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Alpha and Persistence in UK Property Fund Management




Research Findings

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May 2008

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IPF Investment Property Forum

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This programme supports the IPF's wider goals of enhancing the knowledge, understanding and efficiency of property as an investment class. The initiative provides the UK property investment market with the ability to deliver substantial, objective and high quality analysis on a structured basis. It will enable the whole industry to engage with other financial markets, the wider business community and government on a range of complementary issues.

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ALPHA AND PERSISTENCE IN UK PROPERTY FUND MANAGEMENT

Research Findings

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EXECUTIVE SUMMARY

At a glance

- The report examines if UK property funds can deliver persistent performance relative to a benchmark and on a risk-adjusted basis, ie alpha.
- In general, the evidence for systematic out-performance and alpha in property fund performance is not strong.
- More specifically, it is limited to a **small elite** who can sustain such out-performance over relatively long periods.
- Good assets are the most consistent and influential factor behind out-performance and alpha but the effect eventually dissipates.
- Most of the investors interviewed did not see property as an alpha-generating asset class.
- No fundamental changes in property investment strategies are indicated.

- This report, funded by the IPF as part of its Research Programme, examines whether or not there is persistence in the performance of UK property funds. It also compares property with other asset classes, and assesses the implications for property fund management and investment strategies.
- Assessing if funds maintain their performance rankings over consecutive periods is insightful because performance over a single period may be a one-off, purely random, or due to luck. By contrast, a greater proportion of funds out-performing over successive periods than suggested by random chance or luck would be indicative of systematic fund management skill.
- Such analysis of persistent performance is undertaken on returns **relative** to a benchmark and also on a risk-adjusted basis (ie **alpha**). The performance horizons looked at are sets of successive three and five year periods from 1982 onwards, drawing on the Investment Property Databank's (IPD) full set of fund performance data. Such medium term horizons are most relevant for property, given they correspond to the periods by which property performance is typically judged and also because of property's illiquidity and high cost of transacting. There is also a significant amount of specific risk in shorter periods of performance (eg one year), such that it is not predictive of medium term performance.
- Persistence in performance is also examined over two consecutive 10 year periods, this represents a more challenging test and one encompassing a number of property market cycles.
- The study uses factor models – the standard approach used in the equity market – to account for risk in property performance. The approach is favoured over relying on tracking error, a metric which is most appropriate where the objective is to track a benchmark and where betas are generally close to one – something which this report finds is not the case. While the explanatory power of the factor models used is good, they are limited by the relatively short time series of data. The work undertaken for this study suggests that the factor model approach may be a fruitful area for further research.
- This said, the specification of risk models – even in asset classes where techniques are well advanced – is inevitably subjective and hence the conclusions on the persistence in **risk-adjusted returns** (alpha) should be interpreted in this light.
- The conclusions on the existence of out-performance and alpha in UK fund management are mixed; in particular, the statistical evidence is not compelling. Before adjusting for risk, the strongest evidence of general persistence is over three year horizons, less so over five and 10 years. There is, however, a suggestion of performance persistence amongst the very best (ie top decile) funds over 10 years and, to a lesser extent, five and three years.

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- On a risk-adjusted basis, there is evidence of general performance persistence over 10 year horizons, including amongst top decile funds. The evidence is more tentative over five year horizons (analysis of three year horizons was not possible on a risk-adjusted basis).
- The overall conclusion is that the generation of systematic out-performance and alpha in UK property is limited to a small elite of top performers.
- Corresponding to these findings, the performances of good and poor performing funds over the initial period on average tend to converge during the following period. The relatively few funds which perform consistently well, however, show out-performance of around 2 per cent (and alpha of over 4 per cent).
- In explaining medium to long term differentials in relative performance and alpha across funds, property stock is found to be much more important than good property sector allocations. A relatively high exposure to development is also found to be a detrimental factor. However, as its performance subsequently appears to be mean-reverting, good stock is not predictive of performance and alpha in the following period. Yield, however, is a key predictor of future performance and alpha.
- Compared to other asset classes, the medium term performance differentials of the top funds in UK property tend to be comparable to equities. By contrast, the potential for out-performance is much greater in the main alternative asset classes, ie hedge funds and private equity. While there are indications that good performance can be sustained in private equity, the evidence is less compelling in the equity and hedge fund sectors. Property therefore is closer to private equity in this respect.
- Twelve interviews were undertaken with major investors and investment consultants to understand requirements from property investment. Most saw property primarily as a beta asset class, albeit an extremely useful one given its superior return to bonds and the contribution it can make to risk reduction in the multi-asset class portfolio. For such investors, the pursuit of alpha, however, is of much lesser significance. The focus is minimising the risk of not delivering the market return, with the option of a little upside.
- A minority of those spoken to looked at property in a different way, seeing market inefficiency and other investors' conservatism, illiquidity, active management and also disregard of benchmark structures as sources of extra long term return. Such investors are explicitly looking for alpha in property.
- There is nonetheless a more universal search for markets which are perceived to offer returns which are superior to bonds and which are relatively lowly correlated with their existing exposures, including traditional UK property. In property, investors are focusing on international and alternative sectors. The primary objective is to get a beta return but such returns can be superior to traditional UK property either because the markets are inefficiently priced or illiquid for example or require special skills to harvest the performance. These characteristics represent forms of alpha.

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- An important aim of the study was to consider if there might be a shift towards derivatives or other indexed-products at the expense of active fund managers, something which has occurred in other asset classes where alpha is low. While many investors were embracing property derivatives as a tactical tool for altering short term exposures to property and specific property sectors, the overwhelming view at present among these existing investors was that derivatives would not play a more fundamental role as a strategic alternative to the underlying asset class or in portable alpha strategies. Notably, investors were struggling to understand the market's pricing of property derivatives, were concerned about basis risk, and felt that the amount of alpha available in property was small in relation to the potential elsewhere.
- This circumspection towards property derivatives on the part of investors emphasises the importance of the property investment industry and the IPF of continuing with efforts to improve understanding of property derivatives. Engagement with institutional investors and their representatives is clearly an important part of this process.
- Investors were fairly relaxed about the level of fund management fees in property for balanced mandates, comparing them favourably with much higher rates in the alternative asset classes. They did not see property in any form going the same way as equity fund management where there has been a major shift towards low cost, passive mandates.

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1. INTRODUCTION

This report, commissioned by the Investment Property Forum as part of its Research Programme, examines whether or not there is persistence in the performance of UK property funds. The specific objective is to assess if property funds can systematically deliver alpha. The report also considers the implications for property investment strategies and the property fund management industry.

Alpha is a powerful concept in investment and fund management. It relates to the delivery of superior risk-adjusted returns, either from an active fund manager or from an asset class. Investors choose fund managers on the basis of their potential to deliver alpha, and fund managers are often rewarded on this basis. It is set to become increasingly important as a source of performance now that the period of exceptional performance in property appears to be drawing to an end. However, there has also been a long-running debate across asset classes as to whether or not active fund management can systematically add value.

Furthermore, there has been a growing interest this decade in the wider investment industry about explicitly targeting alpha either as a separate element independent of market performance, or through new ways of investing such as hedge funds. At the same time, some investment strategies, in perceiving the futility of seeking alpha, are also simply targeting beta and doing this in the most cost-efficient way. This is having significant implications for parts of the wider fund management industry, for example a shift away from equities and active equity fund managers.

Such a trend could potentially affect property, particularly given the emergence of derivative forms of investment and also the prospect of a period of lower returns. It is clearly important that the property investment community is aware of how these strategies might relate to property and what implications they might have.

Interestingly, during a number of interviews for the recent IPF project *Multi-asset allocation in a modern world*, it was mentioned that property's 'nefficiency' as a market made it attractive through the potential to deliver alpha. It is a theme repeated in the practitioner and academic literature.

Surprisingly, despite its importance to property investors and fund managers and for the future nature of the industry, there has been comparatively little research on the extent to which UK property fund managers can systematically and persistently deliver superior risk-adjusted returns and on the magnitude of any such performance. This is the first objective of the research. In doing this, some form of risk-adjustment has to be made. Therefore, by necessity, a secondary objective of the research is to review the most appropriate form of risk-adjustment in property. This adds to the long seam of research instigated by the IPF on risk in property. It is recognised, however, that the form of risk-adjustment adopted in this report may not be universally accepted and for this reason performance relative to a benchmark is also examined.

Even if *alpha* and good relative performance can be generated by property fund managers, the sources of such out-performance are important. If stock related, this would be very positive for property and fund managers because it is idiosyncratic. However, if more to do with structure, such an attribute will, in general, be replicable (eg through derivatives). Hence, the broad nature of any such alpha in property is explored. In this respect, the aim is not to analyse how fund managers might generate alpha. Rather, the primary objective is to help understand the implications for future property investment strategies and for property fund management.

1. INTRODUCTION

There are two main legs to the analysis. First a detailed quantitative analysis of the extent of persistent performance across property funds and the extent of any such performance. Persistence is central to any study of alpha because it is not certain if performance is random or through luck, as opposed to skill.

The acid test, followed in this report, is to abstract from the current period's performance and check if it is subsequently repeated, hence this focus on the persistence of performance. Such detailed analysis is only possible with the support of IPD who have made a substantial contribution to this study. However, the tabulations in this report and their interpretation are entirely the authors' responsibility.

The second leg to the study involved a series of interviews with institutional investors and investment consultants. These follow a similar set of interviews undertaken for the IPF project *Multi-asset allocation in a modern world*. The objectives are to acquire information on their requirements from and current strategies towards property, how they view property and its potential for alpha by comparison to other asset classes, and to gain insights into future strategies. Their reaction to the quantitative findings on the existence of alpha in property was also sought to help stimulate debate. The authors are extremely grateful to the investors and consultants who gave their time and insights for this study.

The next section of this report presents a literature review on the key academic studies on alpha and persistence in property and, more substantially, in other asset classes; previous research on risk adjustment in property is also reviewed. Section 3 details the methodologies adopted in this study for assessing alpha and persistence in UK property and for the risk-adjustment model. Section 4 describes the IPD database, and the specific samples of data used and types of analysis undertaken in the study. Section 5 is the heart of the report, presenting the detailed quantitative analysis of alpha and persistence and the factors behind it.

Section 6 compares the published evidence on alpha and persistence in other asset classes against the findings from Section 5 on UK property. Section 7 details the findings from the interviews with investors and consultants, and considers the implications for property investment and fund management. The conclusions are considered theme-by-theme in Section 8.

2. PAST WORK ON ALPHA AND PERSISTENCE

2.1 Introduction

The question of whether the performance of fund managers persists over time has been the focus of a long line of research in financial economics. Views on the topic have changed as empirical techniques improve and as better quality data series become more widely available. Interest in this topic is not exclusive to academic researchers, as the outcomes of such studies have important implications for the entire fund management industry. In particular, investors are looking for some guidance as to whether past performance might be a useful guide to future investment outcomes, and on whether or not it is worth their while pursuing 'active' investment strategies.

There are two important dimensions to this problem, first, is the immediate concern about whether performance persists in the future. That is, will a top performing manager have a high likelihood of repeating his or her strong performance from one period to the next. The second, less obvious, but by no means less important question, is what is meant by performance. Many studies consider persistence not only in total returns (raw or unadjusted returns) but also, because such raw returns may purely be compensation for risk, in returns adjusted for risk (measures such as alpha). In this section of the report we will comment on research relating to both matters. While these two aspects of the problem can be viewed in isolation, indeed, research on performance measurement often makes no mention of the research on persistence in manager performance, there is an intimate link between the two. It is difficult to imagine that a fund manager could be labelled a good manager if there was not some expectation that superior performance would be repeated and maintained in the future. Persistence is the test most often used in academic studies as the means of distinguishing genuinely good performance from luck.

It should also be noted that most of the literature in this area relates to the performance of equity fund managers (although the number of articles on hedge funds and private equity in recent years has matched the growing investor interest in these asset classes). While the nature of investing in equities is different from commercial property, there are still many important conclusions that can be drawn from these studies. The number of studies specifically related to property is small and the results of these studies are generally consistent with the broader fund management research.

2.2 Alpha and Persistence

One of the earliest attempts to evaluate the performance of mutual fund managers was by Jensen (1968). Using the Capital Asset Pricing Model (CAPM) as a basis, Jensen shows how a manager's superior performance can be captured by the intercept term in the linear model

$$R_t - R_{Ft} = \alpha + \beta [R_{Mt} - R_{Ft}] + u_t$$

Where R_t is the ex-post total return of the fund achieved by a fund manager, R_{Ft} is the risk-free rate of return, R_{Mt} is the return on the market index and u_t is a random error term. As explained by Jensen (1968, p394)

> *Thus if the portfolio manager has an ability to forecast security prices, the intercept α will be positive. Indeed, it represents the average incremental rate of return on the portfolio per unit time which is due solely to the manager's ability to forecast future security prices.*

The model provides an indication of what the return premium (above the risk-free rate), should be for a fund manager when adjusted for the systematic risk of the portfolio (measured by beta in the above regression model). Superior performance is identified by a positive value of alpha, performance consistent with a market indexing strategy will have no alpha, and in the case of underperformance, alpha will be negative.

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In a sample of mutual funds over the period 1945 to 1964, Jensen finds that the average value of alpha is negative, implying that managers underperformed relative to a risk-adjusted benchmark.

A large number of studies followed the work of Jensen. Important to note is the critical work of Roll (1978), who was concerned about the ability to completely identify the market portfolio used in the model above.

In a highly cited research article, Grinblatt and Titman (1989) were able to identify the presence of a skilled set of fund managers (positive alpha) by carefully controlling for the benchmark index used in the evaluation of the managers. However, they noted that this superior performance was found in gross returns (that is before management fees were charged). After allowing for the effects of fees the superior performance diminished. The dampening effect of fees on persistence is a recurring theme in the literature.

The question of whether the performance of a manager continues over different time periods was considered by Hendricks *et al* (1993). The paper by Hendricks *et al* discusses whether the 'hot hands' phenomenon, often used to describe successive periods of good performance by a sportsperson, applied to fund managers. They find that it is possible to generate economically significant returns by developing a trading strategy based on the past performance of fund managers. The superior performance of fund managers was demonstrated for periods of one to eight quarters.

Also showing strongly in the research is that the performance of managers with 'icy hands' also persists. In fact, Hendricks *et al* point out that the persistence in returns for the poorest performers is much more prevalent that the persistence in performance for the top managers. Persistence in performance was also found in studies by Goetzmann and Ibbotson (1994) and Brown and Goetzmann (1995).

Carhart (1997) provides a critical appraisal of the Hendricks *et al* study. In particular he adjusts for momentum effects in the underlying equity market data and potential survivorship bias in the data (something which the subsequent article by Carhart *et al* (2002) and a number of articles on hedge funds, notably by Malkiel and Saha (2005), explore further). While noting some evidence of superior performance, his overwhelming conclusion is that

> *Although the top-decile mutual funds earn back their investment costs, most funds under-perform by about the magnitude of their investment expenses (Carhart, 1997, p80).*

He also notes that it is the case of the poorest performing fund managers that persistence is particularly strong (that is the managers consistently under-perform).

More recent evidence using advanced statistical techniques continues to provide support for the notion that there is a small group of superior fund managers and the superior performance of these managers persists over time. Work by Kosowski *et al* (2006) finds that:

> *Across a wide array of performance measurement models, our bootstrap tests consistently indicate that the large positive alphas of the top 10% of funds, net of costs, are extremely unlikely to arise solely due to sampling variability (luck) (Kosowski et al, 2006, p2552).*

Furthermore, the authors find that statistical tests indicate this performance persists over time. Busse and Irvine (2006) also find support for performance persist using Bayesian statistical methods.

2. PAST WORK ON ALPHA AND PERSISTENCE

The evidence from the literature on both the existence of superior performance and the persistence of this performance has changed from the original studies on this topic. More recent evidence support the idea that there is a small group of fund managers who achieve superior risk-adjusted returns and this performance persists over time.

2.3 Persistence in property

Given the importance of property to institutional investors (see Bond *et al,* 2007a), it is surprising that very few studies have considered whether the performance of property fund managers persist over time. It is possible that access to data or uncertainty about the appropriate form of risk adjustment may have hindered research in the past. However, some evidence on the persistence of returns for commercial property assets has been presented by Lee and Ward (2000). Using data from IPD they examine whether the returns from properties classified by sector and region persist over time. Such knowledge of the underlying persistence in returns is important for fund managers and it may point to profitable trading strategies that could be employed to achieve superior risk-adjusted performance. Their findings point to the possible presence of persistence in property returns, however, it is not clear this persistence could be profitably exploited given the illiquidity that underlies trading in commercial property assets. The findings of this study were later confirmed by Devaney *et al* (2007) for a larger sample of properties in the IPD database.

One of the few studies that could be found that explicitly considers the topic of performance persistence for property fund managers is provided by Hahn *et al* (2005). Using data on real estate opportunity funds and a methodology that is similar to that employed in this study, the researchers find some evidence of persistence among real estate opportunity fund managers. In this instance, performance persistence is measured across different funds raised by the manager. The research indicates that as much as 20-24 per cent of a subsequent fund performance may be related to past fund performance. However, due to the nature of fund raising that takes place, it may be difficult for investors to profitably exploit this funding because it can be several years before the performance of a fund is clearly determined.

2.4 Risk adjustment models in property

Finally, the process of determining the appropriate risk model for property is considered in this section. Chan *et al* (2006) provide a detailed survey of risk-adjusted benchmarking of fund manager performance. Two methods dominate the literature on benchmarking, characteristics-matched benchmarks and regression-based benchmarks. The difference between these approaches is discussed in more detail in the following section. However, the application of either approach to assessing risk-adjusted performance for property fund managers has been limited. The one exception to this has been the extensive research on risk models for publicly traded property securities.

Due to the relative accessibility and existence of lengthy time series of data on regularly traded prices of real estate investment trusts (REITs), progress on understanding the key risk factors for REITs is well developed. Beginning with Chan, Hendershott and Sanders (1990), researchers have examined the role of economic factors and stock market factors extensively. In a US context Sanders and Karolyi (1998) and Ling and Naranjo (1996) are frequently cited studies. For risk models in international markets Ling and Naranjo (2002) and Bond *et al* (2003) have highlighted the importance of international stock market factors in REIT pricing.

2. PAST WORK ON ALPHA AND PERSISTENCE

In terms of the direct property market, very little research on understanding the most appropriate forms of risk-adjustment has been undertaken. Two approaches used by practitioners in the UK are notable. The IPF/Estates Gazette in their *Annual Property Investment Awards* assess risk-adjusted performance on the basis of the ratio of 10 year return relative to the IPD Universe and the corresponding 10 year tracking error. Cullen (2002) explored performance on this basis in greater detail in his paper to the 2002 *IPD/IPF Property Investment Strategies Conference*. However, tracking error as a measure of risk is widely cited to be appropriate only when the fund's objective is to track a particular index – an overly restrictive criterion for this study.

Second, Blundell, Fairchild and Goodchild (2005) explore "a practical way" of representing the risk in property portfolios. They identify the factors which they believe cause volatility in property portfolios and then graphically (using so-called "risk webs") present risk profiles by showing funds' relative exposures to these risk factors. Again, the risk factors are identified on the basis of tracking errors.

Recent studies sponsored by the IPF also have explored the nature and measurement of risk in property investment and the processes fund managers adopt to monitor and control it (see, respectively, Booth *et al*, 2002, and Frodsham, 2007a). While the work by Booth *et al* on risk in property markets contains interesting findings, the approach in this research has been to employ linear regression models to control for sector risk (discussion in detail in the following chapter). There are many aspects of the Booth *et al* 2002 IPF report report that could not be included in the present report because of time and data constraints. The topic of risk measurement for real estate portfolio remains a fertile area for future research.

