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Investment style positioning of UK unit trusts

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We investigate the investment style positioning of UK equity unit trusts (mutual funds) over the 24-year period from 1987 to 2010 and assess if fund manager claims to follow a particular style strategy are evidenced in practice. Generally, UK unit trusts do not, in fact, consistently track declared styles but subject their funds to style switching or rotation. Nor do funds switch to become simple index trackers, as has widely been reported, but exhibit a mix of behaviour that we refer to as 'market-momentum styling'. Our contribution is to offer a coherent, end-to-end picture of the evolution of investment styles over an economic cycle. In so doing we evidence that fund style positioning is subject to rotation and becomes subordinated to past portfolio performance or style momentum. Even this result is conditional as we go on to demonstrate that style investment is very likely to be driven by broader economic conditions, thereby creating market-momentum styling by default. This is arguably not a style at all and calls into question the intent behind fund 'strategies'.

Keywords: unit trusts; style investing; momentum

JEL Classification: G11

1. Introduction

Mutual funds (unit trusts) categorise their investment styles along lines that are likely to be easily recognisable by the investor community (Sharpe 1992; Brown and Goetzmann 1995; Conrad and Kaul 1998; Chan, Chen, and Lakonishok 2002; Barberis and Shleifer 2003). This not only assists investors in determining the risk-return profiles of funds (Lynch and Musto 2003), but also clearly benefits fund managers in terms of fund marketing and fee generation (Jain and Wu 2000).

If funds are positioned to match a particular style then a style benchmark or index is ordinarily used against which performance might be evaluated (MacDonald 1974; Ward and Saunders 1976; Quigley and Sinquefield 2000; Fletcher and Forbes 2002). Whilst the style positioning of a fund might seem straightforward, the causes of under/over-performance are somewhat harder to determine. For example, consider the potential causes of style drift where fund positioning loses contact with a targeted benchmark. One view might be that style drift arises as a consequence of poor investment timing. Certainly, the near-overwhelming evidence, accumulated from across the world, is that fund managers do not exhibit timing ability (Henriksson 1984; Fletcher 1995; Byrne, Fletcher, and Ntozi-Obwale 2006; Cuthbertson, Nitzsche, and O'Sullivan 2008). An alternative view of fund manager performance might conclude that style drift arises from an undeclared investment style *switching* strategy. The incentive to switch style could arise as a response to, for example, previous poor fund performance which leads managers to seek other benchmarks that offer a better view of fund performance. In such circumstances assessment of fund manager

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performance becomes difficult: fund performance is clouded, investors cannot make risk-based investment decisions and fund evaluation is at risk of being re-directed to a benchmark against which performance 'looks good' (Lehman and Modest 1987).

Our research seeks to examine these issues and uncover mutual fund style switching strategies. Our contribution is to offer a coherent, end-to-end picture of the evolution of investment styles over an economic cycle. Some of the initial parts of our research have previously been reported but, in drawing together what is already known, and adding new evidence on style rotation and its relationship to momentum and market states, we are able to show how fund investment styles evolve. We do this by evidencing the performance of funds to show why style switching is likely to take place. In so doing, we report a significant role for momentum – a finding generally not found for the UK. We reveal which funds are likely to rotate style and report the extent of style switching. We show that, ultimately, investment styles are subordinated to prior period performance in an attempt to improve/maintain performance over different market states. In such circumstances, market-momentum styling arises.

The next section explains why our research questions emerge from the core of the debate on fund performance evaluation and explains how our analytical method addresses the following research questions. Is style investing profitable? Do fund managers make consistent style choices? What is the evidence for style switching? If styles are switched, what style is adopted? We address these questions by first assessing mutual fund style positioning in the UK over a 24-year period from 1987 to 2010, using a near-population sample of mutual funds. Employing the factor approach of Fama and French (1993) and Carhart (1997), we demonstrate that a momentum-based style strategy is very likely to be the style of choice for fund managers, irrespective of declared styles. However, these results are not unconditional and we show that momentum is, in turn, driven by broader macroeconomic forces thus leading to questions over whether fund investment style is determined by *strategic intent* or emerges as a *strategic default*.

