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European Student Housing: Sector Capitalization, Drivers and Investment Characteristics

Real Estate Finance MPhil

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The dissertation is submitted for the degree of Master of Philosophy

UNIVERSITY OF CAMBRIDGE

Department of Land Economy

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Abstract

This dissertation sought to investigate the student housing sector in Europe, focusing on the investment characteristics, drivers and performance of this asset class. Over the last decade the sector has grown substantially, but there has been little done to track the sector. This research, through access to transactional data from 2007 to 2017, created a hedonic index for both the UK and Europe which was used to compare to other real estate sectors. Results indicate that student housing acts as a diversifier owing to its non-traditional drivers. The sector had representation only in the UK-based mixed asset portfolios while the European sector's higher volatility prevented its inclusion. Interviews highlighted the differences between the two regions with the higher education industry, supply and demand dynamics and the regulation of the student housing sector all important for explaining why the UK market has grown substantially more than Europe. This research confirms the strength of student housing not only as an alternative investment, but also as an asset class in its own right.

Key words: alternatives, student housing, hedonic index, mixed-asset portfolio

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Chapter 1 – Introduction

Higher education is a global industry. It is forecasted to be worth $70 billion worldwide by 2020 (JLL 2017a). The importance of the sector to national economies is further highlighted by Cushman and Wakefield (2018) who state that in the OECD, 43% of 25-34 year olds hold a university degree, while in the UK specifically, the university sector has contributed historically around £95 billion to the economy whilst also providing 940,000 jobs. Furthermore, student mobility has risen, with Portugal's international student population rising 70% in five years, the Netherlands receiving a record of 112,000 applications from abroad for 2017/18 while London is expected to see its international student population increase by over 50% in the next decade (Class of 2020, 2017). More recently, European academic institutions have seen significant increases in international enrolment. This has been driven by a multitude of factors, with Figure 1 highlighting the cost of education for EU students, with the cost of studying in the UK substantially higher than other EU countries. Furthermore, there has been a substantial increase in English taught programmes (hereafter ETPs) which has made European universities more attractive to international students. ETPs in the Netherlands have increased by around 1700 since 2007 while in France over the same time period, ETPs have grown from 11 to 1200 (JLL 2017a).

Country	Cost
France	€ 200-650
Germany	€ 0-1000
Ireland	€ 0-3000
Italy	€ 850-1000
Poland	€ 2000-3000
Portugal	Approx. € 1000
Spain	€ 680-2000
Sweden	Free
The Netherlands	€ 2000
United Kingdom	Up to € 10,500

Figure 1. A table highlighting the typical cost of undergraduate education across Europe for EU students at public university (Cushman & Wakefield 2017)

As well as growing international student populations, there has been a growth of students in general who have enrolled in higher education. The Office of National Statistics (2016) highlight that the number of 18 and 24 years old in full-time education between May 1992 and July 2016 grew from 984,000 to 1.87 million in the UK. There has also been a growth of European students in tertiary education. For example, Spain has seen the percentage of the population who have completed tertiary

education rise from 9.9% in 1991 to 35.7% in 2016. France over the same period has seen an increase of 20% so that 34.6% of their population have completed tertiary education (OECD 2018). It is unsurprising therefore that the housing of students is also a growing industry. Investors have focused on the sector and significant levels of investment in purpose built student accommodation (hereafter PBSA) have taken place. Students find accommodation from a range of sources, whether it is PBSA, renting or staying at home. PBSA has been the focus of substantial investment over the last decade especially in the UK, with around €18 billion of investment taking place since 2010 while Europe has only experienced €4 billion over the same timeframe (JLL 2017a). The growth and performance of this part of the student accommodation sector will be the focus of this dissertation.

Little has been done to track the performance of the student housing sector as an investment asset. Data issues have been critical to this. There has previously been insufficient levels of data to be able to track the performance of UK and European student accommodation markets. Being able to track the asset performance is critical from an investment perspective and vital for considering allocation of funds to the sector. Traditionally appraisal-based indices have been relied upon within the sector but in my research I will seek to overcome this data limitation through the creation and use of a hedonic index based on transaction data between 2007-2017 for the UK and Europe, provided by Real Capital Analytics. I will then use the indices to not only draw conclusions on its performance but also to consider how it performs in relation to other real estate asset classes and within a mixed-asset portfolio.

The results of my research indicate that student housing deserves a place in UK asset portfolios as student housing acts as a good diversifier which can provide strong returns. In order to explain this performance and identify the drivers of the capitalization of both sectors interviews were used. Interviews were conducted with individuals in the industry and critically point to the UK's excellent higher education industry as a key factor in supporting its stronger performance. Furthermore, supply and demand dynamics, regulation of the sector and greater liquidity in the UK enabled its development over Europe.

1.1 Research Questions

The following research questions have provided an appropriate way to structure my research, enabling the exploration of the student accommodation sectors in both the UK and Europe with regards to their performance, investment characteristics and the capitalization of the sector:

1. How does the student housing sector perform relative to other real estate asset classes?
2. Using the mean-variance approach, does UK and European student housing receive any allocation into a mixed-asset portfolio based on data between 2007 and 2017?
3. Why is the student accommodation market undergoing a process of capitalization and is there a difference in drivers between the UK and Europe?

Chapter 2 - Literature Review

2.1 Alternative Real Estate & Student Housing

Alternative real estate have received substantial attention and investment recently, and as the 2015 IPF report written by Mansley and Lizieri (2015) highlight, alternative real estate, has increased its representation in the IPD annual index from 4.2% to 11.3% between 2003 and 2013. Defining what is an alternative asset is critical to this research, as well as highlighting the benefits of investing in these asset classes. CBRE (2016) define alternative real estate assets as "investable commercial real estate asset classes outside of the traditional sectors of office, retail, industrial and hotels". It is important to define what gives sectors such as student accommodation, infrastructure and residential the "alternative" label. The primary consideration is the cash flow that the physical assets produce. As Mansley and Lizieri (*ibid*) argue, cash flows not only reflect the supply/demand dynamics of the market and the drivers of the traditional sectors, but can also have drivers that are specific to the sector. An example would be population growth, which has significant impact on the healthcare and senior living sectors, as well as immigration, which can impact the residential market. It is these non-traditional drivers that give these sectors its alternative label. Saiz (2007) finds that in US destination cities an immigration inflow into a city equivalent of 1% of the city's population results in rents and the value of housing rising by 1%. Therefore, it is essential to consider the other possible drivers of the sector and how they are the cause for increased capitalization. A final aspect of the alternatives to consider is that they are operational businesses as well as the real estate. Cushman & Wakefield (2018) state that student accommodation is a key to investors' allocations to operational businesses as there is growth possibility and a defensive aspect to these business models.
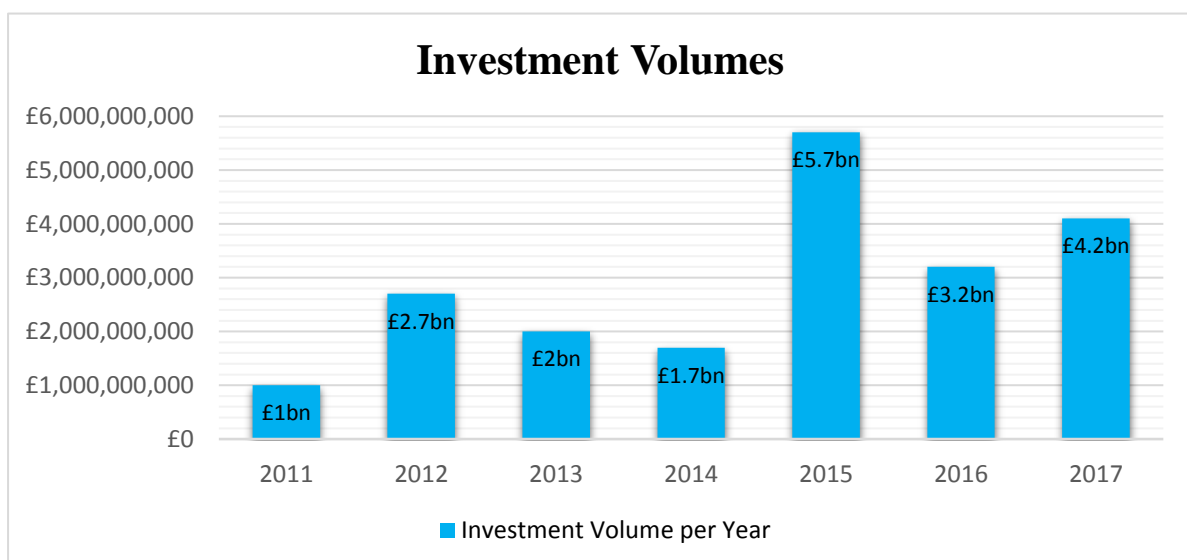

Figure 2. A Graph showing the changes in investment volumes in the UK student housing market between 2011 and 2017 (JLL 2018)

Alternative sector investment has grown dramatically and when compared to the traditional sectors, its size vastly outweigh them. This is outlined by Mitchell (2014), who for the UK estimates that that the residential sector was worth in mid-2013 £4,615 billion with the private rental sector worth £837 billion. At the same time, commercial real estate (retail, office and industrial) was estimated to be £647 billion (*ibid*). What is more, there has been a significant increase in alternative investment since the financial crisis of 2007 as investors have sought to diversify their position. As Savills (2017) allude to, investors have turned to alternative real estates to provide access to real estate as well as the income stream that large pension funds require to maintain the growing ageing population. Figure 2, published by JLL (2018) highlights the increase in investment in student housing, rising from £1 billion in 2011 to £5.7 billion in 2015, and the five-year average investment over that period being £3.3 billion. JLL attribute this to the diversification benefits that alternative real estate assets provide to investors. This will be explored later in this chapter which discusses real estate in mixed-asset portfolios.

