REIT behavior during times of uncertainty: An analysis of the Brexit

Ferry Manshanden

COLOFON

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Author: Ferry Manshanden

Student number: S3375757

E-mail: f.j.manshanden@student.rug.nl

Supervisor: Xiaolong Liu

Abstract

On the 23rd of June 2016, the British voted in a referendum to withdraw from the European Union. The Brexit has made a major impact on different aspects of the British economy. This paper investigates into what extend the Brexit influences the Real Estate Investment Trust (REIT) market. An event-study approach is applied to test the effects of five announcements leading to the Brexit on the returns of REITs. Abnormal returns will be calculated by predicting returns and subtracting them from the actual returns. The returns are predicted by four models: the Capital Asset Pricing Model, the Fama and French three-factor model, the Carhart four-factor model and the Fama and French five-factor model. For each event/announcement are five cumulative abnormal returns tested with a t-test. Two of the five events led to significant negative returns. Based on these four models, the day Prime Minister David Cameron declared he is in favor of an in/out referendum, the day the Prime Minister's plan was announced and the day that the Prime Minister reaffirmed his commitment to an in/out referendum did not have large effects on the REIT market. The day that the date of the referendum was announced and the day the results were announced had a significant negative effect on the REIT market. The outcomes of this research are in interest of academic analysts, investors and policy makers.

1. Introduction

On the 23rd of June 2016 a majority of 51.9% of the British voted to leave the European Union (Forbes, 2016). In London and the other major cities the majority voted to remain. However the majority in the less urbanized areas especially in the north of England voted to leave. The outcome was against the expectations as the polls were slightly in favor of remaining in the European Union (BBC, 2016). What followed on the day after was a day of political and financial chaos (Business Insider UK, 2017). The pound crashed the same day more than 10% at its lowest point. And all European stock markets crashed after the news of the Brexit (The Guardian, 2016). Germany's DAX ended the day 6.8% lower, France's CAC lost almost 8% at close and TFSE 100 lost 3%. In the year after the Brexit the growth rate of other European countries, the United States and Japan were climbing where British growth rates declined (Financial Times, 2017). The negotiations between the United Kingdom and the European Union are causing a lot of uncertainty for the British economy.

Despite analysts trying to predict how the Brexit will affect the British economy the exact effects will remain uncertain. The United Kingdom is the first country ever to withdraw from the European Union and therefore it is difficult to make predictions on the effects. The period between the referendum and the date of leaving the European Union there will be a lot of negotiations and policy changes. The uncertainty remains until Britain is out of the European Union. Uncertainty will have an effect of what investors are willing to pay for stocks. Previous research shows stock prices are likely to decrease when uncertainty increases (Ko and Lee, 2015; Brogaard and Detzel, 2015; Pastor and Varanesi, 2012). The research of Ko and Lee (2015), Brogaard and Detzel (2015) and Pastor and Varanisi (2012) show that economic policy uncertainty has a negative effect on stock prices in most periods of time. The reason behind this is that investors receive noisy signals (the news) and consider the future more risky. However, some periods in their research show the opposite is true. Also research on how stock prices reacted to the Brexit has been done (Oehler, Horn and Wendt, 2017; Belke, Dubova and Osowski). They found the Brexit led to abnormal negative returns. Abnormal returns are the actual returns minus the returns predicted by the model. However no research has been done on how REITs are affected by the uncertainty of the Brexit.

REITs are a type of stock and are just like them traded on major stock exchanges. However, the REIT market is a unique market as it has the characteristics of the stock market and the

characteristics of the real estate market (Fatnassi et al., 2014). As REITs have unique characteristics they also have distinct return characteristics (Chen et al., 1998). The REIT market has become a big market and it is of major importance that reactions of this market are understood by academic analysts, investors and policy makers. The total market capitalization of REITs in the United Kingdom is $64,000 million.[1] Therefore, it is important to do research on how REITs are affected in periods of uncertainty. As uncertainty increases REIT prices get more volatile. Higher volatility means more risk to investors and investors are risk-averse. This means REIT prices might decrease as uncertainty increases. However markets differ from each other and the characteristics of REITs are unique, no conclusions can't be made beforehand. Moreover, there has not been a similar situation before like the Brexit. Nevertheless, there is a good chance a certain situation will occur in the future. As there are multiple countries that might follow Britain. Sweden is one of those countries, like the United Kingdom Sweden refused to introduce the Euro as a currency (Washington post, 2016). Moreover, the country has problems with integrating the hundreds of thousands refugees. The Netherlands is another country that has been discussing to follow Britain to leave the European Union. The head of the PVV a popular right wing populist party supports to leave (Algemeen Dagblad, 2017). The reason for that is to close the borders to prevent terrorism.

As there is a plausible chance a similar situation will happen in the future, analyzing movements of REITs is in interest of academic analysts, investors and policy makers. If markets are understood better, potential negative effects like market crashes are more likely to be prevented or at least can be taken in to account. If the potential effects are known then politicians will be more likely to take this in to account before they are declaring to be in favor or against of stepping out of the European Union. And in case a referendum will take place, policy makers can try to decrease uncertainty by making plans if they know the potential effects.

This paper will analyze how REITs are affected by the Brexit. It will show what happens to the returns of REITs in the United Kingdom after news announcements about leaving the European Unions are released. Therefore the main research question of this paper is: How are REIT returns affected by the Brexit? In this paper several key-announcements of the Brexit will be tested on abnormal returns. This will make it clear how the real estate market reacts in times of economic policy uncertainty. Previous literature focused on stocks in general and included just

[1] The market capitalizations of the REITs included in this paper can be found in table 17 in the appendix. The data is from S&P Global Market Intelligence.

the day that the results of the referendum were announced. This paper contributes to the literature in the following ways. First, limited research has been done on how REITs in specific are affected by economic policy uncertainty. The majority of papers focused on the stock market. Second, this paper will look at the effects of the referendum and on the announcements leading up to the referendum as well. The events leading up to the referendum are likely to increase economic policy uncertainty already. Therefore, it is important to take the effects on the REIT market during these events into account. Existing literature mainly focused on the period of the referendum. This paper will improve understanding the behavior of the REIT market.

The second section of this paper will contain the literature review. The third section will discuss the requirements to be qualified as a REIT and the benefits of the REIT status. In the fourth section the methodology and the data are stated. After that in the fifth section the results will be discussed. And finally in the last section a conclusion will be made.

2. Theoretical framework

2.1 Effects of economic policy uncertainty on stock prices

Several papers have been written about the relationship between economic policy uncertainty and stock prices. Ko and Lee (2015) did research on how economic policy uncertainty affects stock prices in 11 countries over the period from 1998 until 2014. The countries they analyzed are the U.S., Canada, France, Germany, Italy, the U.K., Spain, China, India, Japan and Russia. The periods where most countries experienced most uncertainty where after 9/11, the war in Iraq, the bankruptcy of the Lehman Brothers, the Euro crisis, the Arab spring and the European sovereign crisis. In this paper a wavelet analyses is used to investigate how economic policy uncertainty affects stock prices. They found that if economic policy uncertainty increased stock prices decreased, especially during the early 2000s and late 2000s.

Brogaard and Detzel (2015) did research on how economic policy uncertainty affects asset-prices in the United States. The measured period reached from 1985 until 2015. They used the Baker et al. (2013) measure of uncertainty and tested how this affected asset-prices. The Baker et al. (2013) measure of uncertainty is a weighted average of major news regarding economic policy uncertainty, expiring tax provisions and forecaster disagreements about government purchases and inflation. They found an increase of one standard deviation in economic policy

uncertainty leads to a contemptuous 1.31% decrease in market returns. Moreover, they found that a portfolio with a high economic policy uncertainty beta underperforms a portfolio with a low economic policy uncertainty beta, controlling for exposure of the four factors of the Carhart-model. These findings imply economic policy uncertainty should be considered an important risk factor for equities.

Another research on policy uncertainty of stock prices is done by Pastor and Varanesi (2012) . They developed a simple asset pricing model and used it to make predictions of changes in government policy on stock prices. The predictions of this model follow from three key-assumptions: the government is quasi-benevolent, there is uncertainty about the actions of the government as well as the impact of the actions and the impacts of the policy choices look identical a priori. They found that announcements of policy changes have a decreasing effect on stock prices. Moreover do announcements of policy changes increase stock price volatility and correlation among stocks.

2.2 Effects of the Brexit on Stock prices

Some research has been done on the effects of the Brexit on stock prices. Oehler, Horn and Wendt (2017) did an event study on the referendum of the Brexit to test how it affected stock prices of the FTSE 100. To calculate the abnormal returns the days after the Brexit they subtracted the actual returns by the expected returns predicted by the one factor model by Sharpe(1964) and Lintner(1965). The estimation period in their research reached from the 26th of June 2015 until the 23rd of May 2016 and the event window reached from the 17th of June until the 28th of June 2016. By this they calculated the abnormal returns and the sum of that: the cumulative abnormal return. They found that stock returns of the FTSE 100 had abnormal negative returns significant at the one percent level the two days after the referendum. This means the asset-pricing factors (The information about the Brexit) weren't captured accurately by the market model these two days. However, besides the day of the announcement of the Brexit (day 0) and the day after the announcement of the Brexit (day 1) the results did not show significant negative returns. This means almost no additional negative abnormal returns occurred out of the period of these two days. They also ran a regression to test whether firm-internationalization affected the abnormal returns and the cumulative abnormal returns. The percentage of domestic sales was used as a proxy for the level of internationalization of the firms. They used control variables for firm size and sector as these factor as the proportion of

domestic sales might depend on that. They tested the abnormal return on the day of the announcement of the Brexit (day 0), the cumulative abnormal return from day -1 to day 1 and the cumulative return from day -1 to 5. All of these regressions showed that the domestic sales factor is significant at the five percent level and an adjusted R-squared above 20 percent. This means that the firms with mainly domestic sales had larger negative returns than firms with a high degree of internationalization.

