

# A QUANTITATIVE APPROACH TO REAL ESTATE ASSET ALLOCATION FOR BALANCED FUNDS

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## INTRODUCTION

Conventional market cap weighted portfolios lack diversification, which has the potential to lower their returns and increase risk. In UK commercial real estate, the market has been segmented by use and geographic location. This traditional IPD / MSCI market segmentation reflects a 36% exposure by use to retail using MSCI's Global Property Classification Sectors; and a 50% exposure by geography to London and the South East.

This paper explores how real estate investors and portfolio managers can adapt the way they construct balanced portfolios by borrowing from current capital market practice surrounding factor investing. In Part 1, the paper briefly looks at the work of academic financial research in the second half of the 20th century starting at Modern Portfolio Theory and going on to consider the Capital Asset Pricing Model, the Efficient Market Hypothesis and the growth of passive investing and Exchange Traded Funds (ETF's).

The paper then switches its focus to real estate, noting that very many property portfolios are poorly diversified and carry high levels of specific risk, and suggesting that real estate fund managers should look beyond use and geography and build portfolios that are based around the underlying factors that drive performance.

MSCI research indicates that Quality factors can drive out performance. Our analysis of the published data suggests that a Value approach incorporating relatively high yielding and low MRV/m<sup>2</sup> assets can drive out-performance at some points in the cycle whilst a Growth / Quality approach with a focus on low yield and high MRV/m<sup>2</sup> can drive out-performance at different points in the cycle. There is also clear evidence to suggest that a Momentum based strategy could provide superior performance.

## MODERN FINANCIAL THEORY

The theoretical background developed by finance academics that supports the work of today's portfolio managers.

**Modern Portfolio Theory (MPT)**, developed by Harry Markowitz in the 1950s, is the original study of how a portfolio can be constructed to maximise return against a given level of risk. The idea behind MPT was that a portfolio's overall risk could be reduced by combining a number of weakly correlated assets. The optimal solution or combination of assets is known as the efficient frontier. The curve of the efficient frontier connects the maximum return portfolio with the minimum risk portfolio. Combinations of assets along the efficient frontier will reward investors who take on more risk with higher returns.

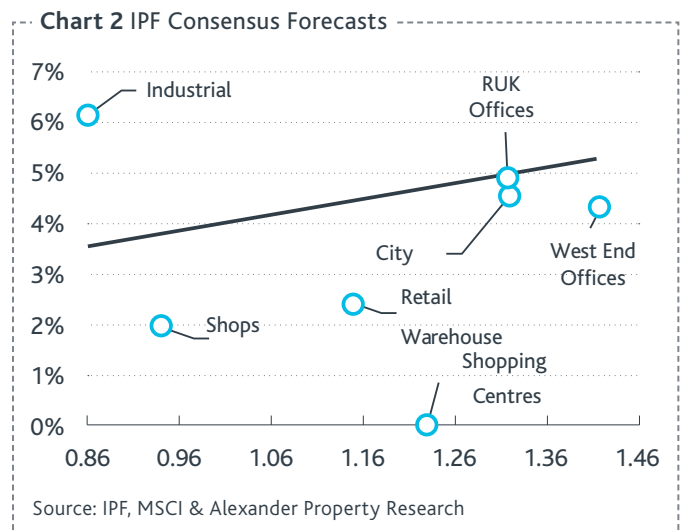
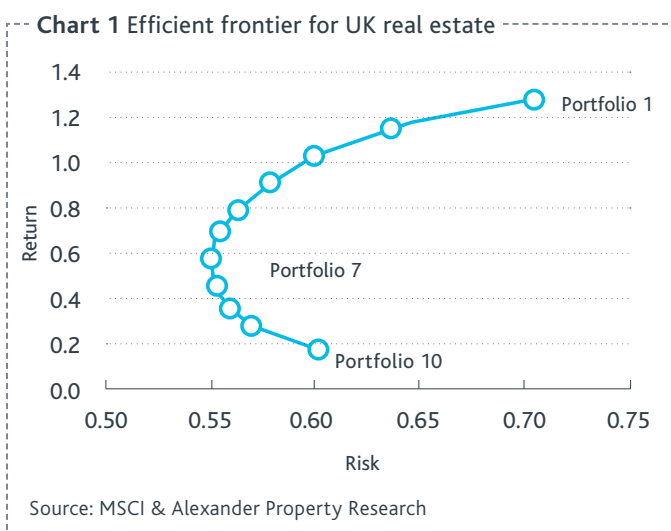
The idea that a portfolio of assets can carry less risk than the sum of parts can be illustrated by using MSCI's monthly UK real estate data which slices the UK market into 11 segments. In the last 5-years the best total return performance has been offered by South East Industrials and the least risky, as defined by market volatility, has been provincial shops outside London and the South East, known to the industry as Rest of UK Standard Retail. But an optimal combination of these 11 market segments can create a portfolio that both (1) carries less risk; and (2) offers a better return than provincial shops (Chart 1).

