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Real Estate Fund Active Management

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Abstract:

The traditional way to measure the active management of a fund is to calculate its tracking error: as measured by the standard deviation of the difference in a fund's returns versus its benchmark returns. However, tracking error alone is an inadequate measure of fund activity since even very actively managed funds can in fact generate rather low tracking errors. Therefore judging the activity level of a fund based solely on tracking error can be misleading. In addition, while tracking error volatility is easy to calculate it only infers what the manager is doing at the portfolio level and does tell you how the tracking errors were generated. For instance, Cremers and Petajisto (2009) argue that the two distinct approaches to active management, stock selection or factor risk, can produce significantly different tracking errors.

Instead of using tracking error alone Cremers and Petajisto (2009) suggest that a more comprehensive picture of active management can be achieved by including Active Share into the calculations, where the Active Share of the fund is measured as half the sum of the absolute difference between the fund's holdings and those of the benchmark portfolio. In other words, Cremers and Petajisto (2009) claim that using Active Share and tracking error together enables investors to distinguish between the types of active management used by funds, stock selection and factor risk, and so classify funds by their investment management strategy: pure indexes, closet indexes, diversified stock pickers, concentrated stock pickers, and factor bets.

Keywords: *Active Share, Tracking Error, Real Estate Funds*

Real Estate Fund Active Management

Introduction

The traditional way to measure the active management of a fund is to calculate its tracking error: as measured by the standard deviation of the difference in a fund's returns versus its benchmark returns (see *inter alia*, Alford et al, 2003, Higgins and Ng, 2009, and Higgins, 2010). However, tracking error alone is an inadequate measure of fund active management since even very actively managed funds can in fact have rather low tracking errors. Therefore judging the activity level of fund management based solely on tracking error can be misleading. In addition, there exists plenty of "closet indexing" among these so called actively managed funds. Closet indexing is referred to when a fund that claims to be actively managed, and therefore charges high management fees, in fact acts like a passive index fund by closely replicating some benchmark index. Finally while tracking error volatility makes sense and is easy to calculate, it only infers what the manager is doing at the portfolio level and does not tell you how the tracking errors were generated. For instance, Cremers and Petajisto (2009) argue that the two distinct approaches to active management, stock selection or factor risk, can produce substantially different tracking errors.

Cremers and Petajisto (2009) suggest that a fund's level of active management would be better understood by examining the actual holdings in the portfolio and comparing those holdings to its benchmark index, which the authors call Active Share. The authors argue that there are two reasons why Active Share is a useful method to measure fund's active management. First, since an active manager can only add value relative to the benchmark by deviating from it, Active Share can help in identifying managers capable of delivering positive alpha through their stock picking activity. Second, Active Share can also be combined with the traditional method of measuring the active management of a fund, tracking error, to provide a more comprehensive way to measure active management. In other words, by using the double sources of active management, Active Share and tracking error, Cremers and Petajisto (2009) are able to classify the funds into one of five investment management strategies categories: pure indexers, closet indexers, diversified stock pickers, concentrated stock pickers, and factor bet funds.

To the best of the author's knowledge the dual sources of active management, Active Share and tracking error, have not been applied in the real estate market so this paper is the first to apply such an approach to classify real estate funds in the UK into the five active management categories identified by Cremers and Petajisto (2009). Then, after the fund categorization, we compare their return performance against Active Share, tracking error, fund size and leverage. Therefore the paper will be able to answer two of the fundamental questions of investment: (1) does active management add value and (2) what form of active management, stock selection or factor risk, is better at adding value to the fund? As such our results will be of interest to investors and financial consultants in revealing which factors should be considered in selecting real estate funds.

The remainder of the paper is structured as follows. The next section discusses the difference between active and passive management. This is followed by a review of the approaches used to measure active management. Section 4 outlines the research design. The next section presents the fund data. Section 6 presents the fund classification results for the overall sample period, while the next section tests the robustness of the classification results in three sub-periods. Section 8 then compares the performance of funds against their level of active management, while the final section presents the conclusions.

Active and Passive Management

Fund managers have two ways to exercise their business. They can operate an active fund management policy, or, on the other hand they may be more passive. Investors investing in actively managed funds seek expertise from the fund managers who are assumed to have a more comprehensive view of the current market situation than investors themselves. This will be done by analysing individual investments and the market in general and actively trying to differentiate the fund holdings from the benchmark index holdings. Passive management, or "indexing", in comparison involves assembling a portfolio of assets that mirrors the performance of a given asset market or its corresponding index. Passively managed funds are often a cheap way to invest in funds and they also offer the advantage of diversification. In contrast, actively managed funds are expected to add value by deviating from their relative benchmark, but as a consequence are less diversified than passive funds and are more expensive to manage.

What distinguishes passive from active fund strategies is the composition of total risk exposure. Both active and passive fund strategies will incur 'incidental' risk, while the active strategy will also incur 'intentional' risk. Incidental risk will occur since neither fund management strategy can ever hold assets that exactly match the benchmark portfolio due to market frictions such as transaction costs and liquidity constraints etc. (see *inter alia*, Chiang,1998; Keim, 1999; and Frino and Gallagher, 2001). Intentional risk arises in active fund strategies as they try to outperform a given benchmark by taking positions that differ from those in the benchmark.

There are two basic ways for a fund manager to engage in intentional or active risk (Fama, 1972). The first is through 'stock selection', which means owning investments that are in the index, but at a weight that is higher or lower than what is in the index. The second way to raise active risk is through 'factor risk', by overweighting or underweighting sectors that have different market risk factors. For instance, a manager who is bullish on an economic recovery might overweight sectors that are economically sensitive, or a manager who is bearish might overweight defensive sectors. Either approach results in different portfolio weightings relative to a manager's official benchmark index.

A dilemma arises however when a fund claims to be actively managed but the fund manager decides to act like a passive fund. These kinds of funds are often referred as 'closet index' funds, since while the fund may claim to be actively managed, and therefore charges high management fees, in fact acts like an index fund by closely replicating some benchmark index. This is naturally the opposite of what investors are paying active managers for. Petajisto (2010) argues that closet index funds generally exist because their managers believe it is safer for them, in terms of their own career prospects, if they track an index rather than take greater risks with more active management, i.e. no one ever gets sacked for matching the performance of his benchmark.

The classification of funds on their level of active management is of interest for at least three reasons. First, it is important to see whether funds indeed are what they say they are: active or passive. In particular, it is important to see whether the fund which has classified itself as an active fund is in fact a 'closet index' fund. Identifying 'closet indexers' is essential because active management fees can be a significant hurdle to outperforming the index for anyone holding a portfolio similar to its benchmark. It is equally important to see whether a passive fund manager is taking 'intentional' risks, rather than mimicking the performance of the benchmark, which is what they are expected to do.

Second, it is important to identify the active management strategy the fund is following to achieve any outperformance. Such a classification will be of benefit to investors as it will

enable them to allocate their funds to different active managers in line with their expectations of future market performance. For instance, if investors expect the future market to be very tranquil, with very few investment opportunities, there is little point to hold active funds with their high fees, when a passive fund will offer similar performance at lower cost. However, if the market is expected to be a boom period, with a large number of investment opportunities, investing in an actively managed fund maybe the more attractive option.

