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## A COMPARATIVE ANALYSIS OF THE PERFORMANCE OF HOTELS AS AGAINST TRADITIONAL COMMERCIAL PROPERTY IN A MIXED-REAL ESTATE PORTFOLIO

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**ABSTRACT.** This article considers the role of hotels in a mixed-real estate portfolio. Using hitherto unexamined IPD data for leased hotels in the U.S. and the U.K. between 2001 and 2013, it investigates whether hotels provide diversification benefits and seeks to critically reassess the view that hotels are uniformly high-risk assets. The study finds, by comparison to more “traditional” property types, that hotels have received little attention from property researchers and tend to be overlooked in the asset allocation process. This might be a result of the commonly held perception that hotels are “alternative” and “high-risk.” Based on results from a portfolio optimization analysis, it was found that hotels in the U.S. are more volatile than traditional property types but do not contribute to the efficient frontier for the time period reviewed. By contrast, the empirical results for the U.K. indicated that hotels are much less risky than expected and contribute to the efficient frontier at lower-risk levels. This was confirmed by the de-smoothed results using the individual correlation coefficient for each property type. Consequently, it was concluded that hotels are an attractive real estate subsector offering credible diversification benefits. Furthermore, it is suggested that hotels are not necessarily deserving of their reputation as uniformly high-risk. This has important practical implications for institutional investors seeking to diversify their portfolios.

### INTRODUCTION

Modern Portfolio Theory (MPT) is a well-known and widely used framework for the selection and construction of investment portfolios (Mangram, 2013). In its simplest form, it is a normative theory based on the expected performance of a pool of investments and the assumed risk appetite of the investor (Fabozzi, Gupta, & Markowitz, 2002). At its core is the central concept of diversification and the corresponding relationship between risk and return (Geracioti, 2009). Although not without critics, the application of MPT has come to represent a large and expansive body of research in the corporate finance literature.

This includes notable work on the role of commercial real estate within a diversified investment portfolio (Hudson-Wilson, Fabozzi, & Gordon, 2003; Hudson-Wilson, Gordon, Fabozzi, Anson, & Giliberto, 2005). As will be discussed, much of the work on commercial real estate has tended to focus on the office, retail, and industrial subsectors, with little attention given to hotels in the asset allocation process. This is despite the fact that hotels account for over \$100bn of investment-grade property in the U.S. (Quan, Li, & Sehgal, 2002; Newell & Seabrook, 2006) and represent approximately 12% of the real estate investment universe by total property value (Hess, McAllister, & Liang, 2001; Corgel, 2005).

This study evolved from the author’s MPhil dissertation in Real Estate Finance (submitted 2014) with the support of Arjun Singh, Professor in The School of Hospitality Business, Michigan State University; Gabriel Petersen, Managing Director in Real Estate, The Blackstone Group and Andrew Baum, Professor of Real Estate Investment in The Department of Land Economy, University of Cambridge.

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Recent estimates by STRGlobal have since put this figure at closer to \$350bn.<sup>1</sup> Although the size of the global hotel industry is more difficult to quantify and data outside the U.S. is relatively scarce (Hotel Analyst, 2012), the argument persists that an industry of this size should be considered within an investment portfolio (Corgel and deRoos, 1997; Petersen, Singh, & Sheel, 2003). This is especially true given the growth and consolidation of the industry since the early 2000s (MKG Hospitality, 2013), improvements in data availability and the ever-growing demand for travel and tourism (WTTC, 2014).

Building on what is a very limited body of research, this study explores whether hotels provide diversification benefits when included in a mixed-real estate portfolio. It focuses on IPD data for leased hotels in the U.S. and the U.K. in an attempt to provide new insights into the investment characteristics of the subsector. It also seeks to critically reassess the view that hotels are uniformly high-risk assets. In doing so, it hopes to encourage debate and further research on the subject of hotels as an important property type.

The remainder of this article is organized as follows: part one considers the academic and professional literature, incorporating the relevant results from the European Hotel Market Survey 2014 (a joint collaboration between the author and Berwin Leighton Paisner (BLP), 2014).<sup>2</sup> Part two describes key characteristics of the data, how they differ from prior research, and their various limitations. This is followed by a review of the methodology and quantitative techniques. Part three presents the empirical results for the U.S. and U.K. property markets with a de-smoothing parameter applied to the U.K. data as a check for robustness. The article concludes with a summary of the relevant findings and their implications for investors and academics, going forward.

<sup>1</sup>In reconciling 2012 P&L data and our 2012 transaction data, we estimated overall value of hotel real estate in the U.S. to be approximately \$350 billion" (Winkle, 2014).

<sup>2</sup>The survey was carried out with BLP in February 2014 and is based on data from over 400 online interviews. Respondents comprised hotel owner/operators, advisors, and investors.

## LITERATURE REVIEW

### The Sticking Power of Labels

According to Eichholtz, Hoesli, MacGregor, and Nanthakumaran (1995), the conventional approach to defining diversification categories for real estate portfolios is to use geographic location and property type. Concentrating on the second of these categories as it relates to this article, much of previous research has tended to focus on a select and dominant few (Jackson & White, 2005). For example, in the same way that Eichholtz et al. (1995, p. 2) analyzed the "property types [comprised within] the commercial real estate market," so, too, have most other researchers focused on the retail, office, and industrial subsectors (Hamelink, Hoesli, Lizieri, & MacGregor, 2000; Lee, 2003; Lee & Byrne, 1998; McGreal, Adair, & Webb, 2009). By contrast, very little research has focused on hotels. Indeed, the majority of literature reviewed for this article show hotels to have been either sidelined or ignored (Gallagher & Mansour, 2000) and, consequently, not included in mixed-asset portfolios (Kallberg, Liu, & Greig, 1996). When compared to more traditional property types such as those listed above, it is clear that hotels have been largely overlooked (Quan et al., 2002; Petersen et al., 2003; Newell & Seabrook, 2006).

One possible explanation for this might be the deeply entrenched view that hotels are an "alternative" real estate subsector (a view no doubt exacerbated by the limited availability of historic data). Implicit in this suggestion is the idea that hotels are somehow *different* to traditional commercial real estate and, therefore, less deserving of academic scrutiny. To an extent this is reflected in debates about whether hotels are more like real estate or an operating business (Corgel & deRoos, 1997). In addition to being viewed as alternative, hotels have earned a reputation for being high-risk assets; a sticky label that tends to be recycled in much of the literature (Allen, 2010; Liu & Quan, 2011; Parker, 2011). Although this reflects a dominant U.S. perspective (Newell & Seabrook, 2006), it might not, necessarily, be a

fair representation of the subsector as a whole. Consequently, there is a danger that hotels (for example, in the U.K.) are viewed through the parameters of what is only a very narrow evidence base, which could have negative ramifications for investment decisions.

### Findings From Prior Research

One of the earliest studies to reference hotels in a mixed-real estate portfolio is Firstenberg, Ross, & Zisler (1988). Their research used NCREIF (2013) total return data for apartments, offices, retail, industrial, and hotels with a broader view to examining the contribution of real estate within a diversified investment portfolio. Although criticized for failing to examine the assumptions of the real estate capital markets (Swensen, 2009), their findings showed that hotels offered the highest returns but were the most risky property type. As such, hotels (and offices) dominated the high-risk and high-return end of the efficient frontier.

Corgel (1996, para.2) makes a similar case, arguing that “lodging properties offer the highest returns among the major property classes, but present the greatest risks.” Evidence in support of this view is presented in his work jointly published with deRoos. Using a total return series developed specifically for the subsector, deRoos and Corgel (1996) found that hotel returns in the U.S. were higher than other property types and were characterized by greater volatility. Although the authors considered the series unsuitable for portfolio allocation decisions, it gave fire-power to the development of the Lodging Property Index (LPI) unveiled later that year.<sup>3</sup> Using this newly developed index, they suggested that hotels were a “natural addition” to a mixed-real estate portfolio and had a legitimate claim to a position among the “expanded real estate core” (Corgel & deRoos, 1997, p. 36). This was due mainly to the high returns over the period 1995–1996 and indicative evidence of poten-

tially low correlations with other property subsectors.