Portfolio 1 is made up of 100% South East Industrials and Portfolio 10 comprises 100% Rest of UK Standard Retail. However, Portfolio 7 with exposure to Central London Standard Retail, Rest of UK Standard Retail, Rest of UK offices, South East Industrial and Rest of UK Industrial carries both less risk and a better return than Portfolio 10. Table 1 in the Appendix shows the constituent portfolios for each data point along the efficient frontier.

**The Capital Asset Pricing Model (CAPM)** introduced by William Sharpe in the 1960s presented the idea of systematic and unsystematic or specific risk. Systematic risk is whole market and macro-economic risk reflecting the possibility of recession and a collapse in market prices. It cannot be diversified away and investors are rewarded for taking on more risk with the opportunity to achieve higher returns.

Unsystematic risk is specific to individual assets. Through diversification it should be possible to eliminate all specific risk in a portfolio reducing the risk of a portfolio to the level of systematic risk inherent in the market as a whole. Quite logically, the market does not reward investors in the form of higher returns for risks that can be eliminated i.e. specific or diversifiable risks. Above market returns can only be achieved by assuming greater systematic risk.

Sharpe's CAPM introduced Beta which defined the risk and return of each asset relative to the performance of the whole market (see Equation 1 in the Appendix). An asset is



correctly priced when its observed price is the same as its value calculated using CAPM. It is over-priced if it is priced at a premium to CAPM value and correspondingly under-priced if the reverse is true. Chart 2 illustrates this, again using historic MSCI UK real estate data to calculate the Beta coefficient and August 2019's Investment Property Forum's Consensus Forecasts. Real estate market segments that are under-priced, and therefore offer a better expected return, lie above the CAPM, Security Market Line and vice versa.

The intuitively pleasing ideas behind MPT and CAPM became entwined with the **Efficient Market Hypothesis** (EMH) academically defined by Eugene Fama in 1970<sup>1</sup> and popularised by Burton Malkiel in "A random walk down Wall Street".

The implications of EMH are firstly, if asset prices promptly and accurately reflect all available information, then the asset price must be a fair price in the light of the information available at that point in time. Secondly, if asset prices reflect all current information they will only respond to changes in news, which is a random event. Therefore, asset price changes behave in a random manner. This randomness places in question the ability to forecast future prices.

A study by Brinson, Hood and Beebower (1986)<sup>2</sup> (BHB) of large American Pension Funds in 1986 used data from 91 large US pension plans over the 1974-83 period comparing the returns to those of a hypothetical fund holding the same average

asset allocation in indexed investments. A linear time-series regression yielded an average R-squared of 93.6%, leading BHB to conclude that asset allocation explained 93.6% of the variation in a portfolio's quarterly returns. In 1991 an update to the BHB study was published that examined returns from the 1977 to 1987 period and found a return variance of 91.5%, essentially confirming the results of the original study.

This research has been interpreted as meaning that it is not possible for active fund managers to consistently out-perform markets and that investors should focus on a high level of diversification and invest in passive index tracking funds and ETF's in their pursuit of out-performance over time.

## ACTIVE AND PASSIVE PORTFOLIO MANAGEMENT

Portfolio Management is the process of matching investment strategy and asset allocation to match objectives, whilst balancing risk and performance. The amount of money under investment in passive funds has grown rapidly at the expense of actively managed funds. This trend has been aided by the development of factor investing allied to ETF's.