Belke, Dubova and Osowski (2018) did research on how the Brexit affected the financial market volatility and the stock prices in different countries of the European Union. They used the empirical approach based on VAR variance decompositions proposed by Diebold and Yilmaz (2009;2012). The daily stock market volatility was calculated as the annualized daily standard deviation of daily high and low FTSE 250 prices. Their sample reached from the 1st of January 2001 to the 23rd of September 2016. The index of net spillovers from economic policy uncertainty to financial volatilities was positive besides a few exceptions. This means that economic policy uncertainty influenced the financial market to larger extent than volatility shocks of the financial market itself. After the referendum of the Brexit the net spillover index changed from 9% to 26%. The value of net spillover index after the Brexit referendum exceeded all historical values of the sample period and it remained high until the end of the sample period. Besides the effect of the Brexit referendum on UK financial marker volatilities did they also investigated the effects on international markets in this paper. The following countries were included in this paper: Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom and the United States. Daily stock returns of the most important stock indexes of the countries were used over the period reaching from the 1st of April until the 22nd of June 2016. A standard economic regressions is used controlled for changing expectations about the monetary policy by including 3-month futures and changing expectation on the global economy by using the S&P commodity price index. The results show that effects of the Brexit for non-European countries are weaker than for European countries. For the European countries they found that besides the United Kingdom the 'GIIPS' countries except for Greece had large negative returns.

2.3 The correlation between REITs and Stocks

A lot of researchers have found correlation between returns on REITs and returns on regular stocks. Previous research showed that economic policy uncertainty has a negative effect on

stock returns and the returns on stocks are positively correlated to return on REITs. However, correlations can vary over time and markets.

Chandrashekaran (1999) calculated correlations of REITs and the S&P 500 from 1975 until 1996. He divided the timespan is four periods. In the period from 1975-1979 the correlation was 0.61. After that it increased to 0,79 in the period 1980-1984. After that the correlations decreased with 0,75 between 1985-1989 and 0,48 between 1990-1996. Moreover, he did conclude that correlations between REITs and the stock market are higher after months where REIT prices went down than after months where REIT prices went up. This applied mainly for the later sub-periods.

Waggle and Aggrawel (2006) also found a declining pattern and overall a low correlation to the market. In the period of 1972-1987 they found a correlation 0,64. After that in the period of 1998-2002 the correlation declined to 0,36. The fact that REITs show correlation with stock prices are making it likely that REITs are also affected by economic policy uncertainty.

2.4 Determinants Real Estate returns

Several studies have been done on what drives the returns on real estate. Chui et al. (2003) did research on what the determinants are of REITs in the period before 1990 and the period after 1990. Their sample included all REITs that are traded on the NYSE, AMEX and Nasdaq for the period from 1984 to 2000. They found that in the pre-1990 period REIT returns are mainly driven by momentum, size, turnover and analyst coverage. In the post-1990 period they found that momentum mainly predicts the returns on REITs. This effect was stronger for larger and for more liquid REITs.

Bradley and Payne (2003) did research on how REITs react to macro-economic shocks. They analyzed the NAREIT index over the period from 1980 to 2000. In order to analyze the effects of macro-economic shocks they used a VAR model. They found that shocks in monetary policy lead to lower returns in real estate investment. This is consistent with the fact that monetary tightening leads to an increase in real interest rates. And an increase in real interest rates leads to lower activity on the real estate market. Unanticipated changes in economic growth lead to a decrease in REIT returns. Also, inflation leads to a decrease in REIT returns. An unexpected rise in default risk premium leads to an increase in REIT returns. The idea behind this is that

when investors have low expectations for of future economic activity, they may find bonds relatively unattractive compared to REITs.

De Wit and van Dijk (2003) focused on the effects on offices. Their article shows how macro-economic fundamentals affects office prices and rents. This research is done at a global basis. The data is used from major cities over Europe, Asia and Northern America and reaches from 1986 until 1999. De Wit and van Dijk used a model with non-stochastic macro-economic supply and demand variables. Changes in employment and GDP are demand variables and changes in vacancy and stock of the offices are supply variables. Time series and cross-sectional data are combined in this model. They found GDP, inflation, unemployment, vacancy and the available stock all affected real estate returns.

2.5 Event studies on REITs

Fuller, Jamani and Yu (2019) did an event study on REITs. They tested the impact on REITs of the transition of the classification of REITs in the S&P500. The transition of the classification of REITs was from the financial sector to the new created Global Industry Classification Standard named 'Real Estate'. The new classification started on the 19th of September 2016. To test the impacts of the event they ran a regression using the market-model, the adjusted market model, the Fama French three factor model and the Carhart four factor model. They found that prior the event date REITs showed significantly negative abnormal returns. After the event date REITs showed significantly positive abnormal returns. This means that by highlighting REITs prominently investors add them to their portfolios.

Glascock and Lu-Andrews (2015) did research on the price behavior of REITs during extreme market-related events. They included 30 negative events in their study which reached from 1992 to 2012. They estimated the abnormal returns on and after the events with the Capital Asset Pricing Model (CAPM). They found that REITs with higher liquidity and larger size react stronger to event and recover faster. REITs with higher liquidity and larger size have higher pre-event beta's which implies higher market risk.

2.6 Three-factor, Carhart and Five-factor model on REITs

Chiang, Lee and Wisen (2005) did research on whether the additional factors of Fama and French had more explanatory power than the one-factor model. They state the measurement is important for performing event studies. They tested the Fama and French three-factor model (Fama and French, 1993) on the daily returns of REITs over the period from 1972 to 2002. The additional factors are SMB which measures performance of small stock compared to large stocks and HML which measures the performance of value stock (high book-to-market ratio) relative to growth stocks (low book-to-market ratio). They concluded that this model is more useful in explaining REIT returns and in estimating the beta than the one factor model. The momentum factor has been proven to have a significant effect on REITs by several researchers. Chui, Titman and Wei (2003) have done research on the momentum effects of REITs in the U.S in the time period of 1984-2000. They found strong momentum effects for the period between 1990 and 2000. Also do they claim that REITs show stronger momentum effects than other industries. Hung and Glascock (2007) did research on momentum effects of REITs during different market states over the period of 1972-2000. They found that momentum effects of REITs are higher during up markets. A limitation of the momentum factor is that it is affected by firm size. Hong, Lim and Stein (2000) did research on the momentum effects for firms with different size. They found that momentum effects decline for larger firms. Chiang, Sing and Tsai (2016) did research on the spillover effects in REITs and used the Fama and French five-factor model. They found that all the five factors were significant for REITs. However, not much research has been done yet on REITs with the five-factor model.

2.7 Hypotheses

The research question of this paper is: How are REIT returns affected by the Brexit? The research question will be tested by two hypotheses. The first hypothesis that will be tested in this paper is whether REIT returns in the United Kingdom were affected by announcements leading to the referendum. The second hypothesis tests whether REIT returns in the United Kingdom were affected by the results of the Brexit referendum.

H0: The returns of REITs in the United Kingdom were not affected by announcements leading to the referendum.
H1: The returns of REITs in the United Kingdom were affected by announcements leading to the referendum.

H0: The returns of REITs in the United Kingdom were not affected by the results of the referendum.
H1: The returns of REITs in the United Kingdom were affected by the results of the referendum.

The expectations are that both hypotheses will be rejected. The expectations are that all events will lead to an increase of economic policy uncertainty. The increase of economic policy uncertainty is expected to have a negative effect on the REIT returns.

3. REITs requirements and benefits

The UK-REIT regime has been operational since the 1st of January 2007. To be qualified as a REIT certain requirements must be met (The London Stock Exchange, 2019). The requirements are divided into three categories: The company conditions, tax-exempt business conditions and the balance of business conditions. The company conditions consist out of the fact that a UK REIT must be a company and solely resident in the UK for tax purposes. It must not be an open-ended investment company and not be a close company. It must be listed to the London Stock Exchange. It must have one class of ordinary shares. The tax-exempt business conditions are that a UK REIT must contain at least three single rental properties, a property can't represent more than 40% of the total value of the property rental business and at least 90% of property rental business profits should be distributed by dividends. The balance of business conditions are that at least 75% of the total profits must arise from it's tax exempt business and the value of the UK REIT's assets must be at least 75% of the total value of it's assets.

The REIT status has multiple benefits for the company as for investors (The London Stock Exchange, 2019). The benefits for the company are the tax efficient structure, access to new investors/capital, potential closes performance to Net Asset Value (NAV) and acquisition currency. The benefits for investors are tax transparency, potentially high-yield returns, access to property for minimal outlay, low/controlled gearing, portfolio diversification, liquidity and strong corporate governance. The high liquidity does imply that REITs are vulnerable when an increase in economic policy uncertainty occurs.