Lastly, the main reason investors decide to invest in actively managed funds is that they are expected to outperform their benchmark index. Therefore, it is important to see whether active management adds value and what form of active management, stock selection or factor risk, is better at adding value to the fund.

The Two Dimensions of Active Management

Tracking Error

The traditional measurement of active management is to calculate tracking error[1] of the fund; as measured by the standard deviation of the difference in a fund's returns versus its benchmark returns. The formula for (ex-post) tracking error is presented below:

$$Tracking\ Error = \sigma(R_p - R_b), \qquad (1)$$

where σ equals standard deviation, R_p equals the portfolio return, and R_b equals the benchmark return.

The logic behind the measurement is that the makeup of the individual investments in the portfolio will be reflected in the pattern of the returns. If the returns of the fund deviate from the index returns significantly through time, the makeup of the fund must be significantly different from the index. High tracking error indicates that the fund return has varied a lot in relation to benchmark return. Correspondingly, low tracking error indicates that the fund and benchmark returns have been close to each other. In other words, the tracking error figure reveals the degree of active risk the fund is taking in searching of added value.

It is assumed that actively managed funds tend to generate higher tracking errors than those of passively managed funds. This is due to the fact that active fund managers try to beat the benchmark index by constructing a fund that differs from the benchmark index, whereas passively managed funds simply replicate the benchmark index. However, even though in theory the tracking error of the index fund should equal zero, in practice this is rarely the case. Chiang (1998) points out fund managers adopting an indexing approach can't guarantee that their funds' performance will be identical to the benchmark index, due to transaction costs, fund cash flows, the volatility of the benchmark, the treatment of income in index returns and changes in index composition through time. A view shared by Frino and Gallagher (2001) who argue that given market frictions tracking error is unavoidable, even in passively managed funds (see also Keim, 1999). Despite these issues Frino and Gallagher (2001) state that tracking error is a natural way to manage passive funds.

Arguing that "it is now commonplace to categorize active managers by the level of active risk" Alford et al (2003) used tracking error to categories US equity funds into three groups: "passive", "structured" and "active". Alford et al (2003) define a "passive" fund as one with a tracking error of less than 1.0% over a full investment period, which includes booms and busts, or 0.5% or lower for during stable times. A "structured" fund in contrast should display a tracking error of between 1% and 5% over a full period, while, an "active" fund should

[1] Israelsen and Cogswell (2007) consider "differential from benchmark" to be more instructive and constructive term than "error".

show a tracking error between 5% and 15% over a full investment period but 3% during normal times[2]. Using this definition of a fund's investment style Alford et al (2003) conclude that managers who exhibit more investment discipline produce higher returns. Specifically, they show that active managers who do a better job of controlling their tracking errors outperform both passive portfolios and other active managers with less risk-evaluating skill.

The approach of Alford et al (2003) has also been used to categorise both wholesale securitised property funds and unlisted wholesale property funds in Australia (Higgins and Ng, 2009 and Higgins, 2010). A wholesale securitised property fund invests in Real Estate Investment Trusts (REITs) with the aim of replicating a particular property index. In comparison, Australian unlisted wholesale property funds are equivalent to UK property funds and hold properties directly.

Higgins and Ng (2009) categorised 16 securitised property funds with complete quarterly data over the period from 2000 to 2007. The authors found that, based on the spectrum of investment styles, as detailed by Alford et al (2003), 13 could be labelled "structured", two funds "passive" and only one "active". Interestingly, the authors report that the rankings based on tracking errors appeared unrelated to other key investment performance measures such as the Sharpe ratio and the information ratio. The authors attribute this to the poor performance of the active and some structured securitised property funds during the market decline.

Higgins (2010) used two sets of unlisted wholesale property funds data, eight that had been in existence since 2002 and four property funds which started after 2005. For all the property funds the author finds that they could be grouped into two of the three Alford et al (2003) categories: "structured" and "active". However, Higgins (2010) notes that the newer property funds that commenced after 2005 all had relatively high tracking errors compared with the established funds, which the author suggests results from their higher debt ratios. The author also notes that apart from one retail property fund, the tracking errors of property funds changed considerably between the stable and abnormal property market conditions. Finally, Higgins (2010) cautions that the use of tracking error alone in categorising the active style of funds is probably too subjective and recommends other characteristics should be evaluated such as the number of buildings and debt levels in the fund. In particular, Higgins (2010) finds that property funds with large property portfolios and low debt levels, i.e. below 20%, provided better tracking error performance.

Active Share

Active Share is found by analysing the actual holdings of a manager's portfolio and comparing those holdings to its benchmark index (Cremers and Petajisto, 2009). By measuring active management in this way, investors can get a clearer understanding of what exactly a manager is doing at the individual asset level to achieve outperformance, rather than drawing conclusions from tracking errors.

Cremers and Petajisto (2009) define Active Share as:

$$Active\ Share = \frac{1}{2}\sum_{i=1}^{N}\left|W_{fund,i} - W_{index,i}\right| \qquad (2)$$

Where: $W_{fund,i}$ and $W_{index,i}$ are the portfolio weights of stock *i* in a fund and in its benchmark index; the sum is taken over the N holdings in the index and in the fund.

[2] Vardharaj et al (2004) suggest the typical levels of tracking error, measured as an annualised standard deviation, should be: zero for an index fund; below 2% for an enhanced index fund and between 5 and 10% for an actively managed fund.

Equation (2) shows that Active Share is calculated as half the sum of the absolute difference between the fund's weight and the index's weight for all the investments represented in the fund and in the index. The sum is divided by 2 to ensure that Active Share takes on a value between zero and 100%[3]. If the fund fully replicates the benchmark index then the Active Share should be zero, i.e. the fund is totally passive. Correspondingly, if the fund's holdings differ completely from the benchmark index the Active Share equals 100% signalling that the fund is totally active. For all other values between zero and 100% Active Share determines the degree to which a fund is actively managed.

Tracking error and Active Share

Cremers and Petajisto (2009) argue that the two distinct approaches to active management, stock selection or factor risk, can produce substantially different tracking error volatilities. A stock picker funds generates alpha with stock selection within sectors and diversifies across sectors. In contrast, 'factor risk' fund managers concentrate in a particular sector that is expected to outperform its benchmark index while holding mostly diversified positions within the sector. The outcome is such that the 'factor risk' fund has substantially higher tracking error than the stock picker fund, which seems to imply that the in 'factor risk' fund is much more active. However, the lower tracking error for the stock picker funds comes from the diversification benefits from spreading across different sectors and so understates its level of active management.