Using the LPI, Quan et al. (2002) examined the viability of hotels in a mixed-asset portfolio that also included S&P 500 stocks and long-term corporate and government bonds. Their results confirmed the finding that, on aggregate, hotels in the U.S. outperformed a majority of asset classes, including the NCREIF index, but offered only limited diversification benefits, given their positive correlations with most other assets. However, they found that hotels were negatively correlated with commercial real estate in addition to evidence that suggested that hotels offered some protection against inflation risk (although this varied by region and star rating).

Building on this small body of research, Petersen et al. (2003) analyzed the role of hotels in a mixed-real estate portfolio that comprised office, retail, apartment, and industrial, using NCREIF data for the period 1992–2001. Their results indicated that hotels in the U.S. outperformed all other real estate subsectors and provided clear diversification benefits. In particular, they found evidence to support the findings of Firstenberg et al. (1988) that hotels had a significant impact on the efficient frontier, presenting investors with a wider range of higher risk and higher return options. They also noted that hotels recovered faster than other property types following the early 1990s economic slowdown, suggesting that timing of investment decisions could potentially play a role in diversification gains.

### The View of Property Professionals

In keeping with the academic literature, professional opinion has tended to share the view that hotels are a high-risk investment. Despite having become more investable (Baum, 2009) hotels are perceived as alternative and not a part of the traditional commercial property sector (IPF, 2014; PIA, 2013). This is supported by results from the European Hotel Market Survey 2014 which found that 71% of respondents agreed it was fair to describe hotels as an alternative real estate asset class. Furthermore, a large majority (83% of respondents)

<sup>3</sup>Note that “no research on portfolio allocations to lodging real estate [had] been performed since Firstenberg et al. (1988)” (deRoos and Corgel, 1996, p. 33).

believed hotels were perceived by real estate investors as more risky than traditional commercial properties. In light of findings from the academic literature, this is unsurprising—although media reports describing hotels as a “niche” type of investment “not for the faint hearted” (The Financial Times, 2012, para. 11) have also likely contributed to this perception.

Although labels such as “alternative” and “high-risk” continue to hound the subsector, the survey results revealed that 54% of respondents believed hotels had outperformed traditional commercial property over the last five years. Furthermore, 61% supported the view that institutional investors increasingly valued the benefits of hotel property as an attractive real estate asset class. The fact that only 7% of respondents thought hotels were “well represented” in a mixed real-estate portfolio could suggest that the time has come to do away with “historical labeling” (Corgel and deRoos, 1997, p. 36) and to reassess the subsector on its merits. This view is echoed in the IPD Pan-European Hotel Performance Report (2013), which highlighted the strong performance of the hotel subsector and concluded with the view that hotels have continued to “show potential as a core real estate portfolio asset” (IPD, 2013, p.7), reiterating comments made at the IPD Investor Briefing that hotels had performed as a “mainstream asset class for quite some time” (Hotel News Now, 2012, para.13).

### Summary

It is clear from the literature that hotels are perceived as both “alternative” and “high-risk.” Based on prior research, this seems a reasonable assessment and one that is supported by professional opinion. Connecting the dots, it is highly likely that labels such as these perhaps influenced investment decisions in the past, and even potentially discouraged academic interest in the subsector. As has been shown, research on the role of hotels in an investment portfolio is limited, with most of the results confined to the U.S. market alone. This is matched by an apparent absence of hotels as a property type in most real estate portfolios. However, there is evidence to suggest an

increasing level of interest in the subsector coupled with a growing “recognition of hotels as an asset class for property investors” (Page, 2007, p. 97), particularly institutional investors (IP Real Estate, 2014). This is also reflected in the ever-expanding IPD hotel index. Therefore, it seems both appropriate and important that further research should be undertaken on the subject of hotels in an investment portfolio.

## DATA AND METHODOLOGY

### Data

A common source of frustration for hotel real estate academics is the limited availability of historic data. Although not without its own constraints in terms of sample size, this study is unique in its attempt to examine total return performance for leased hotels in both the U.S. and the U.K. using hotel data provided by IPD. As a relatively recent addition to the IPD index, this offers a rich source of new information on the performance of the subsector and allows a like-for-like comparison between U.S. and U.K. markets under the umbrella of the relevant academic literature. Further, it enables comparisons to be made between hotels and other property types such as retail, office, industrial, and residential. This is important because it shines a light on the indicative performance of hotels in a mixed-real estate portfolio at a time when “the growing desire for diversification among property investors has led to a large upsurge in interest in the European hotel sector” (JLL, 2012, para.1).

Starting with the U.S., the research uses quarterly property returns for the period Q3 2003–Q2 2013. The total sample includes nearly 3,000 properties by the end of the measurement period, a size comparable to the number of properties examined by Petersen et al. (2003). Of this figure, leased hotels represent approximately 2% of the sample with a capital value in excess of £1.4bn. As a result of better available data, the U.K. research encompasses a slightly broader period Q1 2001–Q3 2013 and a significantly larger sample size of nearly 8,500 properties. Similar

to the U.S., leased hotels account for 2% of the sample with a capital value of approximately £1.8bn by Q3 2013. Across both markets, the IPD index measures ungeared total returns (sum of capital and income components) for directly held real estate based on regular valuations (IPD, 2012). The data exclude transactions and developments and are expressed in nominal terms.

### Methodology

By design, this study employs the principles of MPT as a framework for assessing risk in the construction of an optimally diversified, mixed-real estate portfolio.<sup>4</sup> Although a criticized theory, especially by those who advocate the robust optimization approach (Fabozzi, Kolm, Pachamano, & Focardi, 2007), its influence continues to hold, with as many as 70%–80% of institutional investors reported to rely on MPT when making asset allocation decisions (Pensions and Investments, 2014). Applying this approach to financial-decision making, the quantitative techniques used to assess the trade-off between risk and return are summarized below.

1. The coefficient of variation measures the amount of risk per unit of mean return (the higher the ratio, the more risky the asset). It is expressed by the formula,

$$\text{coefficient of variation} = \frac{\sigma(R_a)}{E(R_a)}$$

where:

$\sigma(R_a)$  denotes standard deviation of asset returns;

$E(R_a)$  denotes expected return of asset.

2. The Sharpe ratio is a more comprehensive tool, which measures the expected return of an asset over-and-above the risk-free rate compared to its risk, as calculated by the standard deviation. The higher the ratio, the better the risk-adjusted returns.

<sup>4</sup>Otherwise known as mean-variance analysis (Fabozzi et al., 2002).

It is expressed by the formula,

$$\text{sharpe ratio} = \frac{E(R_a) - R_f}{\sigma(R_a)}$$

where:

$E(R_a)$  denotes expected return of asset;

$R_f$  denotes risk-free rate;

$\sigma(R_a)$  denotes standard deviation of asset returns.

3. Due to well-known limitations of the Sharpe ratio,<sup>5</sup> the Sortino ratio is often preferred as a measure of risk-adjusted returns (Rollinger and Hoffman, 2013). Calculated in a similar way, it looks at downside deviation as the key measure of risk. It does this by replacing the risk-free rate with a user-specified target level corresponding to the requirements of the investor, otherwise known as the minimum acceptable return (MAR). Again, a higher ratio is considered better because it indicates lower downside deviation. It is expressed by the formula,

$$\text{sortino ratio} = \frac{E(R_a) - \text{MAR}}{\sqrt{\frac{1}{T} \sum_{R_{at} < \text{MAR}}^T (R_{at} - \text{MAR})^2}}$$

where:

$E(R_a)$  denotes expected return of asset;  
 MAR denotes minimum acceptable return;

$R_{at}$  denotes return on asset for the subperiod  $t$ ;

$T$  denotes number of subperiods.<sup>6</sup>

4. A correlation matrix analysis measures the degree of linear association between two variables. The resulting output in Excel is given by the correlation coefficient where the higher the figure ( $= 1$ ), the stronger the relationship between the two variables and, therefore, the degree of co-movement. Applying MPT, a diversified

<sup>5</sup>See Le Sourd (2007).

<sup>6</sup> $t = 0$  represents the lower bound of summation.

