CRA

Final report

Performance persistence in UK equity funds – An empirical analysis

Submitted to:

Investment Management Association
65 Kingsway
London WC2B 6TD

Prepared by:

T Giles, T Wilsdon & T Worboys
Charles River Associates Limited
1 Undershaft
London EC3A 8EE

October 2002

CRA No. D03374-00

Acknowledgements

Contents *Page*

Tables   *Page*

Figures *Page*

Executive summary

The Investment Management Association (IMA, formerly AUTIF) commissioned Charles River Associates Limited (CRA) to undertake research on whether information on past performance is useful for retail consumers (or their advisers) when making investment decisions.

This commission was undertaken to answer the question of whether performance persists in UK equity based unit trusts, and whether consumers can use this information to inform their investment decisions. The remit of this study is unique amongst both the previous publications by the FSA and the previous academic publications in its aim and methodology. It is important to consider this when reading the report.

The first part of our analysis (published in January 2002) provided the most comprehensive review of the literature on past performance in the UK to date. This second part provides statistical and graphical analysis of whether performance persists in UK equity based unit trusts. We have *newly* compiled the largest UK equity based unit trust database to complete this analysis, including both live and dead fund data. Our findings are:

- **Performance broadly persisted in UK equity based unit trusts between 1981 and 2001.** Performance in two sectors is very strong and statistically significant. Using the tests we have employed, it is weaker in the other two sectors. However it is still present in most cases and may be significant if other tests were employed;
- **Based on this information it is possible for retail consumers (and their advisers) to use this performance information to aid their investment decision-making.** However this is not a universal rule. We also need to look at a number of factors such as choice of time horizon, sector, rule and charges;
- **The importance of persistence depends on both the time horizon and the sector in which the fund is invested.** Performance is strongly significant only in the short term for funds in the Equity and Bond Income and Smaller Companies sectors, However it is significant over all time horizons for the UK All Companies and UK Equity Income funds;
- **Choosing a top quartile fund, as opposed to a bottom quartile fund will, on average, add to an investor's potential return.** The cumulative return for funds that are in the top quartile exceeds the returns of those in the bottom quartile over the majority of time horizon and sector combinations; and
- **The results are not sensitive to charges.** We find that the persistence of unit trusts is not counteracted by charges and actually may increase under certain assumptions when charges are included. In addition charges do not affect the positive return resulting from choosing unit trusts based on their quartile position.

Therefore we conclude that, based on our dataset, consumers (and their advisers) can use past performance information as a beneficial part of their investment decision-making process.

However, this does not mean that past performance information should be used in isolation when making an investment decision. When comparing funds investors could take account of a series of other factors such as the risk and expected return of funds and other assets, house reputation, number of funds offered, house style, charges, service and management team.

It is also important to clarify our remit. Past performance is a complex and often misunderstood topic. Our study uses a new dataset and is unique in examining performance solely from the consumer's perspective. Therefore we do not attempt to consider some issues that would normally be considered in other studies, or in the academic literature:

- **We have concentrated on a top quartile investment strategy.** A top quartile investment strategy is both easy to illustrate and understand. Other investment strategies such as avoiding funds in the bottom quartile (which we highlighted in our first paper) could also prove beneficial.
- **We do not use risk-adjusted returns in the analysis of returns, only to provide a basic description of the data and to test the relationship between charges and expected returns.** A consumer would be making a decision based solely on nominal returns, as this is how performance information is displayed. It is important to take account of risk but this is a separate issue;
- **We do not use financial economic methodologies to identify the source of persistence.** Whether the return is due to risk, momentum, size, value or other characteristics does not alter the fact that persistence is apparent and can be used by consumers or their advisers;
- **We have not developed an "optimal rule" for using this performance information.** We have used a simple rule that can be easily used. However we make no claim that this is the optimal approach. Other simple or complex rules may yield even better results; and
- **We have excluded trackers from the sample.** The question on the performance of active and tracker funds is an interesting one, but one which we do not discuss in this paper.

It is therefore apparent that this is a wide-ranging topic and consequentially there is potential for a large amount of further work in this area. This further work would aid understanding of both the investment industry itself and the consumers and advisers acting on industry information, which can only be a beneficial development.

Section 1   Introduction

The Investment Management Association (IMA, formerly AUTIF) commissioned Charles River Associates Limited (CRA) to undertake research on whether information on past performance is useful for retail consumers (or their advisers) when making investment decisions. The results of our analysis are presented in two reports:

- The first, a comprehensive and objective review of the existing literature, was published in January 2002; and
- This second report, which provides new evidence based on statistically and economically robust analysis.

Background

In September 1999, the FSA published a paper by Bacon and Woodrow (1999) entitled "Comparative Information Tables", which recommended that past performance not be included in the FSA's league tables for investment products.

This conclusion was controversial and the FSA staff examined the issue in more detail in an Occasional Paper: "Past Imperfect? The performance of UK equity managed funds" (Rhodes (2000)). This report also asserted that:

> *"retail investors could not usefully exploit information on past performance."*

In September 2001, partly on the basis of the earlier studies, the FSA published its "Report of the Task Force on Past Performance" (FSA (2001)). The report not only considered past performance figures to be of little value, but positively misleading to consumers. Indeed it seriously considered a ban on the use of any past performance figures in fund advertising, in spite (or perhaps because) of the weight that consumers put on this information.

These proposals were then developed further in CP131 (FSA, 2002, Single pricing of collective investment schemes) where the use of performance in advertising was also discussed. Citing similar evidence to the task force, the FSA determined that past performance should not be the dominant message of an advertisement.

More recently, however, in their annual report, the FSA suggested that they might revisit the question of including measures of past performance and risk in the comparative tables.

This research will aid the consideration of this issue by examining:

- Whether performance persists in UK unit trusts; and
- If performance persists, then over which sectors and time horizons can this be observed?

Theory and persistence

It is not the purpose of this paper to examine the theory of stock returns in detail. However there is a need to consider what would be expected if this issue were approached through theory alone.

Orthodox finance theory suggests that persistence should be expected in raw non-risk adjusted returns, unless the risks carried by funds change unpredictably over time or if all funds were exposed to the same risk. This is not to say that markets are either efficient or inefficient. The topic of market efficiency is well documented in the academic literature and there is no inconsistency between persistence in raw returns and market inefficiency.

In Section 3 the theoretical issues of risk adjusted and raw returns are discussed in more detail. We also test whether risk exposure varies across funds and whether risk and fees are correlated.

The approach adopted

The great majority of research in this area has focused on understanding the sources of persistence. In particular, many papers use complex models that account for risk and momentum. The purpose of this paper is not to explain the cause of persistence - only whether it can be shown to exist. Consideration of the causes of persistence are discussed extensively in other literature referred to in our first paper and we do not believe further discussion or analysis of these factors will make a prediction of the possibility of any future persistence any easier. We have, however, tested our results over a 21-year period and are therefore confident that these results exhibit stability over time.

The methodology we chose to adopt has been extensively discussed in the previous report. The critical element is that we are interested in determining purely whether past performance information is useful to retail consumers. This has a number of implications – in particular we are concerned with:

- *Relative rather than absolute returns*: We are not examining whether or not to invest in unit trusts but only if information can be used to make sensible investment decisions between funds;

- *The choices available at the time of investment*: We want to consider whether performance information could be exploited, and this requires taking into account the range of funds available at a point in time and the fact that some of them will subsequently die;

- *Returns net of charges*: Consumers pay both annual and initial charges. These need to be taken into account to determine whether performance information can be usefully exploited; and

- *Exploitable strategies based on current patterns of investing*: Some papers on persistence have adopted re-investment rules that require monthly changes in the

composition of the portfolio. Although this may be interesting at the institutional level, at the consumer level we need to bear in mind that consumers largely hold unit trusts for longer time horizons than a month.

Risk-adjusted or raw returns

At the outset of this project we considered whether the analysis should be undertaken on raw returns or risk-adjusted returns. We chose raw returns even though the majority of the preceding work has been based on risk-adjusted returns. In undertaking our literature review it was clear that this preceding research was really looking at a different question. Almost invariably, researchers have been focussing on the economically interesting question of whether, by skill or other means, fund managers have been able consistently to earn returns in excess of the risks being carried.

To see why this was not relevant to our question – is past performance at all useful to retail consumers? – we could consider the outcome of a test in which risk has been taken into account using a reliable risk model and no persistence has been observed in the subsequent risk-adjusted return.

This outcome does not suggest that there is no persistence in the underlying returns. In fact the opposite is true. As the risk adjustment itself is a function of past performance this test actually establishes persistence in raw past performance data (as long as all funds were not exposed to the same level of risk, see Section 3).

Using risk-adjusted returns was still an option open to us. However, given that reliable risk models employ two to four risk factors and the calculation is beyond the average investor we felt any result would be rejected on grounds of impracticality of calculation and use.

We therefore determined that we would base our analysis on a widely accepted and easily calculated methodology – ranking raw returns by quartile. And while this is not necessarily the optimal method, it is simple enough to establish whether past performance data can be practically exploited by consumers.

Alternatives to risk-adjusted or raw returns

Past performance information should not necessarily be used in isolation when making an investment decision. When comparing funds, investors could take account of other "qualitative" factors such as house reputation, number of funds offered, house style, charges, service and management team.

However, as with risk, these are not truly distinct from relying on raw past performance data. For instance, to establish that there was evidence of persistently higher returns from a particular style we would have to look at past performance information and its relationship to styles and then compare that performance with subsequent returns. In effect these supposedly "qualitative" factors are just different ways of categorising past performance data.

Using these factors may result in a more powerful model than simply examining raw returns by quartile. However, it is a mistake to see these factors as independent of the question of persistence in past performance.

Section 2   Data

The primary aim in assembling the data was to develop the longest possible series of reliable data. To achieve this we obtained data from the S & P Micropal database on all equity unit trusts that existed at any time between 1981 and 2001. There were difficulties in compiling a complete dataset, as S & P Micropal did not include dead fund data for more recent years. In addition to the S & P Micropal data we therefore collected data from a number of sources:

- We were kindly given permission by Garrett Quigley of Dimensional Fund Advisers to use the dead fund data used in the Quigley and Sinquefield (1998) paper, covering the period 1981 to 1997;
- We were also kindly given permission by both S & P Micropal and Garrett Quigley to use a selection of S & P Micropal discs to extract data on funds which died, or transferred out of the sectors studied, during the period 1998 to 2001; and
- We manually filled in the gaps in the series of dead funds using copies of Money Management covering the years 1998 to 2001.

We develop an extension of previously existing datasets. The four IMA sectors we focus on are invested primarily in UK equities and are classified as the UK All Companies, UK Equity Income, UK Equity and Bond Income and UK Smaller Companies sectors. [1] The IMA defines these sectors as follows:

- *UK All Companies*: Funds that invest at least 80% of their assets in UK equities which have a primary objective of achieving capital growth;
- *UK Equity Income*: Funds that invest at least 80% of their assets in UK equities and aim to have a yield in excess of 110% of the FT All Share Index;
- *UK Equity and Bond Income*: Funds that invest at least 20% in both UK fixed interest securities and UK equities. These funds target a yield of 120% or over of the FT All Share Index; and
- *UK Smaller Companies*: Funds that invest at least 80% of their assets in the UK equities of companies that form the bottom 10% by market capitalisation.

The study excluded all other non-equity based funds, such as international, sector specialist, balanced and fixed income unit trusts. In total we had data for 508 unit trusts alive at the end of 2001 and 434 unit trusts that existed for some period between January 1981 and December 2001 – giving a total of 942.

Table 1: Number of UK unit trusts by sector 1981-2001

	1981	**1986**	**1991**	**1996**	**2001***
UK All Companies	108	175	239	282	302
UK Equity and Bond Income	50	58	63	70	47

---

[1] Previously classified as: Growth and Income, Growth, Equity Income and Smaller Companies.

UK Equity Income	61	103	113	106	85
UK Smaller Companies	29	50	73	84	74
All sectors	248	386	488	542	508

*Source: S & P Micropal; Figures are taken as at the year-end. * Classifications change in 1997.*

Table 2: Deaths of unit trust funds by sector 1981-2001

	1981 - 85	**1986 - 90**	**1991-95**	**96-00***	**Total**
UK All Companies	13	37	30	103	183
UK Equity and Bond Income	17	18	30	38	103
UK Equity Income	12	25	26	34	97
UK Smaller Companies	3	8	15	25	51
All sectors	45	88	101	200	434

*Source: S & P Micropal; Figures are taken as at the year-end. * Classifications change in 1997.*

Clearly the treatment of the 434 funds, almost half the sample, that die during the period of the study is crucial.

Table 3: Births of unit trust funds by sector 1981-2001

	1981 - 85	**1986 - 90**	**1991-95**	**96-00***	**Total**
UK All Companies	80	101	73	123	377
UK Equity and Bond Income	25	23	37	15	100
UK Equity Income	54	35	19	13	121
UK Smaller Companies	24	31	26	15	96
All sectors	183	190	155	166	694

*Source: S & P Micropal; Figures are taken as at the year-end. * Classifications change in 1997.*

Over 150 funds have been started (born) in each of the last four five-year periods. The majority of these funds are in the All Companies sector.

Trackers

In addition to using these classifications, we separately identified tracker funds. As trackers do not constitute a separate sector we identified these using two main criteria. Firstly we looked at the name of the fund and secondly, we checked this by analysing the correlation between the returns of the fund and the appropriate index. Using this method we identified 56 trackers in total. We then excluded these funds from our analysis.

Fund survivorship

By assembling data on all funds that have existed since 1981 our dataset allowed us to control for survivorship bias. Datasets containing only live funds may have upwardly biased returns as poorly performing funds are more likely to close before the end of the sample period. A fund closed in 1985 for example, due to poor performance, was still

part of investors' menu of possible choices between 1981 and 1985. [2] If funds that are closed have lower average returns, excluding them will bias average fund performance upwards.

It would be possible to assign the average return, but this would distort our result and exaggerate persistence (as all dead funds would converge on the average). Moreover, our prior belief was that that a fund was much more likely to close if it was performing badly - a view supported by the analysis.

Pre-closure performance of funds that die

To investigate this issue, we looked at the position of funds that subsequently die. We used data for four five-year periods - 1981-1985, 1986-1990, 1991-1995 and 1996-2001 – and sorted these funds into deciles in terms of their performance in the year before they closed. We then analysed all the funds that closed in each of these five-year stages and calculated the average return over the four periods. The results are presented in the charts below.

Figure 1: All companies sector – Relative return prior to closure
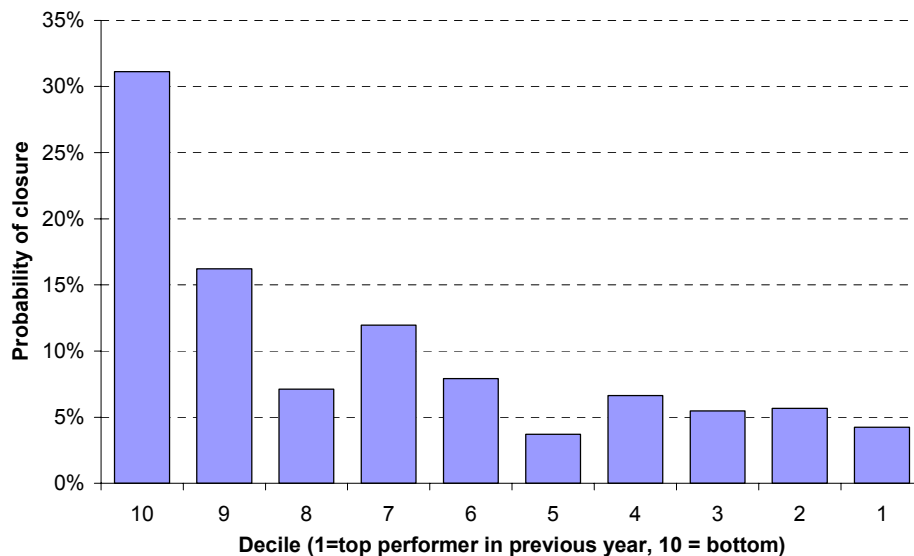
This chart (Figure 1) suggests that for funds in the All-Companies sector in the bottom decile (bottom 10%) there is a 31% chance of dying within the next year. In contrast for the top five deciles (top 50%) there is an average probability of only 5%. This pattern is also repeated throughout the other sectors, although it is slightly less pronounced.

---

[2] Although it is possible the fund stopped marketing to customers before the end of its life, it is not possible to observe this from the data. However our sensitivity testing establishes that the results are robust even if funds that subsequently die in the investment period are excluded from the tests.