For instance, say a portfolio has 40 investments. If all of the positions are in the office sector and so are highly correlated, then small active positions will generate high tracking error, due to 'factor' risk. On the other hand, say the benchmark index is composed of 20 market sectors with 20 properties in each sector. If the fund again holds 40 properties made up of two properties from each of the 20 sectors. The fund will display a low tracking error due to low correlation across the sectors, but its Active Share will be high. In other words, while tracking error does an effective job in capturing 'factor' risk it does not capture 'stock selection' risk, whereas Active Share captures the uniqueness of the portfolio manager's stock-picking activity.

To get a better picture of active management and identify the two forms of active risk within a fund, Cremers and Petajisto (2009) argue that Active Share and tracking error should be examined together. In other words, using Active Share and tracking error together enables investors to distinguish between the types of active management used by funds, stock selection and factor risk, and so enable the funds to be categorised into five management approaches: pure indexers; closet indexers; diversified stock pickers; concentrated stock pickers; and factor bet funds, as presented in Figure 1.

In Figure 1 Active Share, measured on the vertical axis, is used by Cremers and Petajisto (2009) to reflect stock selection, while tracking error, on the horizontal axis, is used to represent the factor risk dimension of active management. Different parts of the two-dimensional distribution of funds can be labelled according to the type of active management they represent, as illustrated in Figure 1. The boundaries of the regions are not clear-cut with only the 'Pure Index' group standing out as a distinct group positioned at the origin while the other four categories are defined as:

- *Closet Indexing* tends to display low Active Share and low tracking error. This type of portfolio management can result in "active-type" fees, (higher) in exchange for little more than passive index performance.

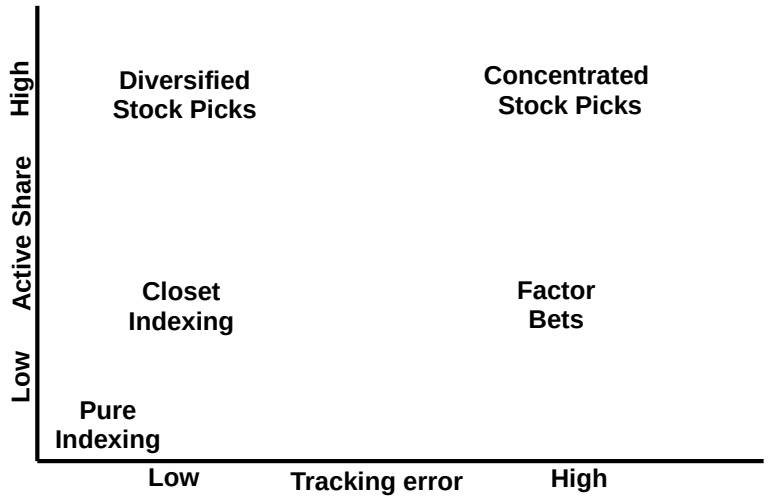
[3] Remember that the sum of the weights for any fund's investments is 100% and the sum of the weights of the index's constituents is 100%. So, if the fund contained none of the investments in the index, then the sum of the absolute differences would be 200%; dividing by 2 reduces the calculation in this extreme example to 100%.

- *Factor Bets* typify managers maintaining portfolios that overweight and underweight systematic factors such as sectors, market capitalizations, or investment style. These managers tend to have low Active Share but high tracking error.

- *Diversified Stock Picks* are indicative of high Active Share but low tracking error. These managers tend to take significant stock-specific positions across sectors so that stock position sizes vary significantly from those in the benchmark but overall sector weightings may be similar to the benchmark.

- *Concentrated Stock Picks* typify managers that take large, stock-specific positions in a few sectors so that both stock position sizes and sector weightings vary significantly from those in the benchmark. These managers tend to have high Active Share and high tracking error.

Figure 1: The Two Dimensions of Active Management



While there is a positive correlation between Active Share and tracking error, i.e. when Active Share is low tracking error tends to be low and when Active Share is high tracking error tends to be high, the results show some amount of variation. For instance, Cremers and Petajisto (2009) found that funds with 4-6% tracking errors can have Active Shares ranging from 30% to 100%, and funds with 70-80% Active Shares can have tracking errors ranging from 2% to over 14%. In other words, “stock picker” funds can be very active despite low tracking error volatilities, while “factor risk” funds can generate large tracking errors without large deviations from index holdings.

Cremers and Petajisto (2009) applied the dual Active Share and tracking error method to measure the active management of 2,650 US funds from 1990-2003 and found that, on average, fund performance is correlated with the degree of active management as measured by Active Share. They found that funds with the highest Active Share exhibited some skill and picked stocks which outperformed their benchmarks by 2.40% per year. After fees and transaction costs this out-performance decreased to 1.13% per year. In contrast, funds with the lowest Active Share had poor benchmark-adjusted returns before expenses, 0.11%, and they did even worse after expenses, underperforming by -1.42%. These results indicate that the most actively managed funds are able to beat the benchmark indices by using their knowledge and expertise. On the other hand, the funds that replicate the benchmark indices generate quite similar returns than the benchmarks before fees, but the after fees returns are

lower than the benchmarks. The authors also find that tracking error by itself is unrelated to fund performance, which confirms the findings of Higgins and Ng (2009).

In a follow-up study, Petajisto (2010) analysed 1,124 U.S. all-equity mutual funds monthly returns from 1990 to 2009. Importantly, these results include a period when large cap stocks did well (the 1990s), small cap stocks outperformed (the 2000s), and the Global Financial Crisis (GFC). Petajisto (2010) found that Active Share was correlated with improved performance, while higher tracking error on its own was not. When both measures were combined, the research concluded that "diversified stock picker"' funds with high Active Share and low-to-moderate tracking error performed the strongest, producing an average annual excess net return over the period of 1.26%, net of all expenses and costs. In contrast, funds with low Active Share (closet indexers) and funds focusing on factor bets consistently underperformed their benchmarks primarily due to fees and expenses.

Research Design

Our methodology closely follows that of Cremers and Petajisto (2009) and Petajisto (2010) with a few exceptions. First, unlike Cremers and Petajisto (2009) and Petajisto (2010) we used only one index as our benchmark portfolio. In contrast, Cremers and Petajisto (2009) and Petajisto (2010) used the benchmark index self-reported by a manager in the fund prospectus. The benefit of the prospectus benchmark is that it is the index the fund manager has publicly committed to beat, so both investors and the manager are likely to focus on performance relative to that benchmark. However, from an inspection of information that is available on each fund it very soon became apparent that the benchmark used has varied over time and with the changes in managers, leaving us with no consistent way to identify the funds' precise benchmark and so we used the UK property index with the widest coverage, on a quarterly basis, the Investment Property Databank (IPD) Quarterly Index (IPDQI)[4].

Second, like Cremers and Petajisto (2009) and Petajisto (2010) we use property data alone in calculating the Active Share of each fund and exclude fund holdings in listed property and cash. Listed property and cash holdings typically represented only 0.06% and 3.63% on average, respectively, so there was very little qualitative and quantitative difference between the results if we included or excluded these two items. Nonetheless, the results below are based on the property data alone, rescaled to 100%, after excluding holdings in listed property and cash.