Research published by Standard & Poors and Dow Jones compares actively managed funds against their benchmarks. Over time certain themes have emerged. One is that actively managed funds have historically tended to under-perform their benchmarks over short- and long-term periods. This has tended to hold true (with exceptions) across countries and regions. Another recurring theme is that even when a majority of actively managed funds in a category have outperformed the benchmark over one time period, they have usually failed to outperform over multiple periods (see Table 1).

Analysis by Morningstar was behind reports in the FT in July 2019 that investors in the US and Europe had fled active mutual funds at the highest rate in at least three years, pulling more than \$30bn in the year to end June 2019 as stock picking came under intense scrutiny. Passive index tracking funds continue to take market share, and by mid-2019 accounted for 37.5% of the mutual fund market in the US, up from 35.5% 12 months earlier. And in Europe, their market share rose to 18.3%, from 16.6% in the same period.

**Table 1** Funds under-performing (%)

Benchmark	5-year	3-year	1-year
Europe S&P 350	78%	83%	90%
US S&P 500	82%	79%	64%
Japan S&P/TOPIX 150	75%	85%	93%

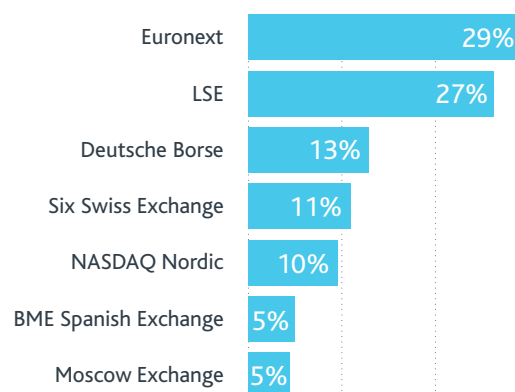
Data to 30th June 2019

Source: us.spindices.com

Conventional passive funds have allocated money to mainstream asset classes such as bonds and equities and to alternative investments like real estate, commodities and hedge funds. Allocations have been made in some cases quite arbitrarily in proportion to market value. A European equity fund might weight its holdings in proportion to the market capitalisation of a number of European bourses (see Chart 3).

Such market-weighted approaches overweight securities or assets with high prices and underweight those with low prices. They have also been shown to be rather concentrated in a small number of mega-cap stocks, sectors and certain market segments (see Table 2). Consequently, market cap weighted portfolios may lack diversification, which has the potential to lower their returns and increase risk. During the Global Financial Crisis (GFC) seemingly efficient market weighted portfolios suffered disproportionately because the traditional asset classes were all seen to be correlated when caught in the eye of the perfect storm.

**Chart 3** European exchanges market cap (%)



Source: Statista, 2019

**Table 2** Components of the Nasdaq 100

Company	Weight (%)
Apple Inc	11.9
Microsoft Corp	11.3
Amazon.com Inc	9.1
Alphabet Inc	8.7
Facebook Inc	4.8
Total	

## REAL ESTATE PORTFOLIO MANAGEMENT

Traditionally, balanced real estate funds have been managed by reference to the IPD / MSCI Universe and its derivative peer group benchmarks leaving portfolios poorly diversified and carrying high levels of specific risk.

In UK commercial real estate, the market has been segmented by use and geographic location (see Table 3). This traditional IPD / MSCI market segmentation reflects a 36% exposure by use to retail using MSCI's Global Property Classification Sectors; and a 50% exposure by geography to London and the South East. Such large weightings would seem to carry a great deal of risk at a time when Amazon and associated internet retailers are posing a very large threat to conventional physical retail; and Prime Minister Johnson's Government is hinting at using the City's access to Euro financial markets as a bargaining chip in discussions surrounding the protection of the UK fishing industry.

It has been argued that the suspension of the M&G Property Portfolio fund, valued at £3bn in December, was caused when retail investors sought to exit the fund due to concerns regarding its 36% exposure to retail. Some of the funds biggest assets included Wales Designer Outlet, Bridgend; Parc Trostre Retail Park, Llaneli; and Fremlin Walk, Maidstone.

A study of five developed markets analysed the size of stock portfolios required to achieve most of the benefits of diversification<sup>3</sup>. The conclusion was that professional portfolio managers who use standard deviation as a measure of risk, and who seek to reduce 90% of diversifiable risk 90% percent of the time, should hold 49 stocks in the US; 43 in the UK; 39 in Japan; 40 in Canada; and 38 in Australia.