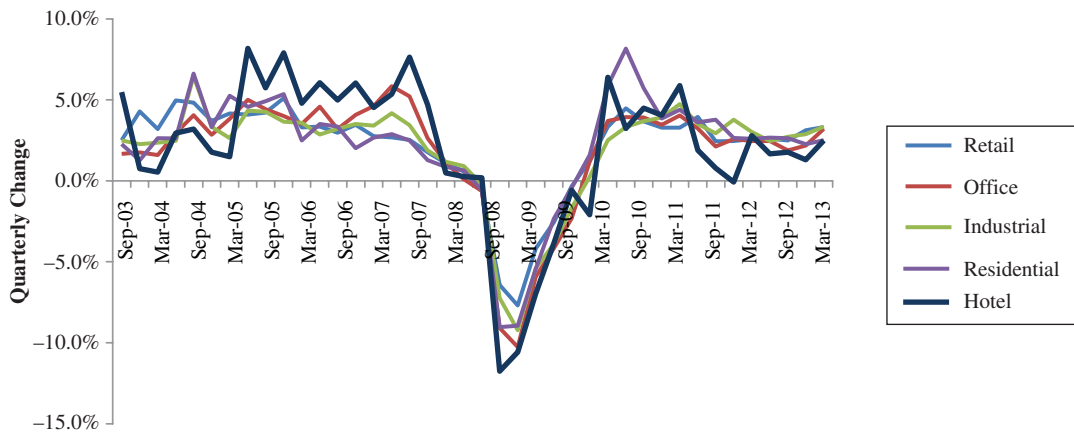


FIGURE 1. Smoothed total returns (Q3 2003–Q2 2013). Source: IPD US quarterly property index Q2 2013, London: IPD.

investment strategy would seek to include those assets that have a lower correlation with one another when combined in a mixed-asset portfolio.

5. A portfolio optimization analysis calculates the proportion of funds that should hypothetically be allocated to a particular asset in constructing the “optimal” portfolio that minimizes risk for a given level of return. Using Solver in Excel, it is possible to construct a set of optimal portfolios that range across the risk-and-return space. Visually this can be illustrated in graphical form and is referred to as the “efficient frontier.” Combinations along this curve represent the best possible trade-off between risk and return, depending on the risk-appetite of the investor. As a guide, the maximum-return portfolio will typically be located toward the upper right-hand corner of the graph, and the minimum-risk portfolio is usually located toward the bottom left-hand corner. A simulation analysis is used to further explore the effect on the portfolio when the amount allocated to a particular asset is changed.

office, industrial, and residential using smoothed total returns for the period Q3 2003–Q2 2013. It discusses the descriptive statistics and how they relate to the academic literature, before exploring the results of a correlation matrix. To understand more fully the performance of hotels in a mixed-real estate portfolio, an optimizer is used to calculate the efficient frontier for a set of portfolios. The corresponding output is presented in graphical form alongside the individual risk and return for each property type. This is supported by the results of a portfolio simulation analysis in order to illustrate the effects on the portfolio when allocations to the hotel subsector are changed. Finally, it concludes with a summary of the empirical results, providing the basis for a more informed analysis of the U.K. hotel subsector. To be clear, the purpose of this section is chiefly to provide a link to the U.S.-focused academic literature, in turn serving as a sense-check for expected results. As a well-established hotel market, the results are expected to offer a useful guide for hypothesizing about the anticipated performance of the U.K. hotel subsector. This is particularly important considering the lack of academic research on the performance of U.K. hotels and their role within a mixed-real estate portfolio.

## EMPIRICAL RESULTS

### Lessons From the U.S.?

This section begins with a brief summary of the performance of U.S. hotels versus retail,

### Analysis: U.S. Hotels

Figure 1 shows the smoothed total return performance for each individual real estate subsector. As per the academic literature, it is

**TABLE 1.** Descriptive Statistics (Q3 2003–Q2 2013)

	Retail	Office	Industrial	Residential	Hotel
Average quarterly return	2.1%	1.9%	1.9%	2.2%	<b>2.1%</b>
Annual return (geometric) mean	8.7%	7.4%	7.8%	8.7%	<b>8.2%</b>
Average return (annualized)	8.9%	7.7%	8.0%	8.9%	<b>8.7%</b>
Risk (standard deviation)	2.9%	3.6%	3.2%	3.5%	<b>4.4%</b>
Sharpe ratio	0.20	0.09	0.12	0.17	<b>0.14</b>
Coefficient of variation	1.33	1.91	1.65	1.63	<b>2.10</b>
Sortino ratio (MAR = 0%)	1.21	0.76	0.90	0.97	<b>0.74</b>

**Sources:** IPD US quarterly property index Q2 2013, London: IPD; Federal Reserve (Datastream, 2010). Note: risk-free rate is the U.S. Treasury Bill (3-month).

evident that hotels were among the most volatile property type, showing exaggerated peaks and troughs throughout the period under review.

From the descriptive statistics above (Table 1) it is clear that hotels achieved moderately high returns relative to other subsectors, sitting below residential and in line with retail, and outperforming both office and industrial. Confirming the visual impression, hotels also exhibited the highest degree of volatility.<sup>7</sup> These results are indicative of the widely held view that hotels are one of the “riskiest real estate asset classes” (Quan, 2008, p. 28) and support the findings of prior research (Firstenberg et al., 1988; Corgel & deRoos, 1997; Petersen et al., 2003), albeit at lower levels of risk and return. This could be a result of the differing periods under review. More likely, it is because of the leased nature of hotels that make up the IPD index, at least by comparison to the more heterogeneous nature of the NCREIF index. Differences aside, due to its inherent volatility, the hotel subsector is characterized by a relatively low Sharpe ratio, a finding similarly noted by Petersen et al. (2003). Using a modification of this measure that looks at downside risk-adjusted performance, hotels are also found to have a low Sortino ratio (MAR = 0%).<sup>8</sup>

A correlation matrix was used to assess the diversification benefits of hotels. Included in

this analysis were GDP and inflation in order to test the performance of the wider U.S. economy in relation to hotels, as well as to examine possible inflation hedging benefits. Based on the findings of Petersen et al. (2003), it was expected that hotels would be positively correlated with all other subsectors (albeit, at a comparatively lower level) as well as GDP and, to a lesser extent, inflation.

The results shown in Table 2 reveal that although hotels tended to be the least correlated of the individual subsectors, the correlations were higher than expected, suggesting only limited diversification benefits. Less surprising was the strong correlation between offices and hotels, a finding highlighted by JLL (2003) and more recently by Cushman and Wakefield (2008). The results also show hotels to be positively correlated with GDP,<sup>9</sup> although it is interesting to note that hotels were less correlated than other subsectors. Although the positive correlation between hotels and inflation was higher than expected, the basic relationship remains a reasonably well-established finding in the academic literature (Gallagher & Mansour, 2000; Hess et al., 2001; Quan et al., 2002; Petersen et al., 2003).

By way of summary, U.S. hotels appear to offer moderate-to-high-returns for the highest level of risk. They also appear to offer limited diversification benefits and some inflation hedging potential. Based on these findings and the academic literature, it might be expected for hotels to play a role in the maximum-return (highest-risk) portfolio. To test this, mean-variance portfolio analysis was used

<sup>7</sup>“Risk” and “volatility” (measured by standard deviation) are used interchangeably (Mangram, 2013).

<sup>8</sup>MAR is typically set at the risk-free rate, target rate or zero. The author adopts zero in keeping with the literature (which assumes the goal is to avoid losses). For examples, see Lhabitant (2006) or Rollinger and Hoffman (2013).

<sup>9</sup>Confirming the results of Wheaton and Rossoff (1998) that hotel demand moves closely in line with GDP.

TABLE 2. Correlation Matrix (Q3 2003–Q2 2013)

	Retail	Office	Industrial	Residential	Hotel	GDP	Inflation
Retail	1.00						
Office	0.95	1.00					
Industrial	0.96	0.97	1.00				
Residential	0.94	0.92	0.93	1.00			
Hotel	<b>0.86</b>	<b>0.93</b>	<b>0.88</b>	<b>0.85</b>	1.00		
GDP	0.74	0.70	0.69	0.73	<b>0.63</b>	1.00	
Inflation	0.48	0.52	0.51	0.50	<b>0.55</b>	0.45	1.00

Sources: IPD US quarterly property index Q2 2013, London: IPD; US Bureau of Economic Analysis (Datastream, 2010).