3. METHODOLOGY

3.1 Introduction

This section outlines the main methodological approaches adopted for analyzing the performance of fund manager returns. In particular, this section discusses the measure used to assess persistence in performance and also the way in which performance can be evaluated (that is, how good performance is distinguished from poor performance). As noted above, an interesting dilemma encountered with this research is that the form of measuring risk adjusted performance is not well developed for commercial property funds. To overcome any concerns the reader may have about possible misleading results arising from an incorrectly applied risk-adjustment process, in each case performance is evaluated using both raw returns (no risk adjustment applied), and at least one form of risk-adjusted returns series. The following discussion of methodology draws heavily on the work of Goetzmann and Ibbotson (1994) and Carhart (1997).

3.2 Performance and its persistence

Before employing any statistical tests, the first stage of the analysis focused on sorting the funds into quartile groupings based on performance in a ranking period. Such ranking periods were based on either three, five or 10 year time periods. The performances of the funds were then observed in the subsequent evaluation period (either the immediately following three, five or 10 year period). It could then be noted how many funds that ranked in the top quartile during the ranking period remained in the top quartile during the evaluation period or if it occurred, how many migrated to lower performing quartiles. The frequency count of cell transitions can then be converted to a relative probability measure by dividing the cell count by the total number of observations in each row.

For instance, if there were 100 funds in the sample, and assuming there was no persistence in manager performance and all the funds continued to operate for the life of the evaluation period, the resulting transition matrix would appear as:

Illustration of transition probability matrix for fund performance funds ranked by first period performance

Ranking period	Quartile 1	Quartile 2	Quartile 3	Quartile 4	Total
Quartile 1	0.25	0.25	0.25	0.25	1.00
Quartile 2	0.25	0.25	0.25	0.25	1.00
Quartile 3	0.25	0.25	0.25	0.25	1.00
Quartile 4	0.25	0.25	0.25	0.25	1.00
Total	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

Each cell in the table shows the likelihood of a fund ranked in a particular quartile migrating to a subsequent level of quartile performance during the evaluation period. For example, in this case the first cell in the table has a value of 0.25. This implies that there is a 25 per cent probability that a fund ranked in the first quartile during the ranking period will remain in the first quartile during the subsequent evaluation period. Similarly the last cell in the table (ignoring the 'Total' rows and columns) shows that a fund in the lowest performing quartile would a have a 25 per cent chance of remaining in the lowest quartile in the subsequent evaluation period. Interestingly, in this particular example, such a fund has the same probability of being a top quartile fund in the evaluation period as it does being in the lowest performing category.

As an illustration of the type of pattern that would be observed if fund performance was persistent, the table below shows the idealised pattern of perfect fund persistence.

3. METHODOLOGY

Illustration of transition probability matrix for fund performance funds ranked by first period performance (showing perfect persistence)

Ranking period	Quartile 1	Quartile 2	Quartile 3	Quartile 4	Total
Quartile 1	1.00	0.00	0.00	0.00	1.00
Quartile 2	0.00	1.00	0.00	0.00	1.00
Quartile 3	0.00	0.00	1.00	0.00	1.00
Quartile 4	0.00	0.00	0.00	1.00	1.00
Total	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

In this case the cells on the diagonal elements of the table are all equal to one. This has the interpretation that each fund is certain to retain the same performance ranking during the evaluation period as was observed during the ranking period.

The transition matrices in this report are presented on two bases, the differences relating to the treatment of "expired" funds. The examples illustrated above effectively exclude expired funds from each row and its denominator.

The second basis includes 'expired' funds. A fund may fall into this category for a number of reasons (see Section 4 for further discussion) – for example, the fund may wind up, it may also cease to exist under its current name when the fund is merged or taken over by another manager. On this basis, a fifth column headed 'expired' is added to each row of the matrix, this representing the transition probability for funds which ceased to exist in the evaluation period. As a consequence, the transition probabilities for the other four columns will have different values, consistent with each row summing to 1 (or 100 per cent).

In each case when persistence is assessed, two main statistical tests are employed. The first is a chi-square test which examines whether the transition probabilities match the pattern shown in the first table above. If the test statistic is not statistically different from zero, then each fund manager has an equal chance of falling into any quartile during the evaluation period and this is consistent with the notion that fund managers do not possess any specific ability. A second test employed is the same of that put forward by Goetzmann and Ibbotson (1994). This test amalgamates the first and second quartiles and refers to this as a 'winner' performance (an above median result), They also group the lower two quartiles and refer to this as a 'loser' (below median) performance. A fund that is the 'winner' group in the ranking period and retains that position in the subsequent evaluation period is designated a winner-winner (WW). A fund delivering a below median performance in both periods is designated a loser-loser (LL), and similarly a fund which either moves from a below median result to an above median result or an above median performance to a below median performance is indicated by the label loser-winner (LW) or winner-loser (WL). The test statistic is calculated as a cross-product ratio, ie:

CPR = (WW * LL) / (WL * LW).

However in order to provide a test of statistical significance, it is necessary to take the natural log of this expression. Note this is the same as that reported by Goetzmann and Ibbotson, who instead use the formula:

LN [(WW – LL) / (WL – LW)].

Which is asymptotically normal with a standard deviation of:

$$\sqrt{\frac{1}{WW^2}+\frac{1}{LL^2}+\frac{1}{WL^2}+\frac{1}{LW^2}}$$

In each case these statistical tests can be applied to either raw returns or risk-adjusted performance measures.

In addition to these tests, we also follow the evaluation methods displayed in Carhart (1997) and show the subsequent return performance of each portfolio of fund grouped by their initial ranking. That is, we calculate the performance in the evaluation period of all funds listed in the first quartile during the ranking period. This allows us to observe, if as a group, the performance of each quartile reverts to a common mean or whether a performance differential remains during subsequent periods. Once again this approach can be used for either raw returns or risk-adjusted performance measures.

3.3 Risk-adjusting property fund manager performance

In this section the use of factor models in modelling the performance of fund managers is explored. This is important as in order to derive a measure of risk-adjusted performance (in this case Jensen's alpha), it is necessary to know what factors drive property returns. The selection of models for consideration is limited by the low frequency of the data set (in this case annual returns).

Methods common in evaluating the performance of equity portfolio managers include characteristics-matched benchmarks based on portfolio holdings or regression-based benchmark. A characteristics-matched approach, while theoretically interesting, was not possible to develop in the time available for this study. Also it is not clear what characteristics should be used in the sorting procedure.

Risk adjustment could be carried out using a single-factor approach – such as assuming the IPD index as a market factor or the equally weighted performance of the funds in the sample.

A potentially suitable multiple regression-based model for risk adjustment is due to Sharpe (1992). In this case the returns from an investment manager are regressed against a set of performance indices for investment subclasses (such as the standard IPD sector classifications [or other passive benchmarks]). Note the regression coefficients are constrained to be non-negative and equal to one. Sharpe's model can be written as:

$$r_{pt} = \gamma_{p0} + \sum_{j=1}^{K} \gamma_{pj} I_{jt} + \upsilon_{pt}$$

where

$$\gamma_{pj} \geq 0, j = 1,..,K$$

$$\sum_{j=1}^{K} \gamma_{pj} = 1$$

Once the alphas have been estimated using a combination of the models above, it is possible to follow the methodology outlined by Carhart (1997) to assess the question of performance persistence.

In finance it is typical to organise the results into decile groupings but due to the small number of managers in the sample it was necessary to focus primarily on quartiles to provide a reasonable number of managers in each group.

The performance characteristics of these groupings can be evaluated (eg are the top groups outperforming consistently), and the subsequent performance of these funds traced.

For the period 1981–2006, three factor models of the return in excess of the risk free interest rate[1] were investigated using performance quartiles comprising each year's corresponding funds:

1. A single factor model (using the IPD Universe excess total return as a benchmark). The beta in this model simply measures the sensitivity of the fund's return (in excess of the risk-free rate) to that of the IPD Universe[2];

2. A version of Sharpe's index model using excess returns in the IPD office, retail, industrial and the 'other' property sectors. Note that in this case, as fund managers can not go short in the property market and the sectors they can invest in are reasonably defined, the coefficients of the Sharpe index model are constrained to be positive and also to sum to one thereby ensuring that the fund is fully invested. The four betas in this model represent average portfolio exposures for the fund manager over the estimation period; and,

3. A model using returns on publicly traded securities (the European Public Real Estate Association [EPRA] index and a corporate bond index), as factors in a multifactor model. In this case the coefficients of the factors were not constrained in the way they were for the Sharpe index model.

In all three models, alpha represents the (expected) excess return, that is the overall return (over the risk-free rate) less that due to risk. However, because the risk-factors are different, its value invariably will vary between the three models, emphasising the observations earlier in Section 2 over the choice of benchmarks in factor models.

In applying the models it was found that the Sharpe index (ie four property sector) model provided the highest level of explanatory power. This model was adopted for the analysis of individual fund returns over 10 year horizons. However, for five year horizons, there were insufficient degrees of freedom, so the single-factor model, which was narrowly behind the four-factor model in terms of goodness of fit (R^2 typically greater than 0.75) in the initial investigations, was used here. In modelling individual fund performances, the models by and large accounted for a large proportion of the variation in fund returns.

3.4 Attributes of performance and persistence

As a final evaluation measure we employ the persistence test of Hendricks *et al* (1993) to determine if risk adjusted performance for each fund in the ranking period is a predictor of risk-adjusted performance in the evaluation period. While this test has been criticized by Carhart (1997) because of the potential econometric problems of using a previously estimated variable in a secondary regression, it has some intuitive appeal and is included along with a range of other fund characteristics. These regressions are intended to investigate whether any known fund characteristics can be used to either explain or predict subsequent fund performance. If such a regression had strong explanatory power, it may be possible to develop a profitable trading strategy for picking top performing funds. More discussion of this approach is included in Section 5.

[1] The risk-free rate for each year was determined by the quarterly average three-month Treasury bill rate.

[2] As explained in Section 4.2, the IPD indices are derived from details voluntarily submitted to IPD by funds for benchmarking and performance measurement and attribution. IPD estimate that their *Universe* accounts for about 55 per cent of professionally managed funds.

4. THE DATA

4.1 Introduction

This section introduces the source of the data used in Section 5 to analyse the persistence of property performance and the specific sample of data used and its characteristics. It also considers the extent of any bias associated with the samples of data.

4.2 IPD's Fund Database

The analysis, by necessity given data limitations and in common with most studies of this type, focuses on the performance of specific funds rather than fund management houses or individual fund managers. In doing this, it draws on the records, relating to the years ending December, of the commercial property portfolios collated by the Investment Property Databank (IPD) since 1981. Funds voluntarily submit their details to IPD for independent performance measurement and benchmarking. IPD (2007a, 2007b) estimates that its records cover 55 per cent of 'professionally managed' funds in the UK, a definition which excludes, among others, small private landlords, owner-occupied portfolios, and funds which own the operating business as well as the property (eg hotels, hospitals).

Potential biases in such 'manager universe' indices are widely noted in the practitioner and academic literature. In IPD's database, such biases may be both positive and negative – for example, resulting from some collective skill which 'professionally-managed' funds add or, alternatively, from those who eschew benchmarking themselves against the norm in order to seek superior returns from (say) opaque, inefficient peripheral markets. In this later respect, Hahn *et al's* (2005) conclusion that some US real estate opportunity fund managers persistently out-perform is notable.

In constructing its indices, IPD collects individual records of the properties directly owned by investors and managed by portfolio managers; details of investments in indirect property holdings, such as limited partnerships and unit trusts, derivatives, listed property and cash are also collected from the portfolio manager.

The histories of funds newly entering the database may be retrospectively added. Similarly, the historic records of funds expiring are also retained up to their last full calendar year. Funds 'expire' not only when they wind up but also when they merge or split, the portfolio manager changes, or when there is a substantial change to the name of the fund. No details are available on the reasons why funds wind up.

The details collected by IPD are combined in a number of ways (see IPD, 2007a). The records of individual properties (but not indirect holdings) are combined into its *Annual Index* which details performance nationally and geographically and for a number of property types; the headline national indices are presented both with and without the performance of "transactions, developments and active management". In the collation of the *Annual Index*, the performances of new funds are included from the date they enter but their histories are not; the histories of funds which expire remain in the *Annual Index*.

IPD also compiles individual fund returns from which performances of standard or customised benchmarks and of the *Universe* are also generated. Such fund returns include indirect holdings, listed property and cash in addition to returns from "transactions, developments and active management". Indirect holdings may be geared and this effect is included in the fund return and, typically, benchmarks. Indirect returns, however, are not included in the *Universe*.

The *Universe* and, as a rule, benchmarks include funds which have expired and the histories of all funds. Both the *Annual Index*, fund and benchmark, and *Universe* performances are weighted according to 'capital employed'.

4.2.1 The impact of fees

IPD's returns are net of property management costs (letting, rent review and general property management costs). However, they do not take account of fund management costs, for which no estimates are available. For a general, balanced fund, the interviews with investors and investment consultants suggested that fund management costs were typically in the range 25-40bps, with performance related fees increasing and (less commonly) reducing these very marginally. Other than this marginal effect from performance related fees, it was suggested during the interviews that the 'best' fund managers would charge higher fees but only marginally so (5-10bps).

The growing number of specialist vehicles (albeit, in accounting for about 14 per cent of funds, still in the minority) tend to charge slightly higher base fees than the general funds; performance-related fees are also understood to be higher and sharper on the upside. It is difficult, however, to estimate the magnitude of these fees and how they affect net performance. It is emphasised that the funds affected represent a small minority.

In the analysis, therefore, no adjustment is made for fund management fees. However, in the vast majority of cases, such fees are relatively low and vary little, and hence are unlikely to distort substantially the conclusions.

4.3 The sample and quantifying fund and benchmark performance

The analyses in this report are based on the individual fund performances *including indirects and transactions, developments and active management*. In contrast to IPD practice, however, funds are combined on an unweighted basis. This is consistent with the approaches adopted in studies of other asset classes and treats each fund equally, avoiding biases brought about by differences in size.

All funds in the IPD database are included in the analysis until they expire, but on condition that they are in existence for the duration of a qualifying period (ie the ranking period – see below).

Most of the analysis is based on fund performance over three, five or 10 year periods (horizons); returns over such periods are calculated as compound annual averages. The corresponding benchmark returns are also calculated as compound averages from the unweighted annual averages across funds. Note that that such benchmarks include indirects and any associated gearing.

Relative performances of funds against the benchmark are calculated in line with IPD methodology, ie as the ratio of the fund return to the benchmark return. Tracking errors are calculated as the standard deviation of the annual differences between the fund and benchmark return, again consistent with IPD methodology.

Ranking and evaluation periods

As noted above, most of the analysis looks at the performance of funds over three, five or 10 year horizons. Performance over one particular period is then compared with the following period. The initial period is termed the *ranking period*, the following one the *evaluation period*. In total, 12 sets of data are examined:

- One set of 10 year data (1987-1996 ranking period vs 1997-2006 evaluation period);
- Four sets of five year data (1982-1986 vs 1987-1991, 1987-1991 vs 1992-1996, 1992-1996 vs 1997-2001, 1997-2001 vs 2002-2006); and,
- Seven sets of three year data (1983-1985 vs 1986-1988, 1986-1988 vs 1989-1991, 1989-1991 vs 1992-1994, 1992-1994 vs 1995-1997, 1995-1997 vs 1998-2000, 1998-2000 vs 2001-2003, and 2001-2003 vs 2004-2006).

Quantile analysis

Funds are ranked into quantiles (specifically quartiles and deciles) according to their performance over each ranking period and each evaluation period. Performance of the set of funds in each quantile is calculated as the unweighted fund average.

Benchmarks

A benchmark return for all the three, five, and 10 year periods is calculated as the annual average of the unweighted average of all funds in the sample under investigation.

Such benchmarks will differ to the IPD Universe, first because this study will not include all funds, second because fund returns are unweighted, and finally because they include indirects.

4.3.1 Fund numbers, attrition, creation and bias

Table 4.1 displays substantial attrition in the funds recorded by IPD. Out of the 200 funds in IPD's 1987 database, only 85 were still in existence at the end of 2006 – an attrition rate of 4 per cent per annum. It is notable that the attrition rate has been increasing, to about 6 per cent with respect to the funds existing in 1992 and to an outstanding 21 per cent for those existing since 2002. So, whereas early generation property funds displayed similar rates of attrition to equity and bond funds, recent generations have experienced comparable rates to hedge funds[3].

There is also considerable dynamism within the database – whereas there are a similar number of funds today as in 1997, only half of them were in existence then.

Table 4.1: Number of funds and surviving funds in the IPD Universe

	Number of funds in IPD Universe as @:					
	Beginning 1982	Beginning 1987	Beginning 1992	Beginning 1997	Beginning 2002	End 2006
Total funds in existence	142	200	242	285	270	280
Funds still in existence @ end-2006	64	85	105	140	188	280

Source: IPD

Previous studies of persistence in other asset classes (see, for example Carhart *et al*, 2002) have identified the survivorship bias generated by excluding funds which subsequently 'die'. This study limits survivorship bias by including some funds which subsequently expire. However, some bias still may exist on account of the following:

[3] As already noted, funds in IPD not only 'expire' because they fail but also because of mergers or substantial changes of name for example an increasing minority of funds are also closed-ended meaning that they have finite life at inception and are therefore planned to expire.

1. Funds are excluded at the outset if they do not survive throughout the whole of the ranking period. As Table 4.2 shows, the number of funds affected is relatively small up until the mid-1990s but this increases and is more substantial (representing about 35 per cent of the number of funds) from the late 1990s. In general, the worst performing funds have a greater probability of expiring (see Table 4.3), so the benchmark return used will be marginally inflated and the ranking of the funds in this study's sample under-stated (because if funds which expired during the ranking period had been included, more of the surviving funds would have been in the top quantile). Excluding these funds, however, will have generated a number of countervailing effects (eg fewer funds staying in the top quantile but also more in the top quantile whose ranking deteriorates), such that any bias in the measure of persistence is unlikely to be substantial.

2. Funds not in existence at the beginning of each period's analysis are excluded from the analysis. Table 4.2 shows that the number of funds excluded in this way is large, comparable to the total number which qualify for inclusion in the sample. Bias could arise because newly formed funds appear initially to out-perform mature funds[4]; hence if they are excluded from the analysis, it will tend to flatter the ranking and the relative performance of funds in this study's sample. Of those included in the analysis, the proportion of funds in the upper quartiles is likely to be exaggerated, and the proportion in the lower quartiles understated; the estimates of persistence will be correspondingly affected.

Table 4.2: Number of funds in the sample compared to number in the IPD Universe

	10 year horizon	5 year horizons			
	1987-2006	1982-1991	1987-1996	1992-2001	1997-2006
Funds existing at start of analysis	200	141	200	242	277
Funds without full ranking period history	30	0	5	29	88
Funds in starting sample	170	141	195	213	189
Funds ceasing to exist during evaluation period	85	4	25	77	49
Surviving funds at end of analysis	85	137	170	136	140
Funds starting during the entire analysis period (net of deaths)	195	105	107	134	140
Funds in existence at end of analysis	280	242	277	270	280

Source: Authors' calculations using data supplied by IPD

Table 4.3: Percentage of funds in the starting sample expiring during the evaluation period, according to ranking period performance quartile

Ranking period relative performance quartile	10 year sample	5 year samples (average)	3 year samples (average)
Top quartile	53%	18%	8%
2nd quartile	38%	18%	11%
3rd quartile	47%	21%	12%
4th quartile	62%	28%	20%
All funds	**50%**	**21%**	**13%**

Source: Authors' calculations using data supplied by IPD

[4] This is inferred by comparing the performances of the evaluation and ranking periods of the same period (eg the set of funds in the evaluation period 1992–1997 with those of the ranking period 1992–1997); the latter includes the funds created during the previous ranking period.