Figure 2: UK Equity & Bond Income sector − Relative return prior to closure
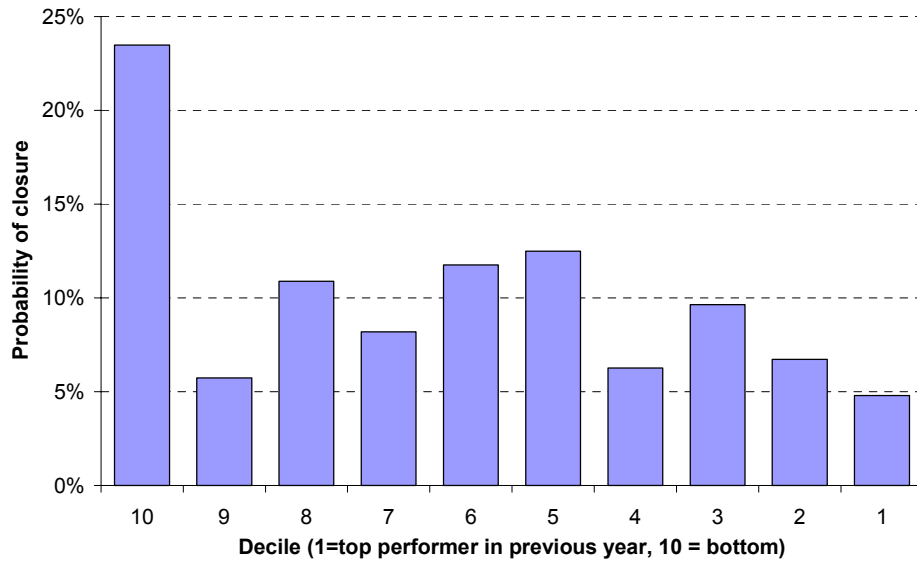
Figure 3: UK Equity Income sector − Relative return prior to closure
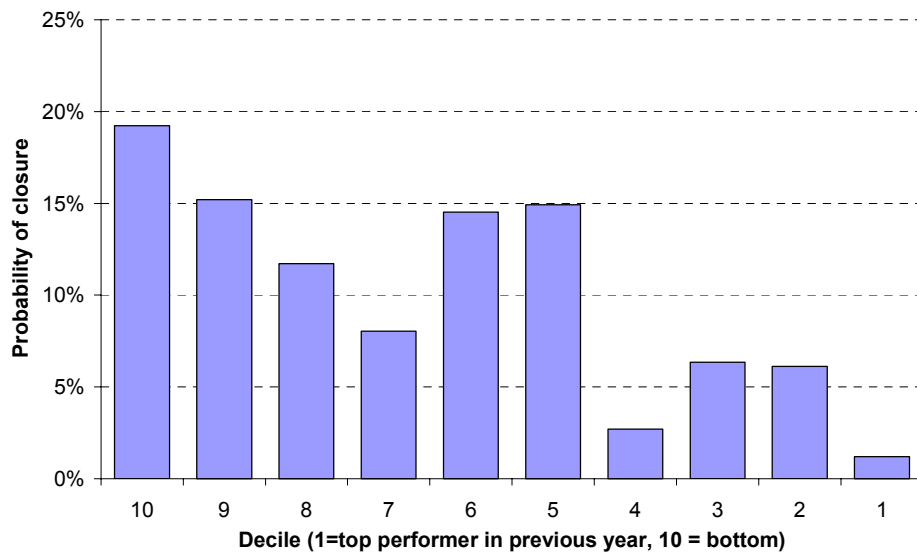
Figure 4: UK Smaller Companies sector – Relative return prior to closure
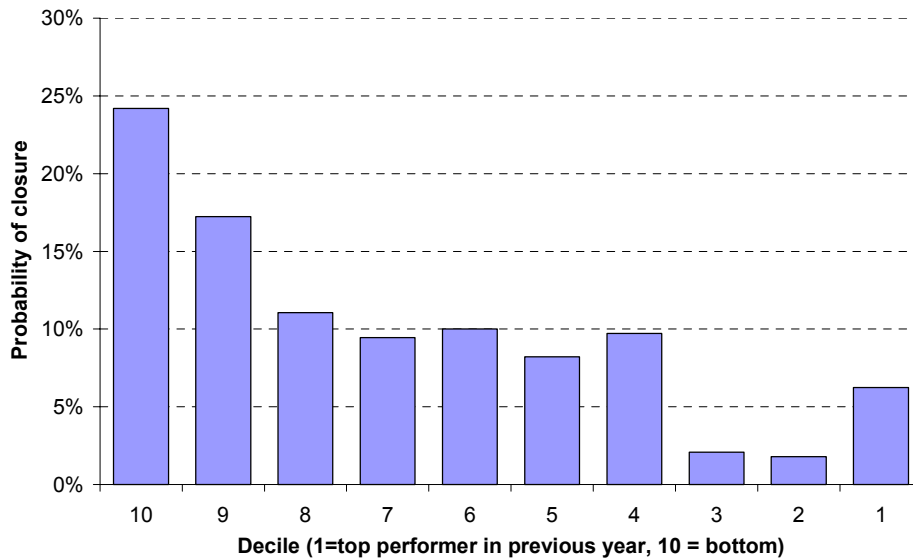
Given the evidence on the relationship between fund death and performance - as well as the number of funds that die in our sample - it is important to deal with this issue appropriately. The ideal would be to replicate what consumers actually do when the fund they are holding dies. However, without detailed data on how consumers might respond, this is clearly not possible. Instead we tested a number of potential rules - that maintain stochastic returns throughout the investment period - to take this difficulty into account.

Figure 5: Treatment of dead funds using a symmetric five year rule using five-year performance as at January 1991 to assess persistence to the end of 1996.
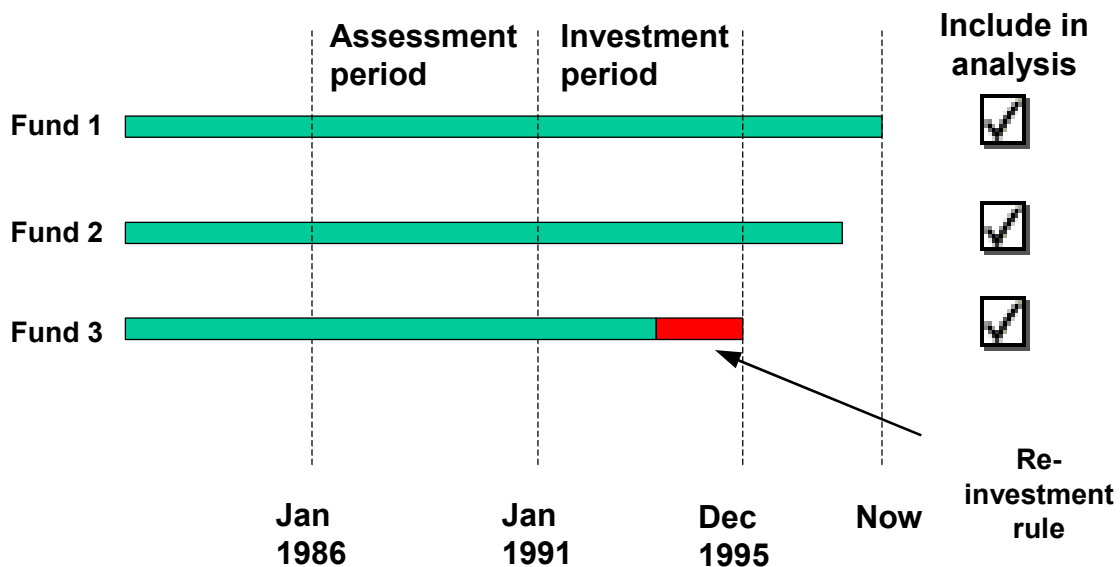
The difference between our approach and that of other authors is illustrated in the figure above. Our approach includes all funds that are alive at the beginning of the investment period – when the investment decision is made. Funds equivalent to 1, 2 and 3 are therefore included in the analysis, as opposed to solely funds 1 and 2.

In comparison Rhodes (2000) only included funds that were live throughout both the assessment and subsequent investment periods (i.e. funds equivalent to 3 were excluded). Other researchers have reduced the length of the investment period down to one month – Blake and Timmerman (1998) – so that the distinction between fund 2 and 3 disappears. Our approach relies on a complete sample of the funds available to the investor and allows us to estimate subsequent returns over longer investment horizons than one month.

Where funds died we tested the following re-investment rules:

- Random allocation across all funds within the sector being tested. This rule is the most neutral;
- Random allocation within the same quartile within which the dead fund began. This rule has the attraction of keeping the investor in the same quartile that they originally chose; and
- Reallocate to another fund offered by the same fund manager and randomly if this was not possible. This goes part of the way towards emulating common investor behaviour.

For the main body of our analysis we follow the first rule of random reinvestment. In the statistical analysis we test whether our conclusions are robust under the other two rules.

The unit trust return data

Within the S & P Micropal dataset there were a number of returns options to choose from, including:

- Whether taxation of dividends is gross or net;
- Whether the spread quoted for the unit trust is bid/offer, bid/bid or offer/offer;
- Whether dividends are reinvested; and
- Whether expenses are deducted.

As described above, our analysis was based on data from three sources, and we needed to ensure they were all derived on the same basis. In particular, it was important to take account of whether returns were on a gross or net basis. [3]

All the measures of return we used included re-invested dividends. However, these were sometimes reported net of tax and sometimes gross of tax. For example, a company that pays a dividend of £1 will pay £0.20 in Advanced Corporation Tax, and the unit trust

---

[3] This section draws heavily on description and the techniques of Quigley and Sinquefield (1998).

will declare a gross dividend of £1 (distributing £0.80 through a cash payment and £0.20 via a tax credit). The tax paid will eventually depend on the tax status of the consumer. The simplest thing to do would be to abstract from the status of the consumer and measure returns based on gross dividends.

Unfortunately the data on funds that died before 1997 was only available on a net basis. For live funds we captured gross data directly from Micropal, and where funds died after 1997 we relied on Micropal net data reported by Money Management.

To get all returns on a gross basis we adopted the methodology of Quigley and Sinquefield (1998). This estimated the difference between gross and net returns based on funds where we had both series over the entire period. It was necessary to do this for each period as the rate of ACT had changed substantially over time, i.e. in 1978 it was 33 per cent and in 1997 it was 20 per cent.

Figure 6: Difference between gross and net returns
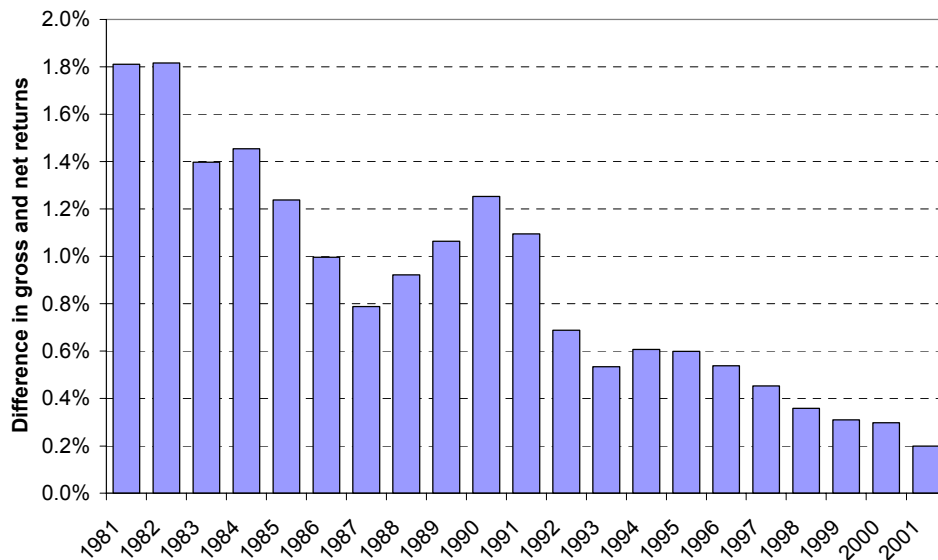
Our test of persistence in gross returns was on a bid-to-bid basis. These returns already reflect the annual management charge. We also test net returns after initial charges.

Section 3   Theory and persistence

It is important to clarify what can be said about the persistence of past performance on the basis of theory alone.

On average, we expect a fund invested in high-risk stocks to have higher raw returns than a fund that invests in a mixture of equities and bonds. That is, we expect higher returns for greater risk. The efficient market hypothesis implies that, on a risk-adjusted basis, it is impossible to generate superior returns consistently. It follows from this that risk-adjusted returns should show no persistence of performance above that which would occur by chance. However, it is often assumed – incorrectly – that the efficient market hypothesis further implies no persistence at all in stock market returns; even before risk adjustments are made.

This view appears to be widely held. In the Sandler Review (2002), at paragraph 7.13, reference is made to the higher returns that can be anticipated from higher risks. Yet at paragraph 7.19 it is suggested "raw data on past performance alone is no guide to future performance". To support this, reference is made to three research papers, Carhart (1997), Rhodes (2000) and Gruber (1996). Our reading of Carhart (1997) and Gruber (1996) suggested these researchers do not support this statement. For example, Carhart (1997) uses a contingency table approach with simple raw returns gross of expense ratios. He finds that:

> "From the figure, it is apparent that winners are somewhat more likely to remain winners and losers are more likely to either remain losers or perish." p.71

Gruber (1996) also conducts analysis using raw returns and states:

> "The surprising thing about persistence is not that it exists, but rather how strong it appears to be.... Expenses, raw returns, α s from the one index model and α s from the four index model all have predictive ability for both raw returns and risk adjusted four index α s over both one year and three year intervals." p. 794

Furthermore, in our previous literature review - Giles, Wilsdon and Worboys (2002) - we discussed the findings of Rhodes (2000). The research undertaken in this paper relies on a substantial extension of that data, a greater focus on the consumer and a more thorough testing of the period using statistical testing, graphical analysis and a contingency table approach. Accordingly our results are potentially more comprehensive than those of Rhodes.

If, as theory suggests, higher risk funds should out-perform low risk funds then, on average, forming a portfolio from funds that have performed well in the past is likely to result in a higher risk profile than the average and consequently higher returns in the future than the average.

Figure 7: Observed versus expected returns illustration
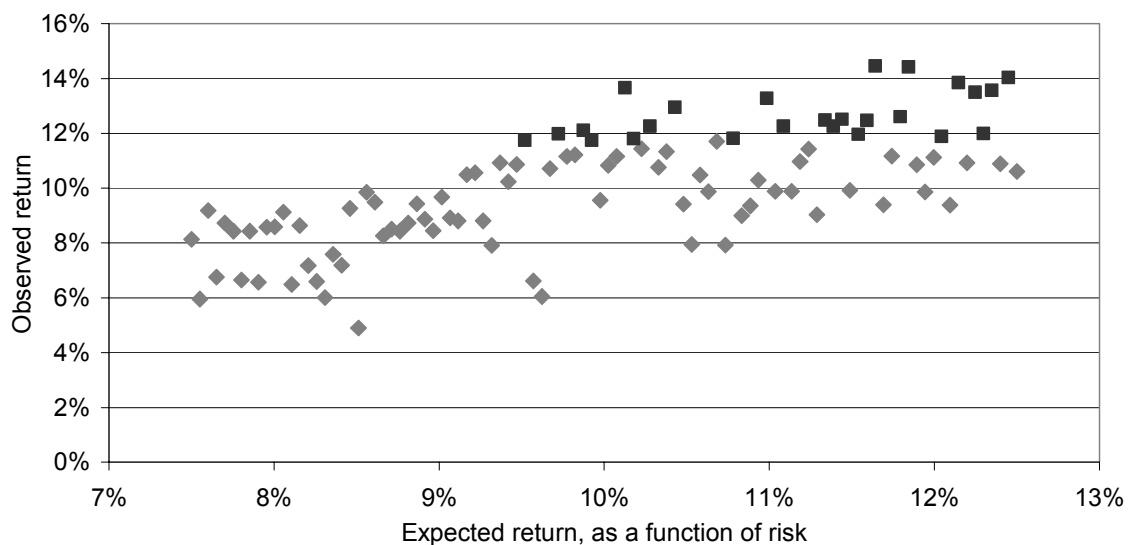
The simulated results in Figure 7, above, illustrate this effect. The return for each fund varies randomly around the fund's assumed expected return. The darker observations are those that are drawn from the top quartile of observed returns. Clearly these top quartile funds tend to have a higher expected return than the funds from the other quartiles. Accordingly, selecting funds from this quartile should result in persistently higher returns than selecting funds at random.

There is nothing unorthodox about this position. We do not need to rely on "anomalies", such as momentum, the small cap effect or value strategies, to suggest that one should expect to observe persistence in the performance of equity funds.

In fact the converse is true. Persistence in raw returns is to be expected unless there is evidence that either the risk carried by each fund varies unpredictably over time or the risk carried by all funds is the same.

However, even if risk did not vary across funds we might still observe persistence only in net returns – without there being any suggestion that markets are inefficient – if charges alone vary across funds. That is, if all funds were exposed to the same risk – and therefore gross expected return – but had different charges then observed net returns would persist. However, this effect would be entirely driven by different charges and therefore an efficient investment strategy would be simply to select those funds with the lowest charges.

Alternatively, we might have some variation in risk across funds but a significant relationship between the level of risk and the level of charges such that persistence in net returns is either exaggerated or offset by charges.

Accordingly, we need to test two questions:

1. Is there any variation in systematic risks for UK equity funds?
2. Is there any systematic relationship between expected returns and charges?

Is there any variation in systematic risks for UK equity funds?

To analyse the first question it is necessary to employ a model for expected returns. The most common model for estimating risk and expected returns is the Capital Asset Pricing Model (CAPM) in which the single risk measure for an asset is the covariance between the return on the asset and the return on the overall market. However, recent research has suggested that other factors, in particular indices related to value and size, also have a systematic effect on expected return. In the US, the principle authority for these models is Fama and French (1993). In the UK these models have, until recently, not been extensively analysed. However recent studies (for example, Dimson, Nagel and Quigley (2001)) suggest that such models are also relevant in the UK.

We use the CAPM to estimate the beta (and therefore systematic risk relative to the wider market) for each non-tracker fund that existed in the five-year period from July 1996 to June 2001. Distributions of these betas are plotted in Figure 8 for each of the four UK equity sectors and for all of the funds from these sectors combined.

We also tested a two-factor market and value model and a three-factor market, value and size model (details available from the authors). In both cases the results were substantially unchanged but the degree of variation between funds is greater.

Results

Figure 8, below, demonstrates that there is significant variation in the risk profile of funds (as measured by the CAPM beta) and therefore in expected returns across funds. This applies both across all sectors and within the four UK equity sectors.

In principle excess returns can be driven by a number of factors, including momentum, value, size and skill. However, these factors are considered by some researchers to be anomalous (and possibly transitory) and their value as a guide to the future can be questioned.

On the other hand, systematic risk is neither anomalous nor transitory. The evidence that there is significant variation in risk across funds within each sector strongly suggests that we should expect some element of persistence in the raw returns of UK equity funds.