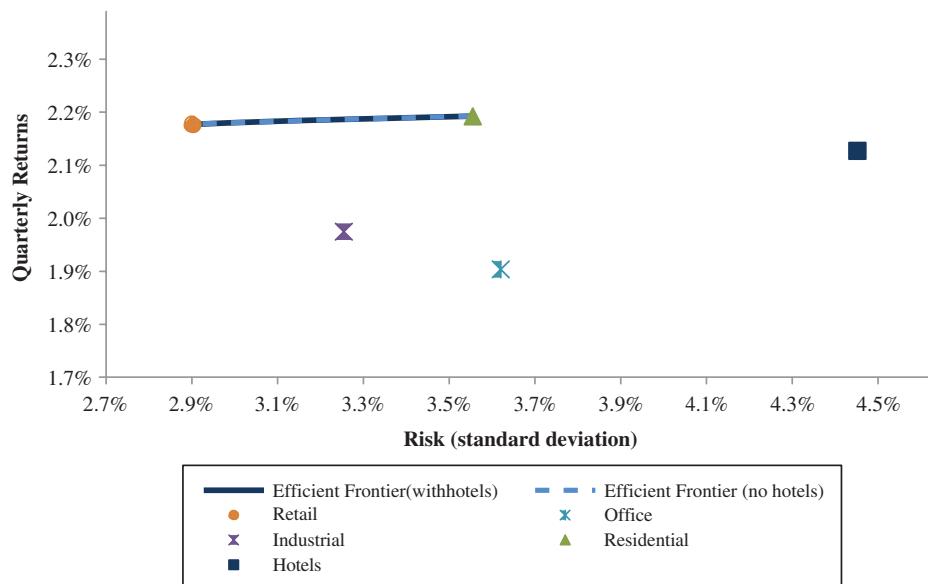
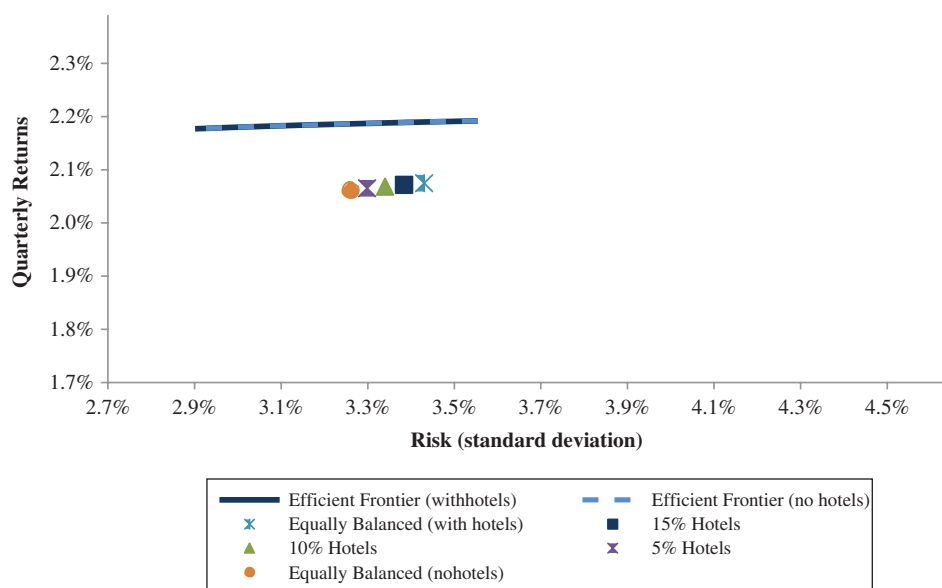


FIGURE 2. Efficient frontier (Q3 2003–Q2 2013). Source: IPD US quarterly property index Q2 2013, London: IPD.

TABLE 3. Efficient Frontier (Q3 2003–Q2 2013)

Efficient Portfolios					Efficient Frontier		
Retail	Office	Industrial	Residential	Hotel	Risk	Return	
0.0%	0.0%	0.0%	100.0%	<b>0.0%</b>	3.5%	2.2%	MAX RETURN
11.1%	0.0%	0.0%	88.9%	<b>0.0%</b>	3.4%	2.2%	
22.2%	0.0%	0.0%	77.8%	<b>0.0%</b>	3.3%	2.2%	
34.0%	0.0%	0.0%	66.0%	<b>0.0%</b>	3.3%	2.2%	
45.8%	0.0%	0.0%	54.2%	<b>0.0%</b>	3.2%	2.2%	
56.9%	0.0%	0.0%	43.1%	<b>0.0%</b>	3.1%	2.2%	
68.6%	0.0%	0.0%	31.4%	<b>0.0%</b>	3.0%	2.2%	
79.8%	0.0%	0.0%	20.2%	<b>0.0%</b>	3.0%	2.2%	
90.9%	0.0%	0.0%	9.1%	<b>0.0%</b>	2.9%	2.1%	MIN RISK
100.0%	0.0%	0.0%	0.0%	<b>0.0%</b>	2.9%	2.1%	

Source: IPD UK quarterly property index Q3 2013, London: IPD.



**FIGURE 3.** Portfolio simulation analysis (Q3 2003–Q2 2013). **Source:** IPD US quarterly property index Q2 2013, London: IPD

to calculate the efficient frontier for a set of portfolios that alternatively included and excluded hotels. Because most investors are thought to be risk-averse (Barlow, 2005), the efficient frontier was solved by minimizing risk for a given level of return (Byrne & Lee, 1995; Wei-Peng, Chung, Ho, & Hsu 2010).

In contrast to prior research, the results (Figure 2, Table 3) show that, due to the disproportionately high level of risk relative to return, hotels did not contribute to the efficient frontier for the period reviewed. Instead, residential occupied the highest-risk and -return end of the efficient frontier, with retail taking up an increasingly significant role in the minimum-risk portfolio.

At this juncture it is perhaps useful to remember the resulting portfolios are “optimal” only in the statistical sense of the word. The high (indeed, “extreme”) weightings allocated to residential and retail, otherwise referred to as *corner solutions*,<sup>10</sup> would unlikely be considered reasonable by any “prudent portfolio manager” (Byrne & Lee, 1995, para.9). This is not to say mean-variance portfolio analysis does

not work (Fabozzi, Focardi, & Kolm, 2006), but rather, to highlight a limitation of this approach and wider differences between theory and practice.

The final part of this section considers a typical range of different percentage allocations (0%–20%) weighted toward the hotel subsector. For each percentage allocation, the portfolio was balanced by an equal weighting of retail, office, industrial, and residential. As the proportion allocated to hotels increased, the resulting risk and return was similarly expected to increase (Petersen et al., 2003).

This was found to be true only in a very limited sense. As illustrated in Figure 3, an increased allocation to the hotel subsector (up to 20%) had a positive yet largely insignificant impact on returns, at the expense of relatively higher levels of risk. Whereas the proportional increase in risk was lower than reported in the literature, the much weaker impact on returns negatively impacted risk-adjusted returns, providing little justification for the inclusion of hotels in a mixed-real estate portfolio. This was confirmed by a comparison of Sharpe ratios.

The results presented here are, thus, somewhat mixed. On one hand, they confirm the academic literature and widely held view

<sup>10</sup>See Black and Litterman (1992) for more on “corner solutions.”