4.3.2 Characteristics of funds

The IPD Universe encompasses a range of fund types. Table 4.4 presents details of these for a number of the samples used in the analysis. Segregated pensions are the largest fund type throughout, and have broadly maintained their weighting. However, the weight of the second and third largest fund types in the1980s – the life funds and the unitised life and pension funds – has diminished over the last decade or so. The pooled pension funds have also declined in significance.

By contrast, the unregulated property unit trusts and other unitised funds and, to a lesser extent, the 'other' category (which covers property companies, charities, and traditional institutions such as the Crown) has grown in importance. As they have also shown a greater tendency to wind-up (see Table 4.5), the suggestion is that these fund types have also been the most dynamic in the creation of new funds.

Table 4.4: Distribution of funds by type in the sample

	Funds continuously in existence during:		
	10 years 1987-96	5 years 1997-2001	3 years 2001-2003
Life and general insurance funds	18%	15%	14%
Unitised life and pension funds	26%	20%	18%
Segregated pension funds	37%	37%	34%
Pooled pension funds	8%	5%	3%
Unregulated PUTs & other unitised funds	4%	13%	18%
Other (property companies, charities etc)	7%	10%	13%
TOTAL	**100%**	**100%**	**100%**

Source: Authors' calculations using data supplied by IPD

Table 4.5: Percentage of funds in the starting sample expiring during the evaluation period, according to fund type

	10 year periods	5 year periods (average)	3 year periods (average)
Life and general insurance funds	42%	18%	10%
Unitised life and pension funds	59%	21%	13%
Segregated pension funds	43%	19%	11%
Pooled pension funds	57%	21%	12%
Unregulated PUTs & other unitised funds	57%	30%	16%
Other (property companies, charities etc)	64%	30%	17%
ALL FUNDS	**50%**	**21%**	**13%**

Source: Authors' calculations using data supplied by IPD

5. PERFORMANCE, ALPHA AND PERSISTENCE IN UK PROPERTY FUND MANAGEMENT

5.1 Introduction

This section assesses the extent of performance persistence in UK property funds and quantifies the magnitude of any such out-performance and alpha. It also examines the characteristics of funds according to performance and the factors behind performance.

A brief overview of the ranges of annual performance across funds is presented, followed by an examination of the subsequent performances of cohorts of funds ranked according to their initial performance.

The bulk of the analysis is concerned with performances over horizons longer than one year, ie three, five and 10 year periods. The first part considers the persistence of relative performance and the magnitude of such performance and follows the methodology described in Section 3. The analysis of relative performance is then combined with an analysis of tracking error to derive an estimate of the *Information Ratio* for property.

The next part considers the persistence of *risk-adjusted* performance, having first quantified the extent of Jensen's alpha across property funds. This is done because some out-performance may be compensation for risk rather than reflecting genuine fund manager skill. This analysis draws on the risk-models which were introduced earlier in Section 3. Finally, the characteristics of and factors behind performance and alpha are explored.

To aid understanding, a brief recap on the methodology for assessing if fund managers are able to deliver superior returns on account of skill and on the concept of alpha and its derivation is given in Box 5.1.

5. PERFORMANCE, ALPHA AND PERSISTENCE IN UK PROPERTY FUND MANAGEMENT

Box 5.1: Fund manager skill, performance and persistence

The primary aim of this report is to assess if property is an asset class characterised by fund managers who are more skilled in delivering performance than their peers. A detailed explanation of the approaches used was given in Section 3. A synthesis and recap of the methodology and concepts used is outlined below.

The main test employed to assess if a fund systematically out-performs is that of **persistence**. Good performance in one period may be due to skill but could potentially also be a one-off, due to luck, or just random. For this reason, persistence is the approach typically used by practitioners and academics to assess if active management delivers superior performance. It measures the likelihood of continuing good performance in the following period. The specific test is if such performance is greater than expected (eg greater than the 50 per cent expectation of being above median).

Performance is quantified in two ways in this report. The first is simply the fund's performance relative to a universal benchmark. This is referred to as **relative performance**. The appeal of this as a measure of a fund's skill lies in its lack of ambiguity.

The second is potentially a more accurate measure but is more subjective and harder to quantify. Underpinning it is the possibility is that some performance may be associated with risk rather than skill. A fund achieving higher returns than another is not more skilled if the higher returns are only compensating for the higher risks. This is important as investors not only target returns but also risk.

The effect on performance due to risk therefore has to be controlled for. This study uses factor models to control for risk. The difference between the overall return of the fund and the part of the return attributed in the factor model to risk (ie beta) is known as (Jensen's) alpha. This is our second measure of fund manager performance. In particular, **our definition of alpha relates to the excess return resulting from selecting good properties, better asset management or successful timing decisions for example. It also relates to better asset allocation to those sub-sectors not in the risk (factor) model.**

As alpha is a residual, the more factors which are controlled for in the risk model, the lower it will tend to be. For example, if a fund has 'bets' either in or out of retail, offices and industrials, the return attributed to the fund's asset allocation in **these sectors** will not be quantified as alpha if the sectors are included in the risk model. There are a range of factors which may or may not be included in the risk model, each correspondingly affecting the value of alpha. Herein lies the subjectivity of the measure.

The inherent difficulties in distinguishing between alpha and beta have been brought into sharp relief in recent years as a result of the emergence of new and alternative asset classes. Such asset classes may carry systematic risks which, like mainstream asset classes, should be rewarded in their risk premia. However, because they are lowly correlated with these mainstream asset classes, adding them to a traditional portfolio could increase returns without affecting risk. While this 'risk-free' return could be seen as alpha, practitioners tend to refer to it as 'alternative' or 'exotic' beta given that the returns fundamentally relate to systematic risk factors.

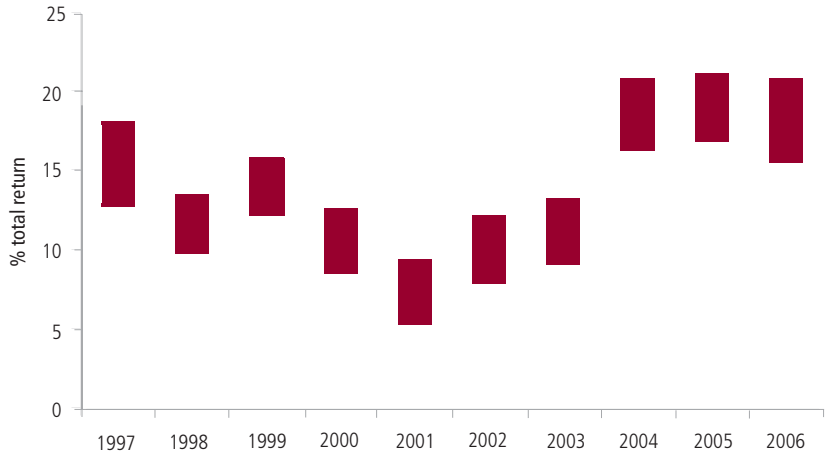
5. PERFORMANCE, ALPHA AND PERSISTENCE IN UK PROPERTY FUND MANAGEMENT

5.2 Relative performance and its persistence

5.2.1 Year-by-year performance and its persistence

Figure 5.1 illustrates the year-by-year inter-quartile range of performance across funds over the last 10 years, published by IPD (2007c) in its *Property Funds Review*. The range in performance across funds has been steady around 4 per cent, other than in 1997 and 2006 when it extended to about 5 per cent.

Figure 5.1: Inter-quartile ranges of annual fund performance, 1997–2006



Source: IPD Property Funds Review

An important point about Figure 5.1 is that the ranking of funds will change year-by-year – the fund at the 25th percentile in 1997 will not necessarily be the same fund at the 25th percentile in 2006. Figures 5.2 to 5.5, drawing on the database assembled for this study, illustrate the subsequent performances of funds grouped according to their initial ranking. For example, all the funds in the IPD Universe in 1987 were ranked according their performance in 1987 and allocated to a quartile; the (unweighted) performance for each quartile in 1987 and for the same set of funds[5] in subsequent years was then calculated. Similar calculations were undertaken using 1992, 1997 and 2002 as starting points. The results are presented relative to the unweighted average performance of all funds.

By definition, the relative performance in the starting year of the top quartile will be relatively strong, with the converse applying to the bottom quartile. For the 1987 and 1992 cohorts (and also for the 1982 cohort which is not illustrated), Figures 5.2 to 5.5 reveal that this initial relative performance very quickly dissipates, to the extent that each cohort's performance fluctuates closely around the average after one or two years. So, by and large, one year's strong (or weak) performance tended to be a one-off. However, this is less the case for the 1997 and 2002 cohorts where the performance of the top and bottom quartiles seems to persist for longer (two to three years) after which it fluctuates around the average.

There are similar findings at the more extreme ends of the return distribution – top and bottom decile funds eventually fluctuate around the average fund performance, reaching such a state quickly in the 1980s and first half of the 1990s but taking longer from the second half of the 1990s.

[5] Note that there will be some attrition in the number of funds.

Figure 5.2: Subsequent relative performance of quartile funds in 1987

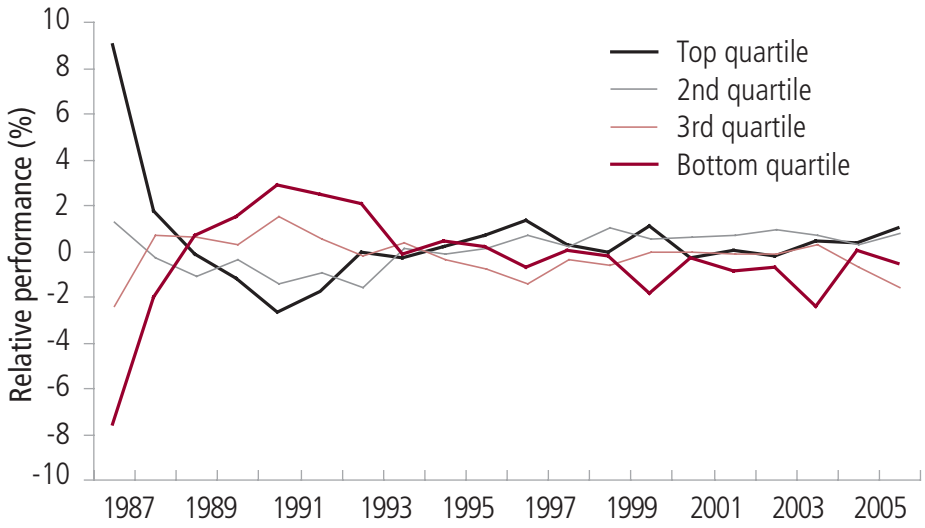


Figure 5.3: Subsequent relative performance of quartile funds in 1992

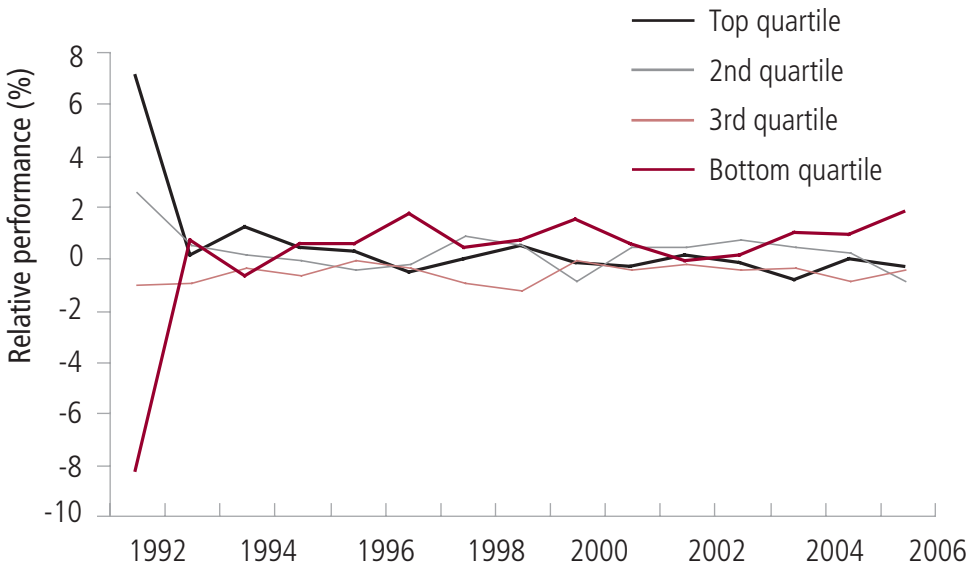


Figure 5.4: Subsequent relative performance of quartile funds in 1997

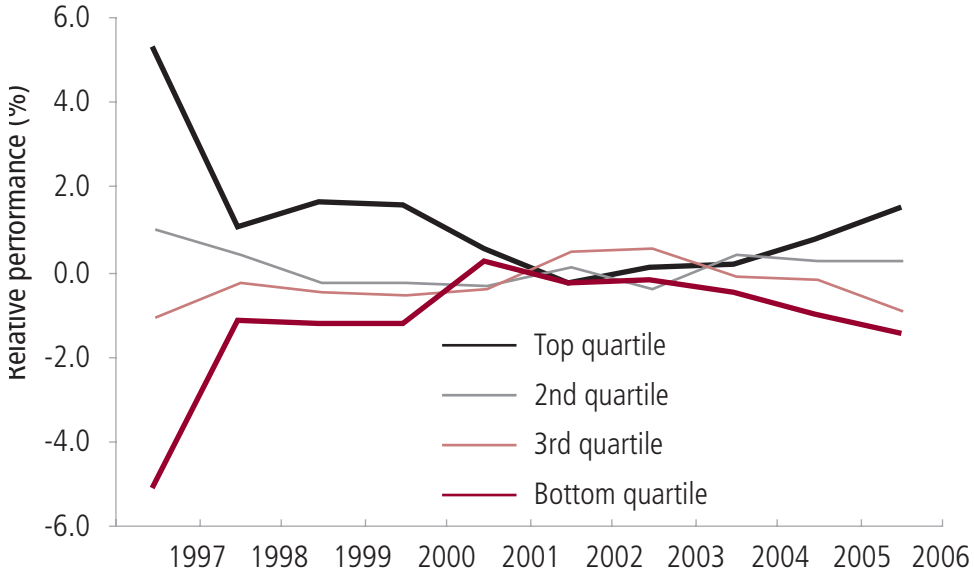
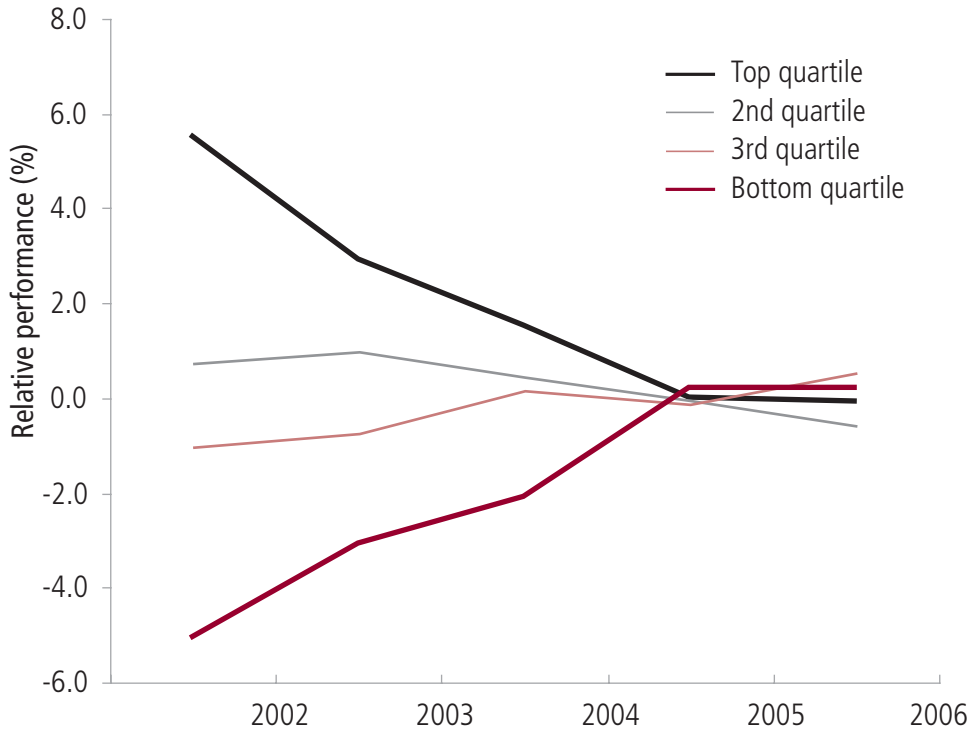


Figure 5.5: Subsequent relative performance of quartile funds in 2002



Sources for Figures 5.2-5.5: Authors' calculations using data supplied by IPD

5. PERFORMANCE, ALPHA AND PERSISTENCE IN UK PROPERTY FUND MANAGEMENT

This analysis presents some visual clues on the extent of persistence in UK property fund performance. The following sections explore this more robustly.

5.2.2 The persistence of medium term relative performance

The analysis examines the persistence of relative performance over three, five and 10 year horizons, that is annual average performance relative to the benchmark over (say) a three year period is compared with that of the following three year period and so on. The three and five year horizons correspond to the periods which investors typically judge property performance, the 10 year horizon is a more demanding test encompassing a number of property market cycles.

The study does not focus on the persistence of one year performance. The discussions with investors and advisers indicated that performance is not judged and that strategies are not pursued over such a short horizon (although the latter is becoming less the case given the strategies followed by fund-of-fund managers). One year performance is also prone to a high degree of specific risk which might distort the analysis. Finally, it can be both impractical (given property's illiquidity) and inefficient (on account of transacting costs) to rebalance portfolios over such a short horizon. Consistent with the findings of Lee (2003), Figures 5.2 to 5.5 on balance do suggest relatively high levels of persistence over one year horizons for both the best and the worst performers.

The findings on medium term performance persistence are presented in varying degrees of detail. Tables 5.1 to 5.2 below present the averages of each set of horizons (ie of all the sets of three, five and 10 year periods which were examined). Full details for each of the specific three, five and 10 year periods are presented in Appendix Table 1.

Table 5.1 shows the proportion of funds in the **top** 10%, 25% and 50% in the first three, five or 10 year period retaining such rankings in the following three, five or 10 year period. Table 5.2 shows the corresponding proportions for the **poorest** performing funds. (This type of table is called a contingency table or a transition matrix.)

The results are presented both including and excluding funds expiring in the denominator. A note on interpreting the transition matrices when expired funds are included is presented in Box 5.2.

Box 5.2: Interpreting the transition tables

The results excluding expired funds are relatively easy to interpret. As outlined earlier in Section 2, if performance was random, it is to be expected that 50 per cent of funds in the top half of performers in the initial period would be in the top half in the following period, and similarly that 10 per cent of top decile funds would be in the same decile/25 per cent in the same quartile during the following period. If the proportions are significantly higher, this would indicate persistence in good/poor performance, whereas if they are lower, it would indicate a reversal of previous performance.

It is more complicated when expired funds are included in the transition matrices. This is because the proportion of funds expiring affects the expected transition probabilities, for example of those remaining in the top quartile. Furthermore, as the table below illustrates, funds expire in varying proportions over the three sets of horizons (being highest over the 10 year horizon and lowest over three years), and for this reason there is no single benchmark expected transition probability when expired funds are included in the transition matrix.