However, a direct or private real estate fund that eliminates all specific risk through diversification is not feasible or, at the very least, a very large number of assets are required; making the proposition available only to the very largest funds.

Brown and Matysiak<sup>4</sup> demonstrate that although it is possible to achieve significant reductions in risk, it is very difficult to achieve high levels of diversification (see Chart 4). In excess of 200 direct property investments are required to approach market tracking risk return profiles. Near market levels of diversification may be an unrealistic aspiration with less than £3 billion to invest based on the average asset value in the MSCI annual universe of £16.8 million.

**Table 3** Standard UK CRE market segmentation

Segment	Weight (%)
Central London Shops	4.7
Rest of South East Shops	2.2
Rest of UK Shops	2.6
Shopping Centres	7.0
Retail Warehouses	14.4
Supermarkets	4.7
<b>All Retail</b>	<b>35.6</b>
City Offices	3.3
Midtown and West End Offices	10.8
Rest of South East Offices	9.7
Rest of UK Offices	7.0
<b>All Offices</b>	<b>30.8</b>
London and South East Industrials	14.7
Rest of UK Industrials	5.5
Distribution Warehouses	9.7
<b>All Industrial</b>	<b>29.9</b>

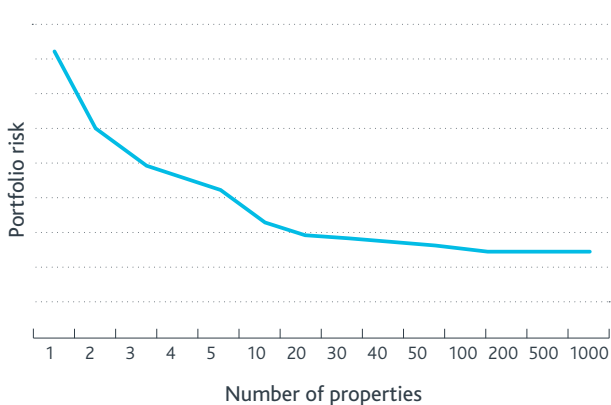
Source: MSCI

Consequently, very many property portfolios are poorly diversified and carry high levels of specific risk. There are currently 29 Balanced Property Funds in the MSCI/AREF Quarterly Property Fund Index. The tracking error of this group ranges between 1.5% and 10.0% (see Table 4).

There isn't a typical value for tracking error. Instead, there is a wide spectrum of products available in every asset class ranging from purely passive to very active. Theoretically an index fund should have a tracking error of zero relative to its benchmark. Enhanced index funds typically have tracking errors in the 1%-2% range. Most traditional active managers have tracking errors around 4%-7%. Those active managers who are willing to take bigger bets away from an index might exhibit tracking errors in the 10%-15% range. Absolute return, benchmark-agnostic strategies could have even higher tracking errors.

The weighted average tracking error of the AREF All Balanced Funds is 4.3% suggesting that these funds are consciously or sub-consciously taking riskier positions than the market as represented by the MSCI Quarterly All Property Universe.

**Chart 4 Risk reduction and diversification**



Source: Brown & Matysiak

**Table 4 Tracking Error of AREF All balanced funds**

	Track ERR	No of assets	Value (£m)
Min	1.5%	28	349.62
1st quartile	3.6%	225	1,472.37
Median	4.5%	67	605.52
3rd quartile	5.7%	23	562.49
Max	10.0%	57	593.28

Source: MSCI & Alexander Property Research



## FACTOR INVESTING OR SMART BETA

Factor investing or “smart beta” involves targeting quantifiable characteristics or “factors” that can explain differences in stock returns. Smart Beta attempts to deliver a better return/risk trade-off than conventional market cap weighted indices by using alternative weighting schemes based on company characteristics which have been shown to be related to future asset returns such as accounting metrics, price momentum or volatility.

Warren Buffett challenged the idea that equity markets are efficient in an article published in 1984 entitled “The Superinvestors of Graham-and-Doddsville”. Buffet’s article studied nine successful investment funds generating long-term returns above the market index by following a value investing strategy.

Building on research by Fama and French (1992)<sup>5</sup> that demonstrated a value premium, or the fact that value stocks tend to have higher average returns than growth stocks, Fisher, Shah and Titman (2016)<sup>6</sup> demonstrated the advantages from combining portfolios with small cap and large cap stocks with a focus on Momentum and Value.