4. Data and Methodology

4.1 Methodology

On the bases of an event study will be determined whether the announcement dates affected the stock prices of REITs in the United Kingdom. The usefulness of an event study comes from the fact that the effects of events, in this case announcements of the Brexit referendum, are reflected in security prices immediately (MacKinley, 1997). This means that the economic impact can be measured by security prices over a relatively short time. The security prices in this paper are measured on a daily basis. Daily returns are most common in event studies as they are readable available and have an acceptable range (Thompson, 1995). An event study examines whether during an 'event window' there has been abnormally positive or abnormally negative returns (Lamdin, 2001). The event window is the entire period of time a stock price reaction may occur. The event window contains at least the day of the news/announcement and the day after news/announcement (MacKinley,1997). It is common to define the event window by the day of the event and five days subsequent of the event (Oberndorfer & Schmidt, 2013). Therefore the first event window of this study contains a total of six trading days (0,+5) . However, accounting for different event windows allows a for a more detailed analyses. Also the event window of the day of the event occurred and the day after the event will be included in the results (0,+1). This shows whether there were significant abnormal return right after the news. Also the event window which contains a longer period will be included. This event window is able to show if there is a recovery which might not be included in the other event windows. This event window includes the day of the event to 10 days after the event (0,+10). Finally, also the event windows of (-1,+1) and (-2,+2) will be taken in to account. These event windows also measure effects before the announcement.

Estimations windows are used to estimate coefficients. The estimated coefficients are obtained by running regressions with four models during the estimation windows.[3] With these coefficients the returns can be predicted during the event windows for each model and each event window. The estimation window is usually the period prior the event window. Following MacKinley (1997) the estimation window will comprise of the 250 trading days prior to the event. The days before the event and the days in the event window should not be included in the estimation window as it will influence the normal performance model parameters (MacKinley,1997). Therefore, the 6 trading days before the event are excluded from the estimation window.

[3] Estimated coefficients are presented in the appendix.

Widely used models to perform event studies are the market model and the one-factor model (MacKinley,1997). The one-factor model is based on the Capital Asset Pricing Model (CAPM):

$$(1)\ \mathrm{Eret}_t = \beta_0 + \beta_1(\mathrm{rmkt} - \mathrm{rf}) + \varepsilon_t$$

Where ERet is the estimated return of the REITs. Rmkt stands for the return of the market and rf for the risk free rate. The ε is the error term. The Capital Asset Pricing model is the first model that will be used to make the predictions. Fama and French (1996) invented a model with additional factors which is better as it has more explanatory power. Chiang, Lee and Wisen (2005) have stated that the additional explanatory power compared to the one-factor model applies to REITs too. Therefore, the Fama and French three-factor model is the second model used in this study to make predictions on the so-called normal returns:

$$(2)\ \mathrm{Eret}_t = \beta_0 + \beta_1(\mathrm{rmkt} - \mathrm{rf}) + \beta_2\,\mathrm{SMB}_t + \beta_3\,\mathrm{HML}_t + \varepsilon_t$$

The SMB measures performance of small stocks compared to large stocks. HML stands for high minus low book-to-market ratio. It measures the performance of value stocks relative to growth stocks. Several researchers (Chui, Titman and Wei, 2003; Hung and Glascock, 2007) state that the momentum factor also increases explanatory power in predicting REIT returns. The Carhart four-factor model is model by Carhart (1997) which is the Fama and French three-factor model extended by the momentum factor. The Carhart four-factor model is the third model used in this paper:

$$(3)\ \mathrm{Eret}_t = \beta_0 + \beta_1(\mathrm{rmkt} - \mathrm{rf}) + \beta_2\,\mathrm{SMB}_t + \beta_3\,\mathrm{HML}_t + \beta_4\mathrm{REITMOM}_t + \varepsilon_t$$

REITMOM is the momentum. The momentum variable implies that past returns are a good predictor of future returns (Chui, Titman and Wei, 2003). To get the daily momentum a one-day lag variable will be created for the daily REIT returns.

Fama and French (2015) added two additional factor to the three-factor model. Chiang, Sing and Tsai (2016) found significant effects for adding the two factors. The Fama and French five-factor model is the fourth model used in this paper:

(4) $\text{Eret}_t = \beta_0 + \beta_1(\text{rmkt} - \text{rf}) + \beta_2\,\text{SMB}_t + \beta_3\,\text{HML}_t + \beta_3\,\text{RMW}_t + \beta_3\,\text{CMA}_t + \varepsilon_t$

The RMW measures the difference between the returns on diversified portfolios of stocks with robust and weak profitability. The CMA factor measures the difference between returns on diversified portfolios of the stocks of low and high investment firms. The abnormal returns are the actual returns minus the normal returns predicted by the models over the event window. The abnormal return is:

(5) $\text{Abret}_t = \text{Acret}_t - \text{Eret}_t$

After calculating the abnormal returns for each day of the event window the cumulative abnormal returns will be calculated. The average of the cumulative return will be tested to see whether the event significantly affected the returns of the REITs. The formulae for the estimates of the average of the cumulative abnormal return is:

(6) $\text{Est(acar)} = \frac{1}{N}\sum \text{AbRet}$

Following Steiner and Heinke (2001) a simple t-test will be used to test on significantly negative returns. The t-value will be calculated for all the daily abnormal returns and for all the cumulative abnormal returns. The formula of the t-value is as follows:

(7) $\text{Tvalue} = \text{AbRet}/\text{SE}$

Abret is the abnormal return and SE is the standard error of the abnormal return.

(8) $\text{SE} = \sigma/\sqrt{n}$

The t-value will determine whether the returns are significant or not significant. The daily abnormal returns and the cumulative abnormal returns for the five different event windows are

for each event tested on significance at the 1-percent level, the 5-percent level and the 10-percent level.

4.2 Data and descriptive statistics

In order to measure the impacts of the Brexit on the returns on REITs we look at several announcements. Event 1 to 4 will be tested in the first hypothesis. Event 5 will test the second hypothesis The five events are presented in the following table:

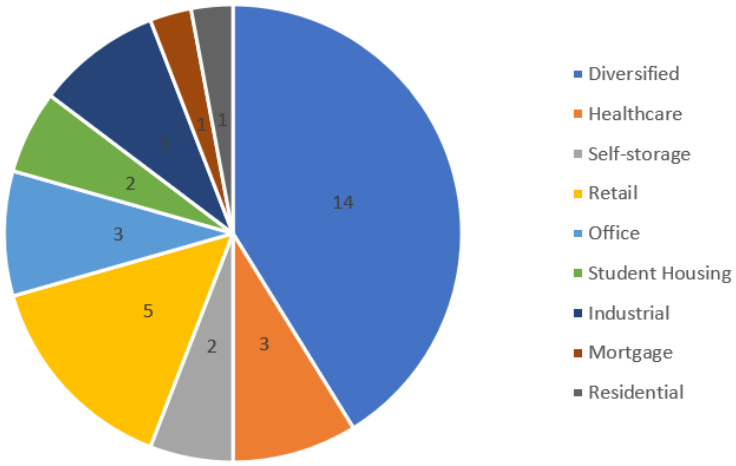
Table 1: Event Timeline

	Event	Date
Event 1	Prime Minister David Cameron declares he is in favor of an in-out referendum for the United Kingdom in the European Union	23rd of January 2013
Event 2	David Cameron sets out his plan for the in/out referendum in a meeting with the European Council	25th of June 2015
Event 3	David Cameron reaffirms his commitment to a referendum and states this will happen before the end of 2017	10th of November 2015
Event 4	The referendum date is announced. It will take place on the 23rd of June 2016.	22nd of February 2016
Event 5	The results of the referendum are announced. The majority of the population of the United Kingdom voted to leave the European Union. There were 16,141,241 (48.1%) citizens voted to remain membership of the European Union. There were 17,410,742 (51.9%) who voted to leave the European Union.	24th of June 2016

There are currently 50 REIT status firms in the United Kingdom. All types of REITs are considered in this paper (equity, mortgage and hybrid). From this 50 REITs there are 34 REITs

used in this research. The remaining REITs are left out as their REIT status was acquired after the first date of the last estimation window. The REITs have the following focus of investments:

Figure 1: Focus of investments



The REITs that are included in the sample are the firms which had a REIT status throughout the entire period consisting the estimation period and the event window for the event. If the REIT status was attained later than the first date of the estimation window, the REIT will be excluded from the sample. Information on the individual REITs included in this research can be found in the appendix.[4] Table 1 shows the means, the standard deviations, the minimum and the maximum for the event windows.

The historical stock prices of the all individual REITs in the United Kingdom are retrieved from S&P Global Market Intelligence. S&P Global Market Intelligence is a platform which provides data, research, news and analytics to institutional investors, banks and universities. With this data the daily returns for the individual REITs will be calculated. Only the daily returns of the REITs that had REIT status throughout the entire estimation window and the event window will be used in the regression. The Fama and French factors for Europe are retrieved from the website of Fama and French (Fama & French, 2019). This data source is considered appropriate as it is the website of the designers of the models. This data source is also used by previous papers using these models. The descriptive statistics of the data are presented in the following table:

Table 2: Descriptive statistics for the REIT returns, Market returns, SMB factor and HML factor

[4] See table 17 in the appendix.