2. Theoretical development

Investors pursue style investing as one method of categorisation as a means of simplifying problems related to choice (Brown and Goetzmann 1997; Mullainathan 2000; Barberis and Shleifer 2003). Equity fund managers position their funds to reflect investor appetite and thus opportunities for style investing are created (Bernstein 1995). So, what should investors look for in a mutual fund and how should they frame their choice between competing funds? These quite natural questions lead into the academic debate and underline the relevance of our own research questions. The key to what follows is to understand how fund performance is evaluated by the identification of superior information as measured by mean-variance efficient portfolios. The issues are deeply related and provide both theoretical and empirical contexts for our own work.

2.1 *Superior information and mean-variance efficiency*

Fund managers participate in a market where they can exploit their superior information to create bankable economic rents from selling their fund management services. This requires information asymmetry between the fund managers and other participants to make their services worth paying-for (Jensen 1969). Fund managers alter fund portfolios to exploit their superior information and, because the superior information is private, this implies a fund position which is different to that which would be selected by an uninformed investor. However, the existence of portfolios created on the basis of private, superior information presents a deep problem for performance evaluation since uninformed investors cannot create benchmarks that reflect the private information set that fund managers use and hence *exact* fund performance evaluation becomes impossible (Admati and Ross 1985; Grinblatt and Titman 1993). From an uninformed observer's viewpoint, inexactness in performance evaluation may give the image that the fund portfolio plots below the security market line and appears not to be mean-variance efficient (Grinblatt and Titman 1989b). This key observation results in the possibility that fund managers are *very likely* to be mis-evaluated when they have superior information. It is possible, however, for investors to control for unknown private information by conditioning on realised returns (Admati and Ross 1985), an issue we expand upon below, so that empirical investigation remains possible. Hence, key questions concerning performance evaluation theoretically are linked deeply with empirical problems of identifying and measuring appropriate benchmarks concerning evaluation of superior performance. Notwithstanding the empirical difficulties, we should not expect to see abnormal performance generally since fund managers with the talent and resources to deliver abnormal performance will have the know-how to extract this economic rent in fees and related costs to their maxima, leaving zero-profit for the investors at the margin (Admati and Pfleiderer 1990).

The link between superior information and mean-variance efficiency is further described by Grinblatt and Titman (1989), who argue that realised positive performance from managed portfolios must be due to alterations in portfolio weights as a response to superior information. This presumes that the efficiency of the index used to compute the performance cannot be rejected. In other words, superior active management is rewarded and can be identified by appropriate construction of mean-variance efficient portfolios. The question then turns to how mean-variance efficiency might be achieved and what is the specific relationship to the detection of unknown private, superior information.

Admati and Ross (1985) explore the conditions under which traditional risk-return measures are able to detect superior performance. Asymmetric information implies heterogeneous beliefs amongst investors and hence there is *no special role for market portfolio*, a fact which does not contradict the observation that differential beliefs can still remain mean-variance efficient (Admati and Ross 1985). What is required is that an uninformed investor derives his/her own security market line and portfolio on the efficient frontier which will be reflective of equilibrium prices. The statistical problem is how to unravel and determine the risk factors of a portfolio where the joint distribution of fund returns and risk factors are confounded by unobservable private (superior) information signals. The answer for fund performance evaluation is to recognise that superior information is, in fact, correlated with ex post realisations of prices as well as with benchmarks created on the basis of 'coarser information' (Admati and Ross 1985; Dybvig and Ross 1985).

A definition of 'coarse' benchmarks is provided in Grinblatt and Titman (1989a), who indicate that an appropriate benchmark needs only consist of those assets that *can be* included in the fund portfolio. If a style declaration is made by a fund then the universe of stocks that qualify for inclusion can be narrowed. Intuitively, therefore, the question can be turned to which appropriate benchmark is needed for the stocks that *should be* included in a fund portfolio out of the qualifying universe. The choice of candidate factors is indicated for the investor from the style declaration of funds. Researchers then test candidate factors against mean-variance efficient portfolios, initially by Jensen's (1968) Capital Asset Pricing Model (CAPM). However, CAPM is both theoretically and empirically unsuitable as a benchmark model for fund management.[1] As an alternative, more general k-factor models show that proxy portfolios can be mean-variance efficient and that all sets of k-factor portfolios are mean-variance efficient as the number of securities increases (Grinblatt and Titman 1985). Thus, the k-factor approach is both theoretically and empirically a necessity.