Factors have their roots in the academic literature cited above. MSCI indicates that a factor can be thought of as any characteristic relating to a group of securities that is important in explaining their return and risk. The most important equity factor is the market. But beyond the market factor the most widely referenced factors cited in the literature have been Value, Growth, Size and Momentum. More recently, Low Volatility, Yield and Quality factors have become increasingly accepted (see Table 5). The latest research has even looked at non-traditional factors like the number of “Google” hits a stock receives or the number of times it is mentioned in mainstream media.

MSCI report that diversification across factors has historically led to (1) lower volatility and higher Sharpe ratios; (2) higher information ratios and lower tracking errors; and (3) less regime dependency over business cycles. Increasingly, institutional investors are being attracted to Factor investing. Globally, the volume of assets in factor funds rose from \$565bn to \$1.2tn in five years, according to Morningstar, and nearly two-thirds of institutions are looking at increasing allocations, FTSE Russell found last year.

Factor investing is backed up by long run evidence, but there are extended periods when particular styles underperform. Since the Global Financial Crisis, the Value style has been the hardest hit with Value investors experiencing a lost decade. Clearly, factors perform differently across the business cycle. Value, Momentum and Size are pro-cyclical; out-performing when growth, inflation and interest rates are rising. Quality and Low Volatility are more defensive factors, leading performance in weaker market conditions. But, “Size, Value, Income, Momentum and Volatility have an important impact on portfolio returns. As “factor effects” they will continue to exist and should be monitored by all investors.”<sup>8</sup>

**Table 5** Established factors in academic research

Factor	Characteristics
Value	Low price relative to book value.
Size	Small market capitalisation.
Momentum	Stronger past performance over last 3, 6 or 12 months.
Low volatility	Lower than average volatility or Beta.
Yield	Higher dividend yielding stocks.
Quality	Quality metrics including low debt, stable earnings growth, strong balance sheet.

Source: MSCI

## FACTOR INVESTING FOR REAL ESTATE

The smart beta approach described above can be used to identify characteristics of real estate that drive out-performance and identify new asset allocation strategies based on factors. Such an approach offers real estate investors new tools to segment the market in addition to traditional approaches that dissect assets by sector and geography as noted above.

For equities, the Quality factor helps explain the movement of stocks that have low debt, stable earnings growth and other "quality" metrics. MSCI have applied this concept to private real estate by using three measures that together serve as proxies for Quality: market rental value per square meter (a reflection of occupier preference), unexpired lease term (reflecting income security) and equivalent yield (reflecting investor preference).

MSCI found that properties with a combination of the highest MRV/m2, longest unexpired lease term and lowest equivalent yield i.e. each of the three quality measures, outperformed the All Property baseline over the eight years ended December 2016, suggesting that a Quality factor premium existed during this period. However, this premium for Quality assets is transitory and varies by time period.

Developing on this work by MSCI we have been able to create a series of market weighted All Property factor / style indices

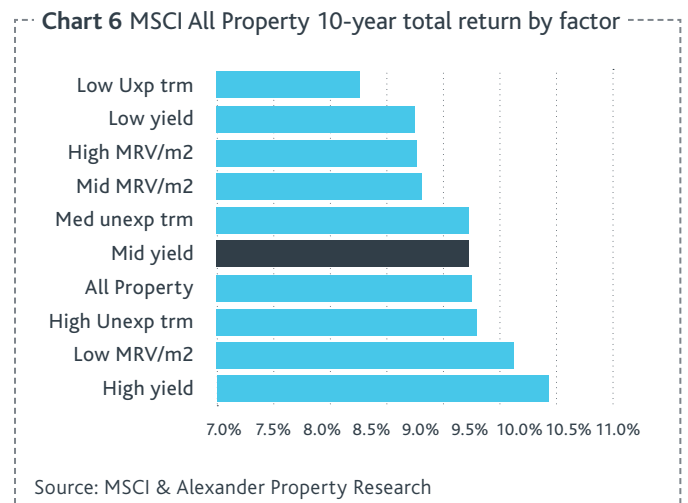
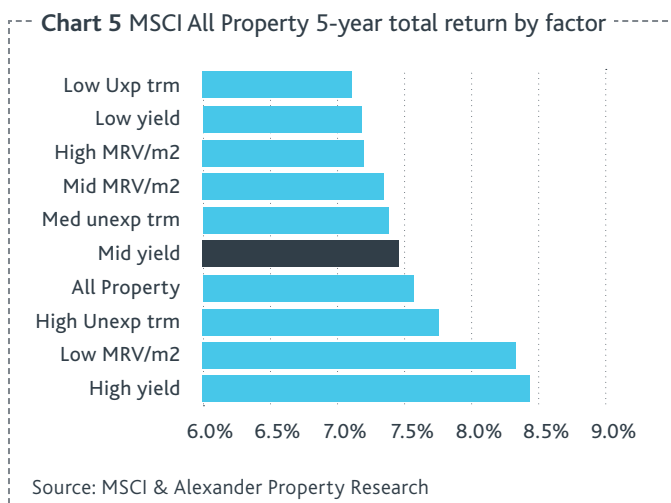
from the quarterly published data. Total returns for a range of property use types segmented firstly by MRV/m2; unexpired lease term and equivalent yield; and secondly by quartile are combined in a market value weighted.