	Estimation Window				Event Window			
	Mean	**Std dev**	**Min**	**Max**	**Mean**	**Std dev**	**Min**	**Max**
				Event 1				
REITs	0,03	0,80	-1,99	2,61	-0,10	0,49	-1,30	0,44
The market	0,06	1,16	-3,47	4,49	0,03	0,55	-1,40	0,59
SMB	-0,01	0,46	-1,65	1,26	0,04	0,19	-0,18	0,43
HML	0,02	0,49	-1,32	1,68	0,01	0,05	-0,05	0,14
RMW	0,00	0,30	-0,76	0,81	0,06	0,26	-0,39	0,43
CMA	0,03	0,24	-0,59	0,61	-0,05	0,20	-0,45	0,27
				Event 2				
REITs	0,04	0,63	-1,65	3,47	-0,22	0,57	-1,25	0,65
The market	-0,01	0,46	-2,52	2,63	-0,26	0,61	-1,13	0,91
SMB	0	0,45	-1,5	1,53	0,04	0,20	-0,27	0,36
HML	-0,01	0,38	-1,37	1,62	0,02	0,08	-0,09	0,20
RMW	0,02	0,24	-0,71	0,95	0,03	0,40	-0,22	0,34
CMA	-0,01	0,22	-0,84	0,59	-0,03	0,32	-0,33	0,76
				Event 3				
REITs	0,07	0,69	-3,26	3,41	-0,06	0,59	-0,97	0,87
The market	0,01	1,05	-3,4	3,15	-0,06	0,48	-0,65	0,88
SMB	0,03	0,54	-1,5	1,53	-0,02	0,18	-0,47	0,21
HML	-0,06	0,41	-1,37	1,62	0,02	0,09	-0,14	0,15
RMW	0,03	0,23	-0,71	0,83	0,13	0,23	-0,29	0,44
CMA	-0,02	0,23	-0,84	0,76	-0,03	0,23	-0,42	0,51
				Event 4				
REITs	-0,02	0,77	-3,26	3,41	-0,04	1,05	-1,78	1,72
The market	-0,07	1,11	-3,4	3,15	0,20	0,67	-1,17	1,18
SMB	0,05	0,56	-1,62	1,87	-0,01	0,27	-0,49	0,44
HML	-0,06	0,42	-1,18	1,75	-0,06	0,11	-0,21	0,13
RMW	0,05	0,24	-1,03	0,81	-0,01	0,51	-1,06	0,94
CMA	-0,02	0,25	-0,79	0,76	0,05	0,23	-0,19	0,36
				Event 5				
REITs	-0,02	0,86	-3,16	3,09	-2,17	5,87	-15,50	4,41
The market	-0,03	1,12	-3,4	3,15	-0,52	2,49	-6,54	2,11

SMB	0,04	0,59	-1,62	1,87	-0,05	0,37	-0,47	0,93
HML	-0,04	0,48	-1,32	1,75	0	0,01	-0,02	0
RMW	0,06	0,31	-1,06	0,94	0,18	0,66	-0,50	1,63
CMA	-0,01	0,26	-0,79	0,69	0,15	0,26	-0,29	0,84

5. Results

5.1 Performance of the models

Almost all of the dependent variables are significant in the estimation models for event 1. Only the HML factor in the Three-factor model and Carhart model and the CMA factor in the Five-factor model are not significant. The R^2's are all higher than 0,57. This indicates that the models explain at least 57% of variability of the data. Also for event 2 are almost all of the dependent variables significant. Only the momentum factor of the Carhart model is not significant. All the R^2's are higher than 0,34. For the estimations of event 3 and event 4 are the HML factor and the momentum factor of the Carhart model not significant. Also, the RMW factor and CMA factors of the Five-factor model are not significant for the estimations of event 3 and event 4. This implies that for the estimations of the event 3 and event 4 the Carhart model and the Five-factor model are not better predictors than the other models. All the R^2's are higher than 0,39 for event 3 and all the R^2's are higher than 0,44 for event 4. For the estimation of event 5 the HML factor is not significant in the Three-factor model. The HML factor and the momentum factor are not significant in the Carhart model. The RMW factor of the Five-factor model is not significant. All the R^2's are higher than 0,46 for event 5.[5]

The estimations of event 1 are not contaminated as no economic policy uncertainty increasing event took place during the estimation period. The estimation period of event 2, event 3 and event 4 can be considered clean as well. During the estimation periods of these events there was not another event which had significant negative effects. The estimation period of event 5 might be contaminated by event 4. However, these events are related to each other. It is common when a referendum takes place that the announcement of the referendum was made in the 250 trading days before the referendum. Other papers also did not exclude the negative returns of the announcement.

[5] See all regression results in the appendix.

5.2 Event 1

The first Key date leading to the Brexit referendum was the 23rd of January 2013. Prime Minister David Cameron declares he is in favor of an in-out referendum for the United Kingdom in the European Union. The following cumulative abnormal returns are estimated by the four models:

Table 3: Cumulative abnormal returns Event 1

Event Window	CAPM	Three-factor	Carhart	Five-factor
0,+1	-0,0096	-0,2228	-0,2442	-0,1627
	(-0,0149)	(-0,3601)	(-0,4057)	(-0,2706)
0,+5	-1,3606	-1,3326	-1,3373	-1,2609
	(-1,5450)	(-1,4901)	(-1,5524)	(-1,4115)
0,+10	-1,4232	-2,0427	-2,0535	-1,9924
	(-1,3170)	(-1,8715*)	(-1,9458*)	(-1,7721*)
-1,+1	-0,7087	-0,9772	-0,9864	-0,8390
	(-1,0065)	(-1,4147)	(-1,4875)	(-1,2243)
-2,+2	-1,1699	-1,3526	-1,3532	-1,1154
	(-1,3921)	(-1,6047)	(-1,6787*)	(-1,3345)

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

All the event windows are showing negative cumulative abnormal returns. The longest event window reaching from the day of the event to ten trading days after the event is significant on the 10-percent level for each model except for the CAPM. The event window reaching from two days prior to the event to two days after the event is according to the Carhart four-factor model significant on the 10-percent level too. This means there is a 90 percent chance the returns were negatively affected during these event windows. This is because the first day and the last two days of these event windows which are not included in the other event windows show relatively high negative returns.[2] The other event windows did not show significant results. The results are not in line with the expectations. The announcement of Prime Minister David Cameron wherein he declares he is in favor of an in-out referendum is not increasing the

economic policy uncertainty to a level that leads to all significant results. Apparently in this early stage the Brexit is considered too unlikely.

5.3 Event 2

The second major event leading up to the Brexit referendum was the day that Prime Minister of the United Kingdom David Cameron sets out his plan for the in/out referendum to the European Council. This happened on the 25th of June 2015. The predictors give the following cumulative abnormal returns:

Table 4: Cumulative abnormal returns Event 2

Event Window	CAPM	Three-factor	Carhart	Five-factor
0,+1	0,1996	0,2395	0,2322	0,1674
	(0,2882)	(0,36360)	(0,3514)	(0,2361)
0,+5	0,3196	0,2558	0,2297	0,6826
	(0,2800)	(0,2373)	(0,2196)	(0,6030)
0,+10	-0,5964	-0,5156	-0,5552	-0,2962
	(-0,4418)	(-0,4124)	(-0,4572)	(-0,2222)
-1,+1	0,0032	0,1410	0,1242	0,2121
	(0,0039)	(0,1804)	(0,1622)	(0,2546)
-2,+2	-0,1008	-0,1219	-0,1457	0,1536
	(-0,0956)	(-0,1226)	(-0,1507)	(0,1473)

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 4 shows that the news in which Prime Minister David Cameron sets out his plan for the in/out referendum did not lead to any abnormal returns for the REITs in the United Kingdom. There are no significant daily abnormal returns and no significant cumulative abnormal returns observed.[6] Like event 1 the chances of a Brexit are considered too low to lead to high economic policy uncertainty. This is not in line with the expectations. An explanation for this could be that David Cameron's actions are considered as a political game and investors are not expecting that the referendum will take place.

[6] See table 17 in the appendix

5.4 Event 3

The third major news announcement leading up for the Brexit is the day that David Cameron reaffirms his commitment to a referendum and states this will happen before the end of 2017. He reaffirms this on the 10th of November of 2015. The regression of four models lead to the following estimated cumulative abnormal returns:

Table 5: Cumulative abnormal returns Event 3

Event Window	CAPM	Three-factor	Carhart	Five-factor
0,+1	0,0398	0,0827	0,0714	0,1280
	(0,0549)	(0,1196)	(0,1046)	(0,1858)
0,+5	0,4628	0,7523	0,7110	0,9411
	(0,3754)	(0,6363)	(0,5988)	(0,7934)
0,+10	-0,8713	-0,3454	-0,4241	-0,0759
	(-0,6210)	(-0,2539)	(-0,3012)	(-0,0551)
-1,+1	-0,2057	-0,3844	-0,3930	-0,3199
	(-0,2328)	(-0,4590)	(-0,4713)	(-0,3826)
-2,+2	-1,6789	-1,7440	-1,7683	-1,6871
	(-1,4659)	(-1,5934)	(-1,6115)	(-1,5411)

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

The news announcement in which David Cameron reaffirms his commitment to a referendum and states this will happen before the end of 2017 also did not lead to any significant cumulative abnormal returns. And the only significant daily abnormal return is measured two days before the announcement. This daily abnormal return is significant at the 10 percent level. The REIT market dropped by 1,41 percent on this day but it is not clear what the reason for this was. On the day of the news announcement REIT prices remained quiet stable. The average REIT price decreased by 0,05% and the day after the announcement the REIT prices increased a bit by 0,4%. The stable returns after this event imply that the economic policy uncertainty did not increase enough. Apparently this announcement is a similar situation like the announcement of event 2. The announcement is considered as a politically point of interest and the chances that the Brexit will happen are considered low. The expectation was that this announcement would

lead to an increase in economic policy uncertainty and thereby to significant negative abnormal returns.