Alongside the increase of alternative investment there has been the increased capitalization of the student housing sector in both the UK and Europe. As outlined earlier, the UK market has received far more focus than the rest of Europe. A key driver of capitalization has been the perceived superiority of UK universities that have attracted not only more international students, but also increased international investment. Capitalization of the sector has been driven by a multitude of other factors, including the desire of investors to have access to a less cyclical sector that provides a steady income stream with strong growth potential. It is the aim of this dissertation to identify the key factors that are driving the capitalization of the sector.

2.2 Real Estate Indices

A key process in any investment market is the flow of information, and quicker information flows allow for more accurate decision-making (Geltner et al. 2003). Real estate indices play an important role in providing information on real estate sectors. However as Devaney and Diaz (2011) state, the heterogeneity of real estate assets, lack of transactions and private nature of the market make creating accurate indices difficult. Therefore, appraisal-based indices are the most commonly associated with real estate markets. These types of indices focus on the capital and income growth of assets over a particular timeframe (Roubi 2015). Appraisal-based indices contain a significantly larger proportion of commercial properties than other types of real estate indices and therefore investors can estimate average returns, volatilities and correlations with other assets (Fisher et al. 1994). In addition, the strong valuation profession in the UK maintains a high standard in the appraisal process.

However there are a number of issues with appraisal-based indices that have been widely discussed in the literature. The foremost of these is appraisal smoothing. Smoothing of an index reduces the volatility in asset performance and as a result it allows for real estate to give the representation of better performance than its actual performance (Fisher et al. 1994). McAllister et al. (2003) argue that this can occur through a number of practices. Anchoring occurs when appraisers relate the current appraisal to previous ones carried out for the asset when the process actually requires that past appraisals be ignored and as a result, value change is underestimated (*ibid*, Diaz & Wolverton 1998). Another process that reduces asset volatility, as Brown & Matysiak (2000) highlight, is that appraisers will often not change the asset value without there being a large enough market change to cross a minimum threshold and as a result therefore, asset volatility is underestimated within appraisal-based indices. Finally, clients can influence the valuation process (Kinnard et al 1997) as highlighted by Crosby et al. (2018) who's research during the financial crisis of 2007- 2008 showed that the value of real estate assets owned by close-ended funds fell by 2% less than the market value to maintain fund value whilst those owned by open-ended funds fell by greater than the market average. Therefore, appraised-based indices need to be corrected for this to properly account for this smoothing.

REIT indices provide instantaneous information of REIT performance through the constantly changing share price which is enabled by REIT market liquidity (Fisher et al. 1994). The market is considered to be more "informationally efficient" (Hoesli et al. 2015) owing to liquidity, lower transaction costs and a greater number of market players. Discussion has taken place over whether REITs provide real estate returns. The seminal paper that considers this issue in significant depth was written by Hoesli and Oikarinen (2012) who through exploration of international real estate data found that in the long run, REIT performance is more closely related to direct real estate than equity markets. Critical however is the need to de-leverage the REIT performance or leverage up the direct real estate index to remove or add sufficient volatility to the respective index. Furthermore, REIT indices often lead direct real estate indices owing to the more efficient market. This is outlined in the articles by numerous authors, such as Crosby and McAllister (2004) who see that the lag varies between 50 to 90 days depending on sector while Hoesli et al. (2015) find that REIT returns can be used to predict direct real estate returns and in some sectors, such as the industrial sector there is evidence that direct real estate lags behind REITs. However, owing to the public nature of the market, REIT indices can be affected by sentiment-driven performance and management related effects (Lin et al. 2009).

The final type of real estate performance index is transaction-based, usually in either the form of repeat-sales or hedonic. Transaction-based indices are bottom up, and use market observed

transactions to judge the performance of particular markets (Roubi 2015). It must be highlighted however that transactions can contain noise and do not represent fully the conceptual market value that the asset is expected to sell at (Fisher et al. 1994). An early pioneer of the repeat-sales approach was Bailey et al. (1963) who argue that an approach that allows for the asynchronous aspect of real estate to be overcome is to only use assets that have been sold at least twice, thus allowing for the control of asset variability. However, there are issues associated with this form of index. Firstly the method is limited to markets that have enough repeatable transactions and some questions have been raised regarding selection bias (Munneke & Slade 2000) and as Geltner (2014) states, the general trend with repeat-sales indices is that house prices appreciate as houses which increase in value are sold more often. In addition, this also assumes that the houses do not change condition between the times they are sold, which is hugely unrealistic (Hill 2011).

Hedonic price indices are another transaction-based index type that is used to track real estate performance. This approach once again draws on transaction prices of assets sold in a particular period and the characteristics of the asset themselves in order to control for the assets' heterogeneity (Syed et al. 2008). For Rosen (1974), this approach draws on the concept that the price of an asset is the result of all of its characteristics. This approach was first used by Court (1939) for cars but has spread across to many different asset types. The characteristics of the asset, both locational and physical (Goodman 1978), along with time dummy-variables are regressed against the log price of the transactions (Hill 2011) before using the exponential of the coefficients to create the index. Criticisms and limitations have been highlighted, relating to the data set size and the selection of the correct variables the focus of these criticisms (Triplett 2004). These will be explored in greater depth in the methodology chapter.

All index construction methods have issues that affect the strength of the index in representing asset performance, but in this research the hedonic index approach was used. Firstly access to appraised values was not possible which ruled out the use of appraised-based indices. The first UK REIT for student accommodation appeared in 2013 and therefore there is insufficient duration for the dataset to be used to judge performance. The lack of repeat-transactions rules out the use of a repeat-sales index, thus leaving the hedonic approach.

2.3 Modern Portfolio Theory & Real Estate in Mixed-asset Portfolios

Modern portfolio theory was devised by Markowitz (1952) to assist investors in the allocation of capital to different asset classes that could be included in a portfolio, with its benefit being that it accounts for risk and return of the assets in relation to each other (Geltner et al. 2014). Modern portfolio theory allowed for diversification to be quantified, with low correlating assets desired in the portfolio (Fabozzi et al. 2002). Markowitz stated that for any investor, "diversification is both

observable and sensible" (1952: 77). The aim of portfolio assembly is to reduce the exposure to specific risk as rational investors would choose to invest in efficient portfolios (Rau 2017) whereby the investor can achieve the greatest returns for each particular risk level (Low et al. 2015). Historical data is used to calculate the relative returns and risk of each asset, with covariance used to dictate the inclusion of an asset within an efficient portfolio (Mangram 2013). The Sharpe Ratio (Sharpe 1966) is often used in conjunction as a measure of risk-adjusted returns of an asset, with the returns of the asset, minus the risk free rate, divided by its standard deviation used to calculate its Sharpe Ratio. A higher Sharpe Ratio suggests that it will have greater inclusion within a portfolio (Geltner et al. 2014). There are a number of issues associated with this approach, with it presumed that investors are rational, asset returns are normally distributed and markets are efficient (Mangram 2013); something that is rarely applicable with real estate.