Figure 8: Distribution of risk across funds

i. All four UK equity sectors
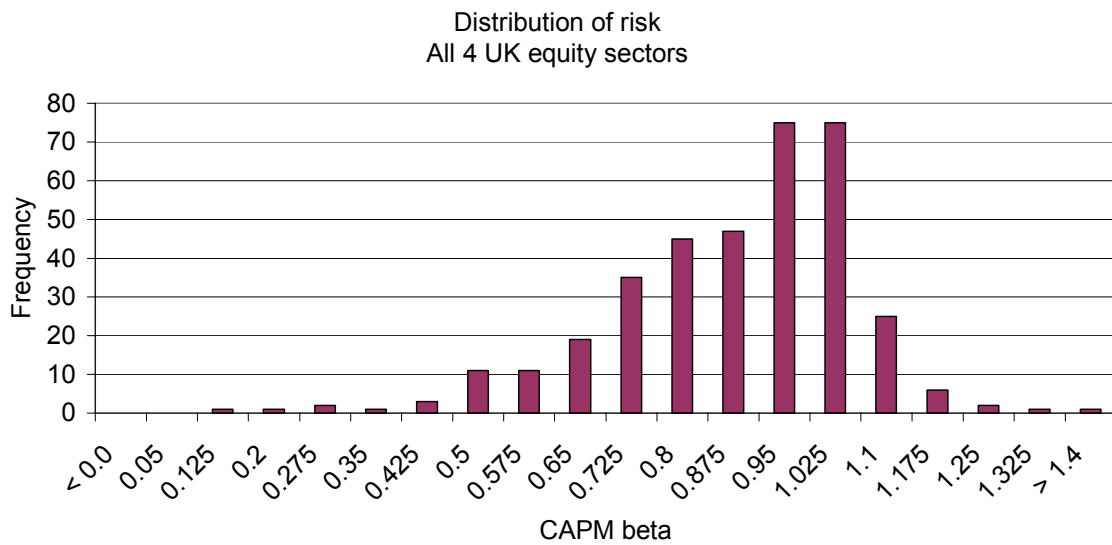
Distribution of risk
All 4 UK equity sectors

ii. UK All companies

Distribution of risk
UK All Companies

iii. UK Smaller companies

Distribution of risk
UK Smaller Companies

iv. UK Equity and bond income

Distribution of risk
UK Equity & Bond Income
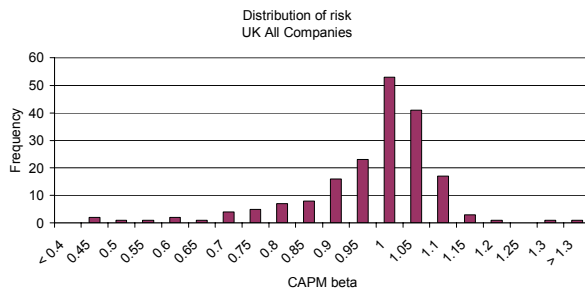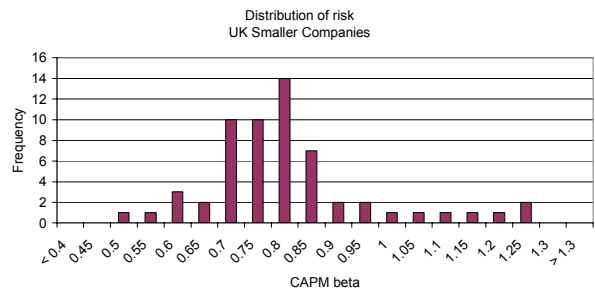
v. UK Equity income
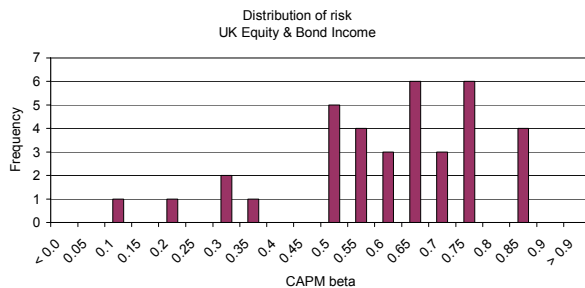
Distribution of risk
UK Equity Income
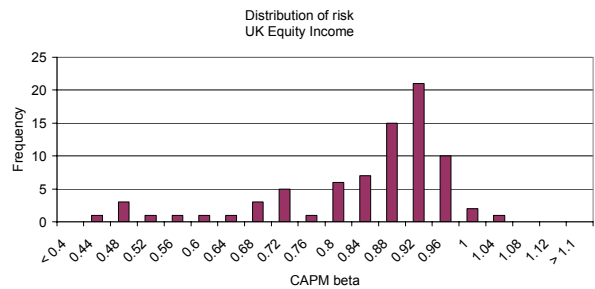
Is there any systematic relationship between expected returns and charges?

Our second question concerns the possibility that risk and charges are related. If this were true, it would be possible to conclude that the range of net returns was a function of the difference in charges rather than solely the difference in the underlying risk and therefore gross expected return.

A direct measure of the significance of this relationship is to estimate the ability of charges to predict risk and therefore gross expected returns. For each of the sectors we

estimate the degree to which charges could explain the level of CAPM beta (and therefore expected gross returns).

Figure 9: Relationship between risk (expected gross return) and charges

i. All four UK equity sectors
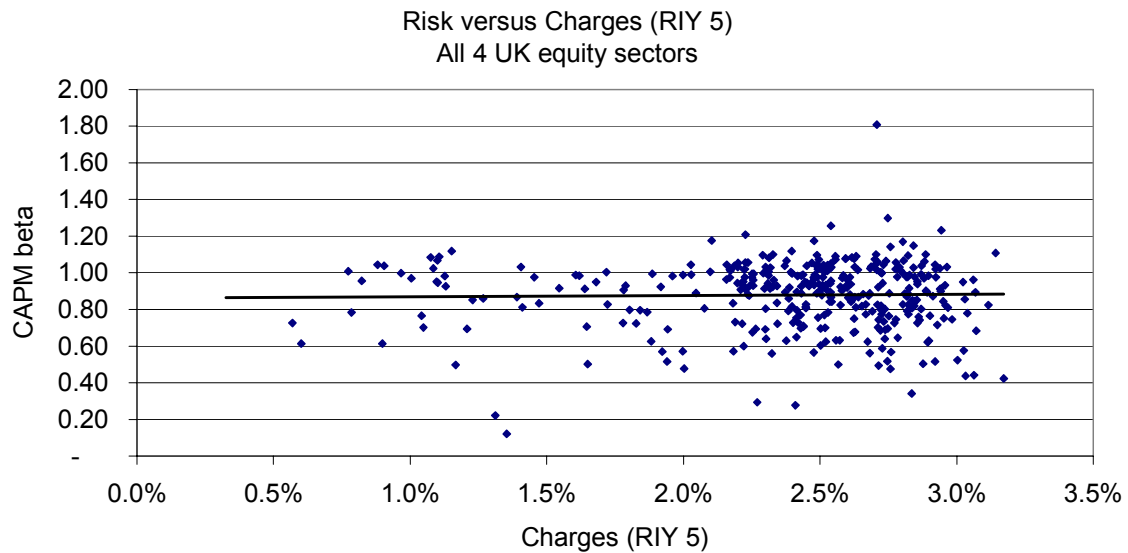
Risk versus Charges (RIY 5)
All 4 UK equity sectors

ii. UK All companies

Risk versus Charges (RIY 5)
UK All Companies

iii. UK Smaller companies

Risk versus Charges (RIY 5)
UK Smaller Companies

iv. UK Equity and bond income

Risk versus Charges (RIY 5)
UK Equity & Bond Income
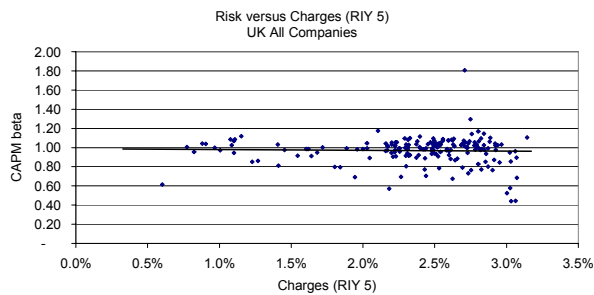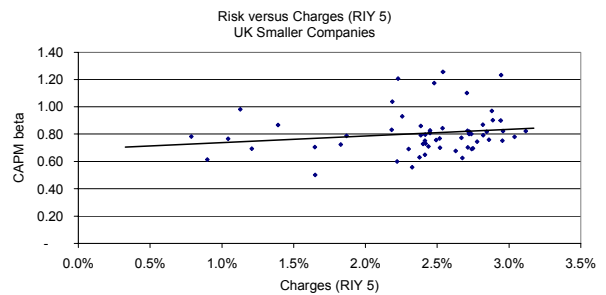
v. UK Equity income
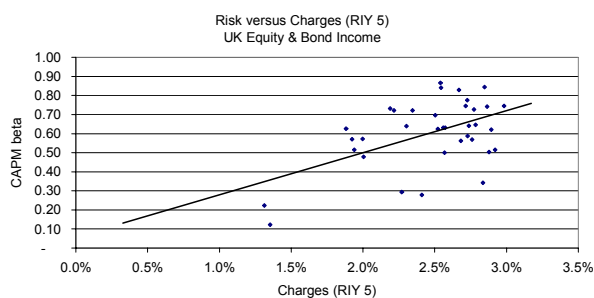
Risk versus Charges (RIY 5)
UK Equity Income
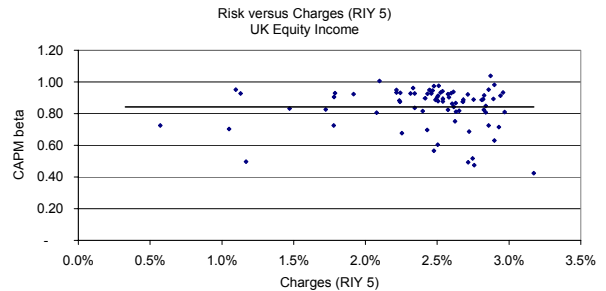
Results

For three sectors - UK All Companies, UK Smaller Companies and UK Equity Income - the degree of charges had a low level of explanatory power (0.00, 0.03 and 0.00 respectively). For UK Equity and Bond Income the relationship was stronger (0.26). Since this relationship is positive it cannot be exaggerating persistence in net returns,

but could be offsetting the influence of risk. However, this result was fully explained by outliers: two low risk and low cost funds marketed by friendly societies. Accordingly, the suspicion that higher charges may be related to higher risk (see Sandler 2002, paragraph 7.22) is not substantiated by these results.

Conclusion

Given the evidence that there is considerable variation in risk across funds we should expect to observe persistence in the gross returns of UK equity funds. Further, since there is no observed relationship between risk and charges, we should also expect to observe persistence in observed net returns that is a product of persistence in gross returns rather than charges.

In Section 4, we directly test the hypothesis that past performance can be of value to consumers by looking at the persistence of raw returns.

Section 4   Persistence analysis

The objective of our analysis is to test whether information regarding past performance is useful to consumers when making their investment decisions. This question can be broken into two main components:

1.   Does past performance data contain information on future performance?
2.   Is this information exploitable by consumers? After taking into account other factors (in particular charges) and the length of time retail investments are typically held, is it beneficial to consider past performance information?

The first question is traditionally tested through the use of statistical and econometric tests. An in-depth discussion of these tests can be found in our first paper. Often, however, as we noted, the studies used detailed financial econometric models with up to four explanatory return variables. The vast majority of investors make investment decisions based on raw performance information (along with a number of other factors as we showed in our first paper). As a result we adopted simpler tests of past performance such as graphical analysis and contingency tables, which utilise and analyse this raw performance information.

The graphical analysis shows the cumulative return a consumer earns from applying a systematic decision rule, based on quartiles, to their fund investment. The contingency tables show the probability of a fund in one quartile being in the same quartile in the following period. If performance was purely random you would expect these probabilities to be 25%, i.e. there is an equal chance of a top quartile fund ending up in any of the four quartiles in the subsequent investment period as the past assessment period effectively has no influence on the future period. Similar approaches have been adopted by Hendricks, Patel and Zeckhauser (1993), Malkiel (1995), Brown and Goetzmann (1995) and Kahn and Rudd (1995) in the US and Lunde, Blake and Timmermann (1998), Blake and Timmermann (1998) and Allen and Tan (1999) in the UK. These researchers however have focussed more on finding and explaining persistence *per se* rather than focussing on consumers' perspectives. The results of these studies have been considered in detail in our earlier literature review, but to briefly summarise two recent UK studies Lunde, Blake and Timmermann (1998) and Allen and Tan (1999) use a contingency table approach and find evidence of persistence. Whilst these results are interesting, we develop our own methodology to consider the results from a retail investor's viewpoint.

Predictive performance could take two forms:

 • Positive serial correlation in performance over time: funds that are currently performing well will continue to perform well whilst poorly performing funds continue to perform badly; or alternatively
 • Today's high performers will be tomorrow's worst performers and vice versa (i.e., negative serial correlation).

To test for the existence of persistence and identify where it is most prevalent, we needed to investigate a number of related issues:

- The period over which performance is measured (we call this the assessment period);
- The sector under investigation (described in the previous chapter);
- The measure of return used;
- The period over which we are testing for persistence (we call this the investment period);
- The point in time at which investors make their investment; and
- The type of investor (and the implications of this on charges incurred).

Contingency table results (returns minus annual charges but not initial) using a symmetric investment rule

First, we construct a cumulative contingency table for funds invested every year since 1981 up to 2000. The objective was to test simple rules. To do this we made two simplifying assumptions. Our contingency table results used a symmetric investment rule, i.e. with the length of the assessment period equal to the investment period. Secondly, for each year we calculate a table setting out the quartile within which funds are invested during the assessment period and the resulting quartile into which funds fall in the investment period. We use quartiles as they are the primary means of measuring fund performance in a broad and understandable way for consumers and they also provide us with a relative measure of returns.

In Table 4 to Table 7 below we show the results using returns that take into account the effect of annual charges but not initial charges. This is primarily because this is the form in which the data is recorded.

Later on in this report we discuss how robust the results are when we relax our assumptions by deducting initial charges from returns. However since we have no direct data on the level of initial charges for older dead funds that analysis must rely on assumptions about the level of initial charges in the past. Further we have no comprehensive data on the history of annual charges for any of the funds. Accordingly the analysis based on the actual recorded data – net of annual charges but gross of initial – must be given the greatest weight.

For this analysis, we provide results for each sector for a number of assessment periods (one to seven years) with performance assessed over investment periods of the same length. For example, the first table shows the results for the UK Smaller Companies sector. This presents seven scenarios testing the performance of funds based on 12-month returns over the subsequent 12 months, and then 24/24, 36/36, 48/48, 60/60, 72/72 and 84/84 months. Clearly, using asymmetric periods (e.g. 1 year past returns versus 2 years future returns, 1 year past returns versus 3 years future returns, etc) would greatly increase the number of scenarios being tested. Further since our task is to discover whether persistence can be observed and not to develop an optimal rule for exploiting persistence this restriction does not alter our conclusions.

Each row of these tables represents the distribution of investment period returns for those funds selected on the basis of the assessment period returns (subdivided into

quartiles). If performance were purely random we would expect to see, as we mentioned earlier, an average of 25% of each initial quartile in the subsequent resulting quartile.

Small Companies sector: by choosing a fund in the top quartile, assessed over one year there was a 39% chance of being in the top quartile in the following year. This result confirms short period persistence. As reported by other researchers, poor performers also show persistence.

UK Equity Income sector: by choosing a fund in the top quartile, assessed over one year, there was a 32% chance of being in the top quartile in the following year. This result again confirms short period persistence. However over subsequent periods the level of persistence was maintained and even increased with six-year performance resulting in a 43% chance of being in the top quartile after a six-year investment period. Poor performance was equally, if not more, persistent across periods.

UK Equity & Bond Income sector: by choosing a fund in the top quartile, assessed over one year there was a 35% chance of being in the top quartile in the following year. Over intermediate periods the level of persistence was less clear but with six-year performance the chance was 30%. Poor performance was similar.

All Companies sector: by choosing a fund in the top quartile, assessed over one year there was a 37% chance of being in the top quartile in the following year. Over subsequent intermediate periods the level of persistence was lower but still substantial and then rose again to 31% over five years. Poor performance is less persistent.

Table 4: UK Smaller companies (with annual charges deducted)

Period 2				
12 months back and 12 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**34.6%**	22.9%	24.7%	17.8%
Second quartile	24.3%	**30.5%**	25.3%	19.9%
Third quartile	24.3%	24.7%	**27.7%**	23.3%
Top quartile	16.8%	21.9%	22.3%	**39.0%**
24 months back and 24 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	26.2%	**29.9%**	22.1%	21.7%
Second quartile	**27.9%**	24.2%	25.4%	22.5%
Third quartile	**27.0%**	23.4%	24.2%	25.4%
Top quartile	18.9%	22.5%	**28.3%**	**30.3%**
36 months back and 36 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	19.9%	**32.8%**	24.4%	22.9%
Second quartile	**34.3%**	23.4%	17.9%	24.4%
Third quartile	18.9%	21.9%	**32.8%**	26.4%
Top quartile	26.9%	21.9%	24.9%	26.4%
48 months back and 48 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**27.8%**	24.7%	25.3%	22.2%
Second quartile	**27.8%**	22.8%	20.9%	**28.5%**
Third quartile	19.6%	25.9%	**27.8%**	26.6%
Top quartile	24.7%	26.6%	25.9%	22.8%
60 months back and 60 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**27.9%**	19.7%	26.2%	26.2%
Second quartile	25.4%	**32.8%**	20.5%	21.3%
Third quartile	23.0%	24.6%	**27.0%**	25.4%
Top quartile	23.8%	23.0%	26.2%	**27.0%**
72 months back and 72 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	26.7%	25.6%	18.9%	**28.9%**
Second quartile	**30.0%**	**27.8%**	21.1%	21.1%
Third quartile	25.6%	26.7%	**30.0%**	17.8%
Top quartile	17.8%	20.0%	**30.0%**	**32.2%**
84 months back and 84 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**34.4%**	21.9%	10.9%	**32.8%**
Second quartile	**28.1%**	20.3%	20.3%	**31.3%**
Third quartile	17.2%	**37.5%**	**32.8%**	12.5%
Top quartile	20.3%	20.3%	**35.9%**	23.4%

Results in bold denote values greater than 27%. The contingency tables show the probability of a fund in one quartile being in the same quartile in the following period. If performance was purely random you would expect these probabilities to be 25% i.e. there is an equal chance of a top quartile fund ending up in any of the four quartiles in the subsequent period as the past period effectively has no influence on the future period.