Third, we use an approach which is similar to that of the Industry Concentration Index of Kacperczyk et al (2005). We do this because data at the individual property level is not available, due to confidentially, but data at the market segment level is, which is akin to an industry classification scheme.

However, unlike Kacperczyk et al (2005) we do not sum the squared differences between the fund segment holdings and those in the benchmark. As Cremers and Petajisto (2009) note if we use the absolute difference rather than the squared difference in the Active Share calculation it tells us the percentage of a fund that is different from the benchmark index. However, if the difference in weights is squared, the numerical value loses this interpretation. Therefore we use a hybrid version of equation 2 to calculate the Active Share of real estate funds in the UK as in equation 3:

[4] At the end of December 2011 the IPDQI contained 9,188 properties from 239 funds with an estimated capital value of £107,538m, representing 49.9% of the UK property market. By way of a comparison, the IPD Monthly Index only covered data from 70 funds with 3,592 properties and an estimated capital value of £33,128m, representing only 14.5% of the market.

$$Active\ Share = \frac{1}{2}\sum_{i=1}^{MS}\left|W_{fund,i} - W_{index,i}\right| \quad (3)$$

Where: $W_{fund,i}$ and $W_{index,i}$ are the portfolio weights of property market segment i in a fund and in its benchmark index and sum up across MS market segments (instead of N individual properties).

There are 10 market segments used by IPD in their standard performance analysis reports to investors. According to tests performed by IPD the 10 market segments maximises the explanatory variance in returns across individual properties and is the most effective split for performance analysis (Fordsham and Key, 1996). The 10 market segments are: Standard Retail Southeast, Standard Retail Rest of UK, Shopping Centres, Retail Warehouses, Offices in the City of London, Offices in the West End, Offices Rest of Southeast, Offices Rest of UK, Industrials Southern and Eastern, and Industrials Rest of UK. However, we also included another category into the calculation, Other Property, which represents holdings in non-traditional property sectors that are held by a number of funds such as: residential property, student housing and leisure property, etc. The 11 market segments weights calculated from the IPDQI data series.

Fourth, unlike Cremers and Petajisto (2009) but like Petajisto (2010) we compute tracking error as the standard deviation of the benchmark-adjusted return, rather than as the residual volatility from a regression of the fund return on its benchmark index, as proposed by Treynor and Black (1973)[5].

Fifth, due to data limitations we use the nine-year average Active Share and tracking error figures when categorizing the funds, whereas Cremers and Petajisto (2009) rebalanced the categories every year. However, to test whether the fund categorisation changed over the period we divided the sample period into three sub-periods based on the performance of the market index: (1) Q4:2003 to Q1:2007 the period before the Global Financial Crisis (GFC); (2) the period during the GFC, Q2:2007 to Q4:2009; and (3) the period after the GFC Q1:2010 to Q4:2011.

Finally, after the fund allocation we compared the return performance of funds against Active Share, tracking error, size and leverage to see if active management adds value.

Fund Data

Data on 38 UK real estate funds are used in this study, which had complete return and market segment data over the period from Q4:2003: to Q4:2011. All the data is taken from the publications of the Association of Real Estate Funds (AREF) as compiled by IPD.

Of the 61 real estate funds covered by AREF at the end of 2011, 23 funds were excluded as they had had incomplete balance sheet data or insufficient returns data over the period. The remaining 38 real estate funds accounting for 67% of the £19,793 billion aggregate value of funds covered by AREF at the end of 2011. In addition, as the NAV of the funds varies widely from £55 million to £2,112 billion, the results should be indicative of real estate fund performance over this period. Nonetheless, the results only hold for those real estate funds that existed throughout the sample period.

IPD classify real estate funds into two categories: Specialist and Balanced. IPD define a Specialist real estate fund as such when 70% or more of their capital is invested in one

[5] In the original working paper by Cremers and Petajisto (2006) tracking error was computed this way. However, in the published version (Cremers and Petajisto, 2009) the authors used the regression residual approach. In the follow-up study Petajisto (2010) reverted to the traditional approach and calculated tracking error as the standard deviation of the benchmark-adjusted return.

specific market sector (e.g. Retail, Office, Industrial or Residential). In all other cases the fund is categorised as a Balanced fund. We have 20 Balanced funds and 18 Specialist funds in our sample, under the IPD classification scheme.

A casual examination of the objectives of the funds indicated that their typical investment objective was to achieve above-average performance through active management of some kind. In other words, all real estate funds, either Specialist or Balanced, claim to be pursuing an active fund management strategy. However, simply looking at the fund's objectives is generally unhelpful in identifying the kind of active management strategy they are following[6]. Nonetheless, from the IPD definition of Balanced/Specialist we can assume that the two fund types are following different active management strategies.

A Balanced fund diversifies the portfolio across the various property sectors and so should have a low tracking error. However, the property segment holdings of a Balanced fund could be very different from those of the benchmark, which implies they are likely to have a relatively high Active Share. This implies that Balanced funds are expected to be classified as 'index' funds of some kind either "closet index" funds or even "pure index" funds, depending on their level of Active Share.

A Specialist fund manager, by definition, concentrates his holdings in a particular market sector and then diversifies within the sector and so is likely to display a high tracking error due to factor risk, i.e. holding market sector weights radically different to the benchmark index. Nonetheless, it is still possible that the Specialist fund may have a high or low Active Share depending on which property sector it is holding and to what extent it is diversified within that sector. In other words, Specialist funds are expected to be classified as "diversified stock pickers" or "concentrated stock pickers" or even "factor bet" funds.

It will be instructive therefore to see whether the dual sources of active management, Active Share and tracking error, are able to identify the active management approaches of each fund and to what extent the IPD classification scheme (Balanced and Specialist) provides investors with a classification of funds that indicates the extent of active management used by the funds.

Fund Classification

In this section the level of active management in UK real estate funds is measured by using Active Share and tracking error and the funds are then assigned to the various forms of active management as identified by Cremers and Petajisto (2009). The results presented graphically in Figure 2 with Active Share measured on the vertical axis, while tracking error is on the horizontal axis.

In order to assign funds into the various active management approaches Cremers and Petajisto (2009) suggest an Active Share of at least 80% is needed to divide stock pickers from index funds. The authors suggesting that an annualised tracking error of 8% is needed to divide stock pickers into "diversified stock pickers" and "concentrated stock pickers". Cremers and Petajisto (2009) label a fund a "closet indexer" only if it's Active Share is less than 60% and its annualised tracking error is less than 6%. The authors arguing that a fund needs an annualised tracking error greater than 6% while its Active Share needs to be below 80% in order for it to be categorised as a "factor bets" fund. Finally, for a fund to be classified as a "pure index" fund, Cremers and Petajisto (2009) argue that it should have an Active Share of less than 20%.