Real estate is often included within portfolios for its diversification benefit, however, it is important to consider the different sectors and types of real estate asset placed within portfolios. Hudson-Wilson et al. (2003) advocate the inclusion of real estate within mixed-asset portfolios owing to its ability to react differently to economic changes when compared to the equity markets. Knight and his co-authors (2005) find that direct real estate has a weak relationship with the equity market which points towards diversification gains. However, the underestimation of volatility by indices was marked as a concern, with the authors arguing that real estate is more peaked and fat-tailed, meaning that it will in generally have plenty of small positive gains and few big losses. Lizieri (2013) further argues that modern portfolio theory always over-accounts for real estate in mixed-asset portfolios because it does not account for the real estate's heterogeneity, long transaction periods and high transaction costs. However, his research indicates that real estate variation is not explained by the factors that explain equity or bond returns which therefore suggests that even during the recent financial crisis, real estate provides diversification. This is further supported by the work of Lee and Stevenson (2006) who found that real estate is included in all portfolios they constructed, ranging from 5 to 25 year holding periods, with the asset class performs relatively consistently. REITs have been shown to be more influenced by factors affecting equity returns so offer less of a diversification benefit (Lizieri 2013), but over a longer time frame, they do act in a similar fashion to direct real estate (Hoesli & Oikarinen 2012). The question therefore is what role would alternative real estate, such as student housing, play in mixed-asset portfolios. As outlined previously, the drivers of the sector are not the same as more traditional real estate sectors, so this suggests that they would be able to diversify portfolios even further and reduce risk exposure. The dissertation will seek to identify the role of student housing in this case.

Chapter 3 – Methodology

This research project used three methodologies: hedonic price index construction, mixed-asset portfolio construction and interviews. By using both quantitative and qualitative methods I believe that trends can not only be identified but they also can be explained. Furthermore, reliance on quantitative research methods has often be criticised as research is often multi-faceted and cannot be limited to hypothesis testing (Kaplan & Duchon 1988). Using multiple methods has been strongly advocated (Jick 1979) and therefore was the approach within this research. Before a discussion of the methods can take place, a consideration the ethical issues is required.

3.1 Ethics

In order for research to be valid, it is critical that the researcher adheres to a strict moral code (Hay 2012), where the research's consequences and the actions of the researcher that could cause risk are mitigated to the greatest extent (Haggerty 2004). With regards to the data, Real Capital Analytics provided the dataset on the condition that a non-disclosure agreement was signed. This was strictly followed, and the data was stored on a password protected storage device in order to prevent others from accessing it. Another important aspect that needed to be controlled was the interview process. Firstly a risk assessment was carried out to ensure that plans were in place for any unexpected events when travelling to the interviews, this followed the guidelines provided by the university. A consent form was also designed that each interviewee was required to sign before going ahead with the discussion, which outlined the purpose of the research, how the data would be stored and gave permission for me to use their name if it was required. Traditionally interviewees remain anonymous for research (Van den Hoonaard 2003) and in this case names and the companies of all the participants have remained anonymous as requested. Once again, the recordings and transcriptions of the interviews were stored on a password protected data storage device.

3.2 Interviews

Interviews provide a method for researchers to uncover relationships, information and conclusions that are not accessible through the use of quantitative approaches (Baxter et al. 2006), and to some degree, compliments the relationships that are discovered through quantitative methods (Steckler et al. 1992). In this dissertation, a critical aspect that was being explored were the causes of the capitalization of the sector. Whilst the quantitative methods can highlight some aspects of this, others, such as how the sector is regulated in different countries and student accommodation's relationship with the residential sector cannot be explained through these approaches. Therefore interviews with individuals in the sector were chosen to compliment the quantitative aspects of this dissertation. The interviews had a semi-structured form, thereby allowing for the interviews to have some structure whilst also enabling the discussion to explore previously unconsidered aspects of the

topics being focused on (Galletta 2013). The aim of the interviews was to gather information on the student housing sector whilst not being a cross-examination, which allows for the complexities of different issues to arise and be discussed (Rowley 2012). Location for the interviews was considered, with interviews taking place at the interviewee's office providing the easiest solution. Choice of location can affect the interviewee as they may not want to discuss some aspects of the research topic in their place of work (Elwood & Martin 2000). This did not seem to be an issue. When interviewing it can be tricky to access the relevant senior individuals who hold influential positions that can provide insight into the research topic (Noy 2008). In order to overcome this, the student housing team at JLL provided assistance and "snowballing" (*ibid*) was also used where the interviewees suggest other potential participants.

Prior to the interview a schedule of possible topics and questions was prepared to provide a prompt during the interview (Jacob & Furgerson 2012). Furthermore the interviews were recorded to allow me to not only concentrate fully but also enable me to review issues subsequently (Berg et al. 2004). The interviews were transcribed and coded soon after to pick up on the themes that arose and to allow data to be more easily organised when presenting findings (Oliver et al. 2005). Eleven interviews took place in total. The participants that were interviewed were developers, institutional investors, operators, private equity investors and agents. This allowed for views to be ascertained from a variety of sources all of which have different aims and perspectives within the sector. The interviewees were anonymised.

3.3 Hedonic Index Construction

The premise of this approach is that the price of an asset is a function of its characteristics and constructing an index based on this approach can allow for market comparison (Goodman 1978). A hedonic index draws on the transactions of a particular asset class that account for time, property attributes, interaction terms and locational factors (Roubi 2015). This research used the time dummy approach, acknowledged as the direct method (Triplett 2004). The price in the regression took the semi-log form, and after estimating the regression the exponentiate of the time dummy variables were used to create an index (Hill 2011). The pricing model has the typical form:

$$P = \beta_0 + \beta_1 X_1 + \cdots + \beta_n X_n + \epsilon$$

Where P is log of the transaction price, $X_{1\ldots n}$ are the relative time, locational and property characteristics and ϵ is the random error. An ordinary least squares regression is used and "under specific assumptions, a regression coefficient shows the effect on the dependent variable of one unit change in the independent variable, holding all other variables constant" (Triplett 2004).

Variable selection is a key aspect to the accuracy of the hedonic price model and the more detailed information that is available on the dataset the ability to obtain pure price changes increases (Syed et al. 2008). Sirmans et al. (2006) list the most common factors that have appeared in hedonic price index based research, such as floor space, land area, age and bedroom number. The dataset contained a range of information but a few of the variables were fully complete. In addition, more variables were added as a hedonic model seeks to identify possible factors that influence the transaction price and as a result variables such as number of universities in the city and student numbers in the city were included. Furthermore, the dataset was checked for transaction repeats and any duplicates were removed. Unfortunately this led to a reduction in the number of usable transactions. In the case for the UK this reduced from over 1000 to 417 while those for Europe reduced from 546 to 165. The UK dataset is sufficiently large, but there may be issues of sample selection bias with the available data on Europe. The reduction in sample size was caused by missing data points. The following variables were included in the regression analysis:

- Market – region with regards to the UK and country for the European dataset (Dummy variables were used)
- Location in the City (Centre or Suburbs)
- Time dummy variables for each year from 2007 to 2017
- Number of Units
- Number of Nearby Universities
- Number of Floors
- Student Numbers (HESA 2018, Eurostat 2018).
- Age of the Asset

Bias in the coefficient estimates can be introduced when a "nonlinear transformation of a random variable" (Hill 2011: 15) occurs) but I am following the work of Syed et al. (2008) who's extensive study on this found that bias was only introduced in the fourth decimal, meaning that this bias is negligible. Critical to this approach is variable selection as omitted variable bias can have a significant effect on the regression output (Triplett 2004). Owing to the nature of the dataset, there are some variables missing that could be important, such as the different types of rooms and also rental levels at the time. Another key issue associated with hedonic regressions is multicollinearity, which occurs when variables are strongly correlated which would not be surprising when accounting for property characteristics (*ibid*). Whilst it doesn't affect the overall regression accuracy, it does risk biasing the coefficient estimates (Xiao, 2017). Multicollinearity was found between the variables representing the student population and the number of universities nearby. As a result the variable representing the number of nearby universities was removed from the regression analysis. Whilst the interviews

highlighted that both are key factors in assessing the local market, the local universities variable was removed.

This method has been critiqued. Firstly the functional form has been critiqued (Xiao 2017) as there is little theoretical basis to choosing the correct form, but the semi-log approach taken in this research is the most common (*ibid*). A further critique has been aimed at the lack of transparency of the approach with regards to the dataset (Triplett 2004). This dissertation is fully reliant on the dataset obtained from Real Capital Analytics but a non-disclosure agreement was signed so this cannot be released. Finally, the subjective nature of choosing the variables has been critiqued as an addition or subtraction of a single variable can cause all the coefficients to change (*ibid*). Triplett attributes the limited take up of this approach not to these issues but to the "conservative tendency with respect to methodology explains some of the mistrust of hedonic indexes that is so evidentially widespread" (2004: 208-209).

In this research the hedonic index was compared to IPD/MSCI's appraised index for UK commercial property and with regards to Europe, IPD/MSCI's European index and EPRA's REIT index were used as they provide representation over the same countries covered in the data provided by Real Capital Analytics. The data will be described in the next chapter. Eviews was the programme chosen to do the regression analysis.