Table 5: UK Equity Income (with annual charges deducted)

Period 2				
12 months back and 12 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**37.0%**	23.1%	17.7%	22.2%
Second quartile	25.3%	26.5%	26.5%	21.7%
Third quartile	18.2%	**27.8%**	**30.3%**	23.8%
Top quartile	19.5%	22.6%	25.6%	**32.3%**
24 months back and 24 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**33.2%**	23.5%	20.4%	23.0%
Second quartile	19.1%	**29.8%**	**27.7%**	23.5%
Third quartile	22.2%	26.4%	26.6%	24.8%
Top quartile	25.6%	20.4%	25.3%	**28.7%**
36 months back and 36 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**31.4%**	19.9%	24.5%	24.2%
Second quartile	**27.0%**	25.5%	26.1%	21.4%
Third quartile	22.7%	**27.0%**	**29.5%**	20.8%
Top quartile	18.9%	**27.6%**	19.9%	**33.5%**
48 months back and 48 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**32.5%**	22.4%	23.1%	22.0%
Second quartile	26.5%	24.6%	**28.0%**	20.9%
Third quartile	23.5%	**29.9%**	**28.4%**	18.3%
Top quartile	17.5%	23.1%	20.5%	**38.8%**
60 months back and 60 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**33.2%**	23.5%	23.0%	20.3%
Second quartile	**30.4%**	**27.2%**	24.0%	18.4%
Third quartile	21.7%	**32.7%**	26.7%	18.9%
Top quartile	14.7%	16.6%	26.3%	**42.4%**
72 months back and 72 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**34.8%**	25.6%	21.3%	18.3%
Second quartile	26.8%	**29.9%**	22.6%	20.7%
Third quartile	**30.5%**	**28.0%**	23.2%	18.3%
Top quartile	7.9%	16.5%	**32.9%**	**42.7%**
84 months back and 84 months forward				
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**34.7%**	22.9%	20.3%	22.0%
Second quartile	**27.1%**	**33.1%**	21.2%	18.6%
Third quartile	**29.7%**	**30.5%**	17.8%	22.0%
Top quartile	8.5%	13.6%	**40.7%**	**37.3%**

Results in bold denote values greater than 27%. The contingency tables show the probability of a fund in one quartile being in the same quartile in the following period. If performance was purely random you would expect these probabilities to be 25% i.e. there is an equal chance of a top quartile fund ending up in any of the four quartiles in the subsequent period as the past period effectively has no influence on the future period.

Table 6: UK Equity & Bond Income (with annual charges deducted)

Period 2			
12 months back and 12 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**35.9%**	23.7%	21.2%	19.2%
Second quartile	24.9%	**29.4%**	26.5%	19.2%
Third quartile	23.7%	24.1%	25.7%	26.5%
Top quartile	15.5%	22.9%	26.5%	**35.1%**
24 months back and 24 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	26.5%	25.0%	27.0%	21.6%
Second quartile	**27.5%**	26.0%	20.1%	26.5%
Third quartile	22.5%	25.0%	**27.5%**	25.0%
Top quartile	23.5%	24.0%	25.5%	27.0%
36 months back and 36 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**30.4%**	24.4%	19.6%	25.6%
Second quartile	21.4%	23.8%	**29.2%**	25.6%
Third quartile	26.2%	23.2%	25.0%	25.6%
Top quartile	22.0%	**28.6%**	26.2%	23.2%
48 months back and 48 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**30.6%**	26.9%	23.1%	19.4%
Second quartile	25.4%	24.6%	20.1%	**29.9%**
Third quartile	25.4%	23.9%	26.9%	23.9%
Top quartile	18.7%	24.6%	**29.9%**	26.9%
60 months back and 60 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	21.5%	**28.0%**	25.2%	25.2%
Second quartile	**27.1%**	22.4%	20.6%	**29.9%**
Third quartile	**27.1%**	26.2%	26.2%	20.6%
Top quartile	24.3%	23.4%	**28.0%**	24.3%
72 months back and 72 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	22.9%	22.9%	20.5%	**33.7%**
Second quartile	25.3%	26.5%	**32.5%**	15.7%
Third quartile	26.5%	26.5%	26.5%	20.5%
Top quartile	25.3%	24.1%	20.5%	**30.1%**
84 months back and 84 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	19.7%	26.2%	14.8%	**39.3%**
Second quartile	21.3%	23.0%	**31.1%**	24.6%
Third quartile	**29.5%**	**29.5%**	26.2%	14.8%
Top quartile	**29.5%**	21.3%	**27.9%**	21.3%

Results in bold denote values greater than 27%. The contingency tables show the probability of a fund in one quartile being in the same quartile in the following period. If performance was purely random you would expect these probabilities to be 25% i.e. there is an equal chance of a top quartile fund ending up in any of the four quartiles in the subsequent period as the past period effectively has no influence on the future period.

Table 7: UK All companies (with annual charges deducted)

Period 2			
12 months back and 12 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**34.5%**	24.7%	20.9%	19.9%
Second quartile	24.6%	**27.6%**	**27.7%**	20.1%
Third quartile	20.3%	26.8%	**29.7%**	23.2%
Top quartile	20.6%	20.8%	21.7%	**36.9%**
24 months back and 24 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**28.6%**	21.8%	21.8%	**27.9%**
Second quartile	23.4%	25.9%	**27.5%**	23.1%
Third quartile	20.5%	**31.2%**	**27.2%**	21.1%
Top quartile	**27.5%**	21.1%	23.5%	**27.8%**
36 months back and 36 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	23.9%	22.7%	24.7%	**28.6%**
Second quartile	21.4%	**28.0%**	**27.4%**	23.2%
Third quartile	25.2%	**27.1%**	26.8%	20.9%
Top quartile	**29.5%**	22.1%	21.1%	**27.3%**
48 months back and 48 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	24.1%	22.8%	24.9%	**28.2%**
Second quartile	24.5%	**28.2%**	25.4%	21.9%
Third quartile	26.0%	**27.1%**	25.8%	21.2%
Top quartile	25.4%	21.9%	23.9%	**28.7%**
60 months back and 60 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	25.4%	24.7%	24.7%	25.2%
Second quartile	**27.3%**	26.1%	25.2%	21.4%
Third quartile	25.2%	26.1%	26.6%	22.1%
Top quartile	22.1%	23.1%	23.5%	**31.2%**
72 months back and 72 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	24.0%	24.6%	25.2%	26.2%
Second quartile	**29.0%**	24.3%	26.2%	20.6%
Third quartile	**27.1%**	**27.1%**	24.3%	21.5%
Top quartile	19.9%	24.0%	24.3%	**31.8%**
84 months back and 84 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	24.9%	24.0%	26.2%	24.9%
Second quartile	25.8%	26.2%	**28.0%**	20.0%
Third quartile	**27.1%**	**31.6%**	23.6%	17.8%
Top quartile	22.2%	18.2%	22.2%	**37.3%**

Results in bold denote values greater than 27%. The contingency tables show the probability of a fund in one quartile being in the same quartile in the following period. If performance was purely random you would expect these probabilities to be 25% i.e. there is an equal chance of a top quartile fund ending up in any of the four quartiles in the subsequent period as the past period effectively has no influence on the future period.

Average returns (returns minus annual charges but not initial) using a symmetric investment rule

We also calculated the average return for adopting an investment strategy based on this observed persistence. This approach calculates – by sector - the cumulative return in the investment period resulting from choosing unit trusts based on quartile performance in the assessment period.

Choosing a fund in the top quartile of the Small Companies sector, based on the previous 12 months performance, and holding it for a year gives an average cumulative return over the 21 years of our data of roughly 20%. This figure falls to below 15% if a fund in the bottom quartile based on the previous 12 months performance is chosen. This suggests a benefit of 5% to the investor by using this decision rule in this sector. It does not, however, take account of charges in this instance and the fund is only held for a short period of time.

In order to look at the effect of choosing funds based on longer periods we consider a similar strategy but used assessment and investment periods of up to seven years. A strong relationship is maintained in terms of past performance for the 24-month comparisons. This relationship is still evident for longer periods, although it is not universal across sectors.

Using 84-month performance as an example, we can see that by choosing a fund in the top, rather than the bottom, quartile - based on its previous 84-month performance and holding it for the following 84 months - produces a higher cumulative return in three out of four sectors. UK Smaller Companies, UK Equity Income and UK All Companies all give a higher cumulative return but UK Equity and Bond Income has a lower cumulative return.

Figure 10: Average cumulative returns for 12 months based on quartiles assessed on 12 months (with annual charges deducted)
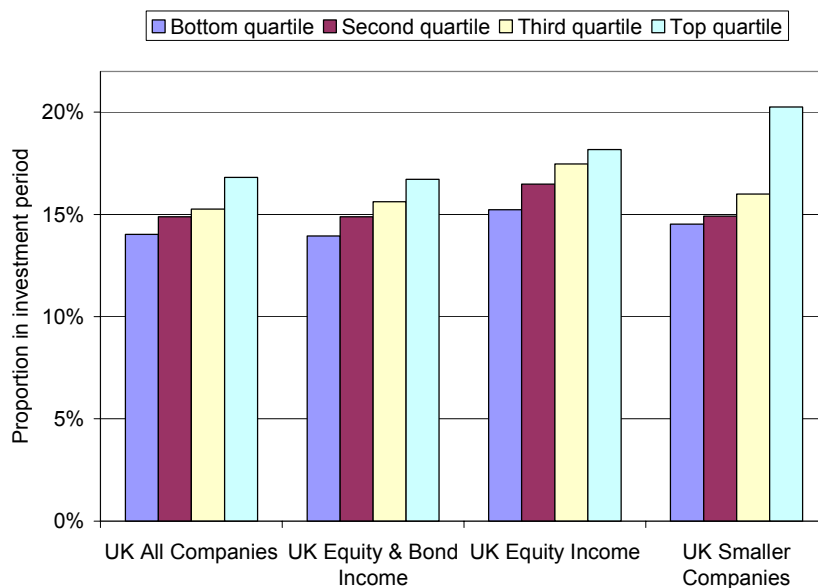
Figure 11: Average cumulative returns for 24 months based on quartiles assessed on 24 months (with annual charges deducted)
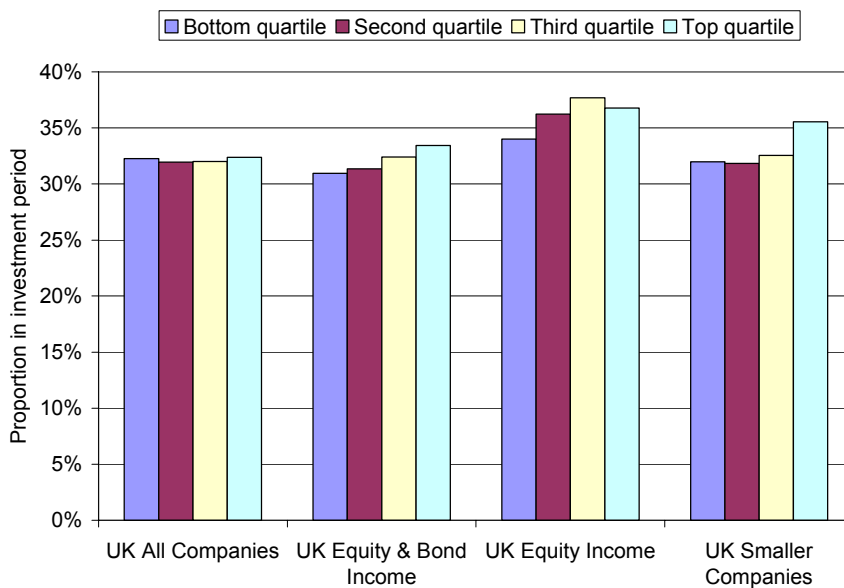
Figure 12: Average cumulative returns for 36 months based on quartiles assessed on 36 months (with annual charges deducted)
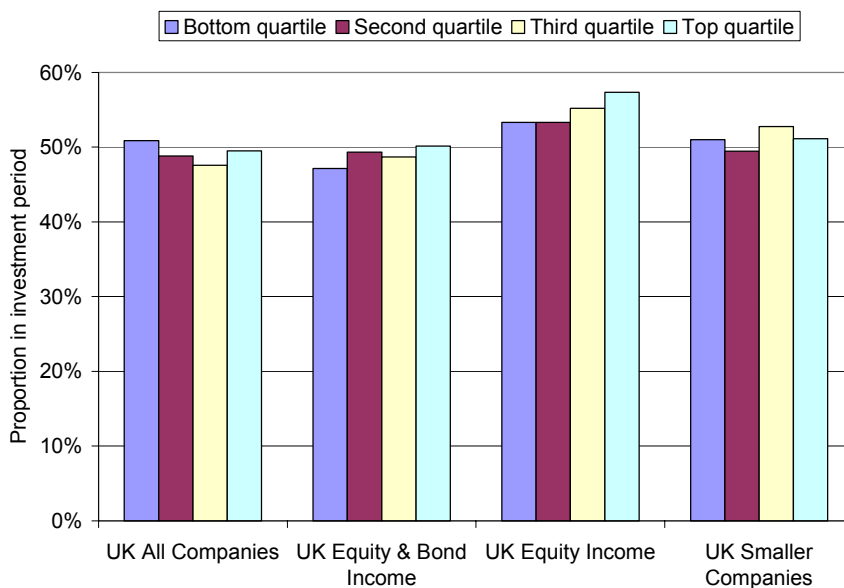
Figure 13: Average cumulative returns for 48 months based on quartiles assessed on 48 months (with annual charges deducted)
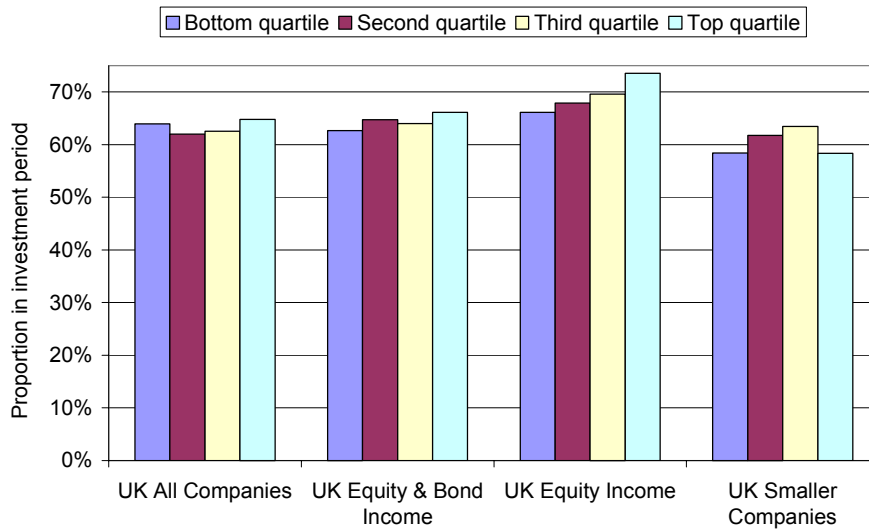
Figure 14: Average cumulative returns for 60 months based on quartiles assessed on 60 months (with annual charges deducted)
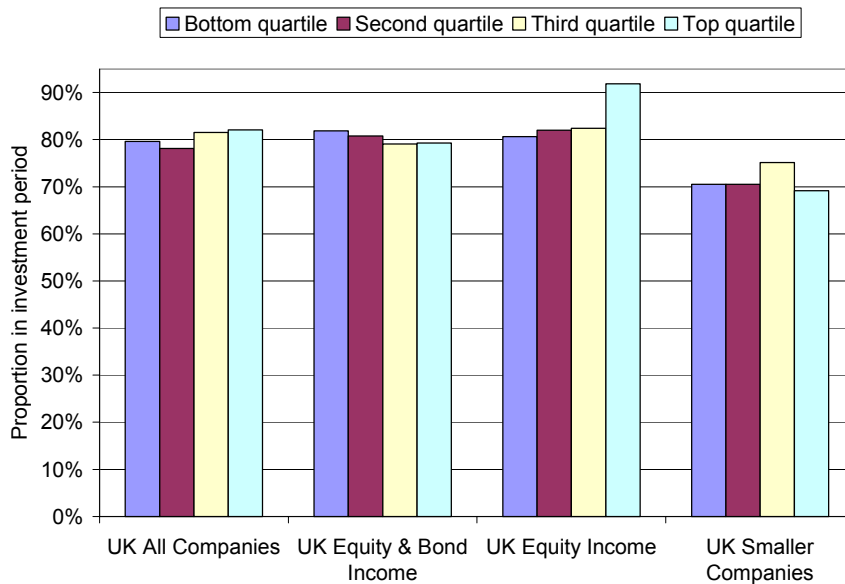
Figure 15: Average cumulative returns for 72 months based on quartiles assessed on 72 months (with annual charges deducted)
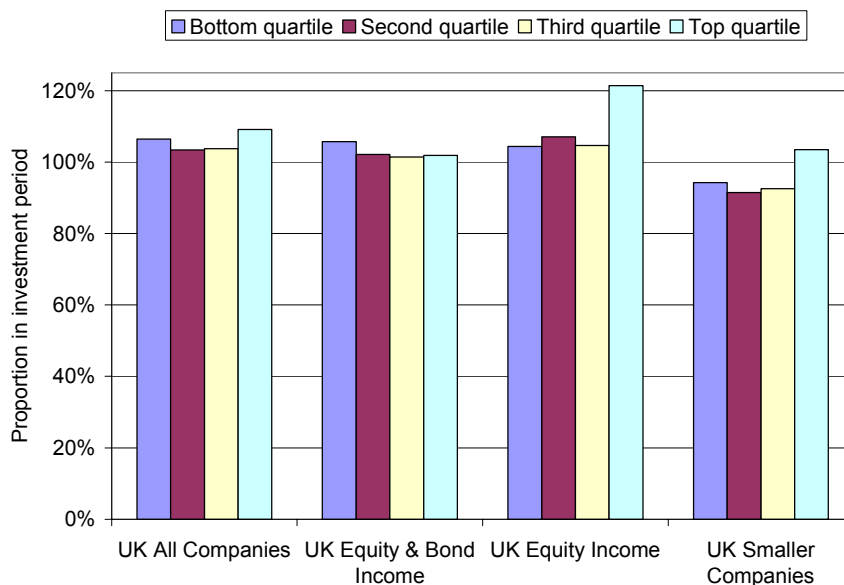
Figure 16: Average cumulative returns for 84 months based on quartiles assessed on 84 months (with annual charges deducted)
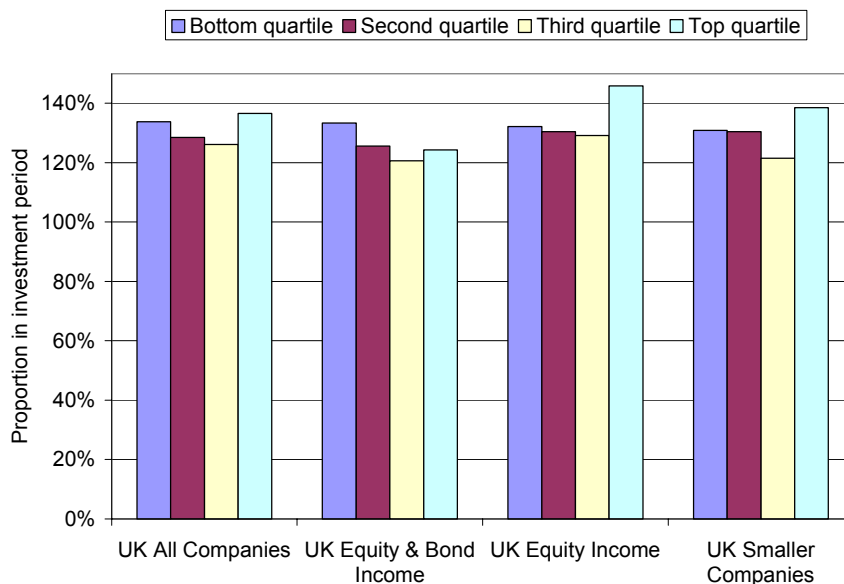
The impact of charges is important, but this impact will depend on the type of consumer. For new investors (who may consider the initial charge a sunk cost) any positive return in the above results could be viewed as useful information. However, for many, it is also important to consider the effect of initial charges on performance as the

initial charge has a disproportionate effect on your return depending on whether your fund performs well or badly. This can be seen by considering that a fund which returns only 5% in its first year would have a return of only 1% with a 4% initial charge taken into account, but a fund returning 15% would return 11%, even after charges. The after charge return of the worse performing fund is only one eleventh of the better performing fund, but one third before charges. Using initial charges captures this relationship. This leads us to consider both initial and annual charges in our subsequent graphs and contingency tables to determine whether our results are robust net of initial charges.