Proportion of funds expiring, by ranking quantile

	10 year horizon	Average for 5 year horizons	Average for 3 year horizons
Top decile	59%	17%	11%
Top quartile	53%	18%	8%
2nd quartile	38%	18%	11%
3rd quartile	47%	21%	12%
Bottom quartile	62%	28%	20%
Bottom decile	59%	36%	25%
All	**50%**	**21%**	**13%**

Source: Authors' calculations using data supplied by IPD

Therefore, a separate set of expected transition matrices have to be calculated. The table shows the these for each of the horizons when the expired funds are included; the greater the proportion of funds ceasing to exist, the lower the benchmark.

Expected transition probabilities when expired funds are included

	Deciles	Quartiles	Top/bottom half
10 year horizon	5%	12½%	25%
Average of all 5 year horizons	8%	20%	40%
Average of all 3 year horizons	9%	22%	44%

5. PERFORMANCE, ALPHA AND PERSISTENCE IN UK PROPERTY FUND MANAGEMENT

Table 5.1: Proportions remaining in top quantile rankings – relative performance

	Top decile in both periods	Top quartile in both periods	Top half in both periods
Including expired funds			
10 year horizon	12%	16%	26%
All 5 year horizons	16%	30%	44%
All 3 year horizons	15%	32%	49%
Excluding expired funds			
10 year horizon	29%	35%	48%
All 5 year horizons	19%	36%	53%
All 3 year horizons	17%	34%	54%

Source: Authors' calculations using data supplied by IPD

Table 5.2: Proportions remaining in bottom quantile rankings – relative performance

	Bottom decile in both periods	Bottom quartile in both periods	Bottom half in both periods
Including expired funds			
10 year horizon	0%	5%	21%
All 5 year horizons	8%	20%	41%
All 3 year horizons	13%	22%	45%
Excluding expired funds			
10 year horizon	0%	13%	46%
All 5 year horizons	13%	27%	53%
All 3 year horizons	17%	27%	53%

Source: Authors' calculations using data supplied by IPD

Following the approaches of previous studies of other asset classes, the following comparisons and associated tests of statistical significance are undertaken:

1. The extent to which all the transition probabilities are different to expected. This considers all forms of persistence, not only that of relatively strong performance but also the persistence of weak, of unexceptional, and of good to bad relative performance for example. A chi-squared test can be used to examine statistical significance;
2. The extent to which persistence occurs specifically in the four corners of the contingency table. This covers not only positive persistence (ie within the top and bottom quartiles) but also negative persistence (ie the prevalence of top to bottom quartile moves and *vice-versa*). Again, a chi-squared test is used to examine the statistical significance; and,
3. A commonly used test (the cross-product ratio) measures the balance between those which show persistence (either good or bad) and those whose performance switches[6], with a ratio of 1 indicating no performance persistence, one statistically greater than 1 indicating persistence, and a ratio statistically less than 1 indicating reversal in performance. A Z-test is used to examine statistical significance. The cross-product ratio for each set of horizons is shown below in Table 5.3.

[6] ie (winners in both periods * losers in both periods) / (winners then losers * losers then winners) where a winner is in the top 50%). See the discussion in Section 3 for further details of this test.

Table 5.3: Cross-product ratios

	Cross-product ratio	p-value
10 year horizon	0.79	58.2%
Average of all 5 year horizons	1.33	8.2%
Average of all 3 year horizons	1.35	0.7%

Source: Authors' calculations using data supplied by IPD

Note: the cross-product ratio is defined as (winners in both periods/losers in both periods) / (winners then losers/losers then winners) where a winner is in the top 50%)

Tables 5.1 to 5.2 reveal that the evidence of persistence is mixed[7]. The indications are strongest for the best performers over three and five year horizons where the transition probabilities for those consistently in the top quantile are relatively high. This theme is highlighted by the cross-product ratios in excess of 1 in Table 5.3.

Furthermore, Table 5.1 indicates that those experiencing top decile performance have a particularly high probability of repeating such good performance. Persistence also exists among those in the top quartile although this is less striking than among the top decile performers (subsequent checks show that the 2nd decile performers have a lower probability of staying in the top two deciles than the top decile performers). There is no evidence of persistence within the top 50% of funds. It is also interesting to note that the top quartile funds on average achieve this status by performing well year in year out – for this group, it is not solely the influence of one or two good years as portrayed earlier in Figures 5.2 to 5.5.

Among poor performers, Table 5.2 indicates that evidence of persistence is less compelling. The proportions continuing to perform poorly are in most cases around or less than the expected level; they are also lower than the proportions (shown in Table 5.1) persisting with good performance. Over the 10 year horizon, the suggestion is that (the worst categories of) 'losers' subsequently reverse their initial poor performance. The low and insignificant cross-product ratio for the 10 year horizon (see Table 5.3) emphasises this tendency.

The impression, therefore, is that persistence in property fund relative performance exists only among the very top performers.

Tables 5.1 to 5.2 also suggest that the length of the horizon over which funds are assessed does not seem to matter, other than for the poorest performing funds where longer horizons reveal a tendency to turn around performance.

Similarly, it is difficult to detect (see Appendix Table 1 for details) any cyclical pattern to persistence, although the better performing funds in the second half of the 1990s did subsequently display relatively high levels of persistence. However, this did not continue in the most recent (2001–2003) three year cohort, so any evidence of a strengthening in persistence in recent years is mixed.

[7] The statistical tests emphasise this. None of the 10 year tests are significant. The overall distributions are significant in only one (out of four) of the five year horizons, and in two (out of seven) of the three year horizons; at the aggregated level, both the three and the five year distributions are significant at the 5 per cent level. Excluding expired funds from the transition probabilities results in the none of the five year horizons being significant and only one of the three year horizons being significant; the aggregated three and five year horizons remain significant. Only two (out of seven) of the three year cross-product ratios are significant at the 5 per cent level, although the aggregated ratio for the three year horizons is (see the p-values in Table 5.3).

5.2.3 The magnitude of persistent relative out-performance

Table 5.4 presents the average relative performance of funds in each performance quantile, over horizons of 10, five and three years. The first column of each horizon shows the performance of groups of funds ranked by quantile; the second column shows the relative performance of the same set of funds in the following (10, five and three year) period. The figures shown are the averages across horizons (ie one set of 10 year horizons, the average of four sets of five year horizons and the average of seven sets of three years horizons); the details for each specific horizon are shown in the Appendix.

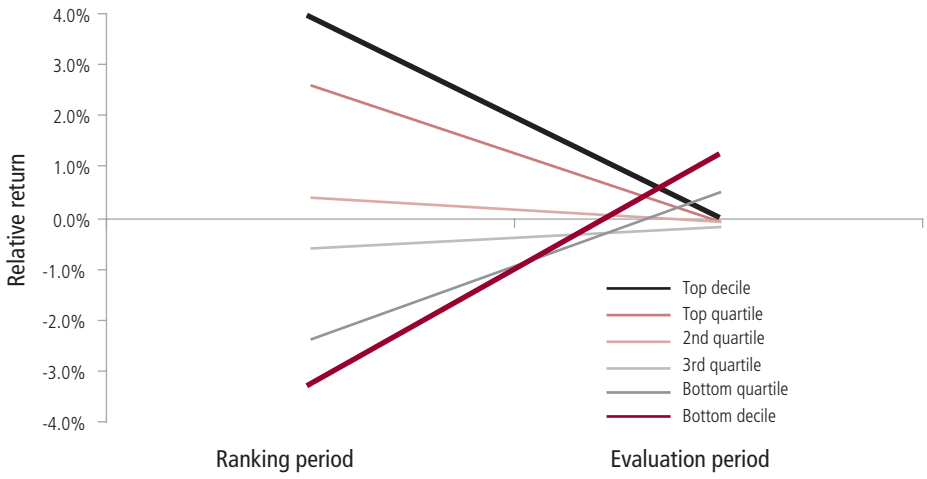
The results for the 10 year horizons are also presented graphically below in Figure 5.6. This plots the average relative performance of funds according to their ranking in the first 10 year period against their average relative performance in the following 10 year period.

Table 5.4: Relative annual average performance according to ranking period quantile

	Horizon averages					
	10 years		5 years		3 years	
Ranking period quantile	Ranking	Evaluation	Ranking	Evaluation	Ranking	Evaluation
Top decile	3.9	0.0	5.1	0.5	6.5	0.5
Top quartile	2.6	-0.1	3.3	0.4	4.2	0.4
2nd quartile	0.4	-0.1	0.5	0.2	0.7	0.0
3rd quartile	-0.6	-0.2	-0.9	-0.3	-1.0	-0.1
Bottom quartile	-2.4	0.5	-3.0	-0.2	-3.9	-0.3
Bottom decile	-3.3	1.2	-4.1	-0.4	-5.6	-0.4

Source: authors' calculations using data supplied by IPD

Figure 5.6: Average fund relative performance, according to initial (ranking period) quantile, 10 year horizons



5. PERFORMANCE, ALPHA AND PERSISTENCE IN UK PROPERTY FUND MANAGEMENT

The first thing to note is that the range of performance during the ranking period narrows the longer the horizon.

The second is the magnitude of relative performance among the top and bottom quantiles of funds[8]. Such high returns are to be expected given top quantile performance is (theoretically) unlimited and that bottom quantile performance can potentially be substantial.

The most striking observation (captured graphically in Figure 5.6), however, is how the subsequent performances of the top and bottom performing set of funds converge with the benchmark. While (other than over the 10 year horizon) the funds which previously performed well on average maintained an advantage in the following period and the poorest performing funds typically continued to suffer, the magnitudes are modest.

The patterns illustrated in Table 5.4 are of course consistent with the cautious conclusion on persistence in property fund performance. They emphasise the only tentative indications of persistence reflected in Tables 5.1 to 5.3. Even so, while the evidence of persistent out-performance is not compelling, it should be noted that the best performing funds bank their initial performance and do not subsequently lose it.

An interesting interpretation of the performances in the columns entitled 'evaluation' is that they represent the relative return of investing, costlessly, in the previous period's hierarchy of funds. For example, a strategy of investing in the top quartile group of funds from the previous five year period would have yielded only 0.4 per cent per annum in excess of the benchmark. It is clear that, after accounting for transaction costs, a strategy of switching investment into a fund which performed well in the previous period on average will not have paid-off.

The subsequent weakening in the performance of the top quantile of course reflects the impact of the large proportion of out-performing funds which then regress. The performance of those funds which persistently out-perform therefore will be better than portrayed in Table 5.4.

Table 5.5 therefore details the performances of the persistent top performers. Again, the magnitude of out-performance declines the longer the horizon. Those with an above median performance in successive periods show relative returns of $1^{1}/_{4}$–$2^{1}/_{4}$ per cent per annum in the second period. The very best top decile's performance, not surprisingly given its unlimited range, is relatively high. It is emphasised that the extent of such persistent out-performance is low, ie about 2 per cent of funds in the top decile, 10 per cent in the top quartile, and around 25 per cent in the top 50 per cent. Conversely, the vast majority of funds show medium and long term returns within 1 per cent of the benchmark.

Table 5.5: Relative annual average performance of persistent performers

	Horizon averages					
	10 years		5 years		3 years	
Quantile in both periods	Ranking	Evaluation	Ranking	Evaluation	Ranking	Evaluation
Top decile	4.3	2.6	5.0	3.5	6.1	6.5
Top quartile	2.9	1.9	3.5	2.7	4.5	3.8
Top 50%	1.3	1.3	1.9	1.8	2.6	2.2

Source: authors' calculations using data supplied by IPD

[8] Be aware that, because the performances shown are the **averages across funds** in a particular quantile, they are not comparable with the earlier Figure 5.1 which illustrated the return of the fund at **each quartile point**.

5.2.4 Performance and tracking errors

The varying performances illustrated above in Tables 5.4 and 5.5 may, to some degree, reflect corresponding risks taken by the funds – for example, gearing in a fund (such as that existent in some indirect vehicles) should normally in the longer term lead to higher but more volatile returns. The effect of risk on performance is comprehensively addressed in Section 5.3.

Before this, however, a commonly used measure of risk in investment portfolios called tracking error[9] is reviewed. Tracking error is calculated as the standard deviation of a fund's returns relative to its benchmark. Ian Cullen used this measure to risk-adjust funds' performance in his paper *Management style and portfolio performance: how to win on risk adjusted returns* for the 2002 IPD/IPF Property Investment Conference. This ratio of a fund's relative return and its tracking error is known as the *Information Ratio*, which is also a standard metric for measuring risk-adjusted performance in all asset classes.

Tracking error is not used as the primary means of risk-adjusting returns in this report, the reason being it is not a universally appropriate metric (see Israelson and Cogswell, 2007). In particular, it requires that the fund's objective is to track the benchmark and is most appropriate when the beta of the portfolio relative to the benchmark is (or is targeted to be) close to 1. Tracking error is less meaningful if a fund's objective is different to tracking or beating the benchmark.

Nonetheless as many funds in IPD benchmark themselves against the index or a close derivative of it, it is interesting to examine the extent to which relative performance and tracking error correspond. The tracking errors shown in Table 5.6 are relative to the unweighted fund average benchmark, and not the IPD Index or Universe. They relate to the average of each fund's tracking error within a particular return quantile and are calculated only for the ranking period. Again, the figures shown in the table are the averages across each set of 10, five and three year horizons.

There is clear U-shaped pattern to the tracking errors with both the best and worst performing funds on average having high tracking errors. So, there is a suggestion that the higher returning funds have been taking on more risk relative to the benchmark, and that the poorer performing funds have either also taken on more risk which has failed or have pursued a low absolute risk strategy.

At first sight, the average tracking errors across all funds look on the high side. For example, the simulations undertaken in an earlier IPF report *Risk Reduction and Diversification in Property Portfolios* (Callender *et al* 2007) for the 11 year period 1994–2004 generated tracking errors ranging from 0.8 for a fund with 500 properties to 7.6 for a fund with two assets and 2.1 for a fund with 50 properties (which is around the norm in the IPD Universe); these compare with the estimate in Table 5.6 of a cross-fund average of 5.7 over a 10 year period.

Two factors explain some of the difference. First, the earlier IPF study's related to standing investments while those in Table 5.6 also include more volatile developments and indirects. Second, the estimates in Table 5.6 are the averages across a number of 10, five year and three year periods from the 1980s when tracking errors were a lot higher than in recent periods. Furthermore, since the estimates relate only to the initial ranking period, they exclude the most recent periods. For example, the estimate for the 10 year horizon relates to 1987–1996 – a relatively volatile period.

In recent periods, this study finds tracking errors for funds on average to be around 3 per cent, which is close to the estimates in the *Risk Reduction and Diversification in Property Portfolios* report.

[9] Sometimes called tracking risk or active risk.

Table 5.6: Average fund tracking errors, according to ranking quantile

	Horizon averages		
	10 years	**5 years**	**3 years**
Top decile	7.0	6.0	6.1
Top quartile	6.6	6.7	4.6
2nd quartile	5.2	3.9	3.3
3rd quartile	4.8	3.7	3.6
Bottom quartile	6.2	4.7	4.2
Bottom decile	5.7	5.4	5.2
All funds	**5.7**	**4.3**	**3.9**

Source: Authors' calculations using data supplied by IPD

5.2.5 The information ratio – estimate for UK property

As noted above, the *Information Ratio* is a commonly used metric of the risk-adjusted performance of a fund; it is also interesting to compare the typical levels across asset classes. The information ratio is also used heavily in assessments of portfolio risk where a higher information ratio, *ceteris paribus*, implies a lower probability of under-performing, and more generally in portfolio construction.

The analysis on the persistent out-performers and tracking errors can be combined to derive an estimate of the information ratio for a 'good' property fund. Such estimates are widely available for bonds and equities but not, until now, for property.

A 'good' fund is defined as one which is in the top 50, 25 or 10 per cent of funds in two consecutive periods (of three, five or 10 years). Table 5.7 gives the typical returns of such funds. Tracking errors are now lower than in the past and hence it is not be sensible to use the figures in Table 5.6. which are averages since the 1980s. For the three and five year horizons, the most recent estimates are used. For the 10 year period, the only estimate (for 1987–1996) is dated; instead, a view is taken, drawing on the information from the latest five year periods. The table indicates that the information ratio is higher the shorter the horizon (a product of the tendency for out-performance to increase the shorter the horizon) and also reveals a tendency for the information ratio to increase between the 2nd and top quartiles but for this progression (other than over 10 years) to stop before the top performance decile.

Broadly speaking, a reasonable estimate of the information ratio in the recent past would range from about 0.5 over 10 years to one over three years.

Assuming higher tracking errors consistent with greater levels of property market volatility than experienced recently[10] would imply a lower, prospective information ratio in the range 0.3 to 0.6.

[10] Such attitudes are highlighted in two recent IPF studies, *Multi-asset Allocation in the Modern World* (Bond *et al*, 2007b) and *Index Smoothing and the Volatility of UK Commercial Property* (Key and Marcato, 2007)

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Table 5.7: Estimates of the information ratio for UK property

	Horizon		
	3 years	5 years	10 years
Relative return			
Top 50 per cent	2.23	1.84	1.32
Top quartile	3.79	2.74	1.92
Top decile	6.46	3.51	2.62
Tracking error			
Top 50 per cent	2.48	2.62	3.00
Top quartile	3.25	3.15	3.50
Top decile	5.59	4.27	4.50
Information ratio			
Top 50 per cent	0.90	0.70	0.44
Top quartile	1.17	0.87	0.55
Top decile	1.16	0.82	0.58

5.3 Risk-adjusted performance and its persistence

The results presented above provide an analysis of the persistence in property returns not adjusted for risk. This evidence is important in understanding the dynamics of total returns generated by fund managers. However, many investors are interested not only in total returns but in total returns adjusted for risk. For example, a fund manager may consistently achieve higher returns than another manager, but this does not necessarily imply the first manager is a better manager, if the higher returns are only compensating for the higher risks taken by the manager. Stripping out the effects of risk from raw performance allows a different perspective on the extent to which funds' performances persist.

Another reason for the extensive research on unadjusted returns in the previous section is that there is little agreement on the most appropriate form of risk adjustment for real estate returns. Section 3 considered possible factor models that could be used in adjusting for the risk exposures of fund managers. There was evidence that even simple models can account for a large amount of the variation in individual fund manager performance. Accordingly, the factor models identified in Section 3 are employed in the following analysis.

The estimates of Jensen's alpha from the 10 and five year factor models described in Section 3 are summarised in the following section. Then, as in the section above, this information is used to examine the transition between performance quartiles.

5.3.1 Risk-adjusted fund performance

The first stage in the analysis applied the multi-factor (ie four property sector) Sharpe model to two, 10 year periods (1987–96 and 1997–2006) to evaluate the performance of UK property fund managers. The four IPD sectors (retail, offices, industrials, and other property) represent the benchmarks for the model. Each equation is estimated for a 10-year period. Hence, there is a general caveat that the model has limited degrees of freedom. Table 5.8 shows the resulting estimates of alpha over the ranking period (1987–1996) and the evaluation period (1997–2006).

Interestingly, only the top quartile (and decile) funds have an average alpha value that is positive in the first period. In the second period both the first and second quartiles have an average value of alpha that is greater than zero.

Table 5.8: Estimates of 10 year alpha for UK property fund managers

	1987–1996	1997–2006
Quartile 1	0.92	1.86
Quartile 2	-0.63	0.51
Quartile 3	-1.49	-0.29
Quartile 4	-3.27	-1.27
Top decile	1.93	2.63
Bottom decile	-4.39	-1.74

Source: Authors' calculations using data supplied by IPD

Table 5.9 provides further information about the distribution of alpha values for the property fund managers. It should be remembered that the period from 1987–1996 included the last major commercial property boom and subsequent severe recession. It is also interesting to note that despite the general improvement in commercial property values and the subsequent rise in average alpha values, only eight funds managed to achieve a value of alpha in excess of two. This is only one more than in the previous period (although as a percentage of the overall number of managers, the percentage of managers with an alpha greater than two is much higher in the second period).