Over five years to September 2019, real estate assets with a relatively high yield and low market rental value per m2 outperformed the All Property average. Whilst assets with a low yield and high MRV/m2 under-performed (see Chart 5). Over ten years to September 2019, real estate assets with a relatively high market rental value per m2 and low yield out-performed. Assets with a low MRV/m2 and high yield under-performed (see Chart 6).

It is common to both 5-year and 10-year periods that assets with a high unexpired term out-performed; while assets with a low unexpired lease term under-performed. This might call into question the tactic in the upward phase of the market cycle of seeking assets with a high vacancy rate supposedly to obtain the valuation benefits from achieving lettings at constantly increasing rental values.

Market conditions differed over these two time periods. The 5-year time frame is dominated by the slowing or even stagnating market conditions caused by the build-up to Brexit and the uncertainty created by the outcome of the referendum. However, during the majority of the 10-year time period real estate assets enjoyed a period of robust performance supported by a stable economy in the course of recovering from the GFC.

Clearly, factors driving performance change through the cycle. In the early periods of recovery characterised by robust performance, growth or quality assets with low yields and high MRV/m2 will out-perform. And as the market cycle reaches maturity, higher yielding assets with Value characteristics out-perform.



## REAL ESTATE MOMENTUM INVESTING

Momentum investing involves buying assets that have enjoyed strong relative performance over the past three to twelve months and selling those that have under-performed.

In an efficient market you would not expect to see a strong relationship between current and lagged returns. The relationship between current quarterly returns on the FT Real Estate index and returns lagged by one quarter appears reasonably random. Whereas the relationship appears much stronger for the MSCI All Property Index (see Charts 7 & 8).

The regression results are also revealing (see Table 6). The coefficient of the FT Real Estate Index is 0.164. The explanatory power of the model is weak; the lagged returns explain just 1% of the variation in current returns. The implication is that the market for REIT shares is efficiently priced.

With the MSCI Monthly All Property Index, the coefficient is 0.89 and lagged model explains 78% of the variation in returns. Serial correlation within private real estate indices is at its most acute at the monthly level. As the valuation interval increases, the stickiness in valuations begins to diminish. Nevertheless, the suggestion from these results is that the market for private real estate assets is inefficient.

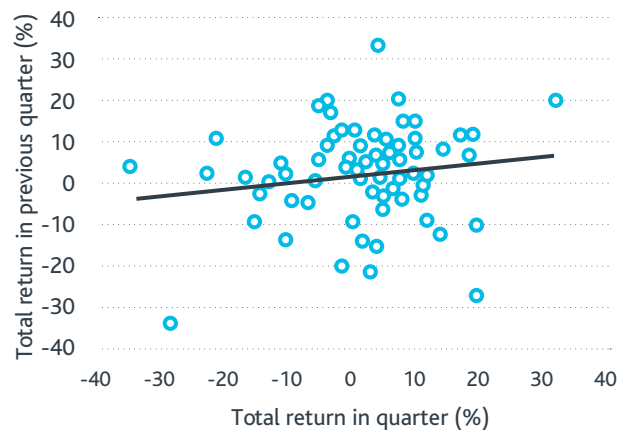
MSCI, together with other data on the UK real estate market, provides annual total return numbers for 11 standard "PAS" segments. In every year the performance of each segment has been ranked from top performer to bottom performer. We construct a hypothetical portfolio and assume that at the start of every year, the portfolio is fully invested in the previous year's best performing PAS segment.