**TABLE 4.** Descriptive Statistics (Q1 2001–Q3 2013)

	Retail	Office	Industrial	Residential	Hotel
Average quarterly return	1.7%	1.5%	1.7%	3.1%	<b>2.0%</b>
Annual return (geometric mean)	6.8%	6.0%	6.5%	12.7%	<b>8.1%</b>
Average return (annualized)	7.1%	6.3%	6.8%	13.0%	<b>8.2%</b>
Risk (standard deviation)	4.0%	3.8%	3.4%	3.7%	<b>2.5%</b>
Sharpe ratio	−0.58	−0.65	−0.70	−0.26	<b>−0.79</b>
Coefficient of variation	2.31	2.45	2.03	1.19	<b>1.27</b>
Sortino ratio (MAR = 0%)	0.65	0.60	0.73	2.93	<b>1.37</b>

**Sources:** IPD UK quarterly property index Q3 2013, London: IPD; Bank of England (Datastream, 2010).

Note: risk-free rate is yield from British Government Securities (10-year nominal zero coupon).

that hotels are typically higher risk compared to more traditional property types.<sup>11</sup> In the case of leased hotels, this is a particularly interesting finding. On the other hand, despite reasonably strong returns and some limited diversification benefits, mean-variance portfolio analysis reveals little justification for the inclusion of hotels in a mixed-real estate portfolio. This may not be altogether surprising considering the time period of the analysis and the different characteristics of the data sampled. Nevertheless, the results appear to suggest an alternative conclusion to the work of Petersen et al. (2003) and their finding that risk-adjusted returns improve as the weighting toward the hotel subsector is increased. As a sense check for expected results, it is observed that despite the differing conclusions, the findings of this section largely re-affirm the results of prior research and support the notion that hotels are one of the most risky property types.

### The U.K. Perspective

To present an analysis comparable with that of the U.S., this section begins in a similar way by reviewing the performance of the U.K. hotel subsector. As a result of improved data availability it focuses on smoothed total returns for the period Q1 2001–Q3 2013.

### Analysis: U.K. Hotels

In contrast to expectations, U.K. hotels performed with considerably lower volatility than U.S. hotels, whereas retail performed with

the highest volatility and suffered most severely from the fallout of the global financial crisis. Despite suffering the largest drop in total returns, residential proved to be the most resilient subsector during the recession, bouncing back in 2009 along with retail. Most likely this was due to the high number of London-based residential properties in the IPD index, a reflection of institutional preference for investment grade property.

The descriptive statistics in Table 4 confirm the visual impression (Figure 4) that leased hotels in the U.K. were less volatile than other real estate subsectors. This stands in stark contrast to the academic and professional literature as well as earlier findings from the U.S. hotel market. Not only were hotels the least volatile property type, they also offered the second highest-returns. This is summarized by the coefficient of variation, which confirms the view that U.K. hotels were less risky than most other property types. Such a conclusion is more difficult to make when using the Sharpe ratio because of the high risk-free return (averaged over the period), resulting in a negative Sharpe ratio for all property types.<sup>12</sup> As an alternative measure, the Sortino ratio was used and shows the hotel subsector to have performed particularly well on a risk-adjusted basis due to its low downside-deviation.

The results of the correlation matrix (Table 5) show that hotels were highly correlated with each of the individual subsectors (with the

<sup>11</sup>A review of available NCREIF data for the same period also confirms this result.

<sup>12</sup>Several modifications to the Sharpe ratio have been proposed in order to address the “negative excess return dilemma”; see, for example, the work of Israelsen (2003, 2005).

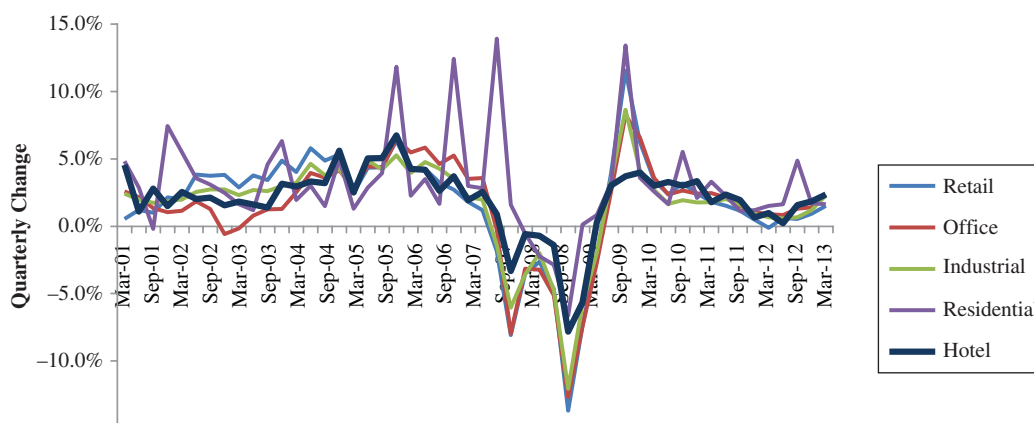


FIGURE 4. U.K. smoothed total returns (Q1 2001–Q3 2013). Source: IPD UK quarterly property index Q3 2013, London: IPD.

TABLE 5. Correlation Matrix (Q1 2001–Q3 2013)

	Retail	Office	Industrial	Residential	Hotel	GDP	Inflation
Retail	1.00						
Office	0.92	1.00					
Industrial	0.98	0.96	1.00				
Residential	0.56	0.57	0.55	1.00			
Hotel	<b>0.90</b>	<b>0.93</b>	<b>0.92</b>	<b>0.54</b>	1.00		
GDP	0.68	0.67	0.70	0.52	<b>0.73</b>	1.00	
Inflation	0.02	0.08	0.03	-0.09	<b>0.09</b>	-0.05	1.00

Sources: IPD UK quarterly property index Q3 2013, London: IPD; Office for National Statistics (Datastream, 2010).

exception of residential). Although not dissimilar to the U.S. findings, the results were less favorable and suggest only limited diversification benefits. As previously found, the U.K. hotel subsector was the most highly correlated with offices. Furthermore, it is noteworthy that hotels were the most highly correlated with GDP, in contrast to the U.S. results. A possible explanation could be the high proportion of variable leases, which accounted for 25% of hotels in the U.K. IPD index in 2001, increasing to 46% by 2012 (81% if hybrid leases are also included). Finally, despite hotels showing the highest correlation with inflation, it was a relatively low figure.

As seen in Figure 5 and Table 6, hotels in the U.K. contributed to the efficient frontier primarily as a result of their lower volatility relative to other subsectors. This is in sharp contrast to the work of Petersen et al. (2003, p. 20), who found that

hotels dominated the frontier “at the top end (high-risk and high-return),” as well as earlier findings of this article. If there is any agreement to be found in these otherwise contradictory outcomes, it is the suggestion that investors might benefit from a wider range of risk and return options by including hotels in a mixed-real estate portfolio.

The seemingly attractive qualities of hotels are further supported by the results of the portfolio simulation analysis (Figure 6). The findings suggest that as the allocation toward hotels is increased, the expected risk of the portfolio declines with almost no perceptible change to the level of return.

In summary, the results of the U.K. hotel subsector present a very different picture to that of U.S. hotels. Due to the low volatility of smoothed total returns over the period under review, U.K. hotels are shown to have a

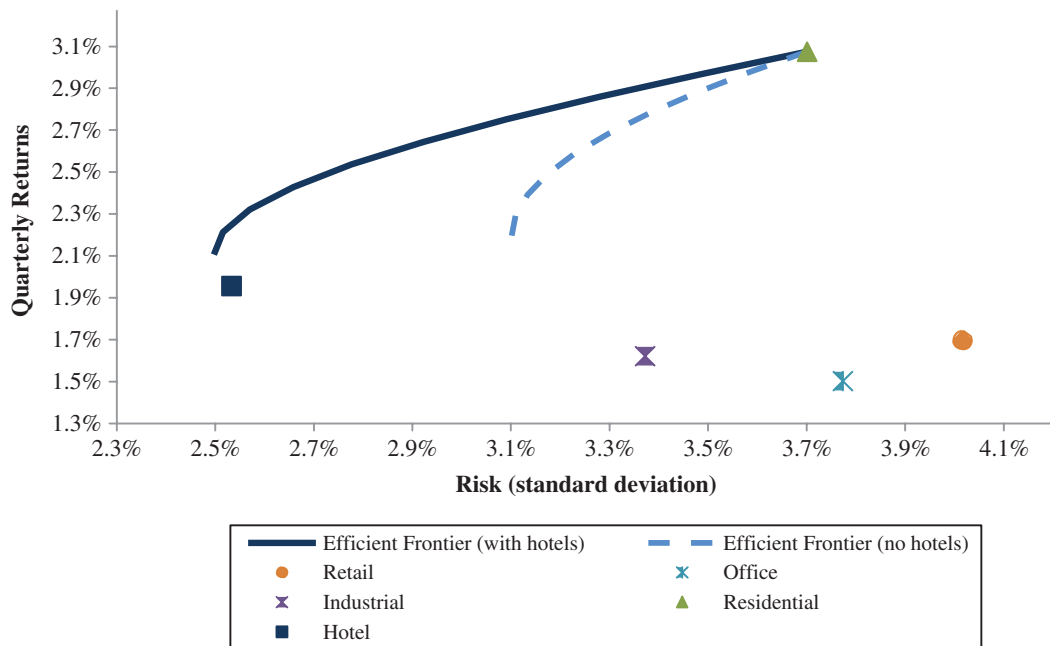


FIGURE 5. Efficient frontier (Q1 2001–Q3 2013). Source: IPD UK quarterly property index Q3 2013, London: IPD.