5.5 Event 4

The fourth major news announcement leading up to the Brexit referendum is the 22nd of February 2016. On this day an announcement is made that the Referendum will take place at the 23rd of June 2016. The four models give the following estimated cumulative abnormal returns:

Table 6: Cumulative abnormal returns Event 4

Event Window	CAPM	Three-factor	Carhart	Five-factor
0,+1	-2,0551	-1,9915	-1,9850	-1,9140
	(-2,5588**)	(-2,6720***)	(-2,7025***)	(2,5970***)
0,+5	-3,2611	-2,8066	-2,7933	-2,7151
	(-2,2593**)	(-2,1361**)	(-2,1274**)	(-2,1030**)
0,+10	-2,1610	-1,7868	-1,7855	-1,3350
	(-1,3272)	(-1,0974)	(-1,0965)	(-0,8199)
-1,+1	-2,5802	-2,6789	-2,6724	-2,7832
	(-2,6825***)	(-2,9328***)	(-2,9487***)	(-3,0984***)
-2,+2	-3,5368	-4,4029	-4,3986	-4,8037
	(-2,6535***)	(-3,6297***)	(-3,6339***)	(-4,0314***)

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

All the different event windows for the date that the referendum is announced give a negative cumulative abnormal returns. The three shortest event windows are all significant at the 1-percent level. This means there is a 99 percent chance the event had a negative effect on REIT returns. From the 18th of February to the 24th of February the abnormal returns were negative. On the day of the announcement and the 24th of February these negative returns were significant. The negative abnormal return on the 22nd of February is significant at the 1-percent level and the negative abnormal return on the 24th of February is significant at the 5-percent level by three out of the four models. The event window reaching from the day of the announcement to five days after the announcement is significant at the 5-percent level. This is

because the daily returns of the 25th of February and the 29th of February were positive. The cumulative abnormal return of the event window that is reaching from the event date to ten days after the event is not significant. This is mainly because there was a recovery after the shock. On the 2nd of March the positive abnormal return was even significant on the 1-percent level. The results of this announcement are in line with the expectations. As the date of the referendum is announced investors realize there is a reasonable chance the Brexit will happen. No longer is the Brexit considered as unlikely to happen. This means economic policy uncertainty increases and REIT returns decrease.

5.6 Event 5

The last key-date tested in this research is the referendum of the Brexit itself. The in/out referendum took place on the 23rd of June 2016. The results of the referendum were announced on the 24rd of June 2016. The majority of the population of the United Kingdom voted to leave the European Union. The four models give the following estimates for the cumulative abnormal returns:

Table 7: Cumulative abnormal returns Event 5

Event Window	CAPM	Three-factor	Carhart	Five-factor
0,+1	-18,3646	-16,6420	-17,1315	-16,9564
	(-19,4847***)	(-18,7527***)	(-19,0534***)	(-19,5160***)
0,+5	-14,6458	-13,3448	-13,9209	-14,1865
	(9,7158***)	(-9,2132)	(-9,6415***)	(-10,0106***)
0,+10	-19,7392	-17,9636	-18,8928	-19,1934
	(-10,3245***)	(-9,7041***)	(-9,7405***)	(-10,4755***)
-1,+1	-17,4388	-15,853	-16,3378	-16,0794
	(-15,1790***)	(-14,6007***)	(-15,3345***)	(-15,1499***)
-2,+2	-14,6054	-13,2271	-14,0877	-13,4372
	(-10,1212***)	(-9,6427***)	(-10,5556***)	(-9,9971***)

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 7 shows that the Brexit referendum led to very high negative returns. All the different event windows have a cumulative abnormal return which is significant at the 1-percent. This implies that the probability that the referendum has led to negative abnormal REIT returns is over 99 percent. Moreover, the cumulative abnormal returns of REITs are lower than then the cumulative abnormal returns for regular stocks found by Oehler, Horn and Wendt (2017). However, the cumulative abnormal returns of regular stocks were also significant at the 1-percent level for each event window. The results are in line with the expectations that the results of the referendum had a significant negative effect on REIT returns. Also, all the daily abnormal returns except for the 30th of June and the two days before the referendum are significant. The two trading days after the referendum showed very high abnormal negative returns. The 24th of June the average REIT price decrease 15,5% and on the 27th of June the average REIT price decreased another 9,8%. The Carhart model predicted the REIT prices should decrease only 5,4% and 2,9% in these two days. Remarkable is that the following two days returns were abnormal positive. On the 28th of June the prices on the REIT market increased by 4,4% which was 2,4% higher than predicted and on the 29th of June it increased by 3,9% which was 1,5% higher than predicted by the Carhart model. However, after this recovery the REIT prices dropped again. From the 1st of July to the 6th of July negative abnormal returns followed again. After that in the last two days of the event window the abnormal returns were positive again.

6. Conclusions and Discussion

In this paper the effects of the economic policy uncertainty of the Brexit on the REIT market have been tested. Five key-dates leading up to the Brexit are tested by using an event study. For this event study the Capital Asset Pricing Model, the Fama and French three-factor model, the Carhart four-factor model and the Fama and French five-factor model have been used for estimations. In this paper five events are evaluated. This includes four major news announcements leading up to the in/out referendum and the day the results of the Brexit are announced. The first three events did not lead to significant negative returns. The last two events did lead to significant negative returns.

The first three events leading up to the Brexit barely had a significant impact on REIT returns. Only two cumulative abnormal returns of these three events were significantly negative. The reason for this is probably that these events were in a too early stage of the Brexit. Moreover, these events were announcements of the Prime Minister and could be considered as political

motives. However, the day that the referendum date was announced and the day the referendum was held the effects were very large. Only one cumulative abnormal return calculated over these two events was not significant. These results imply that in a later stage of the withdrawal from the European Union the economic policy uncertainty increased which led to significant abnormal returns for REITs.

The effects of the first four events can not be compared to previous literature as no research has been done on these events yet. The effects of the Brexit referendum on REITs is stronger than the effect of the Brexit referendum on regular stocks. Even though, REITs and stocks both had negative cumulative abnormal returns that are significant at the 1-percent level.

The first three events led to unexpected results. The expectations were that announcements on the Brexit would lead to economic policy uncertainty and thereby to negative REIT returns. However, the first three events barely led to significant negative returns.

The findings of these paper are relevant as it explains how REIT returns react during times of economic policy uncertainty. The REIT market is a large and unique market. Therefore, it is important to do research on the behavior of REIT returns. In many European countries is the political debate on leaving the European Union so chances are likely a similar situation like the Brexit will occur in the future.

A limitation of this research is that different types of REITs are not taken in to account. During the measured period of economic policy uncertainty only 34 firms had REIT status in the U.K.. This is not enough to test the effects on different types of REITs. Larger studies need to be conducted to find out if the different types of REITs are affected differently by economic policy uncertainty. Also, future research on REITs in different countries has to be done to learn more about REIT behavior. This study only includes REITs in the United Kingdom. Results might differ in other countries. Several countries are having the political debate on leaving the European Union or another situation of economic policy uncertainty may occur. A suggestion for future research on the effects of economic policy uncertainty on UK REITs is the period reaching from the referendum to the actual Brexit. This period also brought a lot of uncertainty as there has been a lot of political debate on the Brexit.

References

Antonakakis, N., Gupta, R. and André, C., 2015. Dynamic co-movements between economic policy uncertainty and housing market returns. *Journal of Real Estate Portfolio Management*, *21*(1), pp.53-60.

BBC. 2016. EU referendum poll tracker. [ONLINE] Available at: https://www.bbc.com/news/uk-politics-eu-referendum-36271589 [Accessed on 16th of June 2019].

Belke, A., Dubova, I. and Osowski, T., 2018. Policy uncertainty and international financial markets: The case of Brexit. *Applied Economics*, pp.1-19.

Brogaard, J. and Detzel, A., 2015. The asset pricing implications of government economic policy uncertainty. Management Science, 61(1), pp.3-18.

Business Insider. 2017. The day after Brexit: Remembering a chaotic day in the markets one year ago. [ONLINE] Available at: http://uk.businessinsider.com/what-happened-the-day-after-brexit-in-markets-2017-6?international=true&r=UK&IR=T. [Accessed 2 July 2018].

Carhart, M.M., 1997. On persistence in mutual fund performance. *The Journal of finance*, *52*(1), pp.57-82.

Chandrashekaran, V, 1999. Time-Series Properties and Diversification Benefits of REIT Returns. Journal of Real Estate Research, 17, 91-112.

Chen, S.J., Hsieh, C., Vines, T. and Chiou, S.N., 1998. Macroeconomic variables, firm-specific variables and returns to REITs. *Journal of Real Estate Research*, *16*(3), pp.269-278.