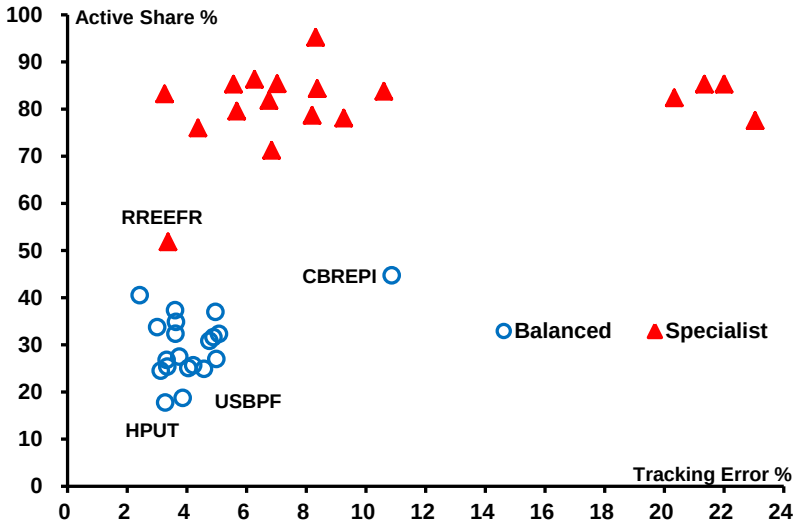
[6] See for example, AREF/IPD Property Fund Vision Handbook Q3 2012.

The average annualised tracking error of the sample is 7%[7], with only one fund (3%) with a tracking error below 3% and four funds (11%) with tracking errors above 20%. This suggests that the majority of funds in the sample can have substantially different quarterly returns than the benchmark index. In comparison, Cremers and Petajisto (2009) find that the majority of their equity funds had lower tracking errors. For example, at the end of 2002, of the mutual funds in their sample Cremers and Petajisto (2009) find that 59% had tracking errors below 8% and 88% of their sample had tracking errors below 12%, while only 5% had tracking errors above 16%.

The difference in tracking errors between real estate funds and equity funds is not surprising. Equity mutual funds can easily hold enough stocks to track a market benchmark due to the divisibility and small lot sizes in stock markets. In contrast, due to the indivisibility and large lots sizes in the commercial real estate market it is impossible for a fund to hold the market benchmark. Indeed, studies suggest show that for investors to achieve a satisfactory level of diversification would need to hold hundreds if not thousands of properties (see *inter alia*, Byrne and Lee, 2000a, 2000b, and 2001; Investment Property Forum, 2007; and Cheng and Roulac, 2007).

The average Active Share for the funds in the sample is 54%, with four funds (11%) with Active Shares below 25% and sixteen funds (42%) with Active Shares above 75%. In the equity market Cremers and Petajisto (2009) report that 62% of their mutual fund sample had Active Shares above 70% and 48% had Active Shares above 80%, while only 14% had Active Shares below 50%.

Figure 2: Classification of Funds based on Active Share and Annualised Tracking Error: Overall Period



The results in Figure 2 seem to indicate that the Cremers and Petajisto (2009) view that an annualised tracking error boundary of 8% is needed to differentiate between "diversified stock pickers" and "concentrated stock pickers" is too small for real estate funds, due to the high tracking errors displayed by real estate funds. In a similar vein, the view that an Active Share boundary "of at least 80% or higher" is needed to divide stock pickers from index funds suggested by Cremers and Petajisto (2009) appears too high for real estate funds.

We therefore use an Active Share of 50% to divide between stock pickers and index funds. To differentiate stock pickers into "diversified stock pickers" and "concentrated stock pickers"

[7] To calculate the annualised tracking error of a fund, we multiple it's quarterly tracking error by the square root of 4, i.e. 2.

an annualised tracking error of 12% seems more realistic. To be a "factor bet" fund we suggest a tracking error of at least 12% and an Active Share of less than 50% is more sensible. For a fund to be classified as a "closet index" fund meanwhile we suggest an Active Share of less than 50% and a tracking error of less than 6% is more appropriate. Finally, we classify a fund as a "pure index" fund if its Active Share is less than 20% and its tracking error is less than 4%.

The vast majority of Balanced funds (95%) had tracking errors below 6%. In contrast, 72% of the Specialist funds have tracking errors above 6%. Second, all of the Balanced funds have Active Shares below 50%, with four (20%) of the Balanced funds with Active Shares below 25% and two funds (10%) with Actives Shares below 20%.

The figures suggest that the majority of Balanced funds are "closet index" funds. While two funds Hermes Property Unit Trust (HPUT) with an Active Share of 17.76% and tracking error of 3.26% and UBS Triton Property Fund (UBSPF) with a tracking error of 3.85% and an Active Share of 18.96% could potentially be "pure index" funds.

All but one Specialist fund had an Active Share above 70%. In other words, the vast majority of Specialist funds are 'stock picker' funds of some kind; either "diversified stock pickers" or "concentrated stock pickers" depending on their tracking errors.

Figure 2 shows there are four Specialist funds (22%) with tracking error above 20%: Grosvenor Festival Place Fund, Grosvenor Shopping Centre Fund, The Junction LP Fund, and The Mall Fund. Each of these funds holds just one market segment and generally only a few properties within the segment. For instance, the Grosvenor Festival Place Fund only owned one shopping centre, while the Junction fund had only six retail warehouses properties, which explains their very high tracking error and high Active Shares. These funds can reasonably be classified as "concentrated stock pickers", while the other 14 Specialist funds (78%) are more likely to be "diversified stock picker" funds.

Figure 2 also shows there is a clear split between Balanced and Specialist funds in terms of active management, which suggests that the (Balanced/Specialist) classification scheme by IPD provides a reasonable classification of funds. However, the analysis highlight that a couple of funds do not fit with the usual definition of Balanced/Specialist as defined by IPD.

A Balanced fund that clearly stands out is the CBRE Property Income Fund (CBREPI), which has a tracking error of 10.8% and an Active Share of 48%, which puts it quite close to the "factor bet" border. The main feature of this fund is that about 60% of the fund is in one sector (Industrials) and so although it would not be classified as a Specialist fund under the IPD definition an analysis of its' tracking error and Active Share suggests that it is more like a Specialist fund.

There is also a Specialist fund (RREEF UK Retail Property Fund (RREEFR)) with a tracking error of only 3.36% and an Active Share of 52%, which puts it very close to the "index fund" border. As its' name suggests the fund has 100% of its property holdings in the retail sector and so explains it's relatively high Active Share. However, the fund is diversified across three retail types (Standard retail, Shopping centres and Retail warehouses), which explains its low tracking error. This implies this fund may be better labelled as a Balanced fund.