**Table 6** Regression of current total return versus

	$\beta$	ADJ. R2
FTSE Reit Index	0.1641	0.0133
MSCI Monthly All Property	0.8881	0.7873
MSCI Quarterly All Property	0.7214	0.4907
MSCI Annual All Property	0.4021	0.1383

Source: FTSE, MSCI & Alexander Property Research

**Chart 7** FT Reit Index



Source: Alexander Property Research & FTSE

**Chart 8** MSCI All Property



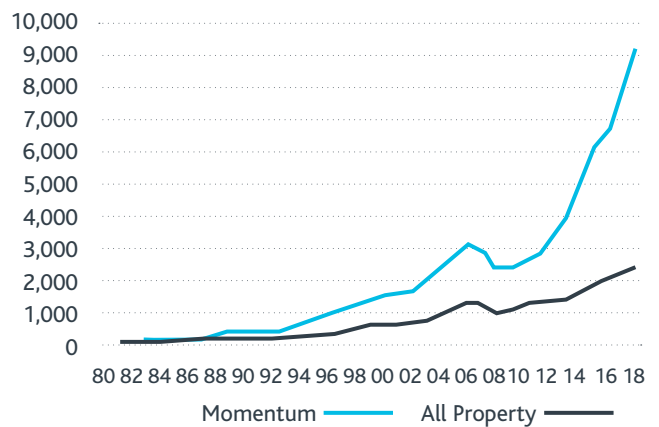
Source: Alexander Property Research & MSCI

We have also adjusted for transaction fees by assuming that the costs of purchase are stamp duty, and investment agency and legal fees; the costs of sale are agency and legal fees. Stamp duty on commercial property purchases is a progressive rate based on the price paid but has been as low as 1% in 1985 – 1997. Agency fees are assumed to have remained constant at 1% and legal fees at 0.25%. There are no purchase or sale costs in any one year if the Momentum Portfolio already holds the previous year’s best performing segment.

Empirical evidence suggests that a Momentum based direct real estate portfolio could provide superior performance and out-perform the All Property average (see Chart 9). On a rolling 5-year basis, a Momentum strategy is clearly cyclical and provided limited benefits between 2002 and 2011 but performed strongly 1986 – 2001 and post-2012. It is also noteworthy that the factor maintained its strong relative performance throughout the 1990-91 economic recession and market downturn (see Chart 10).

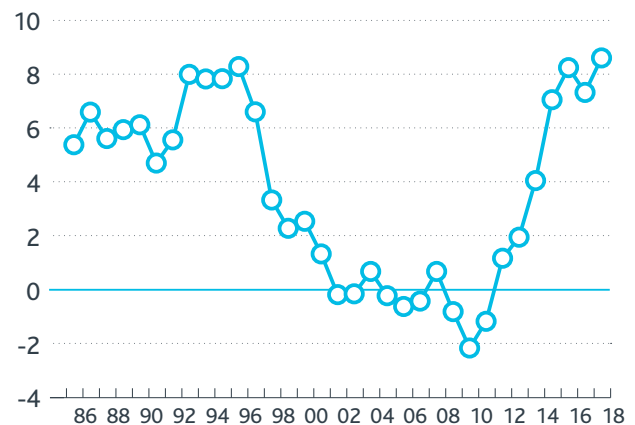
At the index level, there is clearly an advantage to be gained by investors adopting a Momentum strategy for real estate portfolios. However, Brown and Matysiak show that smoothing or serial correlation at the index level does not necessarily imply smoothing at the individual property level. Smoothing at the individual property level is in fact low. A property’s value can be dictated by lease events and micro-market conditions; and there is no relationship between the valuations on different assets. At other times Individual property values respond to macro-market conditions and can at times move in the same direction. It is this later cross correlation that is picked up in indices when the movement in individual property valuations are aggregated.