TABLE 6. Efficient Frontier (Q1 2001–Q3 2013)

Efficient Portfolios					Efficient Frontier		
Retail	Office	Industrial	Residential	Hotel	Risk	Return	
0.0%	0.0%	0.0%	100.0%	<b>0.0%</b>	3.7%	3.1%	MAX RETURN
0.0%	0.0%	0.0%	90.4%	<b>9.6%</b>	3.5%	3.0%	
0.0%	0.0%	0.0%	80.8%	<b>19.2%</b>	3.3%	2.9%	
0.0%	0.0%	0.0%	71.1%	<b>28.9%</b>	3.1%	2.8%	
0.0%	0.0%	0.0%	61.5%	<b>38.5%</b>	2.9%	2.7%	
0.0%	0.0%	0.0%	51.9%	<b>48.1%</b>	2.8%	2.6%	
0.0%	0.0%	0.0%	42.2%	<b>57.8%</b>	2.6%	2.5%	
0.0%	0.0%	0.0%	32.6%	<b>67.4%</b>	2.6%	2.4%	
0.0%	0.0%	0.0%	23.0%	<b>77.0%</b>	2.5%	2.2%	MIN RISK
0.0%	0.0%	0.0%	13.4%	<b>86.6%</b>	2.5%	2.1%	

Source: IPD US quarterly property index Q2 2013, London: IPD.

prominent and noteworthy role within a mixed-real estate portfolio. These results are significant because they present an alternative view with regard to the investment characteristics of the hotel subsector. The lower-risk profile of U.K. hotels might well be a reflection of the leased nature of those hotels captured in the IPD index, although it should be remembered that in spite of this, U.S. hotels were the most risky property type. As such, there is a strong argument to suggest that hotels in the U.K. are

indeed a potentially attractive subsector and are deserving of greater attention by the wider real estate investment community. This would require investors to adopt a more critical stance in light of the widespread perception (indeed, misperception) that hotels are uniformly high-risk assets. Finally, it is noted that although the U.S. hotel subsector offers an interesting comparison, it provides a relatively weak proxy for the performance of U.K. hotels. In many ways this might simply reflect basic structural

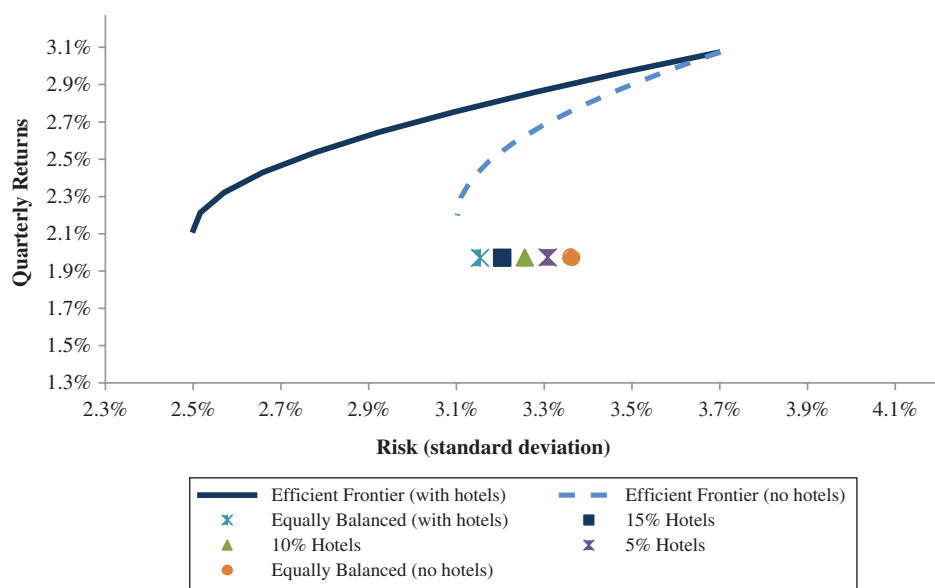


FIGURE 6. Portfolio simulation analysis (Q1 2001–Q3 2013). Source: IPD UK quarterly property index Q3 2013, London: IPD.

differences between two highly developed, yet clearly very different hotel markets.

### The U.K. Perspective Revisited

This section further extends the U.K. analysis but differs as a result of its emphasis on de-smoothed total returns. Using the first-order autoregressive filter developed by Geltner (1993),<sup>13</sup> the original data was de-smoothed using various de-smoothing parameters. This was done primarily in response to the overwhelming case presented in the academic literature that “property valuation indices are smoothed, and property risk should be adjusted” (IPF, 2007, p. 8). Initially, a de-smoothing constant of 0.65 was used to de-smooth the returns. This was to ensure consistency with the academic literature, where it was found that most de-smoothing parameters fell between 0.5 (Haran, Davis, McCord, Grissom, & Newell, 2013) and 0.7 (Lizieri & Ward, 2004),<sup>14</sup> but also to reflect

typical industry practice based on conversations with property professionals. Findings from this initial analysis are presented in the Appendix. By contrast, the empirical results presented overleaf are a product of de-smoothing the data using the individual correlation coefficient for each property type. This was done to improve the accuracy of the results by more precisely reducing the effects of serial correlation and therefore removing some of the inertia (or lag) from the original data (Byrne & Lee, 1995). Throughout this section, comparisons are made to both the smoothed and de-smoothed results ( $\alpha = 0.65$ ) in order to stress-test the findings and ensure consistency with the broader conclusions of this article. Fundamentally, it seeks to substantiate the view that leased hotels in the U.K. offer diversification benefits and are less risky than otherwise implied by the academic literature.

### Analysis: U.K. Hotels De-Smoothed

A visual examination of the results (Figure 7) confirms that after having de-smoothed the data, the volatility of each of the real estate subsectors increased substantially, with little change to the mean returns (Byrne & Lee,

<sup>13</sup>According to IPF (2007) this is the most robust de-smoothing technique.

<sup>14</sup>Note that there is “no absolute way of determining whether a particular value of alpha is most appropriate for the de-smoothing process” (Byrne & Lee, 1995, para.42).

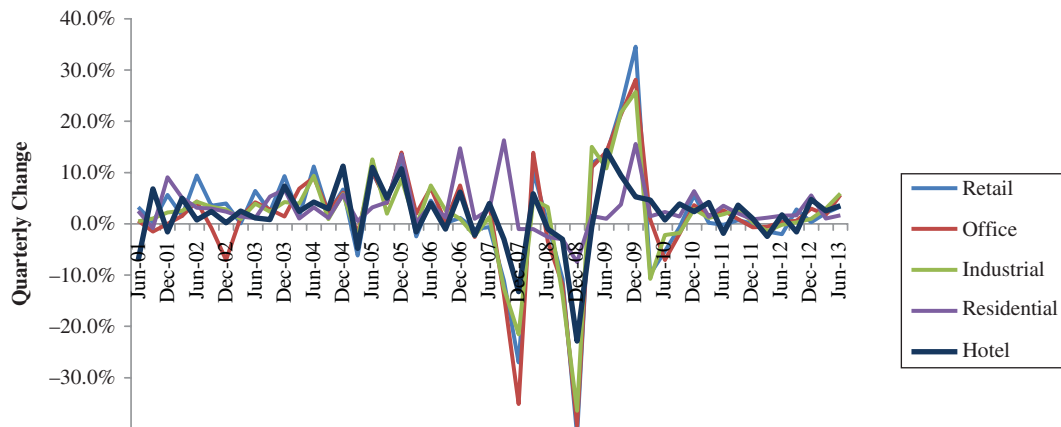


FIGURE 7. UK de-smoothed total returns (Q1 2001–Q3 2013). Source: IPD UK quarterly property index Q3 2013, London: IPD.