In summary, the majority of real estate funds have low tracking errors but high Active Shares. This supports the contention of Cremers and Petajisto (2009) that even very actively managed funds can in fact have low tracking errors. The figures also imply that the majority of UK real estate funds are taking stock selection risks in order to outperform their benchmark indexes. In addition, the approach of Cremers and Petajisto (2009) is able to classify funds on their level of active management (Active Share and tracking error) into

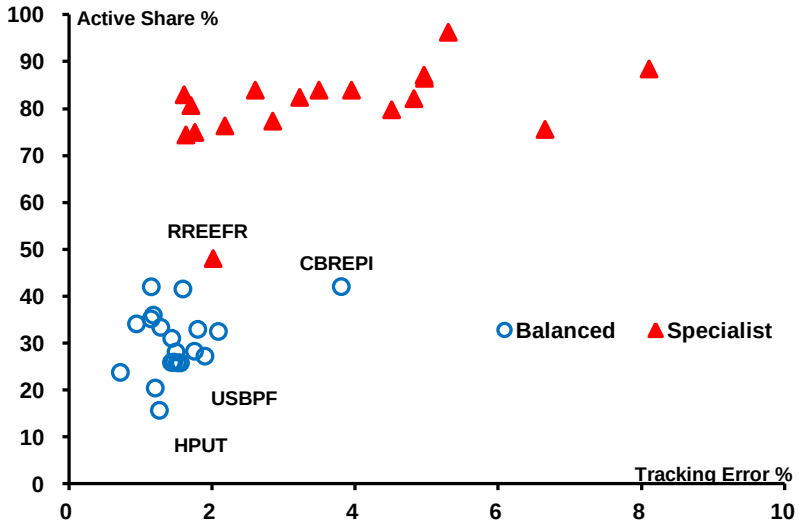
categories that make intuitive sense. Balanced funds tend to be 'index' funds, while Specialist funds tend to be 'stock picker' funds. Lastly, the approach of Cremers and Petajisto (2009) tends to validate the Balanced/Specialist classification scheme used by IPD, with only a few exceptions.

Sub-period Analysis

Due to data limitations we have used nine-year average figures when categorising the funds, whereas Cremers and Petajisto (2009) rebalanced the categories after every year. Therefore it is important to see whether the fund categorisation results would have changed if different time periods were used. In this section, therefore, we breakdown the sample period into three sub-periods based on the performance of the market index: (1) Q4:2003 to Q1:2007 the period before the Global Financial Crisis (GFC); (2) the period during the GFC, Q2:2007 to Q4:2009; and (3) the period after the GFC Q1:2010 to Q4:2011. The sub-period fund categorisation results are presented in Figures 3 to 5.

In the pre-GFC period Figure 3 shows that the average annualised tracking error was only 2.56%, with 95% of the funds showing figures below 6% and only two funds with tracking errors above 6%. The average Active Share was 54%, with 92% of the funds with figurers above 25%.

Figure 3: Classification of Funds based on Active Share and Annualised Tracking Error: Pre-GFC Period



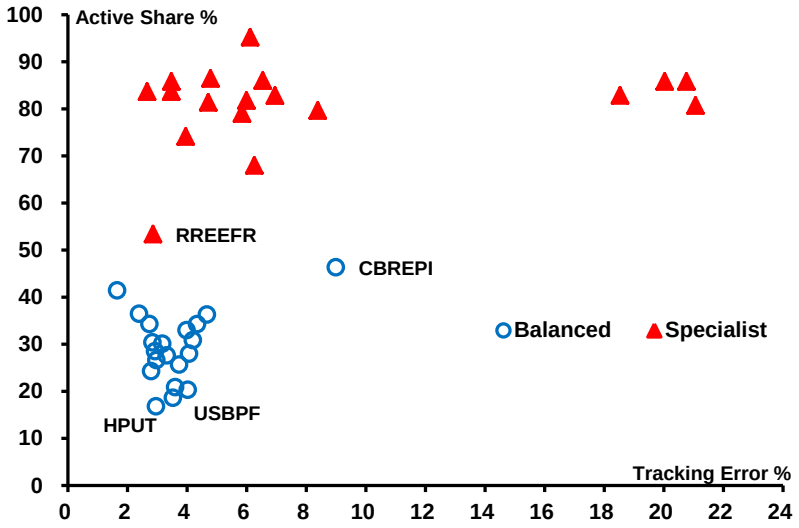
In line with the results in Figure 2 the Balanced funds showed substantially lower tracking errors and Active Shares than Specialist funds. All but one Balanced fund had a tracking errors below 3%. In comparison, only eight Specialist funds (44%) had tracking errors below 3%, while two funds (11%) had tracking errors above 6%. All Balanced funds had Active Shares below 50% with two Balanced funds with Active Shares below 20%. In contrast, all but one Specialist funds had Active Shares above 50%.

CBREPI again stands out from the rest of the Balanced funds with a tracking error of 3.80% and an Active Share of 41% in this period, which once again identifies it more like a Specialist fund. In a similar vein, RREEFR had a tracking error of only 2.02% and an Active Share of 48% and so keeps it nearer to the Balanced fund group. The two potential "pure index" funds (HPUT and UBSPF) show very low tracking errors of 1.20% and 1.26% respectively and Active Shares of 20.44% and 15.69% respectively. However, the four

Specialist funds identified as "concentrated stock pickers" in Figure 2 are less clearly delineated from the rest of Specialist funds.

In the second sub-period, covering the period of the GFC, Figure 4 shows that the results are much more like those for the whole period with an average tracking error of 5.92% and an average Active Share of 54%. Balanced funds had an average Active Share of 29.6%, with five funds (25%) with Active Shares below 25%. Balanced funds had an average tracking error of 3.6%, with 19 funds (95%) showing tracking errors below 6%. Specialist funds in comparison had an average Active Shares of 80.9% with all but three funds (83%) with Active Shares above 75%. The Specialist funds had an average tracking error of 8.4% with three funds (17%) with tracking errors above 20%.

Figure 4: Classification of Funds based on Active Share and Annualised Tracking Error: GFC Period

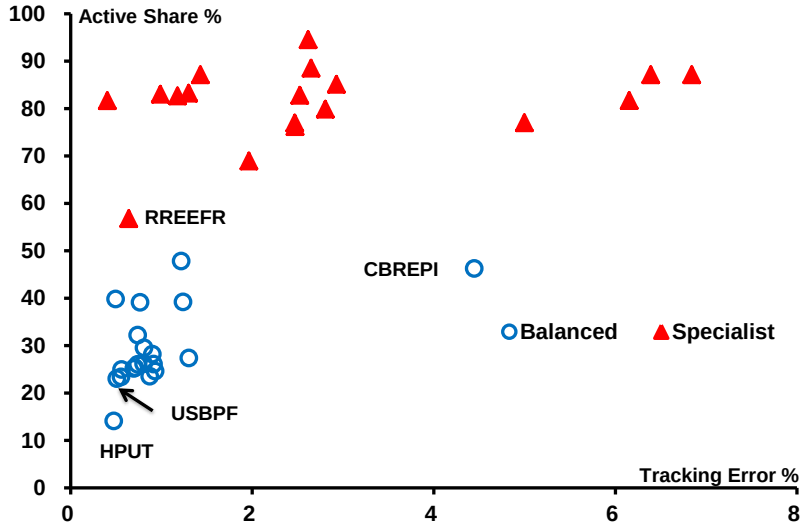


Once again CBREPI had a high tracking error of 8.98% and a high Active Share of 46%, indicating its potential classification as a Specialist fund. While, the RREEFR with a tracking error of 2.86% and an Active Share of 54% is again producing an activity level more like a Balanced fund. The two potential "pure index" funds (HPUT and UBSPF), once again showing very low tracking errors of 2.95% and 3.52% respectively and Active Shares of 16.83% and 18.66% respectively. Lastly, the four Specialist funds identified as "concentrated stock pickers" in Figure 2 again show the highest tracking errors and relatively high Active Shares.