3.4 Mixed-Asset Portfolio Construction

The aim of portfolio construction is to reduce the exposure to the asset's specific risk, with Markowitz (1952), the pioneer of this approach, stating that risk reduction is the key aim of portfolio construction via diversification. Markowitz's premise is that asset risk should be considered within the context of the influence that they have on overall portfolio risk rather than individual risk levels (Mangram 2013). Relying on a heavy number of assumptions such as rational investors, normally distributed returns and efficient markets (*ibid*), modern portfolio theory draws upon the historical data of asset performance to dictate the allocation of capital to assets (Fabozzi et al. 2002). The covariance of assets is used to study the inter-relationship of assets, and using covariance, alongside the risk and return of the assets, allows for an efficiently constructed portfolio. Efficient portfolios is the aim for any rational investor (Rau 2017), and these portfolios are constructed to maximise portfolios returns for a particular level of risk (Low et al. 2015). The Sharpe Ratio is another tool that is used within this context, which was originally labelled the "reward to variability ratio" (Sharpe 1966), which is used to calculate the risk adjusted returns of assets. Once again a reliance on historical data is used and it is influenced by the time period chosen and it relies on the presumption that past performance is representative of future returns (Sharpe 1994).

Real estate is known for its long holding periods (Collett et al. 2003), relative illiquidity (Marcato et al. 2015) and high transaction costs (Nozeman 2010). Whilst the asset class does have deficiencies, real estate plays an important role in the mixed-asset portfolios owing to its diversification ability (Lizieri 2013). Diversification is achieved through allocation of funds to different assets since concentration in a few assets risk overexposure to specific risk (Geltner et al. 2014). Diversification benefit is traditionally identified by looking at correlations of assets with each other, with a correlation of one meaning that two assets move identically while a correlation of -1 means that the assets are perfectly uncorrelated so offer the best diversification. As long as the correlation is not one then there is diversification potential (Fabozzi et al. 2002).

The portfolios were constructed with the following asset being represented in the possible portfolios:

- Student Housing Hedonic Indices for the UK and Europe
- MSCI/IPD's UK Commercial Index (MSCI 2018)
- EPRA REIT index (EPRA 2018)
- S&P 500 (S&P 2018)
- UK 10 year Government Gilts (Investing.com 2018)

The total returns of the indices were used on an annual basis. However, the appraised index was desmoothed by drawing on Blundell and Ward (1987) and Geltner (1989) who state the following equation to account for appraisers' behaviour:

$$\alpha_t = K y^T_t + (1+K)\, \alpha_{t-1}$$

α_t is value that the appraiser has estimated, α_{t-1} is the value of the past appraisal, y^T_t is the actual market value and K is a constant (Geltner 2003: 1049). Furthermore, this equation can be rearranged to give the true market valuation using:

$$y^T_t = (\alpha_t - K\alpha_{t-1})/1\text{-}K$$

K was assumed to be 0.2, based on creating similar first order correlations for the REIT and appraised data. Further to this, the REIT index needed to be deleveraged to make it fully comparable to that of the appraised index. Hoesli and Oikarienen (2012) leverage up the appraised index and this is the approach I will follow, drawing on Modigliani and Miller's (1958) equation:

$$R_{Lit} = (R_{ULit} - R_{dt}LTV_{it})/(1 - LTV_{it})$$

Where R_{Lit} is leveraged direct real estate returns of the sector I in the period t, R_{ULit} is the unleveraged market returns in period t of sector i, LTV_{it} is the loan to value ratio of REITs in t and R_{dt} is the cost

of debt in period t. This research drew on Hoesli and Oikarienen (2012), for the levels of leverage, IPD/MSCI for the unleveraged returns and EY (2015) for the cost of lending in the real estate market. Once the regressions were run, the indices were constructed before portfolio analysis took place.

Chapter 4 – Data

The dataset provided by RCA consisted of 417 useable transactions for the UK and 165 transactions for Europe. The UK dataset had a broad coverage across the UK, as listed in Figure 3. Unsurprisingly, London had the greatest proportion of transactions, followed by the North-west and then the Midlands, both regions home to large cities, the large student populations and many internationally renowned academic institutions. Figure 4 shows the dominance of France, Germany and the Netherlands within the dataset. These are countries with student housing markets that are characterised by a high degree of privatisation and also those where it is more typical for students to leave their home city to study. Figure 5 (overleaf) shows the share of student housing transactions for each year between 2007 and 2017. Clearly identifiable are the waves of investment into the sector. In the UK Between 2007-2011 transaction proportions remained below 5%, more than doubling in 2012 with a further increase in 2014, before once again doubling in 2015 to see around 24.4% of the total

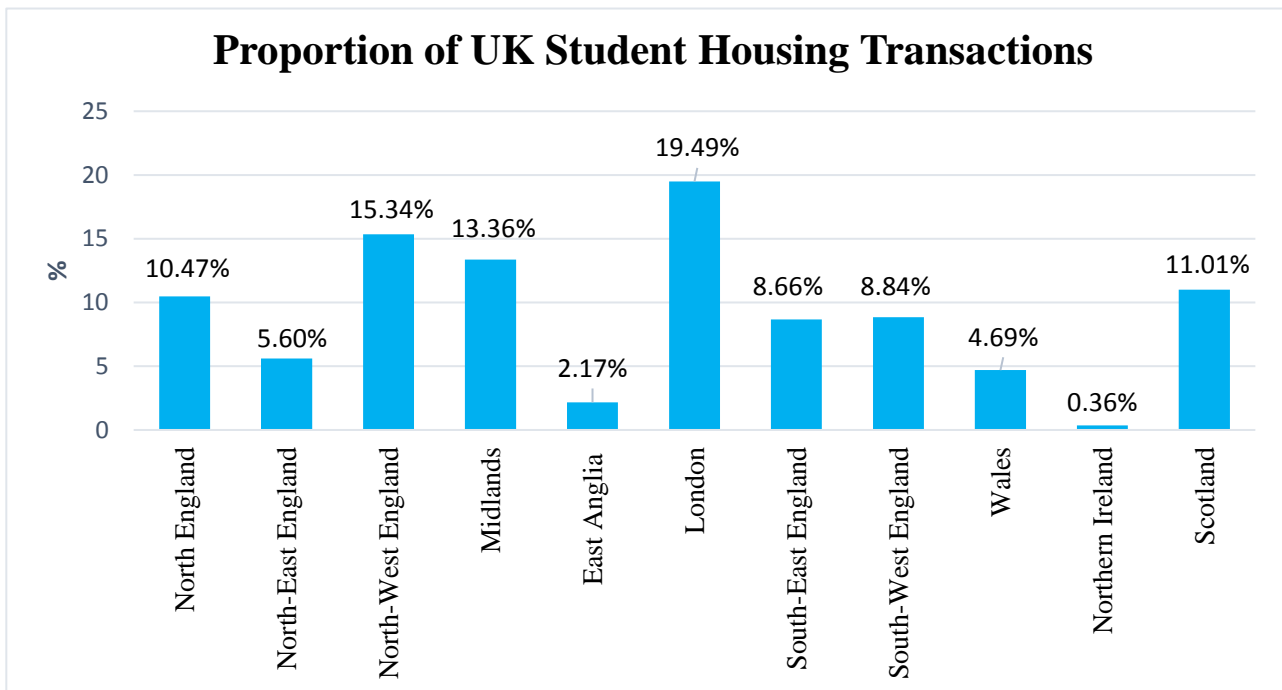Figure 3. The proportion of transactions taking place in each UK region of the dataset. (*Real Capital Analytics*)

Country	Proportion of European Student Transactions in the Dataset (%)
France	11.76
Germany	31.67
Italy	0.90
Netherlands	52.49
Spain	3.17

Figure 4. The proportion of European student housing transactions by country. (*Real Capital Analytics*)