**Chart 9 Momentum v All Property Index (1980=100)**



Source: Alexander Property Research & MSCI

**Chart 10 Momentum rolling 5-year performance v MSCI**



Source: Alexander Property Research & MSCI

## CONCLUSION

A wide-ranging academic literature has grown up to support finance professionals in their role as fund managers. The ideas behind Modern Portfolio Theory, the Capital Asset Pricing Model and the Efficient Market Hypothesis support the growth of low-cost index tracking funds and passive investing. Passive investing has now developed to the point where it is reported that there are now more exchange traded funds (ETF) than stocks.<sup>10</sup>

Factor investing or Smart Beta is yet another development. Value, Size, Momentum, Low volatility, Yield and Quality have an impact on portfolio returns and, although cyclical, need to be monitored by all investors.

Real Estate fund managers need to engage with these developments. They should not stand aloof and claim that their asset class is different and value stock selection skills to the exclusion of all else. Such a strategy has the potential to create poorly diversified and risky portfolios.

There is no reason why commercial property should not move beyond looking at use and geography and build portfolios that are based around the underlying factors that drive performance. Arguably, long income property funds are an attempt to do this.

MSCI research indicates that Quality factors can drive out performance. Our analysis of the published data suggests that a Value approach incorporating relatively high yielding and low MRV/m<sup>2</sup> assets can drive out-performance at some points in the cycle. A Growth / Quality approach with a focus on low yield and high MRV/m<sup>2</sup> can drive out performance at different points in the cycle. There is also clear evidence of momentum effects at the index level.

Investors in real estate are challenged by a lack of historic performance data when they make the decision to purchase. They might decide to reduce portfolio risk through following a low volatility strategy or seek to benefit from a Momentum approach. But at the individual asset level they must rely on their own due diligence prior to purchase. Whether they are able to use the signals generated by the factors discussed above to successfully target individual assets requires further empirical work but what is clear is that alternative theory and practice can and should be considered as part of real estate portfolio strategy and risk adjusted performance creation.

## APPENDIX

**Table 1** Asset allocation for efficient real estate portfolios

RETURN		RISK / (STDEV)							PORTFOLIO WEIGHTINGS				
		SSCL	SSSE	SSRUK	SC	RW	CityO	WEO	RoSEO	RUKO	SEI	RUKI	All
1.27	0.70	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	100%
1.15	0.64	13%	0%	0%	0%	0%	0%	0%	0%	0%	71%	16%	100%
1.02	0.60	14%	0%	4%	0%	0%	0%	0%	0%	0%	43%	39%	100%
0.90	0.58	12%	0%	16%	0%	0%	0%	0%	0%	0%	35%	37%	100%
0.78	0.56	9%	0%	28%	0%	0%	0%	0%	0%	4%	27%	32%	100%
0.66	0.55	7%	0%	39%	0%	0%	0%	0%	0%	9%	19%	26%	100%
0.54	0.55	5%	0%	51%	0%	0%	0%	0%	0%	13%	12%	20%	100%
0.42	0.56	3%	0%	62%	0%	0%	0%	0%	0%	18%	4%	14%	100%
0.29	0.57	0%	0%	75%	0%	0%	0%	0%	0%	23%	0%	2%	100%
0.17	0.60	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%

### EQUATION 1

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f)$$

**Where:**

$E(R_i)$  is the expected return on asset  $i$ ;

$R_f$  is the risk free rate;

$\beta_i$  is the Beta co-efficient of asset  $i$ ;and

$E(R_m)$  is the expected return on the market.

- 
- <sup>1</sup> E. Fama, "Efficient Capital Markets: A review of theory and empirical work, 1970.  
<sup>2</sup> G Brinson, LR Hood and DP Beebower, "Determinants of Portfolio Performance", 1986.  
<sup>3</sup> V. Alexeev and F. Tapon, "Equity portfolio diversification: how many stocks are enough? Evidence from five developed markets", 2012.  
<sup>4</sup> G. Brown and G. Matysiak, Real Estate Investment A Capital Market Approach, 2000.  
<sup>5</sup> E. Fama and K. French, "The Cross-Section of Expected Stock Returns", 1992.  
<sup>6</sup> G. Fisher, R. Shah and S. Titman, "Combining Value and Momentum", 2016.  
<sup>7</sup> Credit Suisse Global Investment Returns Yearbook, 2019.  
<sup>8</sup> Credit Suisse, 2019.  
<sup>9</sup> Brown and Matysiak.  
<sup>10</sup> Credit Suisse, 2019.

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