The post-GFC period results in Figure 5 shows that the fund classification is more like the pre-GFC period with an average tracking error of 1.85%, with only three funds (17%) with tracking errors above 6%. The average Active Share was 54%, with 84% of the funds with Active Shares above 25%.

The split between the two fund types (Balanced and Specialist) is again easy to see. All but one of the Balanced funds had a tracking error below 3%, while 14 Specialist funds (78%) had tracking errors below 3% and three Specialist funds (17%) had tracking errors above 6%. The Balanced funds all showing Active Shares below 50%, with six of the funds (30%) displaying Active Shares below 25%, while, all the Specialist funds had Active Shares above 50%, with sixteen Specialist funds (89%) having Active Shares above 75%.

Figure 5: Classification of Funds based on Active Share and Annualised Tracking Error: Post-GFC Period



The CBRE Property Income Fund (CBREPI) once again shows an active risk level more like that of a Specialist fund, with a tracking error of 2.22% and an Active Share of 46%. The RREEF UK Retail Property Fund (RREEFR) with a tracking error of only 0.32% and an Active Share of 56% once more is showing an activity level more like a Balanced fund. However, of the two potential "pure index" funds only the Hermes Property Unit Trust (HPUT) shows an Active Shares below 20%, this clearly classifies it as a "pure index" fund. While, the four Specialist funds identified as "concentrated stock pickers" in Figure 2 again show the highest tracking errors and high Active Shares.

Table 1: Rank Correlation between Tracking Error and Active Share across Sub-periods

	Tracking Error			Active Share		
	Pre GFC	GFC	Post GFC	Pre GFC	GFC	Post GFC
Pre GFC TE	1.00					
GFCTE	0.64	1.00				
Post GFC TE	0.67	0.65	1.00			
Pre GFC AS	0.75	0.53	0.74	1.00		
GFC AS	0.73	0.51	0.75	0.96	1.00	
Post GFC AS	0.74	0.46	0.71	0.92	0.92	1.00

These results imply that the funds in our sample essentially remained in the same categories within the sample period, even during markedly different market return periods. A view confirmed by the results in Table 1 which presents the Spearman rank correlation between the tracking errors and Active Shares in the three sub-periods. The correlations in Table 1 show that the relationships between the measures of active management are strongly positive across the three sub-periods, especially for the Active Share calculations. This supports the findings of Cremers and Petajisto (2009) who find that Active Share is a more persistent indicator of active management than tracking error. This makes sense, because Active Share is essentially within the control of the fund manager. However, as shown in equation 1, tracking error is influenced as much by the volatility of the market as it is by any anything the fund managers can do (see Higgins and Ng, 2009 and Higgins, 2010). Therefore we feel justified in saying that the classification of the funds based on the dual sources of active management (Active Share and tracking error) is insensitive to the time period.

Active Management and Returns

We report in Table 2 the average return, Active Share and tracking error across our sample period for the various fund groups identified above and for good and bad funds. We define good (bad) performance as being in the top (bottom) five funds in the sample. Following the suggestion of Higgins (2010), that other characteristics should also be evaluated, we also report fund size (£m) and leverage (Debt to GAV %) at the start of each sample period to avoid biasing the results[8].

Table 2: Return, Active Share, Tracking error, Size and Leverage: Overall period

ALL	Av Ret	Av AS	Av TE	Av Size	Av Lev
Overall Average	1.16	54.0	7.0	388	16.2
Type	**Av Ret**	**Av AS**	**Av TE**	**Av Size**	**Av Lev**
Pure index	1.65	17.8	3.3	420	4.9
Closet index	1.33	30.6	4.3	430	7.6
Div. Stock Pickers	1.35	80.1	6.7	308	24.1
Con. Stock Pickers	-0.48	82.6	21.7	554	37.9
Top/Bottom	**Av Ret**	**Av AS**	**Av TE**	**Av Size**	**Av Lev**
Top 5	2.28	87.2	7.6	197	22.8
Bottom 5	-0.61	75.6	12.4	385	44.2

Over the full sample period Table 2 shows that the funds achieved an average return of 1.16% per quarter with an Active Share of 54% and an annualised tracking error of 7%. If we break the funds down into their active management strategies we can see a number of interesting results. The "pure" index fund (HPUT) produced a return much better than the overall average 1.65% compared with 1.16%. The "closet" index funds were only slightly worse (1.33%) than the "diversified stock pickers" (1.35%) with the "concentrated stock pickers" the worst group overall (-0.48%).

In terms of size there is little variation from the average size (£388m) apart from the "concentrated stock pickers" with an average size of £554m, due to their holdings in shopping centres. However, there is a clear pattern in the amount of leverage used by the various groups. Index funds showing the least use of debt while the more the active the fund the greater the use of debt.

These average results however hide a good deal of variation. The funds in the top five places were all "diversified stock pickers" with an Active Share of 87.2% on average but with a similar tracking error to the overall average (7.6%). These funds also were much smaller than the average (£197m) and used only a small amount of debt (22.8%). By way of a contrast the bottom five funds consisted of three "diversified stock pickers" and two "concentrated stock pickers" with only slightly higher Active Shares than the overall average (75.6%) but a much greater tracking error (12.4%). However, these funds were almost twice as big as the 'best' funds and used twice as much debt (44%). This implies that stock picking by managers can add value to the fund however if the manager takes on too much active risk that results in a large increase in tracking error the benefits of stock picking can easily be eliminated.

Table 3 shows that there are noticeable differences in performance of the various fund groups over the three sub-periods identified above. In the first sub-period "diversified stock pickers" were the best performing group, closely followed by the "concentrated stock pickers" who both benefited from the use of greater leverage. In contrast, both "index" fund groups showed similar but lower returns without the benefit of leverage. In the period of the global financial crisis (GFC) however the "stock picker" funds performed the worst, especially the

[8] Due to data limitations the results for the size and leverage data is based on 35 and 37 funds, respectively.

"concentrated stock pickers" due to their greater use of debt, while index funds showed much better performance with substantially lower debt. Lastly in the period after the global financial crisis the more active funds have once again shown the best returns, again benefiting from their greater use of debt.