Chiang, K.C., Lee, M.L. and Wisen, C.H., 2005. On the time-series properties of real estate investment trust betas. *Real Estate Economics*, *33*(2), pp.381-396.

Chiang, M.C., Sing, T.F. and Tsai, I.C., 2017. Spillover risks in REITs and other asset markets. *The Journal of Real Estate Finance and Economics*, *54*(4), pp.579-604.

Chui, A, Titman, S & Wei, J, 2003. The Cross section of Expected REIT Returns. Real Estate Economics, 31, 451-479.

De Wit, I & Van Dijk. R, 2003. The global determinants of direct office real estate returns. Journal of Real Estate Finance and Economics, 1, 27-45.

Diebold, F.X. and Yilmaz, K., 2009. Measuring financial asset return and volatility spillovers, with application to global equity markets. *The Economic Journal*, *119*(534), pp.158-171.

Diebold, F.X. and Yilmaz, K., 2012. Better to give than to receive: Predictive directional measurement of volatility spillovers. *International Journal of Forecasting*, *28*(1), pp.57-66.

Fama, E.F. and French, K.R., 1993. Common risk factors in the returns on stocks and bonds. *Journal of financial economics*, *33*(1), pp.3-56.

Fama, E.F. and French, K.R., 1996. Multifactor explanations of asset pricing anomalies. *The journal of finance*, *51*(1), pp.55-84.
Fatnassi, I., Slim, C., Ftiti, Z. and Maatoug, A.B., 2014. Effects of monetary policy on the REIT returns: Evidence from the United Kingdom. *Research in International Business and Finance*, *32*, pp.15-26.
Fuller, P., Yamani, E. and Yu, G., 2019. The impact of the new real estate sector on REITs: an event study. *Journal of Economics and Finance*, pp.1-19.
Forbes. 2016. Britain Backs Brexit--Against All Expectations. [ONLINE] Available at: https://www.forbes.com/sites/tedbromund/2016/06/24/britain-backs-brexit-against-all-expectations/#53c86017c302. [Accessed 2 July 2018].
Glascock, J.L. and Lu-Andrews, R., 2015. The price behavior of REITs surrounding extreme market-related events. *The Journal of Real Estate Finance and Economics*, *51*(4), pp.441-479.
Het Algemeen Dagblad. 2016. Wilders wil nog steeds een Nexit ondanks kritiek D66. [ONLINE] Available at: https://www.ad.nl/binnenland/wilders-wil-nog-steeds-een-nexit-ondanks-kritiek-d66~adf3ecf4/. [Accessed 3 July 2018].
Hong, H., Lim, T. and Stein, J.C., 2000. Bad news travels slowly: Size, analyst coverage, and the profitability of momentum strategies. *The Journal of Finance*, *55*(1), pp.265-295.
Hung, S & Glascock, J, 2008. Momentum Profitability and Market Trend: Evidence from REITs. The Journal of Real Estate Finance and Economics, 37(1), 51-69.
Ko, J.H. and Lee, C.M., 2015. International economic policy uncertainty and stock prices: Wavelet `approach. *Economics Letters*, *134*, pp.118-122.
Mendelianae Brunensis, 64(6), 2015–2024.
Lintner, J., 1965. The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. *The Review of Economics and Statistics*, *47*(1), pp. 13-37.
Oberndorfer, U., Schmidt, P., Wagner, M. and Ziegler, A., 2013. Does the stock market value the inclusion in a sustainability stock index? An event study analysis for German firms. *Journal of Environmental Economics and Management*, *66*(3), pp.497-509.
Oehler, A., Horn, M. and Wendt, S., 2017. Brexit: Short-term stock price effects and the impact of firm-level internationalization. *Finance Research Letters*, *22*, pp.175-181.
Pastor, L. and Veronesi, P., 2012. Uncertainty about government policy and stock prices. *The journal of Finance*, *67*(4), pp.1219-1264.

REIT.com. 2018. Interest Rates, Inflation, the Stock Market and REITs: What are the Risks?. [ONLINE] Available at: https://www.reit.com/news/blog/market-commentary/interest-rates-inflation-stock-market-and-reits-what-are-risks. [Accessed 2 July 2018].

Sharpe, W.F., 1964. Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance*, *19*(3), pp.425-442.

The Financial Times. 2017. Brexit uncertainty hurting UK economy, says IMF. [ONLINE] Available at: https://www.ft.com/content/1615ddc2-36dc-3aea-b077-04657dfd0a56. [Accessed 3 July 2018].

The Guardian. 2016. Brexit panic wipes $2 trillion off world markets - as it happened. [ONLINE] Available at: https://www.theguardian.com/business/2016/jun/24/global-markets-ftse-pound-uk-leave-eu-brexit-live-updates. [Accessed 2 July 2018].

[ONLINE]Availableat:https://www.londonstockexchange.com/specialist-issuers/reits/howtoqualifyasauk-reit . [Accessed 22th of February 2019].

[ONLINE] Available at: https://www.londonstockexchange.com/specialist-issuers/reits/what-is-a-reit/why-issue.htm. [Accessed 22th of February 2018].

[ONLINE] Available at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html. [Accessed 2th of March 2019].

The Washington Post. 2016. These countries could be next if Britain leaves the EU. [ONLINE] Available at: https://www.washingtonpost.com/news/worldviews/wp/2016/06/23/these- countries-could-be-next-if-britain-leaves-the-e-u/?noredirect=on&utm_term=.9d13cbbd94a0. [Accessed 2 July 2018].

Steiner, M. and Heinke, V.G., 2001. Event study concerning international bond price effects of credit rating actions. *International Journal of Finance & Economics*, *6*(2), pp.139-157.

Thompson, R., 1995. Empirical methods of event studies in corporate finance. *Handbooks in operations research and management Science*, *9*, pp.963-992.

Appendix

Table 8: Abnormal returns Event 1

	CAPM	Three-factor	Carhart	Five-factor
06-02-2013	-0,1090	-0,3961	-0,3906	-0,3170
	(-0,2120)	(0,7926)	(-0,7996)	(-0,6538)

05-02-2013	-0,4703	-0,3636	-0,3533	-0,3883
	(-0,9151)	(0,7278	(-0,7236)	(-0,8010)
04-02-2013	0,6361	0,3898	0,3761	0,3141
	1,2377	(0,7801)	(0,7702)	(0,6479)
01-02-2013	-0,7957	-0,9582	-0,9778	-0,9130
	(-1,5482)	(-1,9176*)	(-2,0026**)	(-1,8833*)
31-01-2013	0,6762	0,6181	0,6293	0,5727
	(1,3157)	(1,2369)	(1,2889)	(1,1814)
30-01-2013	0,4259	0,3603	0,3568	0,3222
	(0,8286)	(0,7211)	(0,7308)	(0,6645)
29-01-2013	0,1757	0,3027	0,2910	0,3280
	(0,3419)	(0,6058)	(0,5960)	(0,6766
28-01-2013	-1,2671	-1,2888	-1,2638	-1,3541
	(-2,4653***)	(-2,5793***)	(2,5881***)	(-2,7932***)
25-01-2013	-0,2955	-0,3007	-0,2963	-0,1685
	(-0,5749)	(-0,6018)	(-0,6067)	(-0,3475)
24-01-2013	-0,1657	-0,0742	-0,0705	-0,1079
	(-0,3223)	(-0,1484)	(-0,1444)	(-0,2226)
23-01-2013	-0,2340	-0,3319	-0,3546	-0,2806
	(-0,4453)	(0,6642)	(-0,7262)	(-0,5788)
22-01-2013	0,2244	-0,1091	0,1104	0,1179
	(0,4366)	(0,2183)	(0,2261)	(0,2431)
21-01-2013	-0,6991	-0,7549	-0,7422	-0,6763
	(-1,3602)	(-1,5108)	(-1,5201)	(-1,3950)

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 9: Abnormal returns Event 2

	CAPM	Three-factor	Carhart	Five-factor
09-07-2015	-0,1127	-0,0507	-0,0402	0,0330
	(-0,2252)	(-0,1063)	(-0,0842)	(0,0634)
08-07-2015	-0,4875	-0,2085	-0,2219	-0,6499
	(-0,9743)	(-0,4368)	(-0,4648)	(-1,2483)
07-07-2015	-0,4842	-0,4869	-0,4992	-0,2904

	(-0,9678)	(-1,0201)	(1,0457)	(-0,5578)
06-07-2015	-0,1106	-0,2847	-0,2813	-0,4607
	(-0,2211)	(-0,5964)	(-0,5893)	(-0,8850)
03-07-2015	0,2791	0,2593	0,2575	0,3891
	(0,5578)	(0,5434)	(0,5395)	(0,7474)
02-07-2015	-0,5585	-0,4568	-0,4658	-0,6340
	(-1,1162)	(-0,9571)	(-0,9759)	(-1,2179)
01-07-2015	0,2402	0,3137	0,3163	0,4811
	(0,4800)	(0,6571)	(0,6626)	(0,9241)
30-06-2015	0,4988	0,3420	0,3380	0,6685
	(0,9969)	(0,7166)	(0,7081)	(1,2841)
29-06-2015	-0,0605	-0,1826	-0,1909	-0,0003
	(-0,1210)	(-0,3826)	(-0,3999)	(-0,0006)
26-06-2015	0,0429	0,0888	0,0822	-0,0169
	0,0857	(0,1860)	(0,1722)	(-0,0325)
25-06-2015	0,1567	0,1507	0,1500	0,1843
	(0,3132)	(0,3158)	(0,3143)	(0,3540)
24-06-2015	-0,2029	-0,0995	-0,1080	0,0448
	(0,4055)	(-0,2063)	(-0,2263)	(0,0860)
23-06-2015	-0,0370	-0,0803	-0,0790	-0,0582
	(-0,0739)	(-0,1683)	(-0,1654)	(-0,1118)