When considering a change of fund, the transfer rate has to be considered. Our analysis therefore includes the full cost of initial charges, both at the outset of the investment and at any point in time where a fund dies and the investors are assumed to reinvest in another fund. In reality some investors can switch at lower cost. For example, entering a new fund can be more cost effective through the use of discount brokers, who traditionally charge lower up-front fees. Furthermore, multi-manager funds also typically charge less to switch funds within their group. To account for this, we have also tested the case where initial charges are incurred at the point of investment but not in the case of reinvestment following closure and found similar results.

Contingency table results (with annual and initial charges deducted) using a symmetric investment rule

We present contingency tables showing the results after accounting for annual and initial charges. Where a fund dies, we adopted the annual charges of the new fund and also assumed an initial charge.

In Table 8, for example, fund performance in the investment period is again measured on a prior assessment period of the same length. In a random sample you would expect only 25% of funds in any one quartile to remain in the same quartile for the subsequent period.

In this case, for the Small Companies sector, we found 35% of funds in the bottom quartile remain in that quartile in the next 12 months. This is higher than would be expected by chance. The results for funds in the top quartile were also emphatic - with 41% of funds in the top quartile remaining there for the next 12 months. This outcome is indicative of a high level of significance. The other points on the diagonal – second and third quartile persistence - are also above 25%. Although poor performance continues strongly in later periods, positive performance appears to diminish.

The Equity Income sector (see Table 10) displays even stronger results with positive persistence in each of the scenarios. Rising from 34% of funds that start in the top quartile remaining in the top quartile after 12 months to 45% for the five-year scenario. For the UK Equity and Bond Income (Table 10) persistence diminishes for the longer scenarios, whilst for the All Companies sector (Table 12) positive persistence is observable across all scenarios.

These results are consistent with returns before initial charges. Accordingly differences in initial charges do not affect the level of persistence. We next test whether they affect the economic impact.

Table 8: UK Smaller companies (with annual and initial charges deducted)

Period 2			
12 months back and 12 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**34.6%**	23.3%	25.3%	16.8%
Second quartile	25.7%	**29.8%**	24.0%	20.5%
Third quartile	23.3%	24.3%	**30.5%**	21.9%
Top quartile	16.4%	22.6%	20.2%	**40.8%**
24 months back and 24 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**28.3%**	**29.9%**	20.5%	21.3%
Second quartile	**27.0%**	23.4%	**29.5%**	20.1%
Third quartile	25.4%	25.0%	23.4%	26.2%
Top quartile	19.3%	21.7%	26.6%	**32.4%**
36 months back and 36 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	23.4%	**30.8%**	22.4%	23.4%
Second quartile	**33.3%**	24.4%	16.4%	25.9%
Third quartile	18.4%	21.9%	**35.8%**	23.9%
Top quartile	24.9%	22.9%	25.4%	26.9%
48 months back and 48 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	25.9%	25.9%	25.9%	22.2%
Second quartile	**28.5%**	22.2%	23.4%	25.9%
Third quartile	22.2%	25.3%	22.8%	**29.7%**
Top quartile	23.4%	26.6%	**27.8%**	22.2%
60 months back and 60 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**27.0%**	26.2%	21.3%	25.4%
Second quartile	**27.9%**	**29.5%**	22.1%	20.5%
Third quartile	24.6%	22.1%	25.4%	**27.9%**
Top quartile	20.5%	22.1%	**31.1%**	26.2%
72 months back and 72 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**32.2%**	22.2%	17.8%	**27.8%**
Second quartile	25.6%	**32.2%**	18.9%	23.3%
Third quartile	23.3%	26.7%	**33.3%**	16.7%
Top quartile	18.9%	18.9%	**30.0%**	**32.2%**
84 months back and 84 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**35.9%**	23.4%	18.8%	21.9%
Second quartile	**28.1%**	20.3%	18.8%	**32.8%**
Third quartile	18.8%	**32.8%**	**29.7%**	18.8%
Top quartile	17.2%	23.4%	**32.8%**	26.6%

Results in bold denote values greater than 27%. The contingency tables show the probability of a fund in one quartile being in the same quartile in the following period. If performance was purely random you would expect these probabilities to be 25% i.e. there is an equal chance of a top quartile fund ending up in any of the four quartiles in the subsequent period as the past period effectively has no influence on the future period.

Table 9: UK Equity Income (with annual and initial charges deducted)

Period 2			
12 months back and 12 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**36.1%**	23.8%	19.5%	20.6%
Second quartile	24.2%	**28.0%**	26.0%	21.7%
Third quartile	19.7%	25.6%	**31.4%**	23.3%
Top quartile	20.0%	22.6%	23.1%	**34.3%**
24 months back and 24 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**35.5%**	22.7%	20.1%	21.7%
Second quartile	20.1%	**29.2%**	**29.0%**	21.7%
Third quartile	20.9%	**27.2%**	26.6%	25.3%
Top quartile	23.5%	20.9%	24.3%	**31.3%**
36 months back and 36 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**31.1%**	24.2%	21.7%	23.0%
Second quartile	**27.0%**	24.2%	**27.3%**	21.4%
Third quartile	22.4%	26.4%	**29.2%**	22.0%
Top quartile	19.6%	25.2%	21.7%	**33.5%**
48 months back and 48 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**33.2%**	23.9%	20.9%	22.0%
Second quartile	26.5%	26.9%	**28.4%**	18.3%
Third quartile	21.6%	**29.1%**	**28.7%**	20.5%
Top quartile	18.7%	20.1%	22.0%	**39.2%**
60 months back and 60 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**36.9%**	24.0%	19.8%	19.4%
Second quartile	**29.5%**	**28.6%**	24.0%	18.0%
Third quartile	21.7%	**30.4%**	**30.0%**	18.0%
Top quartile	12.0%	17.1%	26.3%	**44.7%**
72 months back and 72 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**36.6%**	23.8%	22.6%	17.1%
Second quartile	25.6%	**35.4%**	20.1%	18.9%
Third quartile	26.8%	25.6%	26.2%	21.3%
Top quartile	11.0%	15.2%	**31.1%**	**42.7%**
84 months back and 84 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**34.7%**	23.7%	19.5%	22.0%
Second quartile	**30.5%**	**35.6%**	17.8%	16.1%
Third quartile	26.3%	**29.7%**	22.9%	21.2%
Top quartile	8.5%	11.0%	**39.8%**	**40.7%**

Results in bold denote values greater than 27%. The contingency tables show the probability of a fund in one quartile being in the same quartile in the following period. If performance was purely random you would expect these probabilities to be 25% i.e. there is an equal chance of a top quartile fund ending up in any of the four quartiles in the subsequent period as the past period effectively has no influence on the future period.

Table 10: UK Equity & Bond Income (with annual and initial charges deducted)

Period 2			
12 months back and 12 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**35.1%**	25.7%	18.8%	20.4%
Second quartile	**27.8%**	26.5%	26.1%	19.6%
Third quartile	22.9%	24.9%	25.7%	26.5%
Top quartile	14.3%	22.9%	**29.4%**	**33.5%**
24 months back and 24 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**29.9%**	20.1%	**27.9%**	22.1%
Second quartile	24.5%	**29.4%**	23.0%	23.0%
Third quartile	21.1%	26.5%	25.0%	**27.5%**
Top quartile	24.5%	24.0%	24.0%	**27.5%**
36 months back and 36 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	26.8%	**27.4%**	21.4%	24.4%
Second quartile	23.8%	23.8%	**27.4%**	25.0%
Third quartile	**28.0%**	22.6%	22.0%	**27.4%**
Top quartile	21.4%	26.2%	**29.2%**	23.2%
48 months back and 48 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	18.7%	**34.3%**	24.6%	22.4%
Second quartile	23.9%	**29.1%**	20.1%	26.9%
Third quartile	**35.8%**	16.4%	23.9%	23.9%
Top quartile	21.6%	20.1%	**31.3%**	26.9%
60 months back and 60 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	24.3%	**28.0%**	23.4%	24.3%
Second quartile	**27.1%**	**29.0%**	20.6%	23.4%
Third quartile	**30.8%**	17.8%	26.2%	25.2%
Top quartile	17.8%	25.2%	**29.9%**	**27.1%**
72 months back and 72 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	25.3%	26.5%	10.8%	**37.3%**
Second quartile	18.1%	**30.1%**	**32.5%**	19.3%
Third quartile	**28.9%**	20.5%	**34.9%**	15.7%
Top quartile	**27.7%**	22.9%	21.7%	**27.7%**
84 months back and 84 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**27.9%**	18.0%	19.7%	**34.4%**
Second quartile	19.7%	**29.5%**	**32.8%**	18.0%
Third quartile	**29.5%**	23.0%	21.3%	26.2%
Top quartile	23.0%	**29.5%**	26.2%	21.3%

Results in bold denote values greater than 27%. The contingency tables show the probability of a fund in one quartile being in the same quartile in the following period. If performance was purely random you would expect these probabilities to be 25% i.e. there is an equal chance of a top quartile fund ending up in any of the four quartiles in the subsequent period as the past period effectively has no influence on the future period.

Table 11: UK All companies (with annual and initial charges deducted)

Period 2			
12 months back and 12 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**34.9%**	24.3%	21.1%	19.7%
Second quartile	24.2%	**29.1%**	26.2%	20.5%
Third quartile	20.7%	26.1%	**31.0%**	22.2%
Top quartile	20.2%	20.5%	21.7%	**37.6%**
24 months back and 24 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**30.3%**	22.5%	21.3%	25.9%
Second quartile	22.9%	26.5%	**27.3%**	23.3%
Third quartile	20.6%	**29.8%**	**28.2%**	21.4%
Top quartile	26.2%	21.1%	23.3%	**29.4%**
36 months back and 36 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	26.4%	23.0%	22.1%	**28.5%**
Second quartile	21.8%	**27.3%**	**29.4%**	21.5%
Third quartile	24.1%	**28.9%**	26.1%	20.9%
Top quartile	**27.7%**	20.8%	22.4%	**29.1%**
48 months back and 48 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	25.0%	24.9%	24.1%	26.0%
Second quartile	25.2%	**27.6%**	26.2%	21.0%
Third quartile	26.2%	25.0%	25.4%	23.4%
Top quartile	23.6%	22.5%	24.3%	**29.7%**
60 months back and 60 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	26.1%	26.6%	23.1%	24.2%
Second quartile	**29.1%**	26.6%	22.8%	21.4%
Third quartile	22.8%	**27.0%**	**27.3%**	22.8%
Top quartile	21.9%	19.8%	26.8%	**31.5%**
72 months back and 72 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**27.1%**	**27.7%**	20.2%	24.9%
Second quartile	**29.6%**	25.5%	24.6%	20.2%
Third quartile	24.3%	26.8%	**27.1%**	21.8%
Top quartile	19.0%	19.9%	**28.0%**	**33.0%**
84 months back and 84 months forward			
Period 1	Bottom quartile	Second quartile	Third quartile	Top quartile
Bottom quartile	**27.6%**	24.0%	25.3%	23.1%
Second quartile	**27.6%**	**27.1%**	24.9%	20.4%
Third quartile	24.9%	**28.9%**	**28.4%**	17.8%
Top quartile	20.0%	20.0%	21.3%	**38.7%**

Results in bold denote values greater than 27%. The contingency tables show the probability of a fund in one quartile being in the same quartile in the following period. If performance was purely random you would expect these probabilities to be 25% i.e. there is an equal chance of a top quartile fund ending up in any of the four quartiles in the subsequent period as the past period effectively has no influence on the future period.

Average cumulative return (with annual and initial charges deducted) using a symmetric investment rule

We also calculate the average cumulative return from adopting a symmetrical investment strategy over the four sectors and seven time horizons after accounting for annual and initial charges. This means we calculate returns in the same way as we have calculated returns for the contingency tables, but the difference is in this instance we are looking at the level of returns, as opposed to the relativity of returns. We calculate – by sector - the cumulative return in the investment period resulting from choosing unit trusts based on quartile performance in the assessment period.

Choosing a fund in the top quartile of the Small Companies sector, for example, based on the previous 12 months performance, and holding it for a year gives an average cumulative return over the 21 years of data of roughly 15.5%. This figure falls to less than 10% if you base your decision on funds in the bottom quartile, ranked on the previous 12 months performance. This suggests a benefit of 5.5% to the investor using this decision rule. This result is very similar to that found looking at annual charges in isolation.

Looking further forward, the difference in returns can be considerably larger than the average level of initial charges. This is because when a fund dies we assume the consumer incurs a new initial charge. This is likely to reduce returns dramatically in quartiles where many funds die.

In order to look at the effect of choosing funds based on longer horizons, we considered a strategy based on assessment and investment periods of up to seven years. The results suggest even greater gains from persistence after accounting for initial and annual charges. This is likely to reflect the fact that poorly performing funds are most likely to die and so these consumers are in turn most likely to incur a further initial charge (based on the current assumptions).

Using sixty-month performance as an example we can see that by choosing a fund in the top rather than bottom quartile - based on its previous sixty-month performance and holding it for the following sixty months - produces higher cumulative returns in all four sectors. However, the difference depends on the sector, for example, the largest differences were seen in the Equity Income sector.