Table 3: Return, Active Share, Tracking error, Size and Leverage: Sub-periods

Pre-GFC	Av Ret	Av AS	Av TE	Av Size	Av Lev
Pure index	4.43	20.4	2.4	420	6.3
Closet index	4.21	30.9	3.1	430	6.7
Div. Stock Pickers	5.21	79.9	7.2	308	22.3
Con. Stock Pickers	4.90	81.4	8.0	554	30.5
GFC	**Av Ret**	**Av AS**	**Av TE**	**Av Size**	**Av Lev**
Pure index	-2.64	16.8	5.9	855	5.6
Closet index	-3.02	30.2	7.4	987	9.1
Div. Stock Pickers	-4.40	80.1	10.3	644	25.3
Con. Stock Pickers	-9.88	83.8	40.2	1228	41.7
Post-GFC	**Av Ret**	**Av AS**	**Av TE**	**Av Size**	**Av Lev**
Pure index	2.70	14.1	1.0	598	2.6
Closet index	2.28	30.4	2.0	629	7.5
Div. Stock Pickers	2.52	80.5	3.8	320	25.3
Con. Stock Pickers	3.06	83.2	12.2	262	43.7

These observations are supported by the correlation between fund returns, Active Share, tracking error, size and leverage in Table 4. Table 4 shows that over the full sample period greater active management together with large size and greater leverage led to lower performance. However, the effect of active management on returns changes radically in the various sub-periods. For instance, in the two boom periods, before and after the global financial crisis (GFC), both forms of active management along with greater leverage contributed positively to performance. However, in the period of the global financial crisis greater active management and leverage was detrimental to performance.

Table 4: Correlation: Return, Active Share, Tracking error, Size and Leverage

Overall	Av Ret	Av AS	Av TE	Av Size	Av Lev
Av Ret	1.00				
Av AS	-0.15	1.00			
Av TE	-0.54	0.57	1.00		
Av Size	-0.17	-0.18	-0.04	1.00	
Av Lev	-0.40	0.55	0.58	-0.01	1.00
Pre GFC	**Av Ret**	**Av AS**	**Av TE**	**Av Size**	**Av Lev**
Av Ret	1.00				
Av AS	0.53	1.00			
Av TE	0.74	0.70	1.00		
Av Size	-0.05	-0.17	-0.22	1.00	
Av Lev	0.83	0.54	0.65	-0.02	1.00
GFC	**Av Ret**	**Av AS**	**Av TE**	**Av Size**	**Av Lev**
Av Ret	1.00				
Av AS	-0.44	1.00			
Av TE	-0.72	0.51	1.00		
Av Size	-0.15	-0.26	0.03	1.00	
Av Lev	-0.77	0.54	0.52	0.00	1.00
Post GFC	**Av Ret**	**Av AS**	**Av TE**	**Av Size**	**Av Lev**
Av Ret	1.00				
Av AS	0.20	1.00			
Av TE	0.24	0.60	1.00		
Av Size	0.03	-0.44	-0.32	1.00	
Av Lev	0.12	0.53	0.66	-0.26	1.00

Table 4 also shows a number of interesting features about active management, size and leverage. First, although Active Share and tracking error are positively related (0.57) the

relationship is not perfect, i.e. fund managers do not necessarily have both a high Active Share and a high tracking error, which corroborates the findings of Cremers and Petajisto (2009). Second, both forms of active management tend to be negatively related to size, especially in the most recent period. This implies that funds become more conservative as they grow larger. Lastly, leverage is significantly positively related to Active Share and tracking error, but unrelated to fund size.

From this we can draw a number of conclusions about fund returns and their level of active management. First, funds with high Active Shares can display the highest returns, due to their stock-picking ability, which supports the findings of Cremers and Petajisto (2009) and Petajisto (2010). However, if the fund fails to control its tracking error the benefits of manager's ability to pick good properties can be eliminated, especially if the fund uses too much debt.

Second, "concentrated stock picker" funds exhibited the worst returns over this period mainly as a result of their extremely poor performance in the period of the global financial crisis. However, in both boom periods such funds displayed some of the highest returns. Thus, terminating a holding in an active fund that underperformed during a bear market may be ill-advised. In addition, "concentrated stock picker" funds also offer the investor the opportunity to access property assets that are too large for small pension funds to buy such as shopping centres, as the in case of the Grosvenor Shopping Centre Fund, or property-types that are not on their radar such as the community shopping malls, held by The Mall Fund, which they can add to their traditional property portfolio.

Third, while leverage proved beneficial during stable market conditions it was detrimental in during the market downturn, as is to be expected, since it is well known that leverage increases return volatility (Van der Spek and Hoorenman, 2011), especially in periods of market downturns (Plazzi, et al., 2008; Higgins, 2010; and Baum et al, 2012).

Fourth, the performance of the different active management strategies identified through the two sources of active risk varies with diverse market conditions, which supports the findings of Higgins (2010) and Baum et al (2012).

Lastly, the diversification benefit of "index" funds means they produce relatively low but consistent returns in both bull and bear markets.

Conclusions

Tracking error has traditionally been the most common way to measure the active management of a fund. It measures how closely the fund return follows the benchmark index return. Deviations in these returns indicate how actively the fund is managed. However, tracking error alone is an inadequate measure of fund activity since even very actively managed funds can in fact generate rather low tracking errors. Cremers and Petajisto (2009) suggest therefore instead of using tracking error alone a complete picture of active management is better achieved by including Active Share into the calculations. In particular, Petajisto (2010) argues that "Active Share is a reasonable proxy for stock selection, whereas tracking error is a proxy for systematic factor risk". Thus, using the dual measures of active management should allow us to identify more easily the type of active management strategy the fund is pursuing to add value.

Using data on 38 real estate funds over the period Q4:2003 to Q4:2011 we make a number of conclusions. First, the approach of Cremers and Petajisto (2009) and Petajisto (2010) is able to classify real estate funds in the UK on their management activity into categories that makes intuitive sense and seem stable over time.

Second, Balanced funds show relatively low Active Shares and particularly low tracking errors, due to the benefits of property-type diversification. In contrast, Specialists funds display higher Active Shares and both low and high tracking errors depending on their stock picking approach; diversified or concentrated. In other words, the (Balanced/Specialist) classification scheme by IPD provides a reasonable classification of funds. Nonetheless, there are a few exceptions, which can be easily identified by their Active Shares and tracking errors. As such this new approach to fund classification should enable investors to make a more informed investment decisions in the future.

Third, an analysis of the performance of the various fund groups displayed a number of features of interest. First, active funds that use a lot of leverage and demonstrate stock-picking ability can add value, especially in boom periods. Second, "index" funds, which use little or no leverage, show consistent but low returns all the time. In other words, the performance of the different management strategies varies with diverse market conditions. This implies that investors need to constantly monitor changes in the market and switch between fund management styles, if at all possible.

Finally, like all research the analysis is subject to a couple of caveats. First, the analysis was only based on 38 funds with complete data over the sample period. Second, the relationship between fees and active management was not examined, due to lack of consistent data, even though ultimately investors are concerned with returns after management fee[9]. It would be instructive therefore if the number of funds and time period was expanded to see if the results are robust and to see whether management fees rise with the increase in Active Share, as would be expected, and whether such an increase outweighs the benefits of active manager.

[9] Calculating actual fees paid within funds is complicated as different charges can be applied to different investors. Fees can also be payable on undrawn capital and other fee arrangements and so are difficult to estimate. Nonetheless, results suggest that fees reduced average fund performance by -0.99% per annum over the ten years from 2001 to 2010 (Investment Property Forum, 2012).

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