Table 5.9: Distribution of alpha for UK property fund managers, 10 year horizons

	Number of funds	
Magnitude of alpha	**1987-1996**	**1997-2006**
Alpha > 2	7	8
1 < alpha < 2	6	14
0 < alpha < 1	25	25
-1 < alpha < 0	44	26
-2 < alpha < -1	47	9
Alpha < 2	41	3
Total number of funds	**170**	**85**

Source: Authors' calculations using data supplied by IPD

Table 5.8 shows the average alpha values for each quartile, which are based on performance levels in the ranking and evaluation period. That is, in each period the alpha measure is calculated and each fund ranked accordingly. The summary statistics show the average level of alpha by quartiles. While some funds will appear in the same quartile for the evaluation period as they did in the ranking period, many will not. Therefore, in the same way as earlier in the analysis of relative performance, Figure 5.7 below tracks the performance of managers in each quartile from the ranking period to the evaluation period. A strong tendency towards convergence is noted in the chart. The general ordering of managers by quartile was maintained (deciles are shown by the darker lines), with the top quartile managers in the ranking period, as a group, still outperforming the other managers. However the dispersion of outcomes between groups was markedly reduced.

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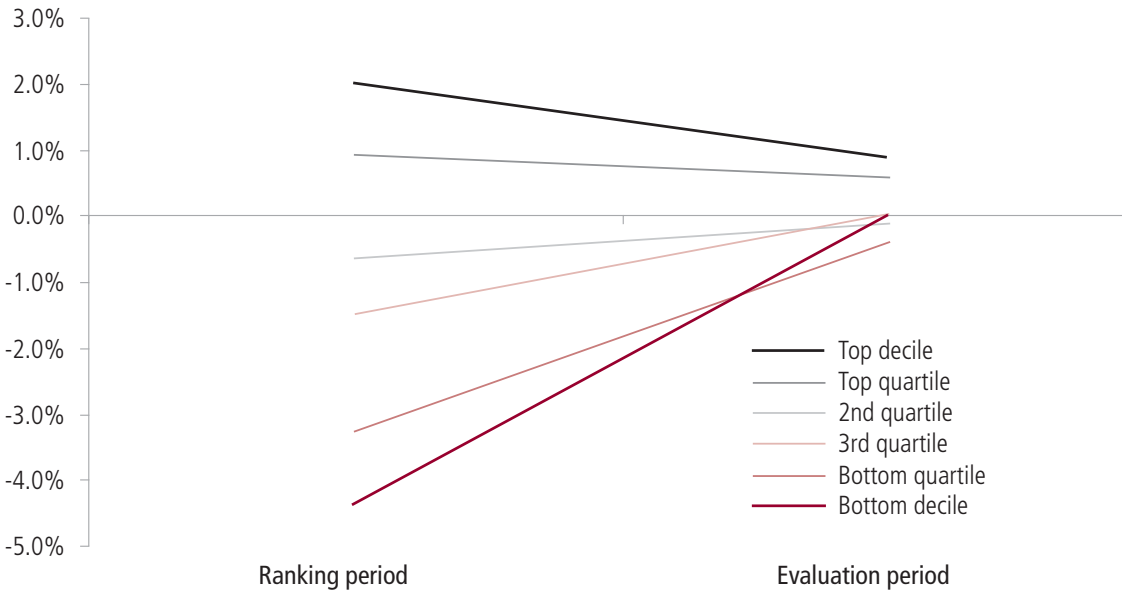
Figure 5.7 Average fund alpha, according to initial (ranking period) performance quantile, 10 year horizons



Source: Authors' calculations using data supplied by IPD

One problem with using the multifactor model is the requirement to use 10-year data periods to estimate the model. This period length was chosen to balance the demands to provide sufficient degrees of freedom with ensuring at least two periods to analyse manager performance. To allow for greater analysis of manager performance by period, a set of models using a single factor model (the IPD Universe index) were estimated to obtain a five year alpha measure. By estimating the models for only five years, a greater number of intervals can be studied with a larger number of managers included in the sample. The same caveat applies to this analysis as applied above, estimating an econometric model with only a small number observations will give rise to large confidence intervals around each parameter estimate. The magnitude of alpha will not be estimated with a great deal of precision.

Table 5.10 shows the estimated magnitudes of alpha by quartiles for UK property fund managers, based on the single factor model. The results presented show the average value of alpha ranked for each quarter when managers are ranked by performance. The average alpha values shown under the heading 'evaluation' show the average level of alpha for the fund quartiles determined in the ranking period.

There is some evidence to suggest that manager performance, as measured by alpha, is counter-cyclical[11]. Alpha is higher during the boom periods of 1987–1991 and 2002–2006. It is lowest for the period covering the early 1990s (ie 1992–1996). Apart from the 1992–1996 period, the top quartile managers, as a group, went on to record the highest average level of performance in the evaluation period (albeit at a lower level than before). This did not occur with the top decile managers, who had average performance measures below in the bottom decile group for subsequent performance in the recent 1992–1996 and 1997–2001 evaluation periods. This result must be carefully interpreted as the number of surviving funds in each decile may be small, and the results may be driven by just one or two adverse cases.

[11] It might be expected that the alphas reported in Table 5.12 should add to zero. However, because alphas are not estimated for all the funds in the IPD Universe (with only those with a sufficient performance history over the estimation period covered), some inconsistency is to be expected. There will also be estimation error.

Table 5.10: Five year alpha for UK property fund managers (Single Factor Model)

	1982 – 1986 sample		1987 – 1991 sample		1992 – 1996 sample		1997 – 2001 sample	
Ranking period quantile	Ranking	Evaluation	Ranking	Evaluation	Ranking	Evaluation	Ranking	Evaluation
Top decile	6.86	0.73	8.76	1.18	4.12	-0.22	6.38	-1.75
Top quartile	4.08	1.00	5.94	0.65	3.05	-0.11	4.55	2.64
2nd quartile	0.46	0.31	1.69	0.20	1.05	0.79	1.79	0.80
3rd quartile	-1.63	0.57	-0.24	0.23	-0.38	-0.30	-0.25	0.11
Bottom quartile	-4.55	0.07	-3.03	-0.59	-2.96	1.28	-3.88	0.34
Bottom decile	-5.93	-0.10	-4.46	0.26	-4.63	1.58	-6.20	0.53

Source: Authors' calculations using data supplied by IPD

Figure 5.7 and Table 5.10 therefore portray the same pattern of convergence in alpha as in the earlier analysis of raw, relative performance. The convergence in Jensen's alpha between five year horizons is greater than that for relative performance but such convergence is less pronounced for Jensen's alpha than relative performance for the 10 year horizons.

5.3.2 The persistence of risk-adjusted performance

To highlight trends in the persistence of risk-adjusted performance, the same types of transition matrix, used earlier to examine raw relative performance, were calculated. Table 5.11 provides some indication of persistence in alpha. Compared to the transition matrix for raw relative performance, the transition probabilities for good and bad funds are higher on a risk-adjusted basis.

For example, it can be observed that the probability of a top quartile manager remaining a top quartile manager is quite high at 21 per cent (note also that among the top decile performers, 12 per cent remained in the top decile – a similarly high proportion to that observed in the raw, relative performance analysis). The probability that a top quartile manager will remain an above median manager (first or second quartile performance) is 44 per cent. Compare this to the probability that a top quartile manager would turn in a below median performance, at 15 per cent and an element of persistence is observed. Similarly, the probably of a bottom quartile manager remaining a bottom quartile manager in the evaluation period is quite high at 21 per cent. The probability that a bottom quartile manager will return an above median performance in the evaluation period is only 7 per cent (44 per cent for a top quartile manager).

Table 5.11: Transition probabilities for fund manager risk-adjusted performance: 10 year samples, 1987-1996 to 1997-2006.

			Evaluation period quartile				
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	21%	23%	7%	9%	40%	100%
	2nd	17%	12%	24%	7%	40%	100%
	3rd	7%	14%	9%	12%	58%	100%
	Bottom	7%	0%	10%	21%	62%	100%
	All	13%	12%	12%	12%	50%	100%

Source: Authors' calculations using data supplied by IPD

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Two tests of persistence are reported for the 10 year performance analysis. Firstly, the cross-product ratio test shows that the performance persistence apparent on visual inspection of Table 5.11 is confirmed. The cross-product ratio is 2.84, which is statistically significant at the 5 per cent level of significance. Second, a chi-square test, is highly significant (chi-square = 27.9, df = 12).

A similar analysis is undertaken for the five year results based on alpha derived from a single factor model. The tests of persistence are conducted using both the individual five year periods and also an aggregated set of results covering all five year periods. The aggregated transition matrix is shown in Table 5.12 below. The transition matrices for the individual five year periods are shown in Appendix Table 3. The cross-product ratio test on the aggregated results is not statistically significant (1.33, p-value = 0.08), implying no persistence in manager performance. However, the chi-square test is significant (chi-square 22.9, df = 12, p-value = 0.02). Although it should be noted that when the expired funds are excluded from the test the results change and show no indication of persistence in quartile rankings (chi-square 11.1, df = 9, p-value = 0.27). It is also notable that persistence in alpha among the very best (top decile) performers over five years is less than in the analysis of raw, relative performance.

Table 5.12: Transition probabilities for fund manager risk-adjusted performance: aggregated five year samples

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	25%	18%	18%	18%	21%	100%
	2nd	23%	22%	20%	20%	15%	100%
	3rd	15%	25%	21%	21%	19%	100%
	Bottom	16%	14%	21%	20%	30%	100%
	All	20%	20%	20%	20%	21%	100%

Source: Authors' calculations using data supplied by IPD

When the statistical tests are conducted on each five year sub-sample, the results show some sensitivity to the time frame chosen. There is strong evidence of persistence in manager performance for funds in the ranking period 1997–2001, when evaluated over the period 2002–2006. In the earlier periods no test of persistence was statistically significant at the 5 per cent significance level.

Over five year horizons, evidence of persistence is therefore weaker for risk-adjusted returns than for relative performance.

5.4 The attributes and predictability of performance and alpha

The results from the previous section suggested that, at least for the 10 year performance interval, there was evidence of persistence in alpha but not in relative performance. For the five year results, the evidence was even more mixed, with the conclusion of persistence dependent on the time period chosen. If this information is to be useful to investors, it would be helpful to know whether there is any way top performing managers can be identified. In this section we investigate three models seeking to explain fund alpha and relative performance.

First, using contemporaneous information on fund characteristics we look to see which, if any, fund characteristics are most closely linked to manager out-performance and alpha. The second model offers another test of persistence by examining whether past values of fund performance and alpha for a fund are associated with higher out-performance (alpha) in the subsequent period. Finally, fund characteristics are tested to see if they hold any predictive ability for future levels of performance and alpha.

The first model investigates whether there are any systematic associations between information on the characteristics of each fund and the level of alpha/performance. The model estimated is:

$$\alpha^{j}{}_{i} = \gamma_0 + \gamma_1 LCV^{j}{}_{i} + \gamma_2 DLF^{j}{}_{i} + \gamma_3 DSPF^{j}{}_{i} + \gamma_4 DPPF^{j}{}_{i} + \gamma_5 DUL^{j}{}_{i} + \gamma_6 DUN^{j}{}_{i} + \gamma_7 STRUCT^{j}{}_{i} + \gamma_8 PROPSCOR^{j}{}_{i} + \gamma_9 HI^{j}{}_{i} + \gamma_{10} EY^{j}{}_{i} + \gamma_{11} DEVRAT^{j}{}_{i} + \gamma_{12} NETINV^{j}{}_{i} + e^{j}{}_{i}$$

These variables are defined in Box 5.3. The variables included in the model were limited to those available in the IPD database. The management house individual fund manager and investment process and changes in these for example, might all be factors associated with and predictive of performance[12] but these were impossible to incorporate.

[12] The investment consultants place a lot of emphasis on associating investment and risk control processes with (prospective) performance.

Box 5.3: Definition of variables in regression model

j a j superscript indicates the period of analysis. For the 10 year results the periods are either 1987–1996 or 1997–2006;

i is a subscript indicating each property fund selected for analysis;

LCV is the natural log of a fund's capital value (direct and indirects) averaged over the relevant time period (eg. 1987–1996);

DLF is a dummy variable to indicate that the fund is a Life and General Insurance Funds (IPD type codes 2 and 3);

DSPF is a dummy variable to indicate that the fund is a Segregated Pension Fund (IPD type code 4);

DPPF is a dummy variable to indicate that the fund is a Pooled Pension Fund (IPD type code 5);

DUL is a dummy variable to indicate that the fund is a Unit Linked Life or Pension Fund (IPD type code 7);

DUN is a dummy variable to indicate that the fund is an Unregulated PUT and other unauthorised fund (IPD type codes 6 and 9);

STRUCT is a variable created by IPD representing the structure score for each fund averaged over the relevant period;

PROPSCOR is a variable created by IPD representing the property score for each fund averaged over the period;

HI is a Herfindahl index to measure the investment focus (or specialisation) of each fund. The index for each fund is created using the following formula:

$$HI_i = \sum_{j=1}^{N} S^2_j$$

Where Sj is the fund's annual percentage capital value weighting to sector j averaged over the period. For example if Fund 3 had the following average allocations during the ranking period: Office = 25%, Retail 70%, Industrial 5%, the Herfindahl index for that fund would be:

$$HI_i = 0.25^2 + 0.70^2 + 0.05^2 = 0.555$$

If Fund 4 was fully invested in retail property over the ranking period, it would have a Herfindahl index of 1.

EY I.C. is a variable comprising the average all-property equivalent yield for each fund (averaged over the period).

DEVRAT is a variable created as the ratio of total development expenditure divided by the total capital value for each fund. Average over the period examined, eg 1987–1996.

NETINV is a variable which is the ratio of net investment divided by the total capital value of each fund. Then take the average of this ratio over each of 10 ten year periods.

There are two important things to note in interpreting the equations. First, for the fund types, it is necessary to exclude one type (it is effectively captured, along with other influences, in the constant/intercept term). The coefficients on the fund type dummy variables should therefore be interpreted relative to this excluded fund type (in this case, a composite comprising the IPD categories property companies, charities and traditional institutions). Second, for the 10 year alpha models, the risk-adjustment model (from which the estimates of alpha were derived) was based on the four IPD sectors (including other). Because the effect of fund sector exposures will have already been partly controlled for, it is to be expected in the 10 year alpha models that the contribution of asset allocation (the IPD structure score) will be diminished.

The results of applying the regression model for fund performance and alpha over the 10 year horizon are shown below in Table 5.13 (a similar analysis of the five year horizons is shown in Appendix Table 4). The model suggests that fund size is positively related to its alpha value, with large funds having a higher alpha. Pooled property funds appear to have a lower value of alpha on average than other fund types. The IPD property score measure, which is a measure of out-performance attributed to stock selection, is positively related to alpha. Neither development exposure nor the net inflow of money into funds has a significant association with fund alpha. The equivalent yield of the fund is significant at the 10 per cent level.

When considering fund performance, the results are slightly different. Fund size is no longer a significant influence, neither are the negative effects associated with pooled pension funds. Yield and the IPD property score both become more influential. The positive effect of the IPD structure score, and the negative effect of a development also become more important; this is to be expected as, in the alpha model, these influences would have already been partly picked-up in the betas of the risk model.

Table 5.13: Determinants of fund alpha/performance: 1987–1996 sample period

	Alpha		Performance	
	Coefficient	t-ratio	Coefficient	t-ratio
Intercept	**-9.94**	3.33	**4.92**	2.07
Size (capital value)	**0.33**	2.80	0.10	1.10
Fund type*				
Life and general insurance	-0.98	1.64	-0.55	1.17
Segregated pension	0.03	0.06	0.22	0.49
Pooled pension	**-1.45**	2.08	-0.45	0.82
Unit-linked life and pension	-0.01	0.02	0.02	0.03
Unregulated PUTs and other unauthorised	0.90	1.10	0.32	0.49
IPD attribution scores				
Structure	0.12	0.69	**0.67**	5.02
Property	**0.19**	2.68	**0.72**	12.68
Investment focus	1.73	1.07	0.42	0.33
Equivalent yield	0.29	1.78	**0.42**	3.23
Development exposure	-3.77	0.63	-9.08	1.90
Net investment	-1.89	1.34	-0.06	0.05
R^2	0.23		0.71	

Coefficients significant at 5 per cent level shown in **bold**.
* relative to property companies, traditional institutions and charities (which are included in the constant term)
Source: Authors' calculations using data supplied by IPD

Over the second 10 year period, the significant determinants of fund alpha are found to be different from those shown in the table above. Table 5.14 shows the estimated coefficients for the regression model.

5. PERFORMANCE, ALPHA AND PERSISTENCE IN UK PROPERTY FUND MANAGEMENT

Table 5.14: Determinants of fund alpha/performance: 1997–2006 sample period.

	Alpha		Performance	
	Coefficient	t-ratio	Coefficient	t-ratio
Intercept	**5.14**	2.26	**12.28**	6.92
Size (capital value)	-0.10	1.15	0.06	0.95
Fund type*				
Life and general insurance	-0.78	1.90	-0.61	1.91
Segregated pension	-0.59	1.62	-0.26	0.91
Pooled pension	-0.61	1.11	-0.52	1.21
Unit-linked life and pension	**-1.02**	2.44	**-0.79**	2.42
Unregulated PUTs and other unauthorised	-0.09	0.21	-0.40	1.20
IPD attribution scores				
Structure	0.24	0.98	0.00	0.01
Property	**0.54**	7.58	**0.91**	**16.40**
Investment focus	-0.81	1.17	-0.59	1.10
Equivalent yield	-0.26	1.72	0.10	0.82
Development exposure	-8.32	0.81	4.72	0.59
Net investment	**0.99**	2.45	-0.24	0.77
R^2	0.49		0.80	

Coefficients significant at 5 per cent level shown in **bold**.

* relative to property companies, traditional institutions and charities (which are included in the constant term)

Source: Authors' calculations using data supplied by IPD

In particular, Table 5.14 shows that fund alpha was associated with manager type (negative association with life funds, and unit linked life or pension funds). Property score is also significant in this period, along with the net investment of a fund and (at the 10 per cent significance level) the equivalent yield. In the case of equivalent yield, the sign of the coefficient is the opposite of that shown in Table 5.13. With respect to raw performance, the negative association with life funds and with unitised life and pension funds also applies, property score is even more influential but yield and net investment are, unlike for alpha, not significant. However, the previously powerful effect of fund structure has evaporated.

The results of the regression model show the difficulty in identifying the fund characteristics that give rise to out-performance. Unfortunately the information set did not contain information on the individual fund manager responsible for the investment decisions. It was interesting to note that equivalent yield was statistically significant in all but one instance (though with varying signs). It may suggest that there is an observed source of risk that is associated with higher yield properties that has not been identified in the model[13]. Development exposure also tends to have a negative influence, albeit not with any statistical significance.

To further investigate the question of persistence in alpha and performance, the model was re-estimated for the 1997–2006 period including the lagged value of alpha/performance (ie from the 1987–1996 period). This regression could only be performed for those funds that existed in the earlier period.

The results, presented in Table 5.15, show that more variables in the model are now significant (though recall that the sample is slightly different from that used in the Table 5.14). Most notably, in showing a statistically significant positive coefficient on the lagged value of alpha (but not performance), they support the conclusions from the previous sections which indicated that over the 10 year sample, the alpha of a fund persists but that of raw performance does not.