Figure 17: Average cumulative returns for 12 months based on quartiles assessed on 12 months (with annual and initial charges deducted)
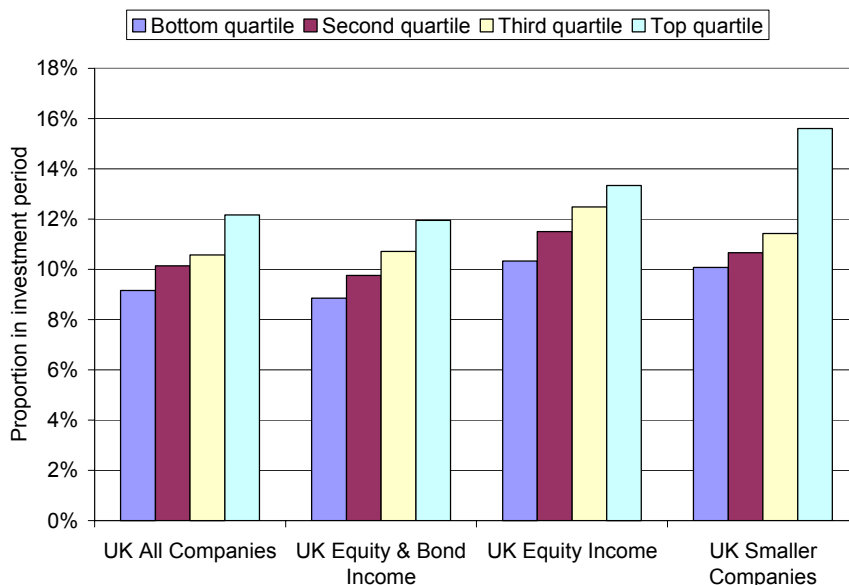
Figure 18: Average cumulative returns for 24 months based on quartiles assessed on 24 months (with annual and initial charges deducted)
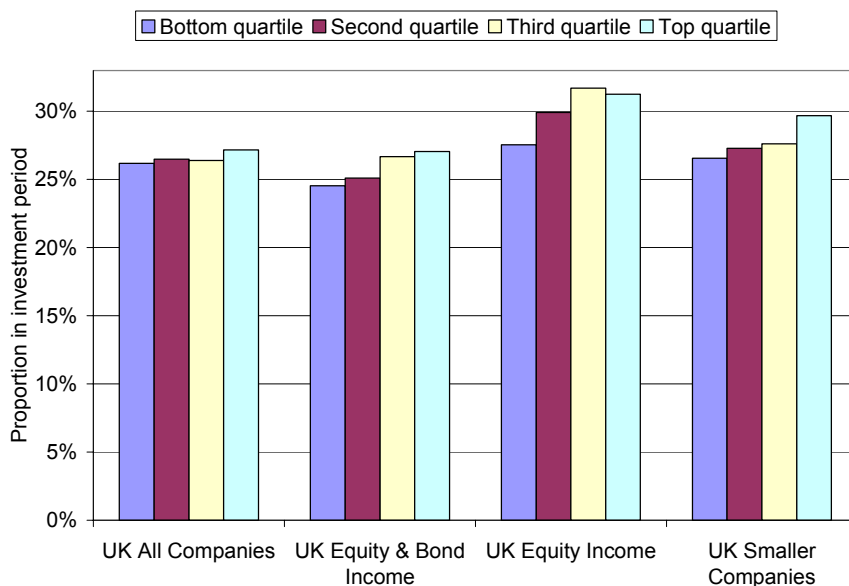
Figure 19: Average cumulative returns for 36 months based on quartiles assessed on 36 months (with annual and initial charges deducted)
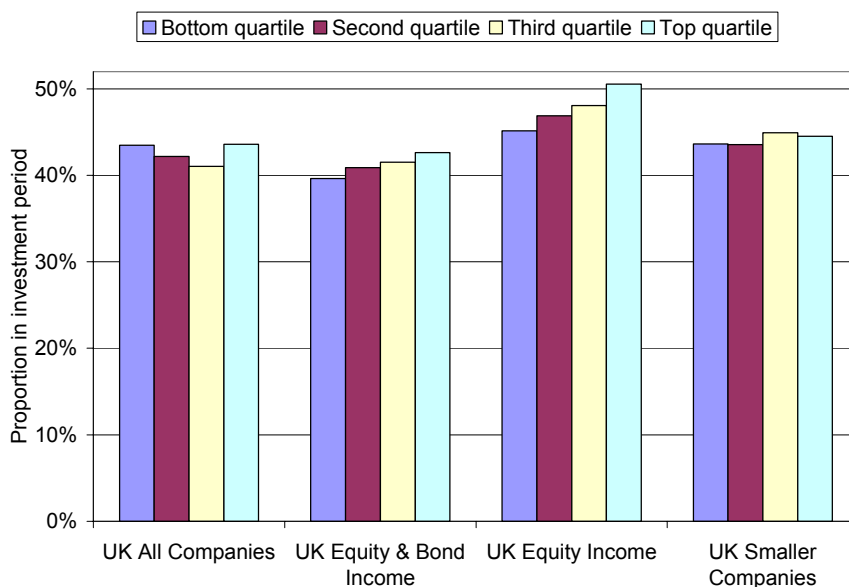
Figure 20: Average cumulative returns for 48 months based on quartiles assessed on 48 months (with annual and initial charges deducted)
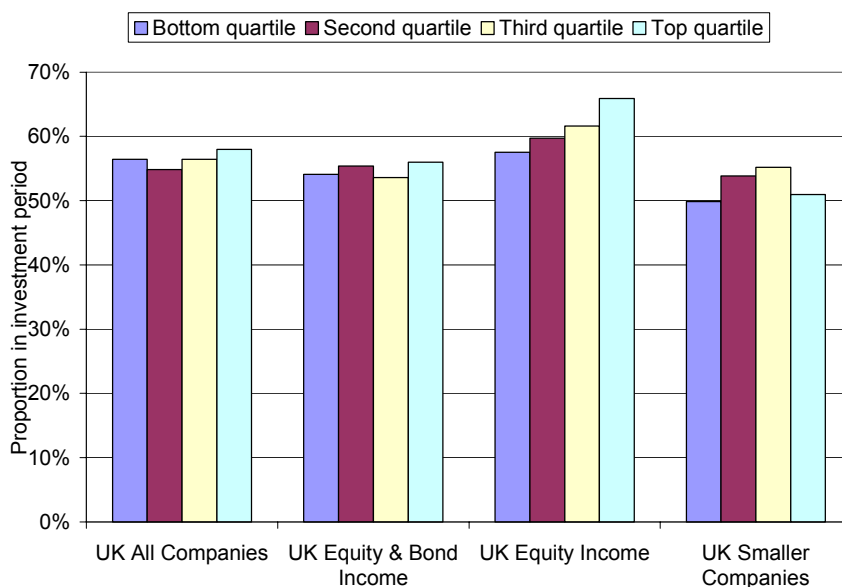
Figure 21: Average cumulative returns for 60 months based on quartiles assessed on 60 months (with annual and initial charges deducted)
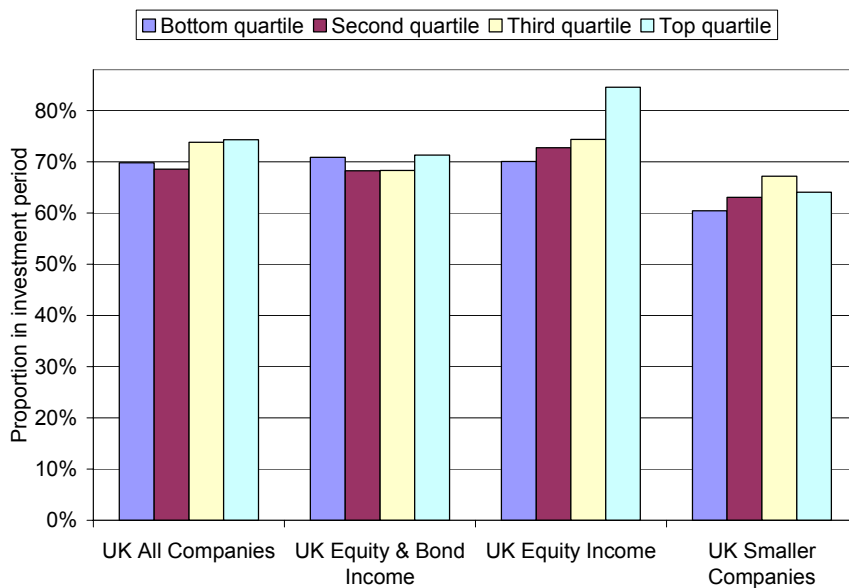
Figure 22: Average cumulative returns for 72 months based on quartiles assessed on 72 months (with annual and initial charges deducted)
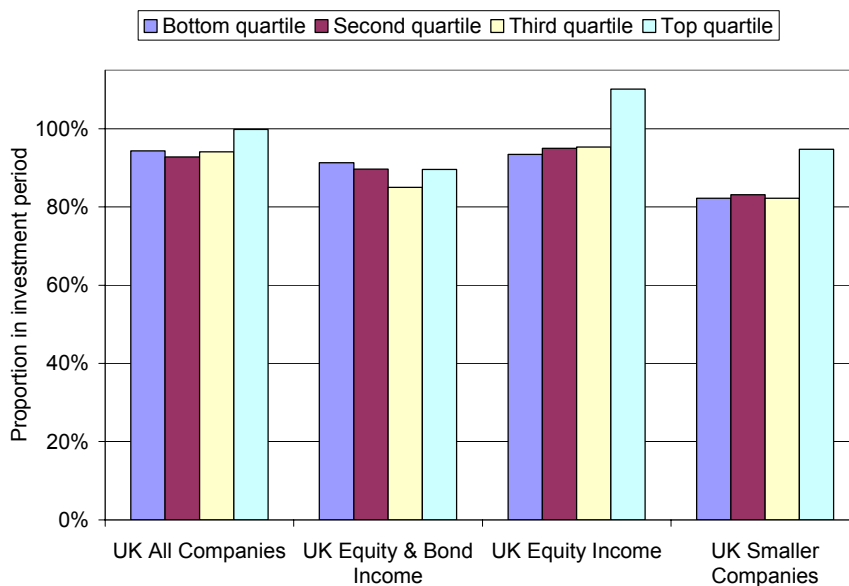
Figure 23: Average cumulative returns for 84 months based on quartiles assessed on 84 months (with annual and initial charges deducted)
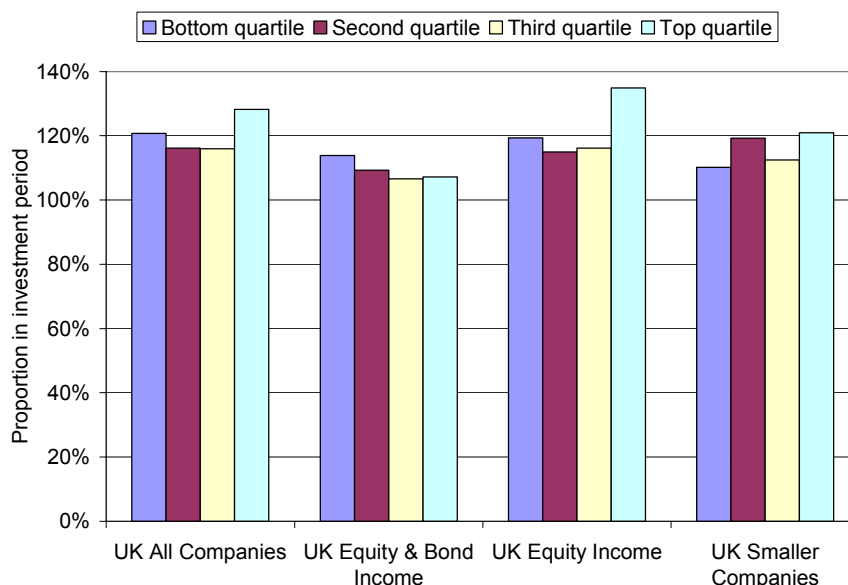
Based on this test, we find positive returns are gained from persistence in each of the four sectors. The size of the effect depends on the assessment and investment periods, with the UK All Companies and Equity Income sectors again displaying larger effects. The UK Equity and Bond Income sector shows stronger results with annual and initial charges accounted for, as opposed to solely annual and the smaller companies effect is relatively strong in the shorter time periods. Although the degree of persistence in cumulative returns for investors who hold unit trusts varies, persistence itself does not appear to be dependent on either the inclusion of annual or initial charges. Indeed the inclusion of initial charges in this series of results, in addition to the annual charges accounted for in the first series of results, strengthens the positive persistence result. [4]

Conclusion

In Annex 1 and Section 5 we provide sensitivity analysis that demonstrates that these results are robust to changes in a number of the assumptions we have made. In none of the cases examined is the conclusion materially altered.

In summary, our results suggest that persistence is a persistent phenomenon that can be economically exploited by consumers.

It has been noted that our results differ from those of previous researchers' work. In the main, this has been because we deal with raw returns while most other researchers deal with risk-adjusted returns. However where researchers have dealt with raw returns their conclusions have not been at odds with our own. We give two quotes in Section 3 of

---

[4] These results are generated by relying on the assumption that an initial charge is levied on funds that need to be reinvested after fund termination. To ensure that this assumption was not providing the key influence we retest net returns without this assumption and find comparable results.

researchers who found persistence in raw returns. However our conclusions have been contrasted with the conclusions of Rhodes (2000). In that case some of his results are presented using raw data – see tables 3 to 5 of that report. In these tables three scenarios are presented, one illustrates positive persistence, one negative and one no persistence. In summary, the author suggests that this demonstrates a lack of persistence.

We also find that individually viewing the contingency tables of a small number of scenarios often gives this type of mixed picture. However, it was only when we examined all potential scenarios were we able to conclude that persistence is significant and that positive persistence outweighs negative persistence. Only by looking across the whole period is it possible to create an objective test that maximises the use of the data.

Section 5   Statistical analysis

So far we have only looked at descriptive statistics on the level of persistence. Even if there were in fact no persistence, we would expect to find a number of funds that repeat good performance or repeat poor performance through chance alone.

In our contingency tables, for example, there is a possibility that a higher proportion of funds will remain in the top quartile through chance alone. If we were to look at another period we might easily find a different result. To check this possibility we do not concentrate on a particular period but test all available data, and apply a variety of statistical tests. For each of these we find that closed form algebraic techniques are undermined by the use of overlapping scenarios. [5] To overcome this we need to employ a simulation technique to set accurate confidence intervals.

Testing contingency tables

It is possible to test whether the pattern of results found in our sample is likely to occur through chance using the chi-squared distribution.

- Test 1 – We first test whether the sum of the difference between the observed and expected number of funds in each cell of the table is significantly different from zero. This test gives a broad indication of the existence of persistence but is neutral over whether the persistence arises from poor performance alone, negative persistence, persistence of good performance or alternatively some strong but not economically useful pattern of persistence;
- Test 2 – We then test whether persistence is more concentrated in the corners of the contingency table. In other words, is there positive or negative persistence in good and bad performance? Using quartiles ensures that the test will pick up persistence of 1st quartile performance followed by 1st quartile results and 4th quartile performance followed by 4th quartile results. However it will also pick up negative persistence that is more difficult to exploit, i.e., 1st quartile performance followed by 4th quartile results and 4th quartile performance followed by 1st quartile results; and
- Test 3 – We therefore add a cross product test to determine the balance between positive and negative persistence.

These three techniques have been used in previous papers (see Do Céu Ribeiro Cortez et al, 1999) and can isolate the existence of positive persistence. However our primary focus is on the identification of positive good performance in isolation. We employ a discrete test (Test 4) to examine this, by testing the discrete number of funds in each sample in the top quartile in both the assessment and investment periods.

---

[5] For example, a five-year scenario starting in 1992 overlaps with a five-year scenario starting in 1995 and the results are therefore not independent.

This test is clearly a strategy that even a naive investor could follow and potentially exploit – being nothing more than simply selecting funds from the top quartile rather than the full range – and so this report emphasises these results.

Conceptually these discrete tests are similar to binomial trials. However they differ in two important ways:

- The probability that a top quartile fund will also be in the top quartile is on average 25%. However in any given trial the actual probability is a function of the returns of the funds from the other three quartiles; and
- As with tests 1-3, for strategies greater than twelve months the problem of overlapping observations arises – as the investment or assessment period increases the number of independent observations decreases.

The first of these points renders the distribution of outcomes narrower than a binomial distribution. Thus, for twelve-month returns a given result is more likely to be significant than would be suggested by a binomial test alone.

Figure 24, below, illustrates this: at a 95% confidence interval, the binomial distribution would suggest that the critical value is 136 funds, but the simulation demonstrates that the 95% confidence level is achieved at the lower level of 134 funds.

Figure 24: Impact of dependent probability without overlap[6]

Distribution of total number of top quartile funds remaining in top quartile
(96 funds over 21 years, 12 months back and forward)

___
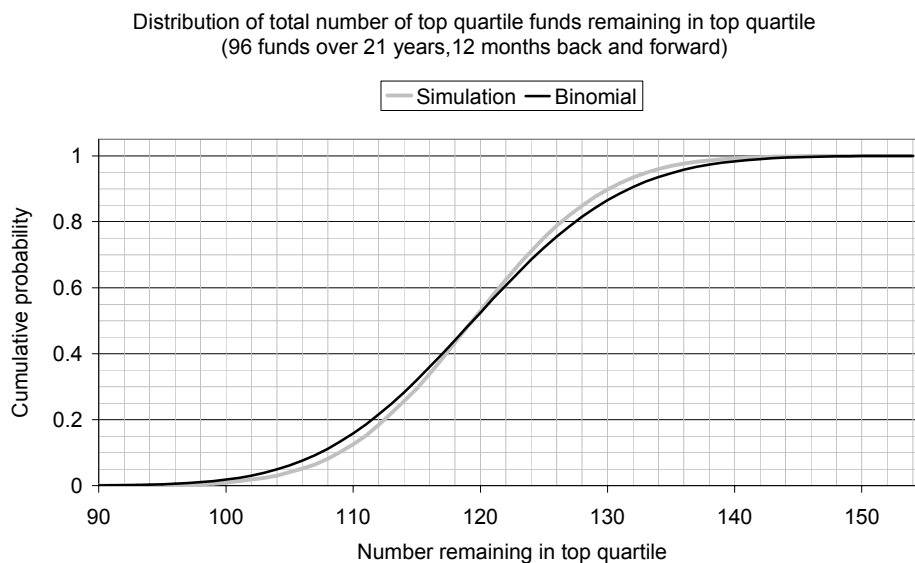
[6] Given 96 funds in each of 20 trials over 21 years of data, the expected number remaining in the top quartile is 120, i.e., $96 \times 20 \times 0.25$ (representing the expected proportion in the initial top quartile) $\times$ 0.25 (representing the expected proportion in the subsequent top quartile).

In the second instance the effect is to render the distribution of outcomes wider than a binomial distribution. Therefore, for sixty-month returns a given result is less likely to be significant than would be suggested by a binomial test alone.

Figure 25, below, illustrates this: at a 95% confidence interval the binomial distribution would suggest that the critical value is 58 funds, yet the simulation demonstrates that the 95% confidence level is achieved at the higher level of 60 funds, reversing the previous effect.

Figure 25: Impact of including adjustment for overlapping observations

Distribution of total number of top quartile funds remaining in top quartile
(96 funds over 21 years, 84 months back and forward)
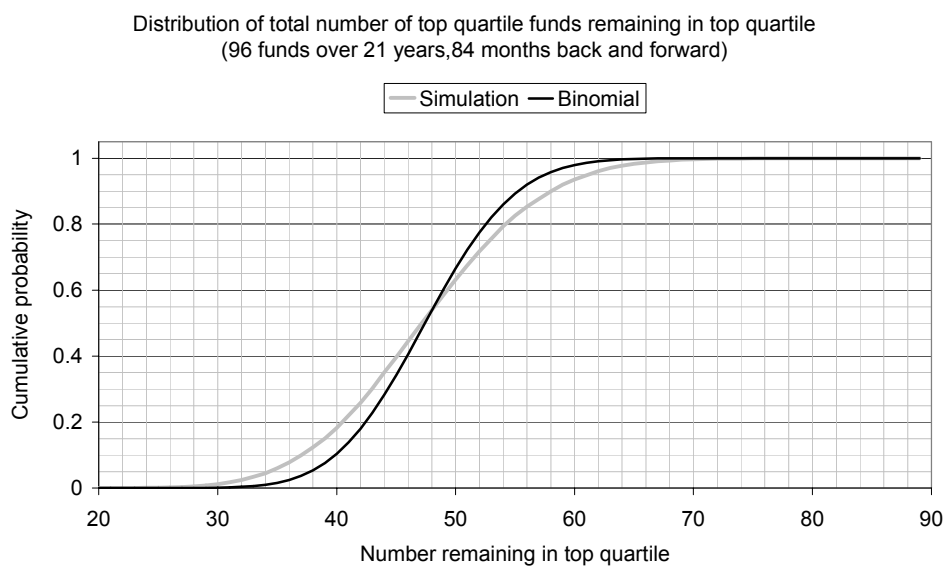
Compared to closed form tests, using the correct confidence intervals for the 12/12-month makes significant conclusions more likely. However, this does not change our conclusions. For tests over longer periods these adjustments make significant conclusions less likely.

Testing results

For the four tests listed above, the most reliable confidence intervals are those generated by our simulations as these adjust not only for the problem of overlapping observations but also, for the discrete test, the dependent probability. However, as guides, we also present the closed form algebraic test results (that is, a standard chi-squared test for Test 1 and a binomial test for Test 4 without adjusting for the two effects discussed above).

