68	-7,01	-1,69
SH	-1,34	-3,07	-0,76	-2,99	-1,93	-5,43	-3,43
IL	-8,07	-6,73	-7,96	-6,82	-3,77	-8,45	-4,02
IM	-3,33	-3,13	-3,17	-3,26	-1,77	-5,84	-3,36
IH	-1,87	-3,25	-1,55	-3,40	-2,51	-2,45	-1,60
BL	-4,57	-3,47	-4,67	-3,36	-1,23	-4,51	-1,90
BM	-6,01	-5,17	-6,16	-5,02	-1,02	-5,95	-1,92
BH	1,39	-1,11	1,05	-0,71	0,48	1,52	-1,07

Table 22: *Reported t-values (β) for all regressions on the country indices, where the excess market return is an explanatory variable.* $H_{0=}\beta=1$, $H_1=\beta\neq1$. *All values are t-values (β)*

	CAPM	THREE FACTOR	FIVE FACTOR	SIX FACTOR (dom)	SIX FACTOR (for)
UK	2,14	2,35	-6,34	2,89	-46,22
FRA	-7,79	-6,76	-1,45	-6,96	-30,55
NED	-4,77	-3,86	-2,12	-5,52	-24,91
SWE	1,24	2,24	7,93	-0,20	-17,85
BELG	-29,40	-28,98	-21,54	-23,42	-36,70
ITA	-1,19	-1,51	0,88	-3,08	-10,87
SUO	-1,22	-0,56	2,52	-2,99	-16,65
AUT	-1,65	-2,05	-1,18	-1,92	-14,43
GRE	-5,65	-4,80	-4,53	-4,88	-8,15
SUI	-37,88	-37,24	-29,68	-29,32	-36,82

Table 23: *List of companies used in the analysis, listed by name, country of origin and homepage*

Name	Country	Web Site
Big Yellow Group	UK	www.bigyellow.co.uk
British Land Co	UK	www.britishland.com
CLS Holdings	UK	www.clsholdings.com
Daejan HDG	UK	www.daejanholdings.com
Derwent London	UK	www.derwentlondon.com
Development Securities	UK	www.developmentsecurities.com
F&C Commercial Property Trust	UK	www.fandc.com
Grainger	UK	www.graingerplc.co.uk
Great Portland Estates	UK	www.gpe.co.uk
Hammerson	UK	www.hammerson.com
Helical Bar	UK	www.helical.co.uk
ING UK Real Estate Income Trust	UK	www.ingrealestate.com
Invista Foundation Property Trust	UK	www.ifpt.co.uk
IRP Property Investments	UK	www.fandc.com
ISIS Property Trust Ld	UK	www.fandc.com
Land Securities Group	UK	www.landsecurities.com
Liberty International	UK	www.liberty-international.co.uk
Minerva	UK	www.minervaplc.co.uk
Mucklow (A. & J.) Group	UK	www.mucklow.com
Primary Health Prop.	UK	www.phpgroup.co.uk
Quintain Estates and Development	UK	www.quintain-estates.com
Segro	UK	www.segro.com
Shaftesbury	UK	www.shaftesbury.co.uk
St. Modwen Properties	UK	www.stmodwen.co.uk
Standard Life Inv Prop Inc Trust	UK	http://uk.standardlifeinvestments.com/ifa/
UK Commercial Property Trust	UK	www.resolutionasset.com
Unite Group	UK	www.unite-group.co.uk
Workspace Group	UK	www.workspacegroup.co.uk
Affine	France	www.affine-group.com
Fonciere Des Regions	France	www.foncieredesregions.fr
Gecina	France	www.gecina.fr
Icade	France	www.icade.fr
Klepierre	France	www.klepierre.com
Mercialys	France	www.mercialys.fr
Silic	France	www.silic.fr
Unibail-Rodamco	France	www.unibail-rodamco.com
Allreal Hld N	Switzerland	www.allreal.ch
PSP Swiss Property	Switzerland	www.psp.info
Swiss Prime Site	Switzerland	www.swiss-prime-site.ch
Corio	The Netherlands	www.corio-eu.com
Eurocommercial Properties	The Netherlands	www.eurocommercialproperties.com
Nieuwe Steen Inv	The Netherlands	www.nsi.nl
ProLogis European Properties	The Netherlands	www.prologis-ep.com
Vastned Off/Ind	The Netherlands	www.vastned.nl
Vastned Retail	The Netherlands	www.vastned.nl
Wereldhave	The Netherlands	www.wereldhave.nl
Castellum	Sweden	www.castellum.se
Fabege	Sweden	www.fabege.se
Hufvufstaden A	Sweden	www.hufvudstaden.se
Klovern AB	Sweden	www.klovern.se
Kungsleden	Sweden	www.kungsleden.se
Wihlborg Fastigheter	Sweden	www.wihlborgs.se
Befimmo (Sicafi)	Belgium	www.beffimo.be
Cofinimmo	Belgium	www.cofinimmo.be