transactions of the dataset before settling in 2016 and 2017 to 14.62% of the transactions. There is also concentration of transactions within certain years of the European dataset as well. 2007-2014 represent just 27.15% of the dataset, with 2015 seeing over 43% of the transactions for European student housing. This coincides with an increase seen in the UK, which suggests that 2015 was a year where there was an increase in investment into the sector and a wider exploration in the European market from investors looking for return opportunities. 2008 saw no transactions in student housing in Europe according to RCA which is conducive with the investment climate seen at the time in the market following the global financial crisis.
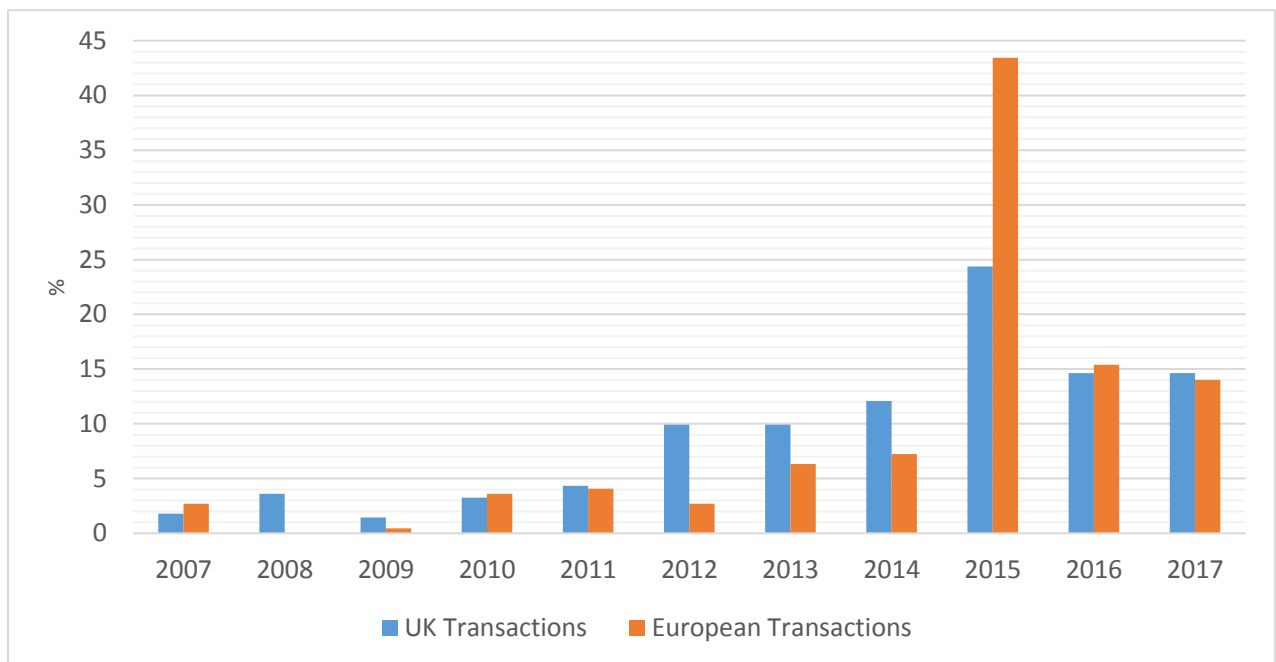
Figure 5. The proportions of UK and European Student housing transactions per year, 2007-2017. *Real Capital Analytics*

Figure 6 (overleaf) provides the sample characteristics for both the UK and European datasets, with the European assets being noticeabley newer with the average age of a European asset 11.85 years at time of sale compared to 14.14 years old in the UK. Generally UK PBSA is not only older, but larger and has a greater lot size, averaging £18 million more per transaction. The large variabilty in the prices indicate that the assets are heterogenous and certain locations will be more valuable than others. To try and reduce the impact of the skewness on the regression output, the price will undergo a log transformation (Bland & Altman 1996).

UK Student Housing Sample Characteristics			
	Mean	**Median**	**SD**
Age	14.14	7.00	25.83
Units	346.82	257.50	360.42
Floors	6.34	5.00	4.40
Price	£29,149,756.16	£17,614,468.60	£37,779,787.76

European Student Housing Sample Characteristics			
	Mean	**Median**	**SD**
Age	11.85	1	23.44
Units	176	136	162
Floors	6.30	5	3.72
Price	11,110,643.24	6,804,136.60	12,390,081.98

Figure 6. Sample Characteristics for the UK and European dataset (*Real Capital Analytics*)

Chapter 5 – Results and Discussion

This section discusses the output of the regression analysis, the following hedonic index and the role that student accommodation plays for an investor for both the UK and Europe. Furthermore, it aims to discuss and explain why these trends have occurred.

5.1 Hedonic Regression Output

The significant variables that influence the price of student housing assets in the UK (Figure 7, overleaf) were the number of units in the asset, the age of the building, the number of floors that makes up the asset and the size of the student population in the local area. No market areas are significant and the only year that has significance is 2017. The lack of significance for any market area and also the location of the asset within the city (city centre variable), show that ultimately the market fundamentals (represented by the student population variable) and the quality and size of the asset (age, floors and units variable) is a greater dictator of price than the location of the asset.

It is surprising that London is not statistically significant owing to its position not only in the UK education industry but also the number of students that study in the capital. In addition, the significance of the 2017 variable as suggested from the interviews can be attributed to the assets that were sold in that year, with prime, London-based assets making up a key aspect of the dataset. The sale of the Pure Student Living portfolio which is predominately prime London-based assets charging premium rents is an example of sales taking place in 2017. However, the variability in the coefficient of the years suggests that the market is in its infancy, and that more stability will arise as the market matures.

Figure 8 (overleaf) highlights the regression output for European student accommodation transactions between 2008 and 2017. As with the UK regression, the age, number of floors, number of units and the student population are all significant variables. At the same time location, whether at the national or city level, is not significant. This suggests once again that the asset's themselves are very important in dictating prices as is the size of the market that is present within the location of the asset. The only year that is significant is that of 2016, which is the year after the substantial increase in investment into the European markets as shown in Figure 4, when close to 44% of all European student housing transactions took place. Interviewees from large investment funds and also a well-known pension fund stated that this is because the demand for assets in the European student housing market was at its peak and that the lack of supply of assets drove prices up.

Variables Included	Coefficient	Std. Error	t-Statistic	Prob.
Constant	14.17	0.90	15.79	0.00
Units	0.02	0.00	15.49	0.00*
Age	-0.04	0.00	-2.80	0.01*
City Centre	0.03	0.08	0.36	0.72
Floors	0.04	0.01	5.69	0.00*
East_Anglia	0.64	0.52	1.23	0.22
London	0.79	0.51	1.53	0.13
Midlands	0.23	0.48	0.47	0.64
North	0.20	0.49	0.42	0.68
North-East	0.35	0.50	0.71	0.48
North-West	-0.29	0.49	-0.59	0.55
Wales	0.33	0.50	0.65	0.51
Scotland	0.30	0.49	0.61	0.54
South-East	0.32	0.49	0.65	0.52
South-West	0.14	0.49	0.30	0.77
Ln_Studentpopulation	0.11	0.07	1.66	0.10*
2008	-0.18	0.38	-0.47	0.64
2009	-0.29	0.43	-0.69	0.49
2010	-0.13	0.34	-0.37	0.71
2011	0.10	0.34	0.29	0.77
2012	0.20	0.32	0.63	0.53
2013	0.19	0.31	0.61	0.54
2014	0.22	0.31	0.71	0.48
2015	0.24	0.31	0.79	0.43
2016	-0.08	0.31	-0.24	0.81
2017	0.62	0.31	1.98	0.05*

Number of Observations = 417, R^2= 0.62 Adjusted R^2= 0.591. Regressions were run for both the UK and European datasets. Diagnostic tests were run in the programme Eviews, with multicollinearity, heteroskedasticity and autocorrelation focused upon. Heteroskedasiticty and autocorrelation were controlled within Eviews by running the heteroskedasticity and autocorrelation programme, originally developed by Newey and West (1987). Positive autocorrelation was seen as the Durbin-Watson test statistic is of 1.81 for the UK regressions and 1.62 for the European regression. This indicates positive correlation but as Field (2009) argues, this is very common and given that it is greater than 1.5 it is not much cause for concern. This is often caused by missing variables and the inclusion of these missing variables is seen as a method to remove the autocorrelation. Unfortunately variables such as rental levels and types of rooms could not be accounted for owing to the detail level of the data provided by Real Capital Analytics.

Figure 7. Regression output for the UK data set that lists the variables, coefficients and relevant significance. (*indicates significance to 0.1)

Variables Included	Coefficient	Std. Error	t-Statistic	Prob.
Constant	12.95	0.76	17.12	0
Age	-0.04	0.00	-2.08	0.04*
Floors	0.02	0.01	1.61	0.10*
Units	0.03	0.00	10.09	0.00*
Ln_Studentpopulation	0.21	0.06	3.43	0.00*
City Centre	0.02	0.11	0.16	0.88
France	-0.15	0.29	-0.51	0.61
Germany	0.18	0.26	0.68	0.50
Italy	0.68	0.51	1.35	0.18
Netherlands	-0.09	0.27	-0.32	0.75
2009	-0.87	0.65	-1.34	0.18
2010	-0.07	0.32	-0.21	0.83
2011	0.48	0.34	1.42	0.16
2012	-0.08	0.34	-0.22	0.83
2013	0.13	0.29	0.45	0.66
2014	0.21	0.30	0.70	0.48
2015	-0.34	0.28	-1.21	0.23
2016	0.56	0.28	1.98	0.05*
2017	0.35	0.29	1.20	0.23
Number of Observations = 165, R2= 0.67 Adjusted R2 = 0.62				

Figure 8. Regression output for the European data set that lists the variables, coefficients and relevant significance. (*indicates significance to 0.1)

5.2 Student Accommodation & Real Estate Sectors

Drawing on the regression output a hedonic index for student accommodation was created and compared to real estate sectors between 2007-2017 for the UK and 2008-2017 for Europe. Figure 9 (overleaf) highlights the performance of student housing in relation to IPD/MSCI's performance for the different real estate sectors.