In the first table of results (see Table 12, below) we present the results of the first test introduced above. Each row represents the result for one of the four sectors and one scenario or combination of assessment and investment periods. We accumulate the results of individual contingency tables and record the test result for the cumulative contingency table.

This result supports the view that persistence is evident across sectors and years. However, although this test has been widely used and does demonstrate a high level of significance, it is not focused specifically on the benefit of investors following a given practical strategy.

Table 12: Summary of cumulative Chi-squared testing (test 1)

Net annual/Gross initial/Randon reinvestment

| | | Strategy in years | Overall deviation from mean | | |
| | | | Test | Level of significance | |
Run	Sector	Back / Forward	Value	Unadjusted	Overlap adjusted
1	UK All Companies	1 / 1	155.5	0.0% ****	0.0% ****
2	UK Equity & Bond Income	1 / 1	42.0	0.0% ****	0.0% ****
3	UK Equity Income	1 / 1	70.7	0.0% ****	0.0% ****
4	UK Smaller Companies	1 / 1	58.1	0.0% ****	0.0% ****
5	UK All Companies	2 / 2	52.5	0.0% ****	0.0% ****
6	UK Equity & Bond Income	2 / 2	5.7	76.7%	82.9%
7	UK Equity Income	2 / 2	32.2	0.0% ****	0.0% ****
8	UK Smaller Companies	2 / 2	14.7	10.0% *	15.0%
9	UK All Companies	3 / 3	32.9	0.0% ****	0.2% ***
10	UK Equity & Bond Income	3 / 3	8.1	52.0%	67.0%
11	UK Equity Income	3 / 3	35.6	0.0% ****	0.0% ****
12	UK Smaller Companies	3 / 3	28.8	0.1% ****	0.5% ***
13	UK All Companies	4 / 4	17.5	4.1% **	15.1%
14	UK Equity & Bond Income	4 / 4	10.2	33.4%	57.7%
15	UK Equity Income	4 / 4	48.8	0.0% ****	0.0% ****
16	UK Smaller Companies	4 / 4	6.8	66.0%	84.0%
17	UK All Companies	5 / 5	14.4	10.7%	35.3%
18	UK Equity & Bond Income	5 / 5	5.0	83.7%	89.9%
19	UK Equity Income	5 / 5	66.4	0.0% ****	0.0% ****
20	UK Smaller Companies	5 / 5	7.5	58.1%	83.0%
21	UK All Companies	6 / 6	17.3	4.4% **	27.6%
22	UK Equity & Bond Income	6 / 6	10.8	28.7%	66.8%
23	UK Equity Income	6 / 6	67.8	0.0% ****	0.0% ****
24	UK Smaller Companies	6 / 6	12.7	17.6%	52.0%
25	UK All Companies	7 / 7	31.8	0.0% ****	3.2% **
26	UK Equity & Bond Income	7 / 7	14.6	10.2%	46.3%
27	UK Equity Income	7 / 7	55.1	0.0% ****	0.0% ****
28	UK Smaller Companies	7 / 7	26.9	0.1% ***	7.4% *

Notes:
* Signficant at 90% level of confidence
** Signficant at 95% level of confidence
*** Signficant at 99% level of confidence
**** Signficant at 99.9% level of confidence

Table 13: Summary of cumulative Chi-squared testing (test 2)

Net annual/Gross initial/Randon reinvestment

Run	Sector	Strategy in years Back / Forward	Deviation of corners	
			Test Value	Level of significance Overlap adjusted
1	UK All Companies	1 / 1	104.6	0.0% ****
2	UK Equity & Bond Income	1 / 1	33.8	0.0% ****
3	UK Equity Income	1 / 1	41.9	0.0% ****
4	UK Smaller Companies	1 / 1	47.7	0.0% ****
5	UK All Companies	2 / 2	11.3	0.9% ***
6	UK Equity & Bond Income	2 / 2	1.6	64.8%
7	UK Equity Income	2 / 2	13.0	0.4% ***
8	UK Smaller Companies	2 / 2	7.7	3.9% **
9	UK All Companies	3 / 3	10.5	2.8% **
10	UK Equity & Bond Income	3 / 3	2.8	48.7%
11	UK Equity Income	3 / 3	19.4	0.1% ***
12	UK Smaller Companies	3 / 3	2.9	46.3%
13	UK All Companies	4 / 4	5.4	24.6%
14	UK Equity & Bond Income	4 / 4	5.7	23.5%
15	UK Equity Income	4 / 4	33.3	0.0% ****
16	UK Smaller Companies	4 / 4	1.3	88.4%
17	UK All Companies	5 / 5	8.1	14.0%
18	UK Equity & Bond Income	5 / 5	0.6	89.9%
19	UK Equity Income	5 / 5	43.1	0.0% ****
20	UK Smaller Companies	5 / 5	0.8	89.9%
21	UK All Companies	6 / 6	9.5	12.2%
22	UK Equity & Bond Income	6 / 6	3.6	55.6%
23	UK Equity Income	6 / 6	48.8	0.0% ****
24	UK Smaller Companies	6 / 6	4.4	47.3%
25	UK All Companies	7 / 7	14.4	5.1% *
26	UK Equity & Bond Income	7 / 7	6.5	29.5%
27	UK Equity Income	7 / 7	24.9	0.4% ***
28	UK Smaller Companies	7 / 7	4.4	48.8%

Notes:
*   Signficant at 90% level of confidence
**   Signficant at 95% level of confidence
***   Signficant at 99% level of confidence
****   Signficant at 99.9% level of confidence

Table 13, above, provides a more focused test (Test 2). By concentrating on the incidence of persistence in the four corner of the contingency table this tests for more useful forms of persistence. Again, in this test persistence is evident, especially for short periods. However the test is relatively weak and not focussed on strategies that consumers can easily implement.

Below, we consider the cross-product ratio for investments made in the all companies sector for different investment periods. This was calculated as a ratio of positive persistence (Win going on to Win (WW) and Lose going on to Lose (LL)) versus negative persistence (Win going on to Lose (WL) and Lose going on to Win (LW)) or (WW*LL)/(WL*LW). A number for this ratio above 1 suggested positive persistence, while a number below 1 revealed negative persistence.

Table 14: Summary of cumulative cross product testing (test 3)

Net annual/Gross initial/Randon reinvestment

Run	Sector	Strategy in years Back / Forward	Cross product	
			Test Value	Overlap adjusted significance
1	UK All Companies	1 / 1	1.58	0.0% ****
2	UK Equity & Bond Income	1 / 1	1.75	0.0% ****
3	UK Equity Income	1 / 1	1.61	0.0% ****
4	UK Smaller Companies	1 / 1	1.64	0.0% ****
5	UK All Companies	2 / 2	0.99	58.8%
6	UK Equity & Bond Income	2 / 2	1.22	12.6%
7	UK Equity Income	2 / 2	1.25	3.1% **
8	UK Smaller Companies	2 / 2	1.39	1.3% **
9	UK All Companies	3 / 3	0.85	89.9%
10	UK Equity & Bond Income	3 / 3	1.00	50.6%
11	UK Equity Income	3 / 3	1.16	15.4%
12	UK Smaller Companies	3 / 3	1.52	0.8% ***
13	UK All Companies	4 / 4	0.99	55.8%
14	UK Equity & Bond Income	4 / 4	1.35	12.3%
15	UK Equity Income	4 / 4	1.27	8.7% *
16	UK Smaller Companies	4 / 4	1.13	29.4%
17	UK All Companies	5 / 5	1.15	16.8%
18	UK Equity & Bond Income	5 / 5	0.96	62.6%
19	UK Equity Income	5 / 5	1.78	0.1% ***
20	UK Smaller Companies	5 / 5	1.26	19.2%
21	UK All Companies	6 / 6	1.08	36.8%
22	UK Equity & Bond Income	6 / 6	0.91	69.1%
23	UK Equity Income	6 / 6	1.99	0.2% ***
24	UK Smaller Companies	6 / 6	1.49	13.8%
25	UK All Companies	7 / 7	1.04	44.1%
26	UK Equity & Bond Income	7 / 7	0.67	87.6%
27	UK Equity Income	7 / 7	2.05	0.8% ***
28	UK Smaller Companies	7 / 7	1.21	40.5%

Notes:
*   Signficant at 90% level of confidence
**   Signficant at 95% level of confidence
***   Signficant at 99% level of confidence
****   Signficant at 99.9% level of confidence

Table 14, above, provides the result of this test which is more focused again (Test 3). By concentrating on the balance between positive and negative persistence this test begins to examine strategies that might be recognisable to consumers. Again in this test persistence is evident – positive in this case – especially for short periods. However, the test is relatively weak and does not differentiate between a strategy based on persistence of good performance and a strategy based in persistence of poor performance.

Table 15: Significance of top quartile returns following top quartile selection (test 4, Period sorted)

Net annual/Gross initial/Randon reinvestment

			Discrete tests			
			Top quartile to top quartile test			
		Strategy in years	Results			Binomial level	Overlapping
Run	Sector	Back / Forward	Trials	Success	%	of significance	adjusted level
1	UK All Companies	1 / 1	946	349	**36.9%**	0.0% ****	0.0% ****
2	UK Equity & Bond Income	1 / 1	245	86	**35.1%**	0.0% ****	0.0% ****
3	UK Equity Income	1 / 1	446	144	**32.3%**	0.0% ****	0.0% ****
4	UK Smaller Companies	1 / 1	292	114	**39.0%**	0.0% ****	0.0% ****
5	UK All Companies	2 / 2	795	221	**27.8%**	3.2% **	3.8% **
6	UK Equity & Bond Income	2 / 2	204	55	**27.0%**	23.2%	28.4%
7	UK Equity Income	2 / 2	383	110	**28.7%**	4.3% **	5.7% *
8	UK Smaller Companies	2 / 2	244	74	**30.3%**	2.5% **	3.1% **
9	UK All Companies	3 / 3	664	181	**27.3%**	8.3% *	11.5%
10	UK Equity & Bond Income	3 / 3	168	39	23.2%	66.8%	74.6%
11	UK Equity Income	3 / 3	322	108	**33.5%**	0.0% ****	0.0% ****
12	UK Smaller Companies	3 / 3	201	53	**26.4%**	29.5%	39.5%
13	UK All Companies	4 / 4	543	156	**28.7%**	2.1% **	5.8% *
14	UK Equity & Bond Income	4 / 4	134	36	**26.9%**	27.1%	37.8%
15	UK Equity Income	4 / 4	268	104	**38.8%**	0.0% ****	0.0% ****
16	UK Smaller Companies	4 / 4	158	36	22.8%	70.5%	74.6%
17	UK All Companies	5 / 5	429	134	**31.2%**	0.1% ***	1.1% **
18	UK Equity & Bond Income	5 / 5	107	26	24.3%	51.5%	60.7%
19	UK Equity Income	5 / 5	217	92	**42.4%**	0.0% ****	0.0% ****
20	UK Smaller Companies	5 / 5	122	33	**27.0%**	26.2%	38.9%
21	UK All Companies	6 / 6	321	102	**31.8%**	0.3% ***	2.3% **
22	UK Equity & Bond Income	6 / 6	83	25	**30.1%**	11.6%	25.0%
23	UK Equity Income	6 / 6	164	70	**42.7%**	0.0% ****	0.0% ****
24	UK Smaller Companies	6 / 6	90	29	**32.2%**	4.7% **	14.4%
25	UK All Companies	7 / 7	225	84	**37.3%**	0.0% ****	0.1% ***
26	UK Equity & Bond Income	7 / 7	61	13	21.3%	69.1%	75.9%
27	UK Equity Income	7 / 7	118	44	**37.3%**	0.1% ***	1.5% **
28	UK Smaller Companies	7 / 7	64	15	23.4%	54.8%	61.2%

Notes:

*	Signficant at 90% level of confidence
**	Signficant at 95% level of confidence
***	Signficant at 99% level of confidence
****	Signficant at 99.9% level of confidence

Bold for >25%

> "Trials" are the cumulative number of funds in the top quartile during the assessment period over the 21 years of data. "Success" indicates the number of funds that remained in the top quartile in the subsequent investment period.

Table 15, above, shows the results of the more retail investor focused strategy of simply investing in top quartile funds. For this test we evaluate the number of funds that subsequently demonstrate top quartile performance. The first point of interest is that in only five of the 28 scenarios tested is the result less than 25%. This strongly suggests that such a strategy is helpful for investors. However, for these observations to be considered statistically significant they must exceed 25% by a critical margin, and the right-hand column demonstrates that most of the scenarios do fulfil this requirement. However the results are most clear for one-year/one-year strategy and mixed for subsequent years.

By re-sorting the above results by sector, Table 16 demonstrates that persistence is virtually universally significant for the two largest sectors - UK All Companies and UK Equity Income. This result is strong evidence that previous conclusions which stated

that investors could not benefit from past performance information appear unsustainable.

This table presents the results for returns net of annual charges and gross of initial charges with reinvestment, following fund death, based on a strategy of randomly selecting another fund from the sector.

Table 16: Significance of top quartile returns following top quartile selection (test 4, Sector sorted)

Net annual/Gross initial/Randon reinvestment

		Strategy in years	Discrete tests				
			Top quartile to top quartile test				
			Results			Binomial level	Overlapping
Run	Sector	Back / Forward	Trials	Success	%	of significance	adjusted level
1	UK All Companies	1 / 1	946	349	**36.9%**	0.0% ****	0.0% ****
5	UK All Companies	2 / 2	795	221	**27.8%**	3.2% **	3.8% **
9	UK All Companies	3 / 3	664	181	**27.3%**	8.3% *	11.5%
13	UK All Companies	4 / 4	543	156	**28.7%**	2.1% **	5.8% *
17	UK All Companies	5 / 5	429	134	**31.2%**	0.1% ***	1.1% **
21	UK All Companies	6 / 6	321	102	**31.8%**	0.3% ***	2.3% **
25	UK All Companies	7 / 7	225	84	**37.3%**	0.0% ****	0.1% ***
2	UK Equity & Bond Income	1 / 1	245	86	**35.1%**	0.0% ****	0.0% ****
6	UK Equity & Bond Income	2 / 2	204	55	**27.0%**	23.2%	28.4%
10	UK Equity & Bond Income	3 / 3	168	39	23.2%	66.8%	74.6%
14	UK Equity & Bond Income	4 / 4	134	36	**26.9%**	27.1%	37.8%
18	UK Equity & Bond Income	5 / 5	107	26	24.3%	51.5%	60.7%
22	UK Equity & Bond Income	6 / 6	83	25	**30.1%**	11.6%	25.0%
26	UK Equity & Bond Income	7 / 7	61	13	21.3%	69.1%	75.9%
3	UK Equity Income	1 / 1	446	144	**32.3%**	0.0% ****	0.0% ****
7	UK Equity Income	2 / 2	383	110	**28.7%**	4.3% **	5.7% *
11	UK Equity Income	3 / 3	322	108	**33.5%**	0.0% ****	0.0% ****
15	UK Equity Income	4 / 4	268	104	**38.8%**	0.0% ****	0.0% ****
19	UK Equity Income	5 / 5	217	92	**42.4%**	0.0% ****	0.0% ****
23	UK Equity Income	6 / 6	164	70	**42.7%**	0.0% ****	0.0% ****
27	UK Equity Income	7 / 7	118	44	**37.3%**	0.1% ***	1.5% **
4	UK Smaller Companies	1 / 1	292	114	**39.0%**	0.0% ****	0.0% ****
8	UK Smaller Companies	2 / 2	244	74	**30.3%**	2.5% **	3.1% **
12	UK Smaller Companies	3 / 3	201	53	**26.4%**	29.5%	39.5%
16	UK Smaller Companies	4 / 4	158	36	22.8%	70.5%	74.6%
20	UK Smaller Companies	5 / 5	122	33	**27.0%**	26.2%	38.9%
24	UK Smaller Companies	6 / 6	90	29	**32.2%**	4.7% **	14.4%
28	UK Smaller Companies	7 / 7	64	15	23.4%	54.8%	61.2%

Notes:
*   Signficant at 90% level of confidence   Bold for >25%
**   Signficant at 95% level of confidence
***   Signficant at 99% level of confidence
****   Signficant at 99.9% level of confidence

Table 17, below, shows that when initial charges are taken into account the level of significance is strengthened (as the descriptive results suggested).

Table 17: Result with initial charges taken into account

Net annual/Net initial/Randon reinvestment

			Discrete tests			
			Top quartile to top quartile test			
		Strategy in years	Results			Binomial level	Overlapping
Run	Sector	Back / Forward	Trials	Success	%	of significance	adjusted level
1	UK All Companies	1 / 1	946	356	**37.6%**	0.0% ****	0.0% ****
5	UK All Companies	2 / 2	795	234	**29.4%**	0.2% ***	0.1% ***
9	UK All Companies	3 / 3	664	193	**29.1%**	0.8% ***	1.6% **
13	UK All Companies	4 / 4	543	161	**29.7%**	0.6% ***	2.4% **
17	UK All Companies	5 / 5	429	135	**31.5%**	0.1% ***	0.8% ***
21	UK All Companies	6 / 6	321	106	**33.0%**	0.1% ****	0.7% ***
25	UK All Companies	7 / 7	225	87	**38.7%**	0.0% ****	0.0% ****
2	UK Equity & Bond Income	1 / 1	245	82	**33.5%**	0.1% ***	0.0% ****
6	UK Equity & Bond Income	2 / 2	204	56	**27.5%**	18.6%	23.2%
10	UK Equity & Bond Income	3 / 3	168	39	23.2%	66.8%	74.6%
14	UK Equity & Bond Income	4 / 4	134	36	**26.9%**	27.1%	37.8%
18	UK Equity & Bond Income	5 / 5	107	29	**27.1%**	26.6%	38.7%
22	UK Equity & Bond Income	6 / 6	83	23	**27.7%**	24.0%	37.3%
26	UK Equity & Bond Income	7 / 7	61	13	21.3%	69.1%	75.9%
3	UK Equity Income	1 / 1	446	153	**34.3%**	0.0% ****	0.0% ****
7	UK Equity Income	2 / 2	383	120	**31.3%**	0.2% ***	0.1% ***
11	UK Equity Income	3 / 3	322	108	**33.5%**	0.0% ****	0.0% ****
15	UK Equity Income	4 / 4	268	105	**39.2%**	0.0% ****	0.0% ****
19	UK Equity Income	5 / 5	217	97	**44.7%**	0.0% ****	0.0% ****
23	UK Equity Income	6 / 6	164	70	**42.7%**	0.0% ****	0.0% ****
27	UK Equity Income	7 / 7	118	48	**40.7%**	0.0% ****	0.2% ***
4	UK Smaller Companies	1 / 1	292	119	**40.8%**	0.0% ****	0.0% ****
8	UK Smaller Companies	2 / 2	244	79	**32.4%**	0.4% ***	0.4% ***
12	UK Smaller Companies	3 / 3	201	54	**26.9%**	24.2%	33.9%
16	UK Smaller Companies	4 / 4	158	35	22.2%	76.7%	79.4%
20	UK Smaller Companies	5 / 5	122	32	**26.2%**	33.3%	44.9%
24	UK Smaller Companies	6 / 6	90	29	**32.2%**	4.7% **	14.4%
28	UK Smaller Companies	7 / 7	64	17	**26.6%**	32.6%	43.6%

Notes:

*   Signficant at 90% level of confidence   Bold for >25%

**   Signficant at 95% level of confidence

***   Signficant at 99% level of confidence

****   Signficant at 99.9% level of confidence

The results above are based on the random re-investment rule. We also tested the sensitivity of these results to alternative re-investment rules. Again, we do not have information on the behaviour of consumers. For example, we do not know if some types of consumer always choose top decile finds whereas others buy funds hoping their performance will rebound. We also do not know if consumers update their beliefs; for example, if they bought a poorly performing fund they might take more consideration the next time. To test for this we adopted a rule that consumers re-invest in the same decile as they initially chose.