[13] Notably, this is also indicated by other work undertaken by Paul Mitchell Real Estate Consultancy Ltd.

However, some care should be taken when interpreting this result. As the value of alpha is estimated for each fund, the standard errors of the regression model shown in Table 5.15 may not be valid. Also, any specification error that occurs in the risk-adjustment model may feed into the value of alpha. If a variable has been omitted that also happens to be persistent, then the conclusion of performance persistence may be spurious.

Table 5.15: Determinants of fund alpha/performance: 1997–2006 sample period: lagged alpha/performance included

	Alpha		Performance	
	Coefficient	**t-ratio**	**Coefficient**	**t-ratio**
Intercept	1.70	0.47	**13.26**	5.32
alpha(-1)/ performance(-1)	**0.17**	2.28	0.06	1.14
Size (capital value)	-0.01	0.09	0.03	0.28
Fund type				
Life and general insurance	-1.36	1.85	**-1.08**	2.11
Segregated pension	**-1.39**	2.20	-0.68	1.55
Pooled pension	**-1.66**	2.11	-0.80	1.47
Unit-linked life and pension	**-1.74**	2.47	**-1.04**	2.13
Unregulated PUTs and other unauthorised	-1.61	1.90	**-1.21**	2.06
IPD attribution scores				
Structure	0.51	1.34	0.47	1.77
Property	**0.52**	4.58	**1.00**	12.83
Investment focus	-1.09	0.41	0.67	0.37
Equivalent yield	0.08	0.37	0.07	0.43
Development exposure	0.58	0.05	11.45	1.35
Net investment	2.62	1.68	-1.25	1.15
R^2	0.51		0.87	

Coefficients significant at 5 per cent level shown in **bold**.
* relative to property companies, traditional institutions and charities (which are included in the constant term)
Source: Authors' calculations using data supplied by IPD

The final question investigated in this section is to examine whether fund characteristics could be used to predict fund alpha and performance in a subsequent period. To do this the model is re-estimated for the 1997–2006 period, but the value of the explanatory variables all relate to the 1987–1996 period. This regression is helpful if an analyst wished to determine, on an *ex-ante* basis, which managers may outperform in the subsequent 10 year period. Surprisingly the model shows a reasonably level of explanatory power. Approximately 35 per cent of the variation in fund alpha (37 per cent for raw performance) is directly attributable to the fund characteristics established in the earlier period. Table 5.16 contains these results.

Two interesting conclusions are apparent from Table 5.16. First, the equivalent yield of the fund in the earlier period is a significant predictor both of fund alpha and of fund performance in the following period. As mentioned earlier this may indicate an uncontrolled for risk factor. Second, the IPD property score measure is significant and negative for alpha (albeit not significant for performance). This may indicate mean-reverting behaviour in the performance of specific assets. On the other hand, IPD's structure score, which was a powerful influence on contemporaneous performance, is not predictive of future performance. This suggests performance from good sector allocations cannot be sustained in the longer term.

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Table 5.16: Determinants of fund alpha/performance, as a function of lagged alpha/performance and lagged fund characteristics: 1997–2006 sample period

	Alpha		Performance	
	Coefficient	**t-ratio**	**Coefficient**	**t-ratio**
Intercept	0.47	0.12	6.28	1.20
alpha(-1)/ performance(-1)	0.12	1.31	-0.10	0.85
Size (capital value)	-0.03	0.20	0.17	0.77
Fund type				
Life and general insurance	**-3.50**	4.70	**-4.31**	4.39
Segregated pension	**-3.15**	4.67	**-3.53**	3.96
Pooled pension	**-3.61**	4.54	**-4.37**	4.16
Unit-linked life and pension	**-3.49**	4.79	**-4.13**	4.29
Unregulated PUTs and other unauthorised	**-3.71**	3.94	**-4.38**	3.52
IPD attribution scores				
Structure	0.11	0.56	-0.03	0.13
Property	**-0.20**	2.15	-0.16	1.34
Investment focus	-0.60	0.23	1.50	0.44
Equivalent yield	**0.41**	2.48	**0.84**	3.83
Development exposure	0.86	0.09	-4.45	0.35
Net investment	-0.62	0.45	-1.37	0.76
R^2	0.35		0.37	

Coefficients significant at 5% level shown in **bold**.
* relative to property companies, traditional institutions and charities (which are included in the constant term)
Source: Authors' calculations using data supplied by IPD

All the models discussed in this section are also repeated using the single factor model over five yearly periods. The results are presented in Appendix Tables 4 to 6. Generally the five year regression results do not support the hypothesis that alpha/performance persists in fund manager returns[14]. The equivalent yield of a fund was found to be a consistent predictor both of fund alpha and of fund performance in subsequent five year periods. The variable net investment was also found to be a significant predictor in three of the four, five year periods examined for alpha (less so for performance). However, the sign of its coefficient was not consistent, with both negative and positive values being observed.

It is also interesting to note from the Appendix tables that in the five year models, asset allocation/fund structure positively contributed to both performance and alpha up to the mid-1990s, after which the effect first evaporated and then (for alpha) became a factor undermining the fund. At the same time, structure was predictive of future performance and alpha up to the mid-1990s but not helpful thereafter. Asset allocation as a driver and predictor of performance, therefore, has become unimportant in recent years.

[14] The lagged value of alpha is only significant (at the 10 per cent level) in one of the four periods considered for analysis; lagged performance was significant at the 10 per cent level in two out of the four five year periods considered.

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5.5 The characteristics of persistent out-performers

A more specific look at the characteristics of the funds which were consistently in the top quantiles of relative performance is outlined below.

Segregated pension funds dominated those consistently in the top decile and quartiles over 10 and five years. The traditional institutions were the 2nd largest fund type (after the segregated pension funds) consistently in the top decile over the full set of five year horizons. In general, the proportion of segregated pension funds and traditional institutions in both the top deciles and quartiles was higher than expected.

The consistent top performers also tended to be smaller than average, although this was largely attributable to the low representation of (typically big) life funds among the top performers.

The tracking errors of those consistently in the top decile and top quantile were higher than average. The suggestion therefore is that the consistent out-performers had relatively large bets relative to the benchmark and higher risk.

A recent report by IPD (2007b) sheds some extra light on the characteristics of the seven funds which were in the top quartile in the two 10 year periods 1987–1996 and 1996–2006. Notable features were:

- Over-exposures to the industrial and 'other' sectors, at the expense of City offices and shopping centres;
- Low exposure to developments (over the last 10 years);
- Good property selection contributing almost three times as much to out-performance as allocations to property sectors; and,
- Higher yields and, corresponding to this, relatively high income returns.

These findings are consistent with the more general analysis of performance outlined in the previous section.

5.6 Conclusions on alpha in UK property fund performance

The evidence of alpha in UK property fund performance is limited. If it does exist it is:

- periodic (occurring only in one out of four five year horizons for both relative performance and alpha, and in two out of seven three year horizons for relative performance – NB risk-adjusted analysis was not possible over this shorter horizon);
- focused on the elite performers (with relatively high proportions of top decile performers retaining their top ranking in the following period over 10 year horizons for both raw relative performance and after adjusting for risk, and over five and three year horizons for relative performance only); and,
- partly associated with risk (in particular given evidence of persistence over five year horizons was weaker having adjusted for risk. Consistent with this, the single-factor model betas tended to relatively high for those funds whose raw relative performance was persistently top quartile).

There is also evidence of alpha – but only on a risk-adjusted basis – over 10 year horizons where both the transition matrices and the regression analysis are supportive of persistence.

6. COMPARISON WITH OTHER ASSET CLASSES

6.1 Introduction

This section compares the extent of relative performance, alpha and their persistence in other asset classes. It relies on a review of the literature, publicly available data, and also on feedback from the interviews with investors and advisers (see Section 7 for further details).

The extent of alpha and the range of performances across funds within the equity, bond, hedge fund, and private equity asset classes is considered first. This is followed by a review of the persistence of relative and risk-adjusted performance. The final part presents the conclusion on the extent to which there is persistent out-performance and alpha in property compared to other asset classes.

6.2 Alpha and relative fund performances in other asset classes

Academic articles and consultancy reports in both the UK and the USA consistently point to a relatively small range in the performance of equity fund managers, and that the range diminishes the longer the measurement horizon. For example, the various reports undertaken by the WM Company for Virgin Money show an inter-quartile range among UK equity funds typically around 7 per cent year-by-year; looking at fund performance over 10 years, this diminishes to around 2 per cent[15]. It should be noted that the discussions with investors suggested that divergences in the UK returns **delivered** to institutions were narrower than portrayed by the WM data, one reason being the adoption of passive, index-tracking strategies in institutional portfolios. Divergences were greater in their overseas equity portfolios where, among other factors, country allocations led to greater variation. The divergences in UK bond returns across investors' portfolios were said to be marginal (around $^{1}/_{2}$ per cent per annum over five years), albeit larger for their overseas' bond portfolios.

In the USA, Malkiel and Saha (2005) find an inter-quartile range for equity fund managers of 4.6 per cent for the five years to 2003 but one of only 1.4 per cent for the 10 year period. For bonds, they find respective inter-quartile ranges of 0.7 and 0.5 per cent, respectively, over five and 10 years. They also show inter-quartile ranges for USA real estate of 1.8 per cent over both five and 10 years. The narrow inter-quartile ranges in long-term US bond and equity fund manager returns is also consistent with the evidence presented in the 2005 Yale Endowment Annual Report.

The Yale report also revealed small-cap equity fund manager returns had a relatively large inter-quartile range (4.7 per cent over 10 years). (It is notable that this was a theme echoed during the interviews by some investors who were targeting small-caps as a source of alpha in their equity portfolios.) Also of interest, both UK and US studies point to a wider dispersion in returns in international equity funds and portfolios.

For the alternative asset classes, divergences in performance look much wider. The British Venture Capital Association (2007), in its 2006 *Measurement Survey*, pointed to inter-quartile ranges of 21.2, 20.3 and 34.0 per cent over three, five and 10 years respectively. Such large magnitudes are also reported in the USA.

For hedge funds, Malkiel and Saha report inter-quartile ranges of 15.6 and 16.7 per cent over five and 10 years, although they note that survivorship bias may distort such estimates. The Yale Endowment report shows a 10 year inter-quartile range (for absolute return funds) of 7.1 per cent which, while lower than other estimates, still suggests a much more disparate range among hedge fund managers than in the mainstream asset classes.

[15] For comparative purposes, IPD's 2007 *Property Funds Review* pointed to inter-quartile ranges of 4.2, 2.5 and 2.1 per cent over 1, 5 and 10 years respectively.

With respect to alpha, estimates not surprisingly vary. For the UK equity portfolios of pension funds, Tonks (2002) suggests a top quartile excess return of 1.56 per annum which is higher than the 0.5 per cent reported by Blake *et al* (1999), something Tonks attributes to greater survivorship bias in the latter. However, Tonks's estimates do not take account of fund management costs; studies in the past have indicated that much, if not all, the alpha is extracted by fund managers in their fees, so this estimate may be on the high side. As mentioned earlier, while the historic evidence is not conclusive, some investors believe that small-cap equities can deliver higher alpha than elsewhere in the equity sector. Some investors interviewed were seeking alpha of around 2 per cent from all or part of their equity portfolio, either through small-cap stocks or some other approach.

For hedge funds and private equity, there is both the alpha from the underlying asset class (eg the risk-adjusted excess return over cash, equities or a basket of mainstream asset classes) to consider, in addition to the alpha from a superior fund manager. In private equity, views are polarised as to whether or not risk-adjusted returns in excess of public equity are delivered (for example, see Phalippou and Zollo, 2005, and Ljungqvist and Richardson, 2003), although part of any excess return over equities might reflect an illiquidity premium. The views of investors and advisers expressed in the IPF Report *Multi-asset allocation in the modern world* indicated comparable risk-adjusted returns to listed equity. On the overall level of alpha expected from private equity, the evidence is thin but the suggestion is that sophisticated investors feel that they can get a premium of over 5 per cent.

In hedge funds and absolute return, there is an intense, fundamental debate over how much of the overall return is alpha and how much is beta (ie associated with the underlying asset classes, such as equities). On the one hand, the views of the advisers interviewed for *Multi-asset allocation in the modern world* were fairly conservative. However, investors were expecting 4-5 per cent more than the advisers for the same level of risk. This represents a high-end estimate for the alpha available from hedge funds and absolute return.

In summary, there is a clear ordering in the dispersion of returns and the level of alpha over the medium term across fund managers – it is negligible for bonds, and while property is broadly comparable to equities, it is over-shadowed by hedge funds and even more so private equity where the range of returns and level of alpha are relatively high. An assessment of the extent to which such managers can persistently deliver superior (and inferior) returns is considered below.

6.3 The persistence of manager returns and alpha in other asset classes

Findings on persistence in other asset classes vary, depending in particular on the extent and type of risk-adjustment, how survivorship bias is controlled for, and the period and time horizon considered.

Extensive research has been undertaken for a number of years into equities. An extensive analysis of UK equity unit trust managers by Charles River Associates for the Investment Management Association (2002), controversially, did not risk-adjust performances. This report suggested a relatively high (>35 per cent) likelihood of equity fund managers remaining in the top quartile over one year horizons but only a marginally higher than expected proportion doing so over three and five years; at 27 and 31 per cent for three and five years respectively, the proportion was lower than the results for UK property presented in Section 5[16]. Negative persistence (ie staying in the bottom quartile) was similar to property. Studies in the late 1990s/early 2000s by the WM Company for Virgin Money also suggested some persistence amongst equity fund managers over short horizons but not over five years.

[16] As the Charles River Associates' estimates excluded dead funds, the comparison against property is made on the same basis.

6. COMPARISON WITH OTHER ASSET CLASSES

Most research into the persistence of equity fund performances focuses on risk-adjusted performance. One of the earliest on the UK by Quigley and Singuefield (2000) echoed the findings of the majority of US studies that persistence existed (for up to three years) but only among the poor performers. However, Tonks finds risk-adjusted persistence in pension funds' UK equity portfolios – the percentage of repeat winners over three years being 57 per cent, which is comparable to property[17]. Recent studies (eg Kosowski *et al*, 2006), using more sophisticated techniques than earlier generations of research, have started to support the idea that there is a small group of fund managers who achieve superior risk-adjusted returns and that this performance persists over time.

For hedge funds, conclusions vary according to the time horizon and the extent and method of risk-adjustment; furthermore, the treatment of survivorship bias is a critical issue in estimates of hedge fund alpha and persistence. On balance, the weight of opinion in the academic literature (for a recent review, see Eling, 2007) is that hedge funds witness persistence over short periods (6-12 months). The evidence is mixed over longer periods but it is typically conceded that persistence diminishes the longer the horizon; one factor here is the diluting effect of increased monies into such 'winning' funds. The studies also vary as to whether any persistence is associated with superior or poor performers.

In private equity, Kaplan and Schoar (2005) find that returns persist strongly across managers and that such persistence is unlikely to be induced by differences in risk or sample bias. The top tercile of managers had a 55% chance of remaining in the top tercile in the following period (compared to an expectation of 33 per cent), and the bottom group a 44% chance of remaining there. These are higher than for property and the other asset classes. Performance also increases with fund size, according to Kaplan and Schoar, and with experience. Phalippou and Zollo also find persistence in private equity fund manager performance.

6.4 Conclusions – alpha and persistence in property compared to other asset classes

Equity and bond fund managers exhibit persistence in performance and alpha over the short term but not longer periods. The underlying alpha for UK equities for a top quartile manager seems (having balanced the empirical evidence and the expectations of some investors) to be no more 2 per cent and possibly under 1 per cent once fees are taken into account. In the US, the evidence is stronger, suggesting that persistence does not last for long and is focused more on poor rather than out-performing funds. For bonds, alpha is much lower if not negligible.

For hedge funds and absolute return, the potential alpha is much greater. Like equities, there is persistence over short periods but it is debateable if this lasts for more than a few years; the balance of opinion is that the magnitude of any persistent alpha diminishes over time. This said, the most sophisticated investors believe that, through the judicious selection of funds/managers, significant risk-adjusted net returns of around 5 per cent can be attained through an exposure to hedge funds. A private equity exposure also has the potential to deliver significant alpha to investors.

While its potential alpha is lower than from private equity and, on the basis of investors' views, hedge funds, property stands apart from other asset classes (with the exception of private equity) on account of its potential to deliver sustained, albeit relatively modest, alpha over extended periods.

[17] In the current study, it was not possible (given the limited degrees of freedom) to undertake any 3-year risk-adjusted analysis. Over the 5 year horizon, the percentage of risk-adjusted repeat winners in property was 53 per cent.

7. IMPLICATIONS FOR PROPERTY INVESTMENT AND FUND MANAGEMENT

7.1 Introduction

This section considers the high level implications for property investment and fund management of the findings on alpha and persistence. It draws largely on a series of interviews with investors and investment consultants. The first part of the section details this survey. Then, investors' requirements from and attitudes towards property are summarised. This assessment also draws on the information collected from investors and investment consultants as part of the earlier IPF study *Multi-asset allocation in the modern world*. It also reports respondents' views towards the emerging property derivatives market and in particular how these might be used to exploit alpha in property and as an alternative to an investment in the physical market. Their attitudes towards fees are also reported.

Finally, investors' emerging thoughts towards property and investment strategies are reviewed; this includes their reactions to the findings on alpha and persistence in UK property.

7.2 The survey of investors and investment consultants

The objectives of the surveys were to collect information on investors' attitudes to and requirements from property compared to the other asset classes, their developing and future property investment strategies, and their reaction to the findings on alpha and persistence.

Twelve interviews, each lasting 1-1½ hours, were undertaken during August to October 2007. Eight of the interviews were with investors (four pension funds, two life funds and two 'other') and four with investment consultants responsible for advising institutions on their strategies. The latter advise most of the UK's pension funds with investments totalling around £1 billion. The interviews with investors were either with multi-asset portfolio managers or with property strategists. The sample is clearly not representative of the universe of institutional investors, the primary objective being to derive insights from large and influential strategists.

The analysis also draws on information collected for the IPF report *Multi-asset allocation in a modern world*. The 13 interviews (six of them different to the current study) with investors and advisers undertaken in summer 2006 focused on their general requirements and high level asset allocation assumptions for the mainstream and alternative asset classes and property.

7.3 Investors' requirements from and perceptions of property

As in the *Multi-asset allocation in a modern world* study, property's role was universally seen as a diversifier, reducing portfolio risk and enhancing returns over and above those available from bonds. Most interviewees were also seeking an overwhelmingly beta return from property, albeit with the aspiration to receive a small (50-100bps) out-performance premium from alpha.

It was generally accepted by investors and the consultants that such out-performance/alpha was modest relative to other asset classes (particularly hedge funds, private equity but also parts of the equity market, notably small-cap). It was deliverable because property was an inefficient market and heterogeneous asset class, and could be tapped into through a systematic approach, active management, sector allocations, and through the expertise, privileges and other advantages which scale is perceived to generate.

7. IMPLICATIONS FOR PROPERTY INVESTMENT AND FUND MANAGEMENT

The key objective for this group was to avoid significant relative under-performance over the medium term; tracking error targets (around the IPD benchmark) were tight at around $2^{1}/_{2}$ per cent. They were therefore looking for their property fund managers "to play a consistent game and to avoid mis-hits". They also recognised the limits that transacting costs impose on more dynamic strategies, and accepted that this would limit alpha.