First, the student sector responded to the financial crisis more slowly and to a lesser extent compared to the other real estate sectors. This suggests that there could be a diversification benefit to investing in the sector and this was mentioned often in the interview-based research process, with the sector's non-traditional drivers, namely population, international demand for education in the UK and returning to education during a financial crisis as reasons for the reduced response.
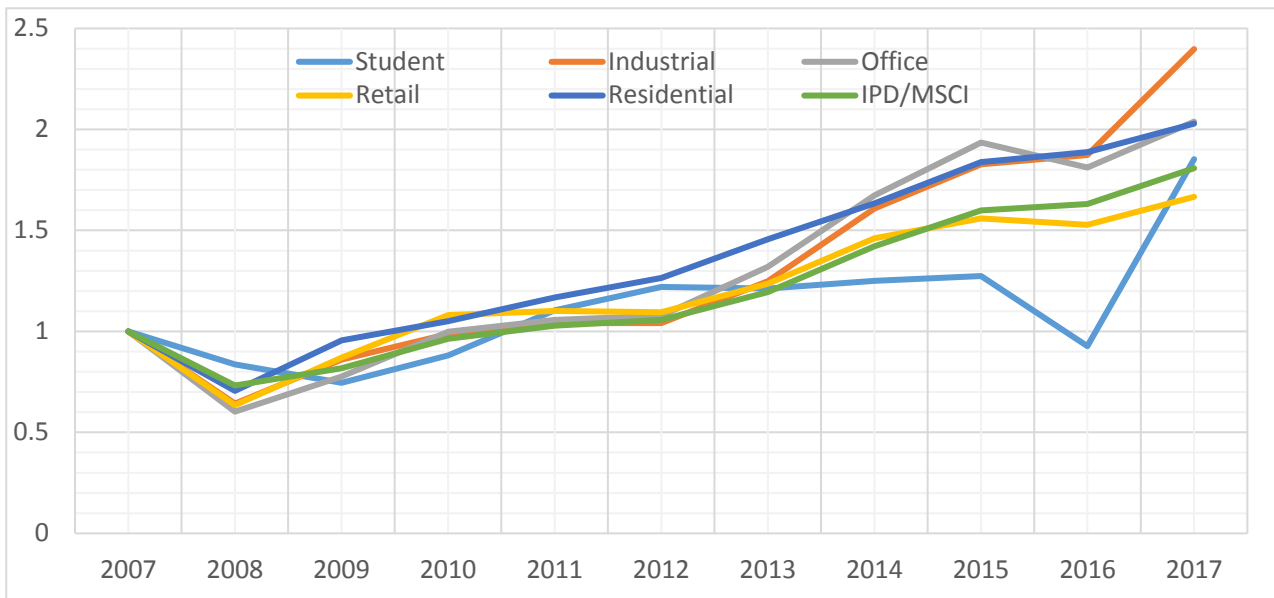
Figure 9. A graph showing the performance of different real estate sectors in the UK and the overall IPD/MSCI index, 2007 to 2017. (*Real Capital Analytics, IPD/MSCI*).

The student sector then tracks the other real estate sectors before plateauing, experiencing a dip in 2016 before recovering substantially in 2017. An interviewee who is a director of a student housing team at a global advisory firm believed that the plateau was the result of the recovery of the other commercial sectors which led to investment diverging away from the student housing sector, and the dip in 2016 associated with post-Brexit vote concerns over loss of European international students. Concerns over the loss of European international students was expressed by the development director of a London focused student housing company and this is a current concern for the many in the industry owing to the proportion of European students in the UK and the growing competitiveness of universities in Europe (JLL 2017a).

A further trend that can be seen is the greater volatility within the index. This can be attributed to the dataset and the size of the market in general. The other sectors dwarf the student accommodation sector in size, and therefore the influence of transactions of high quality assets in cities such as London and Manchester, as well as lower quality assets in smaller cities, can influence the index significantly. In the case of the drop in the index in 2016, only 9 London-based assets were sold that year within the dataset. In 2015 London-based transactions numbered at 28. This therefore can help explain the greater variability in the student housing index. The supply/demand dynamics are explored in more detail within the discussion on the drivers of the sector later in the chapter.

Figure 10 displays the performance of the European student accommodation index relative to European real estate and other investment assets. The first trend that can be identified is that the sector is the most volatile of all compared with fluctuations throughout the period being examined. The interviews highlighted a number of causes for this variability in the index. A primary cause of this volatility is that in some European countries regulation of the student housing market is different. Firstly in the Netherlands and Germany rent control exists in the market, which consensus among those interviewed points to a less attractive investment opportunity than the UK where rents increase at the market rate. This means that in countries that do not have rent control in place there is a possibility that price increases and yield shifts will take place at different rates and therefore reduce the usefulness of a European hedonic student housing index. Another part of regulation that is affecting the index is French specific, whereby individual apartments in a student accommodation building can be sold off. This prevents an accurate account for asset performance in France, and as one participants alluded to, will prevent a UK-like market appearing in France.

The variability that can be seen in Figure 11 (overleaf) can also be attributed to the vast under-supply and immaturity of some markets. Keogh and D'Arcy (1994) argue that one aspect of a mature property market is that all investment opportunities can be satisfied and that it is easily accessible for investors but as can be seen from the interviews, this cannot be said for the European student housing market at the moment. With the development of more assets, the market will mature to meet this requirement. This can over-affect the index when the data pool is smaller, as seen with the European dataset when compared to that of the UK. Finally student demand in countries like Spain and Italy can affect the index as well. A large US REIT that has a student focused fund stated that in these
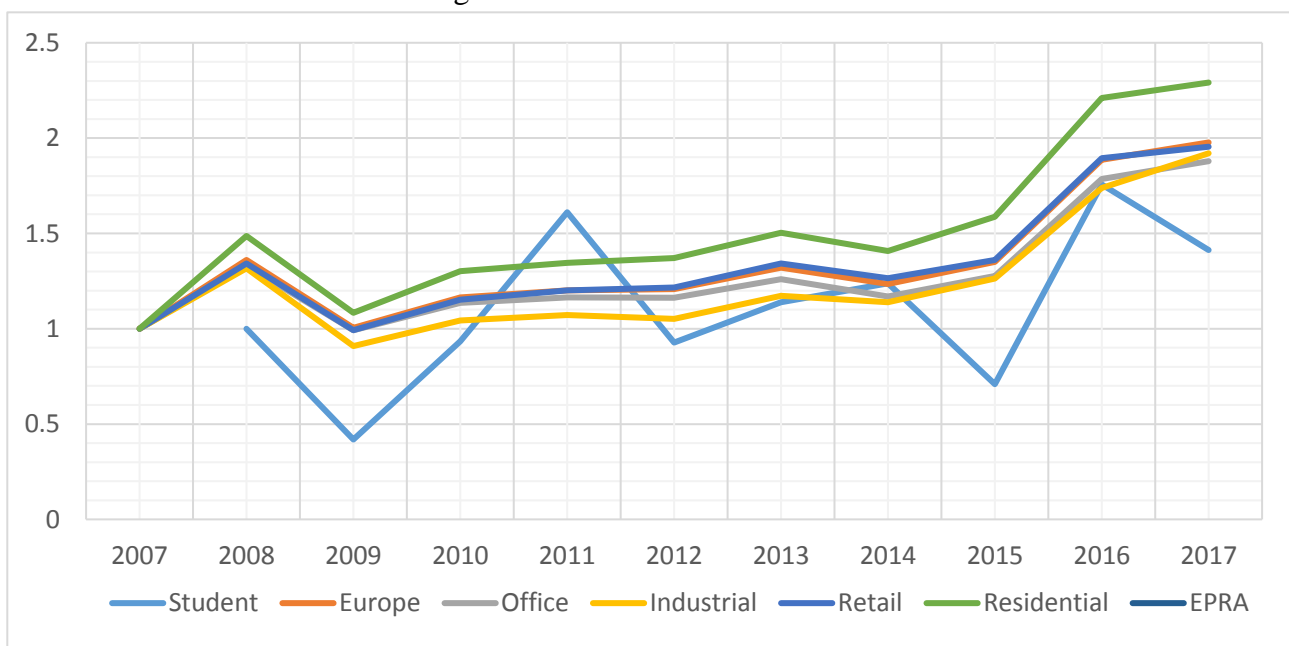

Figure 10. Index performance of European real estate sectors, 2007-2017. (*EPRA, Real Capital Analytics, IPD/MSCI*)

countries the majority of students remain at home for their time at university and it is only with the increasing internationalisation of education that PBSA is required in European cities.