Table 18 demonstrates that the significance of persistence is also increased if investors of funds that die reinvest in funds from the same quartile as their original investment.

Table 18: Result if reinvestment is based on original strategy

Net annual/Gross initial/Quartile based reinvestment

			Discrete tests				
			Top quartile to top quartile test				
		Strategy in years	Results			Binomial level	Overlapping
Run	Sector	Back / Forward	Trials	Success	%	of significance	adjusted level
1	UK All Companies	1 / 1	946	348	**36.8%**	0.0% ****	0.0% ****
5	UK All Companies	2 / 2	795	221	**27.8%**	3.2% **	3.8% **
9	UK All Companies	3 / 3	664	185	**27.9%**	4.2% **	7.2% *
13	UK All Companies	4 / 4	543	158	**29.1%**	1.3% **	4.1% **
17	UK All Companies	5 / 5	429	138	**32.2%**	0.0% ****	0.4% ***
21	UK All Companies	6 / 6	321	101	**31.5%**	0.4% ***	2.9% **
25	UK All Companies	7 / 7	225	83	**36.9%**	0.0% ****	0.2% ***
2	UK Equity & Bond Income	1 / 1	245	87	**35.5%**	0.0% ****	0.0% ****
6	UK Equity & Bond Income	2 / 2	204	55	**27.0%**	23.2%	28.4%
10	UK Equity & Bond Income	3 / 3	168	44	**26.2%**	32.4%	39.5%
14	UK Equity & Bond Income	4 / 4	134	35	**26.1%**	34.0%	45.2%
18	UK Equity & Bond Income	5 / 5	107	26	24.3%	51.5%	60.7%
22	UK Equity & Bond Income	6 / 6	83	20	24.1%	51.7%	60.3%
26	UK Equity & Bond Income	7 / 7	61	9	14.8%	96.1%	89.9%
3	UK Equity Income	1 / 1	446	145	**32.5%**	0.0% ****	0.0% ****
7	UK Equity Income	2 / 2	383	117	**30.5%**	0.6% ***	0.6% ***
11	UK Equity Income	3 / 3	322	108	**33.5%**	0.0% ****	0.0% ****
15	UK Equity Income	4 / 4	268	101	**37.7%**	0.0% ****	0.0% ****
19	UK Equity Income	5 / 5	217	93	**42.9%**	0.0% ****	0.0% ****
23	UK Equity Income	6 / 6	164	65	**39.6%**	0.0% ****	0.1% ***
27	UK Equity Income	7 / 7	118	45	**38.1%**	0.1% ****	1.0% **
4	UK Smaller Companies	1 / 1	292	112	**38.4%**	0.0% ****	0.0% ****
8	UK Smaller Companies	2 / 2	244	72	**29.5%**	4.7% **	6.1% *
12	UK Smaller Companies	3 / 3	201	53	**26.4%**	29.5%	39.5%
16	UK Smaller Companies	4 / 4	158	38	24.1%	56.7%	63.8%
20	UK Smaller Companies	5 / 5	122	36	**29.5%**	10.6%	23.4%
24	UK Smaller Companies	6 / 6	90	24	**26.7%**	30.8%	45.0%
28	UK Smaller Companies	7 / 7	64	16	25.0%	43.3%	52.6%

Notes:
* Signficant at 90% level of confidence   Bold for >25%
** Signficant at 95% level of confidence
*** Signficant at 99% level of confidence
**** Signficant at 99.9% level of confidence

It has also been suggested that the most realistic reinvestment strategy is to choose a fund offered by the same fund manager. Table 19 demonstrates that this also increases significance.

Table 19: Reinvestment based on same manager

Net annual/Gross initial/Manager based reinvestment

			Discrete tests			
			Top quartile to top quartile test			
		Strategy in years	Results			Binomial level	Overlapping
Run	Sector	Back / Forward	Trials	Success	%	of significance	adjusted level
1	UK All Companies	1 / 1	946	349	**36.9%**	0.0% ****	0.0% ****
5	UK All Companies	2 / 2	795	223	**28.1%**	2.2% **	2.5% **
9	UK All Companies	3 / 3	664	186	**28.0%**	3.4% **	6.0% *
13	UK All Companies	4 / 4	543	158	**29.1%**	1.3% **	4.1% **
17	UK All Companies	5 / 5	429	135	**31.5%**	0.1% ***	0.8% ***
21	UK All Companies	6 / 6	321	103	**32.1%**	0.2% ***	1.7% **
25	UK All Companies	7 / 7	225	81	**36.0%**	0.0% ****	0.4% ***
2	UK Equity & Bond Income	1 / 1	245	89	**36.3%**	0.0% ****	0.0% ****
6	UK Equity & Bond Income	2 / 2	204	57	**27.9%**	14.7%	18.7%
10	UK Equity & Bond Income	3 / 3	168	40	23.8%	60.0%	66.9%
14	UK Equity & Bond Income	4 / 4	134	34	**25.4%**	41.5%	52.3%
18	UK Equity & Bond Income	5 / 5	107	30	**28.0%**	20.0%	31.7%
22	UK Equity & Bond Income	6 / 6	83	21	**25.3%**	41.7%	52.4%
26	UK Equity & Bond Income	7 / 7	61	9	14.8%	96.1%	89.9%
3	UK Equity Income	1 / 1	446	146	**32.7%**	0.0% ****	0.0% ****
7	UK Equity Income	2 / 2	383	120	**31.3%**	0.2% ***	0.1% ***
11	UK Equity Income	3 / 3	322	107	**33.2%**	0.0% ****	0.0% ****
15	UK Equity Income	4 / 4	268	103	**38.4%**	0.0% ****	0.0% ****
19	UK Equity Income	5 / 5	217	93	**42.9%**	0.0% ****	0.0% ****
23	UK Equity Income	6 / 6	164	64	**39.0%**	0.0% ****	0.1% ***
27	UK Equity Income	7 / 7	118	41	**34.7%**	0.7% ***	6.1% *
4	UK Smaller Companies	1 / 1	292	113	**38.7%**	0.0% ****	0.0% ****
8	UK Smaller Companies	2 / 2	244	73	**29.9%**	3.4% **	4.4% **
12	UK Smaller Companies	3 / 3	201	54	**26.9%**	24.2%	33.9%
16	UK Smaller Companies	4 / 4	158	36	22.8%	70.5%	74.6%
20	UK Smaller Companies	5 / 5	122	34	**27.9%**	20.0%	33.5%
24	UK Smaller Companies	6 / 6	90	25	**27.8%**	23.0%	37.3%
28	UK Smaller Companies	7 / 7	64	14	21.9%	66.0%	69.2%

Notes:
*   Signficant at 90% level of confidence   Bold for >25%
**   Signficant at 95% level of confidence
***   Signficant at 99% level of confidence
****   Signficant at 99.9% level of confidence

Conclusion

In conclusion, the statistical tests suggest that much of the observed persistence is strongly significant, much at a confidence level as high as 99.9%. From this there appears to be very little doubt that investors can derive useful evidence from past performance data. The results are stronger both in the UK All Companies and UK Equity Income sectors – where there is significant evidence of persistence over a number of time periods. The UK Equity and Bond and Smaller Companies sectors show weaker results, although persistence is still strong over relatively short periods. The strength of persistence in the short term is a result echoed by other studies.

We have only tested one potential model – investment based on selection from the top quartile. It should be noted that other strategies could be even more powerful than this.

Annex 1   Sensitivities

For our analysis we wished to test for a number of sensitivities. Some of the results of our sensitivity analysis are presented here and some in Section 5. We tested:

- Whether different charging assumptions altered the outcome (see Section 4 and Section 5);
- Different reinvestment rules for funds that die during the investment period (see Section 5);
- Whether the complete exclusion of these funds alters the results (see below);
- Whether asymmetric investment rules alter the result; and
- Whether persistence has weakened since 1990.

In each of these cases our conclusions were reinforced.

Results excluding funds that die in the investment period

In the analysis of Rhodes (2000) dead funds were included if they existed throughout both the assessment period and the investment period. To test whether this approach produces significantly different results from this report, we reproduced the results for the UK All Companies sector on the same basis as Rhodes (2000).

Table 20 below shows that the differences between the two approaches does not appear to be significant

Table 20: Impact of excluding funds that die during the investment period

Net annual/Gross initial

			All assessment period funds included		Only funds that survive investment period included	
Run	Sector	Strategy in years Back / Forward	Average number of funds	Persistence in top quartile	Average number of funds	Persistence in top quartile
1	UK All Companies	1 / 1	189	36.9%	185	37.0%
2	UK All Companies	2 / 2	177	27.8%	167	28.0%
3	UK All Companies	3 / 3	166	27.3%	150	28.3%
4	UK All Companies	4 / 4	155	28.7%	135	28.5%
5	UK All Companies	5 / 5	143	31.2%	121	31.1%
6	UK All Companies	6 / 6	128	31.8%	107	32.6%
7	UK All Companies	7 / 7	113	37.3%	92	39.3%

Results using an asymmetric investment rule

The results above only looked at symmetrical assessment and investment periods. However, there is no reason for consumers to limit themselves to this information. They could equally use the performance over a short period (one year) to determine their investment, even if they are interested in returns over a five-year period. Alternatively, consumers could use five-year returns to consider investment for the subsequent two years.

It might be useful to consider why consumers might adopt these strategies and for the purposes of our analysis we consider a range of alternative scenarios.

We show the results for using one year of performance information for one to five-year investment periods in Figure 26. In Figure 27 we show the corresponding information for a five-year assessment period. The results are reported in terms of a cross product ratio. A number above 1 suggests positive persistence and a number below negative persistence.

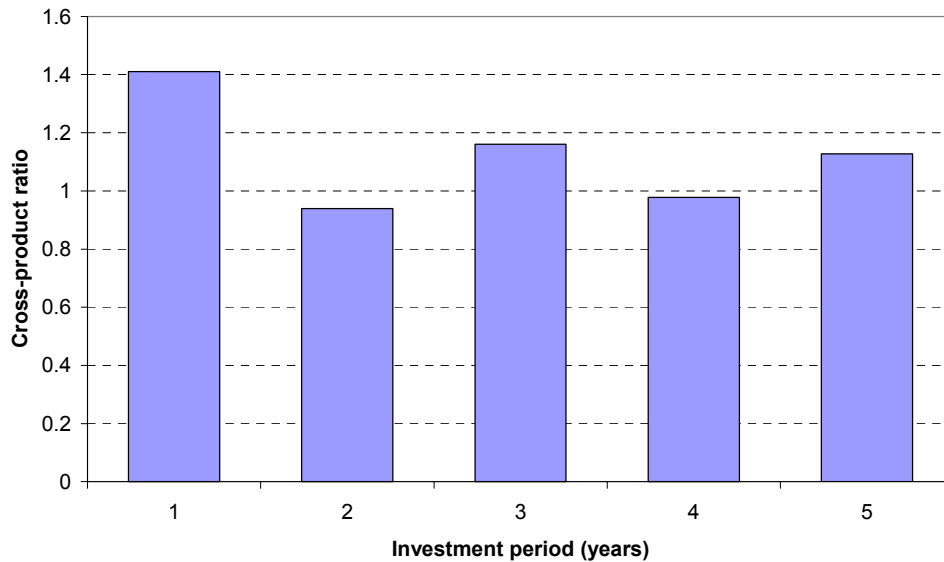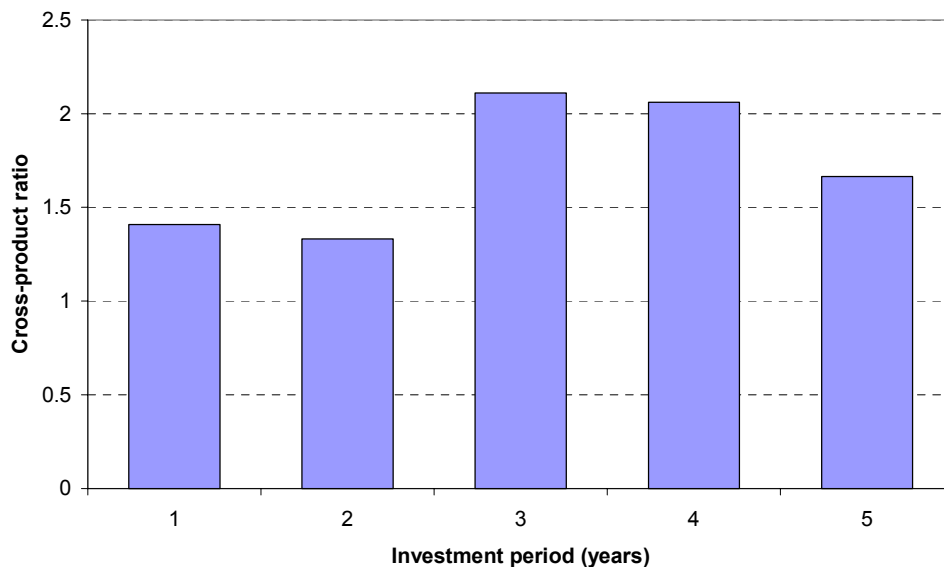**Figure 26: One-year assessment period versus 1-5 year investment period**

Figure 27: Five-year assessment period versus 1-5 year investment period

We found that one-year performance was most persistent for the subsequent year. However, it also seemed to have a positive but smaller effect in following years. This suggests that short-term returns are persistent and get locked into the performance of the fund.

We also found that five-year performance appeared to be a very useful predictor in the short-term and also, more importantly, in the medium term.

Sensitivity of the results to the time period

It has been claimed that persistence is a symptom of the 1980s. To examine this issue we have calculated the difference between the top and bottom quartile for each year of the period using different investment strategies. Examining each of the sectors in turn:

- *All Companies*: although there was a strong reversal in 1998, the level of 1-year persistence appears similar in the 1980s and 1990s. Three-year persistence declines but the pattern of five-year persistence appears broadly consistent.
- *UK Equity*: 1-year persistence follows a similar pattern to All Companies but with a more consistent picture in three and five years.
- *UK Equity and Bond*: performance seems more important in the 1990s than the 1980s.
- *Small companies*: followed a similar pattern to UK equity.

For more details on the range of scenarios tested, please contact the authors.

Annex 2   Bibliography

Allen D. E., and Tan M. L., 1999, A Test in Persistence of the Performance of UK Managed Funds*, Journal of Business Finance and Accounting*. Vol. 24 No 2 155-178.

Bacon and Woodrow, 1999, Comparative Information Tables.

Blake, David. & Alan Timmermann*,* 1998, Mutual Fund Performance: Evidence from the UK, *European Finance Review,* 2: 57-77.

Brown, Stephen J., William N. Goetzmann, 1995, Performance Persistence, *Journal of Finance* 52, 679-698.

Carhart, Mark M., 1997, On Persistence in Mutual Fund Performance, *Journal of Finance* 52, 57-82.

Dimson, Elroy, Stafan Nagel and Garrett Quigley, 2001, Value versus Growth in the UK Stock Market, 1955 to 2000, *Work in progress*.

Do Céu Ribeiro Cortez, Maria., Paxson, Dean A., and Manuel José da Rocha Armada, 1999, The Persistence of Mutual Fund Performance: Evidence for a European Regional Market, *Work in progress*.

Fama, Eugene F., and Kenneth R. French, 1993, Common risk factors in the returns on bonds and stocks, *Journal of Financial Economics* 33, 3-53.

FSA, 2002, CP131: Single pricing of collective investment schemes: proposed amendments - Feedback on Discussion Paper 8.

FSA, 2001, Report on the Task Force on Past Performance.

Giles, Tim, Tim Wilsdon and Tim Worboys, 2002, Performance persistence in UK equity funds – A literature review, Charles River Associates, London, January 2002

Gruber, Martin. J., 1996, Another puzzle: the growth in actively managed funds, *Journal of Finance* 51, 783-810.

Hendricks, Darryll, Jayendu Patel, and Richard Zeckhauser, 1993, Hot hands in Mutual funds: Short run persistence of performance, 1974-88, *Journal of Finance* 48, 93-130.

Kahn, Ronald N. and Andrew Rudd, 1995, Does historical performance predict future performance? *Financial Analysts Journal,* 43-52.

Lunde, A., Timmerman, A., and Blake, D., 1998, The hazards of mutual fund underperformance: A Cox regression analysis. *Working paper, Department of Economics UC San Diego,* 1-39.

Malkiel, Burton G., 1995, Returns from investing in equity mutual funds 1971 to 1991, *Journal of Finance* 50, 549-572.

Quigley, Garrett and Rex A. Sinquefield, 1998, Performance of UK equity unit trusts. Published in *Journal of Asset Management* 1, 72-92, 2000.

Rhodes, M. 2000, Past imperfect? The performance of UK equity managed funds, *FSA Occasional Paper* 9, 1-58.

Sandler, R. 2002, Sandler Review: Medium and Long-Term Retail Savings in the UK.

Additional references are provided in the first report or are available on request