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 10: Abnormal returns Event 3

	CAPM	Three-factor	Carhart	Five-factor
24-11-2015	-0,6244	-0,4115	-0,4252	-0,4064
	(-0,8595)	(-0,8169)	(-0,8573)	(-0,8084)
23-11-2015	-0,8595	-0,8017	-0,8092	-0,8276
	(-1,6431)	(-1,5915)	(-1,6316)	(-1,6464)
20-11-2015	0,0427	-0,0186	-0,0219	0,0220
	(0,0816)	(-0,0369)	(-0,0441)	(0,0437)
19-11-2015	0,2576	0,2524	0,2484	0,2761

	(0,4924)	(0,5011)	(0,5009)	(0,5494)
18-11-2015	-0,1505	-0,1183	-0,1243	-0,0812
	(-0,2878)	(-0,2348)	(-0,2507)	(-0,1616)
17-11-2015	0,1860	0,4218	0,4091	0,4759
	(0,3555)	(0,8373)	(0,8249)	(0,9468)
16-11-2015	0,3296	0,3605	0,3541	0,4121
	(0,6301)	(0,7156)	(0,7140)	(0,8198)
13-11-2015	0,2763	0,3945	0,3842	0,3988
	(0,5282)	(0,7831)	(0,7747)	(0,7933)
12-11-2015	-0,3689	-0,5073	-0,5078	-0,4736
	(-0,7052)	(-1,0070)	(-1,0239)	(-0,9422)
11-11-2015	0,0788	-0,0105	-0,0117	-0,0141
	(0,1507)	(-0,02	(-0,0236)	(-0,0281)
10-11-2015	-0,0390	0,0932	0,0831	0,1421
	(-0,0746)	(0,1851)	(0,1675)	(0,2826)
09-11-2015	-0,2455	-0,4671	-0,4644	-0,4478
	(-0,4693)	(-0,9272)	(-0,9364)	(-0,8909)
06-11-2015	-1,1043	-0,8523	-0,8675	-0,8936
	(2,1111**)	(-1,6919*)	(-1,7491*)	(-1,7778*)

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 11: Abnormal returns Event 4

	CAPM	Three-factor	Carhart	Five-factor
07-03-2016	-0,6795	-0,7586	-0,7599	-0,8399
	(-1,1657)	(-1,3884)	(-1,411)	(-1,5501)
04-03-2016	-0,2036	-0,4200	-0,4236	-0,5951
	(-0,3492)	(-0,7687)	(-0,7865)	(-1,0983)
03-03-2016	0,8937	0,8519	0,8464	1,0750
	(1,5332)	(1,5519)	(1,5717)	(1,9840)
02-03-2016	1,5313	1,8631	1,8623	2,1446
	(2,6269***)	(3,4100***)	(3,4581***)	(3,9581***)
01-03-2016	-0,4418	-0,5166	-0,5174	-0,4044
	(-0,7579)	(-0,9455)	(-0,9608)	(-0,7465)

29-02-2016	0,3934	0,3620	0,3628	0,2436
	(0,6748)	(0,6626)	(0,6736)	(0,4495)
26-02-2016	-0,4931	-0,1428	-0,1450	0,1344
	(-0,8459)	(-0,2614)	(-0,2692)	(0,2481)
25-02-2016	-0,1621	0,0569	0,0634	-0,0440
	(-0,2781)	(0,1042)	(0,1177)	(-0,0812)
24-02-2016	-0,9442	-1,0912	-1,0896	-1,1351
	(-1,6198)	(-1,9972**)	(-2,0232**)	(-2,0949**)
23-02-2016	-0,2218	-0,5067	-0,5024	-0,5778
	(-0,3896)	(-0,9274)	(-0,9329)	(1,0663)
22-02-2016	-1,8332	-1,4848	-1,4826	-1,3351
	(-3,1449***)	(-2,7176***)	(-2,7530***)	(-2,4662**)
19-02-2016	-0,5251	-0,6873	-0,6830	-0,8692
	(-0,9008)	(-1,2580)	(-1,2648)	(1,6042)
18-02-2016	-0,0124	-0,6328	-0,6184	-0,8854
	(-0,0212)	(-1,1582)	(-1,1451)	(-1,6341)

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 12: Abnormal returns Event 5

	CAPM	Three-factor	Carhart	Five-factor
08-07-2016	1,8787	1,7432	1,8291	1,6848
	(2,8131***)	(2,7473***)	(2,9203***)	(2,7160***)
07-07-2016	1,8359	1,7205	1,5565	1,5055
	(2,7489***)	(2,7116***)	(2,4851***)	(2,4270***)
06-07-2016	-3,4041	-3,2760	-3,4904	-3,3880
	(5,0971***)	(-5,1631***)	(-5,5725***)	(-5,4619***)
05-07-2016	-4,2419	-3,6584	-3,7071	-3,5428
	(-6,3665***)	(-5,7658***)	(-5,9186***)	(-5,7114***)
04-07-2016	1,1519	-1,1480	-1,1609	-1,2663
	(-1,7248*)	(-1,8093*)	(-1,8521*)	(-2,0414**)
01-07-2016	-1,0220	-1,2114	-1,2142	-1,2710
	(-1,5302)	(-1,9092*)	(-1,9386*)	(2,0490**)
30-06-2016	-0,5544	-0,5252	-0,3689	-0,6919

	(-0,8302)	(-0,8277)	(-0,5890)	(-1,1154)
29-06-2016	2,3330	2,2590	2,4264	1,8666
	(3,4932***)	(3,5602***)	(3,8739***)	(3,0091)
28-06-2016	2,9623	2,7748	2,3673	2,8663
	(4,4354***)	(4,3731***)	(3,7795***)	(4,6207***)
27-06-2016	-7,4136	-6,3362	-6,9454	-6,5102
	(-11,1004***)	(-9,9860***)	(-11,0887***)	(-10,4952***)
24-06-2016	-10,9511	-10,3058	-10,1861	-10,4461
	(-16,3971***)	(-16,2422***)	(-16,2626***)	(-16,8403***)
23-06-2016	0,9258	0,7890	0,7937	0,8769
	(1,3863)	(1,2435)	(1.2672)	(1,4137)
22-06-2016	-0,1289	-0,1489	-0,1172	-0,2240
	(-0,1930)	(-0,2347)	(-0,1871)	(-0,3611)

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 13: Regression Capital Asset Pricing Model from 7th of February 2012 to the 22nd of January 2013

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.5097	0.0294	17.33***	0.000***
Constant	0,0030	0.0342	0.09	0.930
R^2		0.5537		
Adjusted R^2		0.5518		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 14: Regression Fama and French Three-factor model from 7th of February 2012 to the 22nd of January 2013

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.6448	0.0493	13.07***	0.000***
SMB	0.4055	0.1164	4.48***	0.001***
HML	-0.0487	0.0817	-0.60	0.552
Constant	-0.0003	0.0335	-0.01	0.992
R^2		0.5759		
Adjusted R^2		0.5706		

Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 15: Regression Carhart-four factor model from 7th of February 2012 to the 22nd of January 2013

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.6578	0.0486	13.54***	0.000***
SMB	0.3999	0.1142	3.50***	0.001***
HML	-0.0833	0.0810	-1.03	0.305
Momentum	-0.1413	0.0417	-3.39***	0.001***
Constant	-0.0047	0.0330	-0.14	0.887
R^2		0.5953		
Adjusted R^2		0.5885		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 16: Regression Fama and French Five-factor model from 7th of February 2012 to the 22nd of January 2013

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.5936	0.0570	10.41***	0.000***
SMB	0.3229	0.1187	2.72***	0.007***
HML	-0.2877	0.1359	-2.12**	0.035**
RMW	-0.5557	0.2022	-2.75***	0.006***
CMA	-0.1636	0.1692	-0.97	0.335
Constant	0.0139	0.0337	0.41	0.681
R^2		0.5901		
Adjusted R^2		0.5814		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 17: Regression Capital Asset Pricing Model from the 9th of July 2014 to the 24th of June 2015

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.4196	0.0385	10.90***	0.000***
Constant	0.0432	0.0338	1.28	0.202

R^2		0.3406		
Adjusted R^2		0.3377		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 18: Regression Fama and French Three-factor model from the 9th of July 2014 to the 24th of June 2015

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.5475	0.0492	11.12***	0.000***
SMB	0.3172	0.0921	3.44***	0.001***
HML	-0.1870	0.0876	-2.14**	0.034**
Constant	0.0357	0.0331	1.08	0.281
R^2		0.3851		
Adjusted R^2		0.3773		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 19: Regression Carhart-four factor model from the 9th of July 2014 to the 24th of June 2015