	UK Asset Returns	UK Asset SD	European Asset Returns	European Asset SD
Student	10.37%	0.351	23.55%	0.752
Industrial	11.12%	0.201	8.40%	0.191
Office	9.65%	0.211	7.99%	0.187
Retail	7.10%	0.506	8.43%	0.188
Residential	8.54%	0.195	10.59%	0.217
IPD/MSCI	6.96%	0.131	8.62%	0.192
EPRA	-	-	5.08%	0.259

Figure 11. Average annual returns and standard deviations of the different real estate sectors in the UK and Europe, 2007-2017. (*Real Capital Analytics, IPD/MSCI*)

This variability can be further seen in the returns and standard deviation (which is used to represent volatility) of the student housing sectors in the UK and Europe when compared to other real estate sectors. In the UK the only sector with greater returns is the industrial sector while the average annual returns of PBSA in Europe are the highest. What could trouble investors is the high volatility of the UK and European student housing sectors, with both student accommodation sectors having the highest volatility out of all the real estate sectors. This is once again driven by both sectors' relative immaturity compared to the more established commercial real estate sectors. Keogh and D'Arcy (1994) also state that the openness of the market, meaning the ease with which investors from abroad can access the markets can be used to identify the maturity of markets. Baum and Hartzell (2012) allude to this as well, stating that investors often need to rely on players in the local market to understand the market's inner workings. The greater variability seen with European markets can be associated with this lack of openness, with fewer investment assets, different working cultures and knowledge of the European markets when compared to the UK. With the sector being relatively young in Europe as well as differences in maturity and regulation across European countries, it is unsurprising that its variability is greater than that of the UK student accommodation sector.

5.3 Student Accommodation and Mixed-asset Portfolios

Alternative real estate sectors, such as student accommodation are often placed within portfolios to act as a diversifier to reduce the overall risk of the portfolio, as Markowitz (1952) instructed. This rationale was cited frequently by participants when discussing the UK student market, who argued that especially after the global financial crisis that investors into their funds were seeking

less exposure to traditional sectors and traditional economic drivers. A common measure used to identify the potential diversification benefit with different assets is by creating a correlation matrix. In Figure 12 we can see the correlation matrix of UK student housing with other real estate sectors and also UK 10-year gilts and the S&P 500. Student accommodation has the ability to be a key diversifier for investors. From the matrix, the highest correlation that the student sector has is with

the industrial sector, which is only at 0.36. In addition, the UK student sector has no correlation whatsoever with treasury gilts and has a small positive correlation of 0.1 with the residential sector. The next best diversifier is that of the treasury gilts but owing to their much lower returns, lower Sharpe ratio and higher correlations than the student sector, it makes the gilts a less attractive diversifier than student housing. The industrial, retail, residential and office sectors have a relatively high correlations so would not act as a strong diversifier within a mixed-asset portfolio. This suggests that within the mean-variance framework that its diversification potential and strong returns could place the student accommodation sector within a UK mixed-asset portfolio.

Correlation Matrix	Student	Industrial	Office	Retail	Residential	IPD/MSCI	Gilts	Equity
Student	1.00	0.36	0.23	0.16	0.10	0.30	0.00	0.26
Industrial	0.36	1.00	0.93	0.92	0.89	0.91	0.42	0.86
Office	0.23	0.93	1.00	0.96	0.89	0.97	0.45	0.83
Retail	0.16	0.92	0.96	1.00	0.93	0.89	0.44	0.83
Residential	0.10	0.89	0.89	0.93	1.00	0.83	0.51	0.84
IPD/MSCI	0.30	0.91	0.97	0.89	0.83	1.00	0.31	0.82
Gilts	0.00	0.42	0.45	0.44	0.51	0.31	1.00	0.56
Equity	0.26	0.86	0.83	0.83	0.84	0.82	0.56	1.00

Figure 12. The correlation matrix for UK real estate sectors, equity and treasury gilts. (*Real Capital Analytics, IPD/MSCI, S&P, Investing.com*)

Figure 13 shows the correlation matrix for assets included within the European mixed asset portfolio. Whilst the student accommodation sector is less correlated with the other real estate sectors, it is more strongly correlated than the UK student accommodation sector is with other UK real estate sectors. The strongest correlation that the UK student accommodation sector had was 0.36 with the industrial sector but in the European scenario the correlation with the industrial sector is 0.71 and 0.78 with the retail sector. Of the real estate asset classes, REITs, based off the EPRA index, is the best diversifier, offering the lowest correlations with the direct real estate sectors. The negative

correlations that all real estate sectors have with bonds and the equity market all give real estate diversification potential, as stated widely in the literature (Hudson-Wilson et al. 2003, Lizieri 2013). However the high volatility seen in the European student accommodation risks its exclusion from the optimal portfolios that mean-variance relies on.

Correlation Matrix	Student	Industrial	Office	Retail	Residential	EPRA	European IPD/MSCI	Gilts	Equity
Student	1.00	0.71	0.75	0.78	0.75	0.23	0.76	-0.48	-0.23
Industrial	0.71	1.00	0.98	0.98	0.98	0.39	0.98	-0.29	-0.28
Office	0.75	0.98	1.00	1.00	0.99	0.32	1.00	-0.30	-0.29
Retail	0.78	0.98	1.00	1.00	0.99	0.34	1.00	-0.31	-0.28
Residential	0.75	0.98	0.99	0.99	1.00	0.41	0.99	-0.29	-0.32
EPRA	0.23	0.39	0.32	0.34	0.41	1.00	0.34	-0.20	-0.19
European IPD/MSCI	0.76	0.98	1.00	1.00	0.99	0.34	1.00	-0.30	-0.29
Gilts	-0.48	-0.29	-0.30	-0.31	-0.29	-0.20	-0.30	1.00	0.69
Equity	-0.23	-0.28	-0.29	-0.28	-0.32	-0.19	-0.29	0.69	1.00

Figure 13. The correlation matrix for European real estate sectors, equity and treasury gilts. (*Real Capital Analytics, IPD/MSCI, S&P, Investing.com*)

Using the mean variance approach optimal portfolios were constructed for both the UK and Europe using real estate, shares and bonds, based off index data from 2007 to 2017. Figure 14 and 15 (overleaf) list the diagnostics for the optimal portfolios. In the UK, the student accommodation sector and the residential sectors make up the entirety of the portfolio. However the European optimal mixed asset portfolio does not include any student housing whatsoever, and analysis shows that it is only included to achieve higher returns for substantially greater risk, which for non-rational investors may be attractive. The strong presence of the European IPD/MSCI at 70% benefits from the mix of sectors that make up the index. Whilst these proportions would be wholly unrealistic for a mixed-asset portfolio it does allude to a number of conclusions.

Optimum Portfolio	UK	Europe
Student	43.35%	0.00%
Industrial	0.00%	0.00%
Office	0.00%	0.00%
Retail	0.00%	0.00%
Residential	56.65%	29.90%
IPD/MSCI	0.00%	70.03%
Bonds	0.00%	0.00%
Equity	0.00%	0.00%
EPRA		0.08%

Figure 14. The Weightings for the optimal portfolios for a UK and European mixed-asset portfolios based on data from 2007 to 2017. *(Real Capital Analytics, IPD/MSCI, S&P, Investing.com)*

Optimum Portfolio	UK	Europe
Mean	14.65%	9.10%
SD	0.160	0.104
Sharpe Ratio	0.184	0.075

Figure 15. The returns, standard deviation and Sharpe Ratios for the optimal portfolios for a UK and European mixed-asset portfolios based on data from 2007 to 2017. *(Real Capital Analytics, IPD/MSCI, S&P, Investing.com)*

Firstly, as Lizieri and Mansley (2015) discuss, alternative real estate sectors do offer diversification benefits. This can as seen by the UK student accommodation representation in the optimal portfolio. It is the low covariance that the student accommodation sector has that sees it make up 43.55% of the optimal portfolio, and this indicates that it is beneficial for investment houses to consider student accommodation when constructing mixed-asset portfolios that seek to maximise returns for the minimal levels of risk. In the UK portfolio the returns are greater than that of the European mixed-asset portfolio but with greater variability as a result. However, the higher Sharpe Ratio that is gained with the UK portfolio indicate that the risk-adjusted returns are stronger. A further conclusion that can be made is that the variability in the European student sector was the undermining factor that prevented its presence in the mixed-asset portfolio. However from the interviews European student accommodation seemed to be included owing to the exceptional gains that were possible through development when it seeks to exploit the supply/demand imbalances. This is reinforced by

the interview with a US-based REIT that invests in European student accommodation, who will only develop because of the gains that can be made. This was also true for a pan-European private equity firm who stated that they look to purchase European assets that offer a value-add opportunity as they can gain significantly from the yield shift. The representation of European student accommodation in the future will grow as the sector matures, more assets enter the market and the sector become more informationally efficient.