TABLE 7. Descriptive Statistics (Q1 2001–Q3 2013)

	Retail	Office	Industrial	Residential	Hotel
Average quarterly return	1.8%	1.6%	1.7%	3.1%	<b>1.8%</b>
Annual return (geometric mean)	5.0%	3.8%	5.0%	12.4%	<b>6.8%</b>
Average return (annualized)	7.6%	6.5%	7.0%	12.8%	<b>7.6%</b>
Risk (standard deviation)	10.7%	10.8%	9.4%	4.4%	<b>6.0%</b>
Sharpe ratio	-0.20	-0.23	-0.25	-0.22	<b>-0.36</b>
Coefficient of variation	5.80	6.83	5.50	1.45	<b>3.26</b>
Sortino ratio (MAR = 0%)	0.25	0.20	0.25	2.52	<b>0.46</b>

Sources: IPD UK quarterly property index Q3 2013, London: IPD; Bank of England.

1995). The increased volatility can be recognized by the higher frequency in the number of peaks and troughs over the period, as well as by the more dramatic quarterly change in de-smoothed total returns. This is further confirmed by the descriptive statistics (Table 7) which show a higher standard deviation for all property types. The one notable difference between these results and the de-smoothed results ( $\alpha = 0.65$ ) is the lower-risk profile of the residential subsector. This is simply a reflection of the low serial correlation of its returns and the relatively high de-smoothing parameter that had originally been applied to the data.

According to industry studies, “risk as measured by the IPD UK Index should be multiplied by factors anywhere from 1.5 to 3.5”

(IPF, 2007, p. 10). Applying this recommendation to the original, smoothed data provides a range into which the average risk of the de-smoothed total returns should fall, if correctly calculated. Although only a rough guide, the expected result was verified, confirming both the appropriateness of the methodology used and the reliability of the de-smoothed statistics above.

The correlation matrix in Table 8 shows that hotels were among the least correlated of the individual subsectors. Although this confirms the original results, a closer comparison reveals that after having de-smoothed the data, hotels became less correlated with other property types. The strong, positive relationship with offices continued to exist as well as the low correlation with the residential subsector.

TABLE 8. Correlation Matrix (Q1 2001–Q3 2013)

	Retail	Office	Industrial	Residential	Hotel	GDP	Inflation
Retail	1.00						
Office	0.94	1.00					
Industrial	0.97	0.93	1.00				
Residential	0.47	0.43	0.40	1.00			
Hotel	<b>0.75</b>	<b>0.80</b>	<b>0.75</b>	<b>0.40</b>	1.00		
GDP	0.27	0.25	0.24	0.44	<b>0.39</b>	1.00	
Inflation	0.04	0.02	0.05	−0.08	<b>0.08</b>	−0.05	1.00

Sources: IPD UK quarterly property index Q3 2013, London: IPD; ONS.

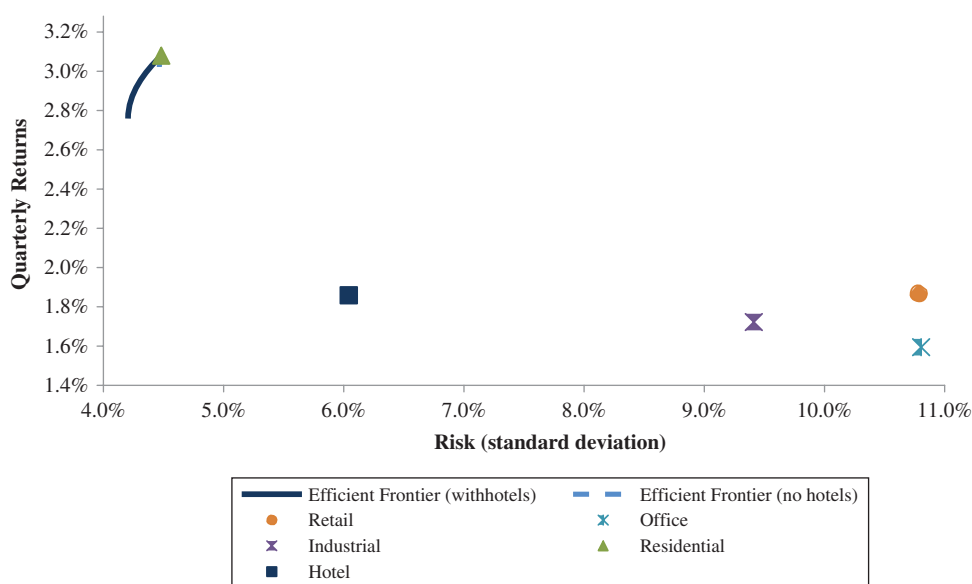


FIGURE 8. Efficient frontier (Q1 2001–Q3 2013). Source: IPD UK quarterly property index Q3 2013, London: IPD.

To provide a more definitive view, multiple regression analysis was performed.<sup>15</sup> The results conclusively showed, that, with the exception of offices, hotels were not significantly related to any of the other real estate subsectors at the 5% level. This finding further supports the suggestion that U.K. hotels are likely to provide

<sup>15</sup>The necessary diagnostics were checked to ensure the relevant assumptions had been met. The only major issue found was multicollinearity, with particularly high VIFs for retail and industrial. To ensure robustness, retail was removed from the analysis. Consequently, all VIFs dropped below 10, which, for the purpose of this analysis, was deemed acceptable. The results were reaffirmed after a robust multiple regression analysis was run to correct for heteroskedasticity, ensuring that all assumptions had been satisfied.

some limited diversification benefits in a mixed-real estate portfolio. Finally, although much reduced, hotels continued to show a moderate correlation with GDP and its relationship with inflation remained positive but low.

In summary, it is clear from the de-smoothed results that U.K. hotels offered reasonably high-returns and performed with a relatively low level of risk during the period under review. Although residential became more attractive, the results confirmed the original finding that hotels justified inclusion in a mixed-real estate portfolio. It was also apparent that hotels offered some diversification benefits as well as potential

TABLE 9. Efficient Frontier (Q1 2001–Q3 2013)

Efficient Portfolios					Efficient Frontier		
Retail	Office	Industrial	Residential	Hotel	Risk	Return	
0.0%	0.0%	0.0%	100.0%	<b>0.0%</b>	4.4%	3.1%	MAX RETURN
0.0%	0.0%	0.0%	97.1%	<b>2.9%</b>	4.4%	3.0%	
0.0%	0.0%	0.0%	94.1%	<b>5.9%</b>	4.3%	3.0%	
0.0%	0.0%	0.0%	91.2%	<b>8.8%</b>	4.3%	3.0%	
0.0%	0.0%	0.0%	88.3%	<b>11.7%</b>	4.2%	2.9%	
0.0%	0.0%	0.0%	85.4%	<b>14.6%</b>	4.2%	2.9%	
0.0%	0.0%	0.0%	82.4%	<b>17.6%</b>	4.2%	2.8%	
0.0%	0.0%	0.0%	79.5%	<b>20.5%</b>	4.2%	2.8%	
0.0%	0.0%	0.0%	76.6%	<b>23.4%</b>	4.2%	2.8%	MIN RISK
0.0%	0.0%	0.0%	73.7%	<b>26.3%</b>	4.2%	2.7%	

Source: IPD UK.