A minority of investors eschewed this 'balanced' approach. Either because of the house style and philosophy across asset classes, or because of the belief that property had special characteristics, they were following what could be loosely termed an 'absolute return' approach to property investment. Absolute return is the cornerstone to most alternative asset class strategies, particularly hedge funds. The objective is to generate performance and maximise long-term returns independently of a traditional index/benchmark (such as IPD)[18]. Alpha plays a fundamental role in such approaches as its return is independent of overall market performance. At the extreme, the return from an absolute return strategy should have no relationship with the market performance.

Those interviewed pursuing an absolute return strategy recognised that some *beta* could not be avoided. However, these strategies represented a fundamentally different approach:

- eschewing reference to benchmark structures and their short term performance;
- only investing when, and in assets where, the prospective return was above the absolute return target;
- serially avoiding markets where longer term (risk-adjusted) returns were routinely poor (City offices, developments were cited as examples);
- explicitly pursuing returns from active management and cashflow; and,
- looking to exploit systematic mis-pricings and illiquidity, and, if necessary, to use leverage to amplify the return from such inefficiencies.

Such strategies were being pursued to generate higher returns in the long term than IPD.

[18] Even among those pursuing a traditional relative return strategy, some noted that the IPD indices were not an exclusive representation of the UK property universe and that strategies should extend beyond it.

7.3.1 Investors' attitudes towards property derivatives

Derivatives are potentially an important theme in this analysis of investors' requirements from property and the existence and potential for alpha in property. First, in seeking a market return (*beta*) from property, it may be more efficient to achieve such an exposure through a derivative or some other index product. This might be particularly attractive either if alpha is non-existent in property or if (as seems to be the case) alpha is not a fundamental requirement for most investors in property.

Second, and in a similar vein, if investors possess good sector allocation skills and if this was an important factor behind out-performance[19], the use of sector-based property derivatives would enable a much more active (and rewarding) approach than is possible at present, given property's illiquidity and transacting costs.

Such use of derivatives would be particularly preferable if investors believed they (or their managers) could generate alpha at the overall market or sector level; under such conditions, the underlying and its alpha could be retained whenever there was a need to reduce exposure (which could now be achieved through derivatives).

The final potential for derivatives involves a more sophisticated and powerful exploitation of alpha. It would allow property to participate in the strategies now being followed by many multi-asset class investors in their quest for more efficient portfolios with higher returns and lower risk. The way this is being done is through an explicit targeting of and allocation to alpha through the use of *portable alpha*.

Portable alpha is an approach whereby an exposure to an underlying asset class which has alpha is combined with a short position in the index derivative of that asset class. In doing this, the investor is 'beta neutral' (ie has a zero exposure to the market, and meaning that the exposure to the market's risk is hedged out and that asset allocation is left unaffected). The investor is just left with the asset class's alpha which is *ported* to the portfolio. Of course, the investor could get the same amount of alpha by magnifying exposure to the underlying asset class; property derivatives, however, may now enable this alpha to be accessed without affecting, in net terms, asset allocations and portfolio risk. This option could potentially open up a new role for property.

Leaving aside the issue of whether or not alpha is available in property, the investors and investment consultants spoken to were generally sceptical of using property derivatives in such sophisticated ways and even of using them generally other than as a tactical means of increasing or reducing the underlying exposure to the market.
The specific points made were:

- Lack of confidence and understanding of the market's pricing of property derivatives. Respondents were accustomed to negligible spreads over LIBOR in equities and bonds, the large positive and negative spreads experienced, respectively, in 2006 and the second half of 2007 being difficult to comprehend in their eyes;

[19] The analysis in Section 5 showed that structure was a relatively small contributor to performance and alpha and, furthermore, that a good structure did not predict performance and alpha in the following period. This does not necessarily imply that fund managers are not good at sector allocations – for example, they might have been limited by illiquidity or transactions costs.

- On a similar theme, there was an interesting juxtaposition of concern over the liquidity of the property derivatives market, the inherent illiquidity and disequilibrium of the underlying property market, and the extremes of mis-pricing in the derivatives market – an inference that the derivatives market is characterised by the same, limiting features of the property market; and,
- There was mixed concern over basis risk (whereby, because of property's heterogeneity and consequential specific risk in a portfolio, there is not a perfect correlation between the derivative and the underlying portfolio of the hedger). An alternative view was that "a half decent hedging instrument was better than none".

This said, it was recognised that the property derivatives market would continue to develop and eventually would become more liquid, efficiently priced and comprehensible. Even on this basis, there was some circumspection about using them strategically as an alternative to the underlying – one issue being that it would be costly to liquidate physical portfolios. However, it was conceded that this might be more appealing to those looking to invest in property for the first time.

With respect to using derivatives to enable portable alpha strategies, it was felt that the potential alpha was insufficiently large by comparison to the larger and more implementable potential elsewhere. Such strategies are therefore unlikely in property.

These cautionary observations over property derivatives were echoed in a recent survey by EDHEC (2007).

7.3.2 Implications for fund management fees

Business models often distinguish between those who add unique value and command a premium price, and those who offer a commoditised product at a competitive price. In this respect, a contrast is made between the equity fund management industry in the 1970s whose new, innovative, systematic processes were perceived to add value, and the situation nowadays in equities where market inefficiencies have been fully exploited to the extent that only beta is available, on account of competitive forces, at a very cheap price. Hedge funds and private equity, by comparison, are perceived to add significant value, and because such skills are limited, they can charge premium fees. Studies of equities also indicate that any managers who can persistently deliver alpha tend to capture much of this in higher fees.

The limited potential for alpha in property and the conclusion that most fund managers are delivering (with the tacit connivance of investors) little more than beta might suggest that property fund management could go the same way as equities. The option (eventually) of achieving a market exposure through derivatives could facilitate this. The message from the interviews, however, was this was unlikely.

As noted in Section 4.2.1, property fund management fees (especially for balanced mandates) are typically in the range 25-40 bps; performance related fees can inflate these but only marginally and the impression given was that investors capture the bulk of any alpha. Fees (both base and performance-related) for specialist and international property funds are higher. Overall (and perhaps surprisingly), most investors expressed satisfaction at the level of fees in property fund management, contrasting them favourably with other management intensive asset classes. Furthermore, they were happy to pay higher fees in return for reliable alpha.

The conclusion is that these attitudes may limit the development of derivatives as an alternative to a physical exposure and may also allow the few alpha-generating fund managers to re-claim some of it in higher fees.

7.4 Emerging strategies towards property

The suggestion from the above analysis is that investors are typically targeting a beta return from property with the hope of a little out-performance. Alpha as a major plank to a property investment strategy is being pursued only by a minority of investors. Most believe that the eventual emergence of a mature, efficient and liquid property derivatives market will not change these fundamental features.

Whereas this active alpha did not feature in emerging strategies, investors and investment consultants nevertheless referred to some themes arising from their quest to improve returns and reduce risk in the multi-asset portfolio.

These themes were described in various ways but in some respects there was commonality between them. In some ways, these approaches are analogous to the core:satellite strategies in equities where an indexed core (delivering cheap beta) is surrounded by a number of smaller more active mandates whose aim is to deliver alpha. The logic is that it is easier to get significant alpha selectively and in small chunks, rather than a little alpha across the whole portfolio.

In property, these satellites might be alternative property sectors (eg student housing, car showrooms, caravan parks etc), core and value-added international property, and even opportunistic international property. However, while an excess return through active alpha (ie that generated by the manager's unique skill and as defined in this study) may be part of the investor's motivation, they do not perceive it as the over-arching one. Rather, the motivation is get an exposure to a market which reduces portfolio risk through a relatively low correlation with traditional UK property. Investors and the investment consultants saw these as the most significant and important developments in property strategy. There were two particular strategies:

- Allocations to continental European property, on account of its perceived low correlation with UK property and other asset classes. The majority preferred a targeted approach (particular sectors or countries for example) generating superior returns from asset allocation; this is a form of alpha which has long been sought in investors' strategies in overseas equities. At the same time, some investors were also willing to take on more risk (eg through opportunistic strategies, high gearing) than they did in the UK; they were also looking for specialist managers capable of delivering active alpha. The motivation was that allocations to continental European property were so small (in relation to the overall portfolio) that something extra to a plain-vanilla market return was necessary to generate a return which would justify the allocation;
- Some appetite for alternative property sectors (student accommodation, marinas for example).

This appetite in some ways mirrors the growing general interest in the concept of exotic (or alternative) beta. Asset classes with exotic beta have three important characteristics. First, they are lowly correlated with existing asset classes and hence can increase the return to a portfolio without increasing risk. Second, they are markets which are difficult to access and where an extra return can be generated on account of this and also on account of other investors' wariness towards them. Proponents of exotic beta see these two characteristics as forms of alpha on account of the improvement in risk-adjusted returns they deliver to a portfolio.

Finally, as specialised expertise is required to tap into such returns, there can also be an element of manager skill in the return – this conforming with the definition of alpha adopted in this report.

8. CONCLUSIONS

8.1 Introduction

This section presents the key conclusions of the report, theme by theme. The extent of persistent relative performance and alpha in UK property fund management is considered first. This perspective is then combined with the conclusions on investors' requirements from property and the how property's alpha compares with that in other asset classes in order to consider the implications for property investment strategies and fund management.

8.2 Persistence and alpha in property

The report finds that evidence of systematic medium term out-performance and alpha amongst UK property funds is not compelling. It is periodic and at best focused on the strongest performing funds. Unlike in most other asset classes, such positive persistence appears not to diminish as the horizon lengthens. Evidence of persistent poor performance is least compelling. This is unlikely to be due to weaker funds to winding-up. In essence, persistent performance in property is limited to a small elite. There is no clear evidence that these tendencies have changed over the past few years although any developments associated with the recent expansion in property fund management may obviously take time to come through.

In line with these conclusions, the subsequent performances of top and second quartile funds are, on average, less exceptional. For the three and five year horizons, there is still out-performance (and alpha) but it is relatively modest. Over 10 year horizons, the earlier relative performance advantage is totally eroded whereas for risk-adjusted alpha it is still there but marginal.

With initial out-performance banked, the better performing funds still retain an advantage over the longer term but most are within 1 per cent of the benchmark (as are the poorer performing funds). The 25 per cent or so of funds which consistently out-perform, however, do so on average by around 2 per cent per annum over six to 10 years, and about $1^{1}/_{2}$ per cent over 20 years. Although the estimates take no account of the effect of fees, variations across managers (other than for the small number of specialised funds) do not look large, so the effect on differential performance is likely to be insignificant. Similar observations apply to the extent of risk-adjusted alpha.

Reports by IPD attributing the year-on-year performance of funds typically emphasise the greater contribution of stock than property sector allocation. Over the medium term, this report finds that stock dominates even more, and there are also indications that the relatively modest contribution of structure to medium term performance and alpha is weakening over time. This weakening is probably associated with the narrowing of returns across sectors over recent years (something which may not continue). While good stock is the more important influence behind alpha and relative performance its contribution is not sustained. The modest performance persistence of property funds may reflect this finite potential to extract value from the assets in a portfolio.

Yield is also an important 'style' factor but has varied from positive to negative according to the point of the cycle. However, it is the only factor which is predictive of future performance. A high development exposure has typically undermined alpha and relative performance; it seems not to be a question of timing because a high development exposure in the preceding period is also not associated with superior contemporaneous performance.

Finally, there is little definitive evidence to emerge about fund manager type. Large funds did well in the 1990s, otherwise life funds did poorly, but both these factors have since dissipated. The preponderance of segregated pension funds (and traditional institutions) with persistent top decile performance is interesting and may be signalling something different about the style of some of this group. This would fit in with feedback from some of the interviews with investors. PUTs and other unlisted funds have performed well in relative terms most recently but the observation that their alpha has been negligible over this period suggests that this could be due to them taking on greater risk (eg through gearing). There is insufficient history to assess if specialist funds systematically deliver higher alpha; this is an area for research in the future.

8.3 Investors' requirements from property

Most investors see property primarily as a beta asset class, albeit an extremely useful one given its superior return to bonds and the contribution it can make to risk reduction in the multi-asset class portfolio. For such investors, the pursuit of alpha, however, is of much lesser significance. The focus is minimising the risk of not delivering this market return, with the option of a little (not much more than $^1/_2$ per cent) upside.

A minority of investors look at property in a different way, seeing market inefficiency, illiquidity, active management and also disregard of benchmark structures as sources of extra long term return. Such investors are explicitly looking for alpha in property and see an important role for it in enhancing the returns of the multi-asset portfolio and in reducing its risk.

More generally, there is a growing recognition of the role property can play in these multi-asset class portfolio objectives. Investors are now seeking out new markets (specifically international and new/alternative property sectors) which offer superior returns to bonds and which are relatively lowly correlated with their existing exposures, including traditional UK property. In addition to the multi-asset portfolio diversification benefits, the primary objective is to get a beta return but such returns can be superior to traditional UK property either because the markets are inefficiently priced or illiquid for example or require special skills to harvest the performance. Such performances represent forms of alpha.

A number of important points were made about property derivatives during the interviews with investors and investment consultants. Most welcomed them, and a number were using them as a means of altering tactical exposures to property or specific sectors. However, in terms of more fundamental roles, specifically as a strategic alternative to the physical or for use in portable alpha strategies, there was greater scepticism. In particular, most interviewees were struggling to understand the market's pricing of property derivatives; they were also concerned about basis risk. At the same time, it was perceived that, because the amount of portable alpha available was small in relation to the potential elsewhere, it would not be worth the effort.

The consistency of these comments about property derivatives emphasise the importance of the property investment industry and the IPF continuing with efforts to improve education and understanding of property derivatives. Engagement with institutional investors and their representatives is an important part of this process.

The point was also made that there would be costs (in both respects) to shifting an exposure from the underlying to the derivative (something which, of course, would not represent a barrier to those new to property investment). Interestingly, investors and investment consultants did not see fund management fees as a disincentive to holding the underlying asset class.

8. CONCLUSIONS

8.4 Property compared to other asset classes

Investors by and large do not see property as an alpha generating asset class. By comparison to private equity and hedge funds, the potential for excess returns is demonstrably much smaller. The previous IPF report *Multi-asset allocation in the modern world* found that those investors with explicit processes in place were anticipating an additional 4-5 per cent per annum more than average from their hedge fund investments; Section 8.2 above indicates that a reasonable expectation from property might be 2 per cent. In effect, most investors are seeking less than 1 per cent out-performance from property, although this of course reflects the psyche of the traditional (index-hugging) balanced strategy; adventurous investors are aiming higher.

Academic research indicates that while short term performance persistence prevails in all the other asset classes, medium term persistence is limited to private equity.

The longer term performance potential of successful hedge funds seems to be diluted by capital inflows. Interestingly, in property, there is no evidence that relatively high net capital inflows on average harm performance potential. Consistent with this, property stands out further because, unlike bonds, equities and hedge funds, performance persistence does not appear to diminish with time. In the same way, performance persistence in property is more associated with out-performance, unlike the greater persistence among poor performers in these other asset classes.

Despite the general academic evidence against persistent performance in equities, some investors were thoughtfully pursuing alpha in the asset class, for example through small-cap managers. Similarly, even though the best hedge funds seem unable to sustain their substantial performance advantage over the long-term, the indications are that investors are targeting alpha in this sector through the judicious and dynamic selection of managers.

This report finds that property can compare itself favourably with most other asset classes. At the same time, the information ratio – a measure of the risk-adjusted contribution to a portfolio – looks better for property's best managers than in equities. There is a case, therefore, for property to be considered in the active strategies of multi-asset class investors and in particular for the very best investors to have a relatively high exposure to property.

8.5 Implications for property investment and fund management

The report's analysis suggests that there will not be a major switch among existing investors to derivative or other index-products as a strategic alternative to holding the underlying asset class, or substantial use of property derivatives as part of portable alpha strategies. Neither does it indicate any nascent pressure on fund manager fees in the same way there has been in the equity sector on account of the switch to passive, index-tracking managers.

While there are limits to alpha through investing in mainstream UK property, investors are nevertheless increasingly looking to property to contribute to their quest for new sources of return which are superior to bonds and lowly correlated with their existing exposures. The most common ways they are doing this are through investing internationally and in alternative property sectors. Some investors explicitly favour those markets which are least accessible, require special skills to extract the performance, and hence where alpha may be available. This inevitably will present opportunities for adventurous and skilful property fund managers.

8. CONCLUSIONS

This development and the interest in absolute return strategies is an important development, worth monitoring because it represents the main way investors are seeking to exploit alpha in property. In the same way as the shift to the niche sectors characterised by exotic beta, it may have implications for benchmarking and performance measurement, given they are explicitly not benchmarked. The extent to which they are truly absolute return may become apparent in a weak property market.

The report's findings on persistence suggest that using past performance as a basis for selecting fund managers would not be successful in property. It is notable that such criteria are not used by the investment consultants, who focus primarily on managers' investment and business processes – an approach which also needs to be used carefully as the analysis finds that good stock selection skills and asset allocation strategy are not predictive of future performance.

Similarly, a strategy of switching to the previous period's best fund is unlikely to be successful in property. The greatest potential is over one year horizons where the performance advantage of the best funds is greatest but even so the gain would not cover the transacting costs. The more modest advantage that the best performing funds continue to enjoy over three and five years would also not cover the costs.