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0,5321	0,0495	10,75***	0,000***
SMB	0,2997	0,0916	3,27***	0,001***
HML	-0,1702	0,0871	-1,95**	0,052**
Momentum	0,0424	0,0519	0,82	0,416
Constant	0,0414	0,0332	1,25	0,213
R^2		0,3883		
Adjusted R^2		0,3772		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 20: Regression Fama and French Five-factor model from the 9th of July 2014 to the 24th of June 2015

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.5703	0.0490	11.64***	0.000***
SMB	0.2606	0.0921	2.83***	0.005***
HML	-0,2419	0.1243	-1.95*	0.053*

RMW	-0.5042	0.2342	-2.15**	0.032**
CMA	-0.6962	0.2138	-3.26***	0.001***
Constant	0.0307	0.0325	0.94	0.347
R^2		0.4132		
Adjusted R^2		0.4003		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 21: Regression Capital Asset Pricing Model from the 24th of November 2014 to the 9th of November 2015

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.4195	0.0334	12.47***	0.000***
Constant	0.0645	0.0352	1.83*	0.068*
R^2		0.3991		
Adjusted R^2		0.3966		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 22: Regression Fama and French Three-factor model from the 24th of November 2014 to the 9th of November 2015

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.5863	0.0492	11.91***	0.000***
SMB	0.3894	0.0929	4.19***	0.000***
HML	-0.2203	0.0848	-2.60***	0.010***
Constant	0.0368	0.0344	1.07	0.285
R^2		0.4519		
Adjusted R^2		0.4448		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 23: Regression Carhart-four factor model from the 24th of November 2014 to the 9th of November 2015

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.5792	0.0494	11.73***	0.000***
SMB	0.3747	0.0932	4.02***	0.000***

HML	-0.2122	0.0846	-2.51	0.013
Momentum	-0.0008	0.0488	0.02	0.986
Constant	0.0429	0.0347	1.24	0.217
R^2		0.4550		
Adjusted R^2		0.4454		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 24: Regression Fama and French Five-factor model from the 24th of November 2014 to the 9th of November 2015

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.5862	0.0493	11.88***	0.000***
SMB	0.3761	0.0950	3.96***	0.000***
HML	-0.2774	0.1052	-2.64***	0.009***
RMW	-0.1902	0.1963	-0.97	0.333
CMA	-0.0265	0.1735	-0.15	0.879
Constant	0.0394	0.0346	1.14	0.256
R^2		0.4543		
Adjusted R^2		0.4425		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 25: Regression Capital Asset Pricing Model from 6th of March 2015 to the 19th of February 2016

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.4520	0.0338	13.37***	0.000***
Constant	0.0133	0.0377	0.35	0.724
R^2		0.4248		
Adjusted R^2		0.4224		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 26: Regression Fama and French Three-factor model from 6th of March 2015 to the 19th of February 2016

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.6248	0.0457	13.68***	0.000***

SMB	0.4525	0.0897	5.04***	0.000***
HML	-0.1865	0.0872	-2.14**	0.033**
Constant	-0.0095	0.0362	-0.26	0.794
R^2		0.4867		
Adjusted R^2		0.4803		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 27: Regression Carhart-four factor model from the 6th of March 2015 to the 19th of February 2016

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.6245	0.4611	13.54***	0.000***
SMB	0.4527	0.0902	5.02***	0.000***
HML	-0.1864	0.0880	-2.12	0.035
Momentum	0.0032	0.0473	0.07	0.946
Constant	-0.0094	0.0364	-0.26	0.796
R^2		0.4832		
Adjusted R^2		0.4745		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 28: Regression Fama and French Five-factor model from 6th of March 2015 to the 19th of February 2016

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.6421	0.0459	13.99***	0.000***
SMB	0.4810	0.0910	5.29***	0.000***
HML	-0.3855	0.1469	-2.63***	0.009***
RMW	-0.1116	0.2265	-0.49	0.623
CMA	0.4186	0.1722	2.43	0.016
Constant	-0.0095	0.0365	-0.26	0.794
R^2		0.4997		
Adjusted R^2		0.4892		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 29: Regression Capital Asset Pricing Model from the 9th of July 2015 to the 23rd of June 2016

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.5159	0.0368	14.03***	0.000***
Constant	-0.0127	0.0414	-0.31	0.759
R^2		0.4611		
Adjusted R^2		0.4587		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 30: Regression Fama and French Three-factor model from the 9th of July 2015 to the 23rd of June 2016

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.6681	0.0515	12.97***	0.000***
SMB	0.4059	0.0976	4.16***	0.000***
HML	0.0184	0.0864	0.21	0.831
Constant	-0.0209	0.0402	-0.52	0.605
R^2		0.4992		
Adjusted R^2		0.4926		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 31: Regression Carhart-four factor model from the 9th of July 2015 to the 23rd of June 2016

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.6720	0.0527	12.75***	0.000***
SMB	0.4035	0.0997	4.05***	0.000***
HML	0.0152	0.0874	0.17	0.861
Momentum	-0.0406	0.0492	-0.82	0.411
Constant	-0.0247	0.0412	-0.60	0.549
R^2		0.4996		
Adjusted R^2		0.4906		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 32: Regression Fama and French Five-factor model from the 9th of July 2015 to the 23rd of June 2016

	Coefficient	Standard error	T-value	P-value
Rmkt-rf	0.7077	0.0515	13.75***	0.000***
SMB	0.4335	0.0956	4.53***	0.000***
HML	-0.3037	0.1539	-1.97**	0.050**
RMW	-0.2683	0.2104	-1.27	0.204
CMA	0.6364	0.1789	3.56***	0.000***
Constant	-0.0162	0.0400	-0.41	0.685
R^2		0.5268		
Adjusted R^2		0.5163		
Observations		244		

*: significance at a 10 percent level, **: significance at a 5 percent level, ***: significance at a 1 percent level

Table 33: Market cap, Investment focus and REIT status

	Market Captilization in usd	Investment focus	REIT status of
AEWU UK REIT (AEWU)	174,4	Diversified	apr-15
Assura (AGR)	1673,4	Healthcare	apr-13
Big Yellow Group (BYG)	1873,6	Self-storage	jan-07
British Land Company (BLND)	6617,1	Diversified	jan-07
Capital & Regional (CAL)	263,5	Retail	dec-14
Custodian REIT (CREI)	584,8	Diversified	mrt-14
Derwent London (DLN)	5352,8	Office	jul-07
Empiric Student Property (ESP)	704,7	Student Housing	jul-14
F&C Real Estate Investments (FCRE)	303,4	Diversified	jan-15
GCP Student Living (DIGS)	783	Student Housing	mei-13
Great Portland Estates (GPOR)	2413	Office	jan-07
Ground Rents Income Fund (GRIO)	134,6	Diversified	aug-12
Hammerson (HMSO)	3329,2	Diversified	jan-07
Hansteen Holdings (HSTN)	476,6	Industrial	okt-09
Highcroft Investments (HCFT)	73,9	Mortgage	mrt-13
INTU Properties (INTU)	1916,1	Retail	jan-07

Land Securities (Land)	7777,3	Diversified	jan-07
The Local Shopping REIT (LSR)	29,1	Retail	mei-07
LondonMetric Property (LMP)	1576,1	Diversified	jan-07
McKAY Securities(MCKS)	302	Office	apr-07
Mucklow(A&J) Group (MKLW)	411	Diversified	jul-07
Newriver Retail (NRR)	827,9	Retail	nov-10
Primary Health Properties (PHP)	1125,8	Healthcare	jan-07
Real Estate Investors (RLE)	124,6	Diversified	jan-15
RDI REIT PLC (RDI)	719,8	Diversified	dec-13
SEGRO(SGRO)	7930,7	Industrial	jan-07
Safestore Holdings (SAFE)	1451,8	Self-storage	apr-13
Secure Income REIT (SIR)	1580,2	Diversified	jun-14
Schroder Real Estate Investment Trust (SREI)	376,3	Diversified	mei-15
Shaftesbury (SHB)	3296,4	Retail	apr-07
Standard Life Investments Property Income Trusts (SLI)	410,3	Diversified	jan-15
Target Healthcare REIT (THRL)	534,4	Healthcare	jun-13
Tritax Big Box REIT (BBOX)	2541,3	Industrial	sep-12
Workspace Group (WKP)	1919,2	Office	jan-07

Programming:

In excel:

Step 1: Filter out the REITs that acquired REIT status after the first date of the estimation window.

Step 2: Get the average of the REIT return.

Step 3: Create a file with the Fama and French factors and the average of the REIT returns and open this file in Stata.

Programming codes in Stata:

Step 4: Gen momentum = REITret[_n-1]

Step 5:

Reg REITRet MarketRet

Reg REITRet MarketRet SMB HML

Reg REITRet MarketRet SMB HML MOM

Reg REITRet MarketRet SMB HML RMW CMA

Step 6: Sum REITRet MarketRet SMB HML RMW CMA

Now all descriptive statistics and estimated coefficients are complete.

In excel:

Step 7: Use the coefficients in excel to estimate the REIT returns by using the Carhart-four factor model.

Step 8: Subtract the estimated returns from the actual returns to get the abnormal returns.

Step 9: Divide the abnormal returns by the standards errors to get the t-values.

Step 10: Add up the abnormal returns to get the cumulative abnormal return for the five event windows.

Step 11: Divide the cumulative abnormal returns by the standard errors to get the t-values.