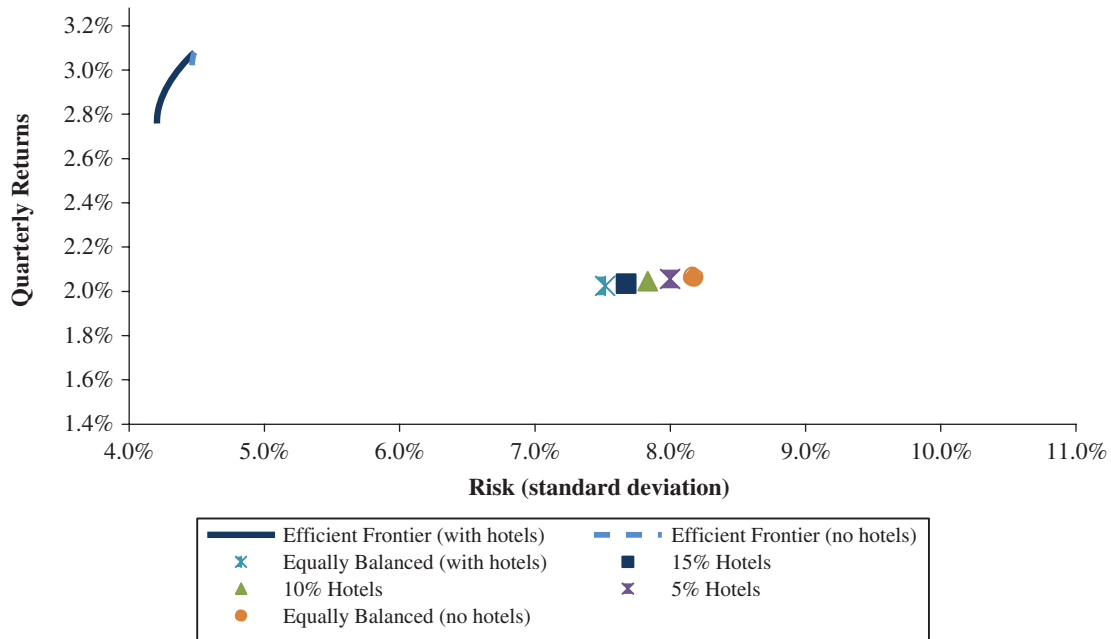


FIGURE 9. Portfolio simulation analysis (Q1 2001–Q3 2013). Source: IPD UK quarterly property index Q3 2013, London: IPD.

inflation hedging qualities (although evidence for this was far from robust).

The results of the mean-variance portfolio analysis are presented in Figure 8 and Table 9. Because of the strong risk and return profile of residential, the efficient frontier for a portfolio excluding hotels was characterized by a consistently high allocation toward the residential subsector. As such, the efficient frontier can hardly be recognized, appearing as a dot beside

the marker for residential. In contrast, the efficient frontier for a portfolio including hotels offered a wider range of options, particularly for the risk-adverse investor. In spite of the lower allocation toward hotels (versus the original findings), the results support the view that hotels are an attractive real estate subsector. This is reaffirmed by the de-smoothed results ( $\alpha = 0.65$ ), suggesting that the findings are broadly consistent.

The attractiveness of hotels is further demonstrated by the results of the portfolio simulation analysis, as illustrated in [Figure 9](#), confirming that as the allocation toward hotels is increased, the expected risk of the portfolio declines.

The de-smoothed results presented in this section appear to confirm the basic findings of the original analysis and reaffirm the view that leased hotels in the U.K. are a credible and attractive investment proposition, particularly for risk-averse investors. Their positive contribution to a mixed-real estate portfolio is also supported by the de-smoothed results ( $\alpha = 0.65$ ).

## CONCLUSIONS

This article has examined the role of leased hotels in an investment portfolio. Using data provided by IPD for the U.S. and U.K. property markets, its stated aim was to explore whether hotels provide diversification benefits when included in a mixed-real estate portfolio and to critically reassess the view that hotels are uniformly high-risk assets.

Based on the findings of the literature review, it was clear that by comparison to more traditional property types, hotels have received little attention from property researchers and tend to be overlooked in the asset allocation process. This may be a result of the commonly held perception that hotels are alternative and high-risk, labels that are seemingly justified by the results of prior research and held to be true by a majority of real estate professionals. Coming full circle, this might have negatively influenced investment decisions in the past and wider academic interest in the subsector. Taking the U.S. as a proxy for the performance of the U.K., the empirical findings confirmed the literature and widely held view that hotels are more volatile than traditional property types. This was verified by checking available NCREIF data for the same period. However, contrary to the results of [Firstenberg et al. \(1988\)](#) and [Petersen et al. \(2003\)](#), hotels did not contribute to the efficient frontier, suggesting an alternative conclusion to their earlier work. Although

this may be a result of differences in the dataset and/or time periods, the basic findings supported the view that hotels are one of the most risky property types in the U.S.

Taken in isolation, these results merely echo the findings of prior research and serve to consolidate what is already a very narrow evidence base. By extending the analysis and shifting the focus to the U.K., the empirical results tell a rather different story. Here, it was found that hotels are much less volatile than other real estate subsectors and perform particularly well on a risk-adjusted basis. Despite high correlations, especially with the office subsector, hotels offer some diversification benefits and contribute to the efficient frontier at lower-risk levels. This was confirmed by the de-smoothed results using the individual correlation coefficient for each property type (and checked for robustness using a de-smoothing constant of 0.65). Consequently, it was observed that hotels are not necessarily deserving of their reputation as uniformly high-risk investments.

It is acknowledged that, due to limitations in available data, this study cannot claim total coverage of the hotel market. For example, examining only leased hotels forced an exclusion of alternative operating contracts (i.e., hotels under management or franchise agreement). Although this was an unavoidable limitation of the data, the research nevertheless contributes to the literature by offering insights into the performance of leased hotels in two of the most highly liquid hotel investment markets. The practical implications are also of considerable relevance, especially for institutional investors. Considering their desire for diversification, institutional investors would do well to reconsider hotels as something more akin to a mainstream asset class ([Hotel News Now, 2012](#)) and reexamine the strategic role hotels can potentially play in a diversified investment portfolio. This would necessitate further academic research, which, spurred by continual improvements in data availability, presents an exciting opportunity. A logical extension of this research would be to examine the importance of star-rating and geographic location (both avail-

able through IPD) as one way to better understand the characteristics of hotels in an investment portfolio. As the IPD index expands to include a wider range of markets, it would be interesting also to test the findings of this study against the results of hotels in different countries.

### AUTHOR NOTE

Nicholas Worsley is the 2014 recipient of the prestigious Mansford Award from the University of Cambridge for his MPhil dissertation on hotels in a mixed-real estate portfolio. He was also recently awarded the Best Graduate Student Research Article Award by the AHFME.

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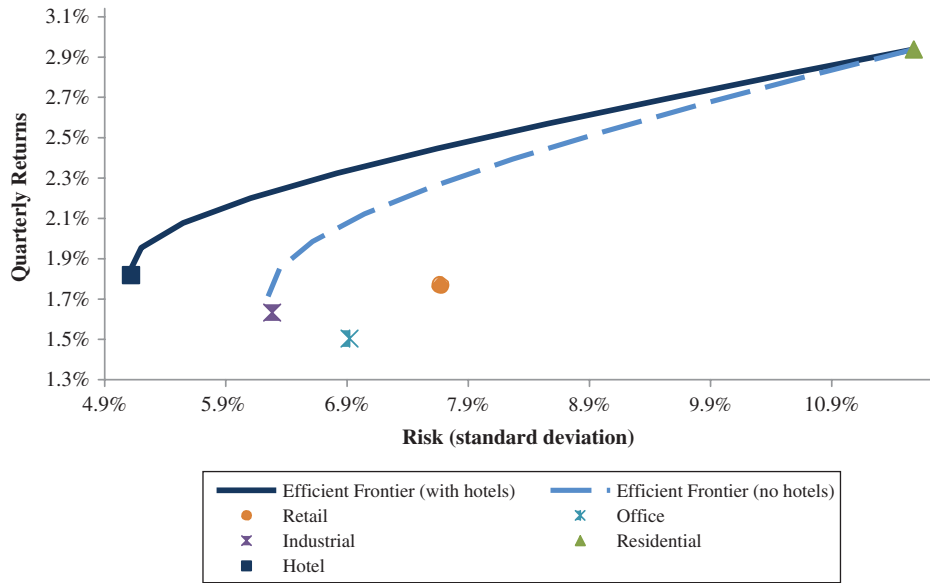
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APPENDIX

Analysis: UK Hotels De-Smoothed (Alpha= 0.65)



Efficient Frontier (Q1 2001–Q3 2013) **Source:** IPD UK quarterly property index Q3 2013, London: IPD.