5.4 Market Differences & Drivers of Capitalization

The evidence from the index construction and portfolio analysis gives indication that student housing is now a worthy source of strong returns that can act as a diversifier for investment portfolios. However it is critical to understand how it does so and what have been the drivers to the capitalization of the sector in the UK and Europe.

The first aspect that contributes to the diversification potential and the growth of the sector is the education industry within the UK and Europe. This was clear in all the interviews that were conducted, with the development director for a London-based student housing provider arguing that London's dominance not only in the UK but across European cities is that it has the best educational institutions by comparison with any European city. This was expanded upon by the director at a well-known institutional investor, stating that the reason why the UK student accommodation sector has developed ahead of Europe is because of the strength of UK education industry as it draws more international students to study in the UK. Looking at the QS world university rankings (2018), the UK has 15 universities in the top 100 of which four are in the top 10, while the entirety of Europe also has 15 institutions in the top 100 with only one in the top 10. Furthermore, London has two universities within the top 10 and four within the top 100 in the world, while Paris and Munich have two universities each in the top 100 (*ibid*). What is clear is that the UK is as superior to Europe with regards to the education quality on offer and therefore the sector was able to develop earlier as it had a strong academics base that required much needed student accommodation. Furthermore, the reputation of UK higher education has attracted greater numbers of international students that have further increased the demand for PBSA and therefore strengthening the sector. In the 2016/17 academic year, there were 442,375 students for overseas which represents 19% of the UK student population (UKCISA 2018) of which 6% are from Europe and 13% are from the rest of the world. In the same academic year in the Netherlands, the total number of international students was close to 90,000 (NUFFIC 2018), while in France the number of international students was 323,000 (Campus France 2018) which is substantially greater than the Netherlands but still lags behind the UK. Therefore unsurprisingly the UK student accommodation sector has led in Europe but with growth being seen in international student numbers in European countries (NUFFIC 2018, Campus France

2018) along with the cheaper cost of education as seen in Figure 1, the student accommodation sector in Europe will continue to grow.

Another important aspect to consider is the nature of the sector itself within the UK and Europe, with supply/demand dynamics, a key driver of the capitalization of the sector. In the UK there has been an imbalance between supply and demand from students for purpose-built student beds in many cities. In the case of London, JLL (2017b) state that over 210,000 students cannot access PBSA even though there has been increase in the amount of PBSA by 125% since 2007 owing to the number of students in the capital increasing at the same rate as the number of new PBSA beds. The development director of a London-based operator stated that this imbalance will further increase as there is a restricted development pipeline for PBSA in London in the coming years. This imbalance is present across the UK with Savills (2016) showing that cities like Aberdeen, Glasgow, Birmingham and Southampton all have a between 3 to 4 students to each purpose-built student bed, while cities like Manchester, Liverpool and Sheffield between 2 to 2.5 students to each purpose-built student bed. This imbalance was raised in the interviews that took place, as it provides a base for development gains but also rental growth in the sector. Supply/demand dynamics were a reason often stated in the interviews for the growth of the European industry, with a director at a European student housing developer and operator stating that this is one of the first and key figures looked at when considering future opportunities. Within Europe, JLL (2017a) estimate that, PBSA in France represents 15.3% of the market share, 11% in Germany and only 2.3% in Italy. These figures help to explain why the European student housing sector has grown in recent years as investors can develop with the knowledge that the market can absorb the new supply.

Another important factor to consider is the relationship between the student accommodation sector and the residential market in both the UK and Europe which helps explain the divergence in maturity. The interviews highlighted that, in the UK, student accommodation is seen as a separate from the residential market, while in many European countries it is treated within the residential sector. A director at a private equity firm that is developing in Scandinavia and Germany stated that the distinction that exists in the UK doesn't in the rest of Europe, with assets, even though they may target students, taking a mix of tenants. This is further reinforced by a director at a European student housing operator who branded their assets as "student hotels" in order to avoid the complex planning issues surrounding development of student accommodation in countries like Spain and the Netherlands. This can help explain the slower capitalization in Europe relative to the UK. Further, it remains commonplace for students studying in Europe to look for accommodation in the private rental sector as PBSA is a relatively new concept. For example, in Italy over 20% of students find accommodation in the private rental sector whilst it is also common to rent in Spain owing to the pre-

financial crash housing boom (JLL 2017a). In the UK PBSA is treated as a separate entity from the rest of the residential sector, with its own planning use class. Students do enter the rental sector to find accommodation, with "Homes in multiple occupation" responsible for housing around 400,000 students in the UK (Allsop 2016), however the stricter regulation of this market with the introduction of HMO licences, safety regulations and possible fines (UK Government 2018) is restricting the growth of the HMO market and therefore enabling the PBSA market to further expand. Therefore the relationship that PBSA has with the residential market has helped drive the capitalization ahead of Europe as planning is more straightforward, the asset class is more established and the increasing regulation of the HMO market encourages more PBSA development and use.

In addition, the nature and regulation of student accommodation within Europe slowed the capitalization of the sector relative to the UK. The UK has a more liquid direct letting market whereby rents can be set to the market rate. Cushman and Wakefield (2017) show for the last few years rental growth has been around 3% per annum which has maintained the strong performance of the UK PBSA, and as discussed in an interview with a global institutional investor, it has been a key aspect of the sector attracting international institutional investors. Europe however is more complex, with agents, a director at private equity firm and a US-based REIT that develops student accommodation in Europe citing market regulation as a key issue that has limited their involvement. Firstly, rent control is present in a number of markets, such as the Netherlands and Germany. Interviewees pointed out that this made the markets less attractive in comparison to the UK. Secondly, knowledge of markets has also acted as a barrier to entry for the European sector. Knowledge and information is a key concern when investing abroad (Baum & Hartzell 2012), and when asked about the comparison between knowledge and information on the UK and European student accommodation markets, the broad consensus from the interviews is that the UK is more informationally efficient, and as Keogh and D'Arcy (1994) state, this makes the UK market more mature. The information available on European countries' student markets is improving as more transactions occur and more actors get involved in the market but this still acts as a limiting factor to the expansion of the student housing sector in Europe.

Overall, both the UK and European student accommodation sectors have benefitted from significant supply and demand imbalances for beds which has fuelled the development of PBSA. However the stronger educational sector, a free market and a weaker relationship with the residential market have all been key drivers in the development of the UK student accommodation market ahead of that in Europe. These different drivers from the commercial real estate sectors help student accommodation act as a diversifier and a defensive asset for possible investors.

Chapter 6 – Conclusion

This research set out to provide the first analysis of the student housing sectors in both the UK and Europe using a hedonic price index for both markets based off transactional data from 2007 to 2017. Both the UK and European markets were found to be high performing in comparison to other sectors, but only the UK sector enters a mean-variance optimal portfolio. Its stronger diversification capabilities during this time period and lower risk profile relative to the European student housing sector enabled its inclusion unlike the European student housing sector. These differences were explained in the interviews. The UK has a superior education sector compared to the European countries included in the dataset and as a result, it attracts a larger international and domestic student population. As a result there are key supply/demand dynamics that drive the need for PBSA. This is supported by the hedonic regression output where the student population variable was deemed significant to the price of the assets. Furthermore, the separation that UK student accommodation has from the residential market and the reduced regulatory environment not only of the sector but of the UK property market in general has driven the development of the UK student housing market ahead of its European counterpart. That is not to say that European student housing is not to be invested in. The market is still in its infancy and as the interviews showed, the drivers still make it an attractive opportunity in certain countries with a strong educational industry and large imbalance in supply and demand dynamics underpinning the sector's capitalization.

The results found in this dissertation can be more widely applied. Key fundamentals, sector regulation and market freedom are all key considerations of investors in real estate, and for investors looking to enter the student housing sectors, are critical considerations. In addition, the results help explain the growth of investment into alternative real estate owing to its different drivers when compared to traditional real estate. Furthermore, this dissertation supports the combination of both qualitative and quantitative methods in real estate research and when researching a sector that has received minimal academic focus as it allows for explanation of trends and relationships that would not otherwise be discovered.

However, there are some limitations to this research that need to be remembered. Firstly, more transactions and rental information at time of sale would improve the regression analysis and the hedonic regression. In addition, the size of the dataset is a weakness especially in relation to the European regression. Information on more transactions would provide a more accurate indication of the sector's performance. An interesting possible avenue for research would look at the impact of the different room types on the price of the assets as the dataset was limited to the number of units in the assets To achieve this, however, would be difficult as one would need operators to provide information as well as obtaining details of building configuration at the time of past transactions.

Furthermore, a future study on the development of the European student housing market would be beneficial, as an increase in transactions would improve the accuracy of the hedonic index construction enabling a comparison to see whether it has matured relative to the UK. A common description that was presented in the interviews was that the European market was like the UK five to seven years ago, therefore a research project to explore this could be valuable.

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