9. DATA APPENDIX

Appendix Table 1: Relative performance transition matrices
10 year horizon: 1987–1996 compared to 1997–2006

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	16%	7%	14%	9%	53%	100%
	2nd	14%	14%	10%	24%	38%	100%
	3rd	7%	21%	14%	12%	47%	100%
	Bottom	14%	7%	12%	5%	62%	100%
	All	13%	12%	12%	12%	50%	100%

5 year horizons: 1982–1986 compared to 1987–1991

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	36%	14%	19%	31%	0%	100%
	2nd	37%	26%	14%	23%	0%	100%
	3rd	14%	22%	36%	25%	3%	100%
	Bottom	11%	34%	29%	17%	9%	100%
	All	25%	24%	25%	24%	3%	100%

1987–1991 compared to 1992–1996

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	31%	18%	14%	20%	16%	100%
	2nd	22%	22%	27%	22%	6%	100%
	3rd	14%	35%	22%	16%	12%	100%
	Bottom	21%	10%	25%	27%	17%	100%
	All	22%	22%	22%	22%	13%	100%

1992–1996 compared to 1997–2001

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	22%	17%	20%	15%	26%	100%
	2nd	11%	19%	17%	23%	30%	100%
	3rd	15%	15%	21%	11%	38%	100%
	Bottom	15%	13%	6%	15%	51%	100%
	All	16%	16%	16%	16%	36%	100%

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1997–2001 compared to 2002–2006

		Evaluation period quartile					
		Top	**2nd**	**3rd**	**Bottom**	**Expired**	**Total**
Ranking period quartile	Top	33%	13%	17%	15%	23%	100%
	2nd	17%	21%	19%	13%	30%	100%
	3rd	9%	21%	19%	28%	23%	100%
	Bottom	15%	19%	19%	19%	28%	100%
	All	19%	19%	19%	19%	26%	100%

All 5 year periods

		Evaluation period quartile					
		Top	**2nd**	**3rd**	**Bottom**	**Expired**	**Total**
Ranking period quartile	Top	30%	16%	18%	19%	18%	100%
	2nd	21%	22%	20%	20%	18%	100%
	3rd	13%	23%	24%	19%	21%	100%
	Bottom	16%	18%	19%	20%	28%	100%
	All	20%	20%	20%	20%	20%	100%

3 year horizons: 1983–1985 compared to 1986–1988

		Evaluation period quartile					
		Top	**2nd**	**3rd**	**Bottom**	**Expired**	**Total**
Ranking period quartile	Top	33%	31%	15%	18%	3%	100%
	2nd	33%	28%	23%	15%	0%	100%
	3rd	18%	23%	23%	33%	3%	100%
	Bottom	13%	15%	36%	31%	5%	100%
	All	24%	24%	24%	24%	3%	100%

1986–1988 compared to 1989–1991

		Evaluation period quartile					
		Top	**2nd**	**3rd**	**Bottom**	**Expired**	**Total**
Ranking period quartile	Top	30%	22%	20%	28%	0%	100%
	2nd	11%	26%	33%	30%	0%	100%
	3rd	24%	28%	24%	24%	0%	100%
	Bottom	35%	24%	24%	15%	2%	100%
	All	25%	25%	25%	24%	1%	100%

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1989–1991 compared to 1992–1994

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	35%	37%	19%	9%	0%	100%
	2nd	20%	24%	20%	22%	13%	100%
	3rd	20%	24%	30%	24%	2%	100%
	Bottom	21%	11%	28%	40%	0%	100%
	All	24%	24%	24%	24%	4%	100%

1992–1994 compared to 1995–1997

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	27%	20%	24%	20%	8%	100%
	2nd	16%	28%	22%	22%	12%	100%
	3rd	22%	21%	22%	22%	12%	100%
	Bottom	22%	19%	19%	22%	17%	100%
	All	22%	22%	22%	22%	12%	100%

1995–1997 compared to 1998–2000

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	35%	15%	14%	17%	18%	100%
	2nd	20%	23%	25%	20%	12%	100%
	3rd	11%	23%	20%	23%	23%	100%
	Bottom	8%	11%	14%	13%	55%	100%
	All	19%	18%	18%	18%	27%	100%

1998–2000 compared to 2001–2003

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	34%	15%	11%	25%	15%	100%
	2nd	9%	28%	23%	17%	23%	100%
	3rd	25%	21%	21%	17%	17%	100%
	Bottom	13%	17%	26%	21%	23%	100%
	All	20%	20%	20%	20%	20%	100%

2001–2003 compared to 2004–2006

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	25%	24%	18%	25%	7%	100%
	2nd	22%	16%	24%	27%	11%	100%
	3rd	20%	27%	18%	16%	18%	100%
	Bottom	19%	19%	26%	15%	22%	100%
	All	21%	21%	21%	21%	15%	100%

All 3 year periods

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	32%	23%	17%	20%	8%	100%
	2nd	18%	25%	24%	22%	11%	100%
	3rd	20%	24%	22%	22%	12%	100%
	Bottom	18%	16%	24%	22%	20%	100%
	All	22%	22%	22%	22%	13%	100%

Appendix Table 2: Relative performance according to ranking quantile

	10 year horizons		5 year horizons							
	1987-2006		1982-1991		1987-1996		1992-2001		1997-2006	
	Ranking period	Evaluation period	Ranking period	Evaluation period	Ranking period	Evaluation period	Ranking period	Evaluation period	Ranking period	Evaluation period
Ranking period quantile										
Top quartile	2.6	-0.1	3.8	0.2	4.2	0.5	2.5	0.3	2.7	0.5
2nd quartile	0.4	-0.1	0.4	0.8	0.6	0.1	0.7	-0.1	0.3	-0.1
3rd quartile	-0.6	-0.2	-1.1	-0.6	-1.2	0.2	-0.5	-0.3	-0.7	-0.6
Bottom quartile	-2.4	0.5	-3.2	-0.5	-3.7	-0.9	-2.8	0.2	-2.3	0.2

	3 year horizons													
	1983-1988		1986-1991		1989-1994		1992-1997		1995-2000		1998-2003		2001-2006	
	Rank period	Eval period	Rank period	Eval period	Rank period	Eval period	Rank period	Eval period	Rank period	Eval period	Rank period	Eval period	Rank period	Eval period
Ranking period quantile														
Top quartile	4.9	1.1	4.8	-0.3	5.4	1.0	3.7	0.2	3.6	0.6	3.2	0.1	3.4	0.1
2nd quartile	0.4	0.9	1.0	-1.1	1.2	0.4	1.1	0.0	0.5	0.2	0.4	-0.4	0.4	-0.3
3rd quartile	-1.3	-0.7	-1.4	0.2	-1.4	-0.1	-0.6	0.0	-0.9	-0.4	-0.8	0.5	-0.8	0.0
Bottom quartile	-4.0	-1.4	-4.6	1.2	-5.3	-1.3	-4.3	-0.2	-3.2	-0.6	-2.8	-0.3	-3.1	0.3

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Appendix Table 3: Fund alpha transition matrices, 10 year horizon: 1987–1996 compared to 1997–2006

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	21%	23%	7%	9%	40%	100%
	2nd	17%	12%	24%	7%	40%	100%
	3rd	7%	14%	9%	12%	58%	100%
	Bottom	7%	0%	10%	21%	62%	100%
	All	13%	12%	12%	12%	50%	100%

5 year horizons: 1982–1986 compared to 1987–1991

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
	Top	100%	19%	22%	22%	0%	100%
Ranking period quartile	2nd	26%	23%	26%	26%	0%	100%
	3rd	29%	29%	14%	29%	3%	100%
	Bottom	9%	28%	41%	22%	9%	100%
	All	25%	24%	25%	24%	3%	100%

1987–1991 compared to 1992–1996

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	29%	21%	31%	19%	14%	100%
	2nd	32%	26%	17%	26%	4%	100%
	3rd	16%	37%	28%	19%	12%	100%
	Bottom	24%	13%	26%	37%	21%	100%
	All	22%	22%	22%	22%	13%	100%

1992-1996 compared to 1997-2001

		Evaluation period quartile					
		Top	2nd	3rd	Bottom	Expired	Total
Ranking period quartile	Top	13%	32%	24%	32%	30%	100%
	2nd	32%	18%	34%	16%	28%	100%
	3rd	18%	30%	18%	33%	38%	100%
	Bottom	41%	19%	22%	19%	49%	100%
	All	16%	16%	16%	16%	36%	100%

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1997–2001 compared to 2002–2006

		Evaluation period quartile					
		Top	**2nd**	**3rd**	**Bottom**	**Expired**	**Total**
Ranking period quartile	Top	50%	19%	13%	19%	33%	100%
	2nd	19%	35%	19%	27%	21%	100%
	3rd	13%	26%	38%	23%	17%	100%
	Bottom	22%	19%	28%	31%	32%	100%
	All	19%	19%	19%	19%	26%	100%

All 5 year periods

		Evaluation period quartile					
		Top	**2nd**	**3rd**	**Bottom**	**Expired**	**Total**
Ranking period quartile	Top	25%	18%	18%	18%	21%	100%
	2nd	23%	22%	20%	20%	15%	100%
	3rd	15%	25%	21%	21%	19%	100%
	Bottom	16%	14%	21%	20%	30%	100%
	All	20%	20%	20%	20%	12%	100%

Appendix Table 4: Regression model of fund characteristics, fund alpha and total fund performance. Five and 10 year sub-samples

	1987–1996		1997–2006		1982–1986		1987–1991		1992–1996		1997–2001		2002–2006		5 year average
Variable	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	
							Performance								
Intercept	4.92	2.07	12.28	6.92	3.09	1.60	8.60	3.11	4.75	1.95	6.52	3.41	21.05	9.53	8.80
lcv1	0.10	1.10	0.06	0.95	0.23	2.50	0.02	0.13	0.19	2.10	0.26	3.54	-0.09	1.10	0.12
dlf1	-0.55	1.17	-0.61	1.91	0.44	0.94	-0.52	0.88	-1.00	1.91	-1.34	3.92	0.53	1.37	-0.38
dspf1	0.22	0.49	-0.26	0.91	0.42	0.91	-0.25	0.46	0.66	1.31	-0.83	2.57	0.85	2.55	0.17
dppf1	-0.45	0.82	-0.52	1.21	0.80	1.48	-0.36	0.53	-0.78	1.21	-0.93	2.05	0.77	1.33	-0.10
dul1	0.02	0.03	-0.79	2.42	1.21	2.60	0.15	0.26	-0.17	0.31	-1.18	3.20	0.52	1.34	0.11
dun1	0.32	0.49	-0.40	1.20	0.73	1.12	0.13	0.16	0.11	0.18	-1.04	2.88	0.89	2.61	0.16
struct1	0.67	5.02	0.00	0.01	0.74	3.14	0.48	3.48	0.85	5.68	0.15	0.78	-0.16	1.42	0.41
propscor1	0.72	12.68	0.91	16.40	1.02	23.94	0.95	17.79	0.58	12.06	0.97	19.98	1.06	20.47	0.92
hi1	0.42	0.33	-0.59	1.10	3.19	3.18	-1.98	1.42	-0.34	0.30	0.61	1.10	-0.52	1.03	0.20
ey1	0.42	3.23	0.10	0.82	-0.07	0.62	0.34	2.38	0.22	1.67	0.17	1.49	-0.66	4.42	0.00
devrat1	-9.08	1.90	4.72	0.59	-10.53	3.25	-10.29	2.15	-9.39	1.92	7.53	3.10	-5.58	0.79	-5.65
netinv1	-0.06	0.05	-0.24	0.77	2.22	1.66	-0.59	0.46	0.27	0.34	-2.50	3.22	0.20	38.16	-0.08
R-squared	0.71		0.8		0.87		0.74		0.58		0.81		0.92		
							Alpha								
Intercept	-9.94	3.33	5.14	2.26	-13.46	4.32	-3.59	1.16	-2.28	0.97	-5.09	1.02	34.61	2.73	2.04
lcv1	0.33	2.80	-0.10	1.15	0.36	2.47	0.10	0.76	0.12	1.36	-0.04	0.20	-1.11	2.40	-0.11
dlf1	-0.98	1.64	-0.78	1.90	-0.04	0.05	-1.05	1.60	-0.93	1.83	-0.98	1.10	1.03	0.47	-0.39
dspf1	0.03	0.06	-0.59	1.62	0.50	0.67	-0.71	1.18	0.55	1.12	-1.56	1.84	1.72	0.90	0.10
dppf1	-1.45	2.08	-0.61	1.11	0.45	0.51	-0.69	0.91	-0.52	0.84	-1.23	1.04	3.70	1.11	0.34
dul1	-0.01	0.02	-1.02	2.44	1.02	1.35	-0.11	0.17	0.04	0.07	-0.24	0.25	3.40	1.53	0.82
dun1	0.90	1.10	-0.09	0.21	0.43	0.40	0.10	0.10	0.21	0.35	-1.49	1.57	1.72	0.88	0.19
struct1	0.12	0.69	0.24	0.98	1.19	3.11	0.30	1.89	0.91	6.26	-0.06	0.12	-2.91	4.56	-0.12
propscor1	0.19	2.68	0.54	7.58	0.98	14.22	0.98	16.33	0.63	13.69	1.05	8.24	0.70	2.35	0.87
hi1	1.73	1.07	-0.81	1.17	5.34	3.28	-0.79	0.50	-0.57	0.52	-2.09	1.43	1.21	0.42	0.62
ey1	0.29	1.78	-0.26	1.72	0.44	2.43	0.36	2.23	0.24	1.86	1.00	3.45	-2.12	2.47	-0.02
devrat1	-3.77	0.63	-8.32	0.81	-13.54	2.58	-9.10	1.69	-7.75	1.64	2.55	0.40	26.20	0.65	-0.33
netinv1	-1.89	1.34	0.99	2.45	3.94	1.82	-0.38	0.27	0.85	1.09	1.50	0.74	-0.07	2.29	1.17
R-squared	0.23		0.49		0.74		0.7		0.63		0.47		0.19		

Note: for variable codes, see Box 5.3 in Section 5.

Appendix Table 5: Regression model of fund characteristics, fund alpha and total fund performance. Five and 10 year sub-samples, including lagged values of alpha or performance.

	1997–2006		1987–1991		1992–1996		1997–2001		2002–2006		
Variable	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	5 year average
					Performance						
Intercept	13.26	5.32	7.36	2.45	2.68	0.92	7.82	3.32	20.37	8.70	9.56
lagged dep	0.06	1.14	-0.08	1.61	0.01	0.15	0.04	0.91	-0.08	1.63	-0.03
lcv2	0.03	0.28	0.13	0.98	0.26	2.41	0.22	2.44	-0.13	1.44	0.12
dlf2	-1.08	2.11	-1.46	2.24	-0.51	0.85	-1.53	3.09	0.28	0.65	-0.81
dspf2	-0.68	1.55	-1.25	2.02	1.12	1.97	-1.21	2.56	0.57	1.48	-0.19
dppf2	-0.80	1.47	-0.87	1.21	-0.21	0.31	-1.11	2.00	0.35	0.62	-0.46
dul2	-1.04	2.13	-0.50	0.80	0.42	0.68	-1.53	3.02	0.06	0.14	-0.39
dun2	-1.21	2.06	-0.55	0.59	1.03	1.27	-1.56	2.72	0.48	1.08	-0.15
struct2	0.47	1.77	0.51	2.89	0.76	3.97	0.08	0.31	-0.07	0.43	0.32
propscor2	1.00	12.83	0.88	13.94	0.55	9.33	0.99	15.73	0.99	16.35	0.85
hi2	0.67	0.37	-0.38	0.21	1.96	1.09	0.77	0.77	-1.36	1.88	0.25
ey2	0.07	0.43	0.31	1.76	0.14	0.93	0.10	0.79	-0.21	1.25	0.09
devrat2	11.45	1.35	-5.60	1.03	-7.17	1.39	5.47	2.16	8.60	0.63	0.32
netinv2	-1.25	1.15	-0.89	0.54	0.33	0.36	-3.75	3.86	-0.09	0.37	-1.10
R-Squared	0.87		0.71		0.54		0.82		0.77		
					Alpha						
Intercept	1.70	0.47	-6.94	2.12	-4.11	1.48	-2.28	0.34	-5.79	0.49	-4.78
lagged dep	0.17	2.28	-0.08	1.63	-0.01	0.15	-0.08	0.72	-0.10	0.61	-0.07
lcv2	-0.01	0.09	0.28	1.94	0.17	1.70	0.04	0.16	0.18	0.39	0.17
dlf2	-1.36	1.85	-2.31	3.28	-0.35	0.61	-2.37	1.69	-1.36	0.65	-1.60
dspf2	-1.39	2.20	-2.04	3.06	1.05	1.94	-2.39	1.78	3.14	1.67	-0.06
dppf2	-1.66	2.11	-1.40	1.79	0.11	0.17	-2.38	1.51	4.83	1.74	0.29
dul2	-1.74	2.47	-0.84	1.24	0.72	1.23	-0.88	0.61	5.18	2.43	1.04
dun2	-1.61	1.90	-0.92	0.90	1.26	1.63	-2.23	1.37	3.23	1.49	0.33
struct2	0.51	1.34	0.32	1.68	0.80	4.40	-0.44	0.58	-2.08	2.58	-0.35
propscor2	0.52	4.58	0.86	12.66	0.61	10.86	1.08	6.07	-0.07	0.24	0.62
hi2	-1.09	0.41	1.23	0.63	1.36	0.79	-7.32	2.57	2.06	0.58	-0.67
ey2	0.08	0.37	0.34	1.79	0.18	1.21	0.84	2.27	-0.09	0.10	0.32
devrat2	0.58	0.05	-3.62	0.61	-4.93	1.01	6.89	0.95	69.25	1.01	16.90
netinv2	2.62	1.68	-0.51	0.29	0.84	0.98	-1.01	0.36	-8.39	6.99	-2.27
R-Squared	0.51		0.67		0.6		0.46		0.34		

Note: for variable codes, see Box 5.3 in Section 5.

Appendix Table 6: Regression model of fund alpha and total fund performance, as a function of lagged values of alpha or performance and lagged fund characteristics. Five and 10 year sub-samples.

	1997–2006		1987–1991		1992–1996		1997–2001		2002–2006		
Variable	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	Coefficients	t-ratio	5 year average
					Performance						
Intercept	6.28	1.20	10.88	2.54	-2.09	0.57	-2.21	0.51	12.91	2.85	4.87
lagged dep	-0.10	0.85	-0.65	3.16	0.07	0.83	-0.02	0.22	0.24	1.35	-0.09
lcv1	0.17	0.77	-0.13	0.66	0.21	1.40	0.35	2.17	-0.21	1.17	0.05
dlf1	-4.31	4.39	0.31	0.30	-0.96	1.30	-4.43	4.60	-0.30	0.35	-1.35
dspf1	-3.53	3.96	0.56	0.54	0.82	1.18	-3.64	3.85	-0.74	1.00	-0.75
dppf1	-4.37	4.16	1.95	1.61	-0.87	1.03	-2.86	2.49	-1.63	1.48	-0.85
dul1	-4.13	4.29	1.95	1.84	0.30	0.41	-3.80	3.75	-2.22	2.52	-0.94
dun1	-4.38	3.52	3.21	2.12	0.83	0.82	-4.12	3.77	-1.47	1.75	-0.39
struct1	-0.03	0.13	-0.52	0.95	0.51	2.94	-0.02	0.08	-0.40	0.97	-0.11
propscor1	-0.16	1.34	0.77	3.34	-0.10	1.01	-0.14	1.26	-0.25	1.28	0.07
hi1	1.50	0.44	5.53	2.38	2.16	1.29	4.09	1.79	-1.05	0.79	2.68
ey1	0.84	3.83	0.55	2.24	0.57	3.12	1.06	4.97	0.71	2.81	0.72
devrat1	-4.45	0.35	-2.54	0.33	-8.71	1.47	-7.80	1.04	-15.85	1.32	-8.73
netinv1	-1.37	0.76	1.61	0.54	-2.44	1.44	-0.56	0.46	-1.24	0.47	-0.66
R-Squared	0.37		0.25		0.27		0.37		0.21		
					Alpha						
Intercept	0.47	0.12	-10.39	2.34	-8.78	2.44	-9.60	1.27	-17.15	1.27	-11.48
lagged dep	0.12	1.31	-0.44	3.63	0.02	0.27	-0.46	2.21	-0.26	1.13	-0.29
lcv1	-0.03	0.20	0.05	0.26	0.14	0.92	0.22	0.76	0.07	0.13	0.12
dlf1	-3.50	4.70	-0.84	0.82	-0.83	1.10	-5.06	3.00	-3.29	1.31	-2.50
dspf1	-3.15	4.67	-0.42	0.41	0.72	1.02	-4.01	2.41	-0.44	0.20	-1.04
dppf1	-3.61	4.54	0.95	0.81	-0.68	0.80	-3.05	1.51	0.62	0.19	-0.54
dul1	-3.49	4.79	1.15	1.12	0.57	0.75	-2.16	1.21	1.43	0.56	0.25
dun1	-3.71	3.94	2.34	1.58	0.96	0.95	-4.32	2.25	-2.43	0.98	-0.86
struct1	0.11	0.56	-0.42	0.78	0.61	3.51	0.65	1.33	-3.30	2.62	-0.62
propscor1	-0.20	2.15	0.52	3.44	-0.04	0.45	0.07	0.33	-0.50	1.25	0.01
hi1	-0.60	0.23	7.64	3.35	2.08	1.23	-4.24	1.06	8.67	2.17	3.54
ey1	0.41	2.48	0.77	3.11	0.61	3.28	1.25	3.33	1.85	2.35	1.12
devrat1	0.86	0.09	-3.21	0.43	-8.83	1.47	4.82	0.37	-24.12	0.66	-7.84
netinv1	-0.62	0.45	2.07	0.71	-2.79	1.62	3.51	1.62	-19.91	2.48	-4.28
R-Squared	0.35		0.28		0.28		0.23		0.22		

Note: for variable codes, see Box 5.3 in Section 5.

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