2.2 *Analytical methods*

The two broad analytical methods used by researchers in examining fund performance and establishing appropriate benchmarks are characteristics-based and returns-based approaches. Characteristics-based methods are distinguished from returns-based methods in that they use, as their source data, the actual holdings of fund portfolios. This requires examination of fund stock holdings on a monthly basis, which is the highest frequency most easily available (Morningstar and Lipper).[2] We employ a returns-based method of analysis to identify benchmark factors and factor loadings. There are two key empirical advantages to our approach. First, factor models maintain closer connections to the empirical asset pricing literature in their approach to identify risk factors. Factors models which are derived from the *k*-factor linear model (Jensen 1968, 1969) contain properties which are well known, particularly with respect to the conditions under which Jensen's alpha may be interpreted as meaningful in relation to fund performance evaluation (Lehman and Modest 1987).[3] Second, our weekly data availability and sampling frequency maintain a closer connection to meaningful interpretation of our style-based tests than would a characteristics-based approach based on monthly sampling. The additional information content in weekly sampling, and in other data-construction approaches we explain below, support identification of mean-variance efficient portfolios which we have argued is central to an analysis of fund performance.[4] This approach will support the accuracy (power statistics) of the results and the resulting inference (Kothari and Warner 2001). Wermers (2012) argues that returns-based measures sampled at a higher frequency may add further information on fund manager behaviour in relation to style drift. In essence, weekly sampling is more likely to capture portfolio changes than is monthly sampling if weekly sampling mimics more closely the frequency of managerial decision points.

There are a number of factor-based approaches in the literature that reflect choice within the *k*-factor approach. The Fama and French (1993) three-factor (3F) model is a variant of Sharpe's (1992) general model and an extension of CAPM. The additional risk factors relate to size and value and are reflective of two main style categorisations that have been extensively investigated. As might be expected, there is significant empirical support for a factor-based approach which has underlined the approaches' longevity in the literature. Chan, Chen, and Lakonishok (2002) report, in an empirical US study, that the parsimonious 3F model performs as well as more elaborate factor models on out-of-sample returns predictions tests. Our specific method of style classification follows that of Chan, Chen, and Lakonishok (2002), which employ two key risk dimensions, market capitalisation and value–growth, augmented by momentum. The purpose in undertaking this approach, as Chan, Chen, and Lakonishok (2002) explain, is that it mimics (for the two key dimensions) the approach largely employed by the mutual fund industry. Since it is our objective to uncover the investment intentions versus investment outcomes of the fund industry, our analytical approach has to be in sympathy with their activities to reveal the concentration and consistency of fund styles. As we go on to discuss, such an approach allows us to make direct inferences concerning the intentionality of fund style management.

In a further important extension, Jagadeesh and Titman (1993) showed that stocks that perform well over a 3–12-month period tend to continue to do so over the subsequent 3–12 months, the results of which are confirmed in a large number of subsequent studies (see, e.g. Chan, Jegadeesh, and Lakonishok 1996; Conrad and Kaul 1998; Jegadeesh and Titman 2001). This is referred to as *regular* momentum and is based on a zero-cost replicating portfolio strategy that goes long in past winners and shorts past losers. Substantial out-of-sample evidence shows that the momentum effect is not likely due to a data snooping bias, and also appears to be significantly and economically profitable in many European markets. The momentum effect is small (see, e.g. Doukas and McKnight 2005) but positive in many emerging markets (see, e.g. Rouwenhorst 1999), and has been observed in some Asian markets (see, e.g. Chui, Titman, and Wei 2000). Studies of price momentum strategies based on individual firms have also been extended to portfolio-based momentum strategies in a number of different contexts (see, e.g. Moskowitz and Grinblatt 1999;; Hong, Lim, and Stein 2000; Lee and Swaminathan 2000; Zhang 2006; Avramov et al. 2007). Despite these fairly widespread findings and despite the implications for efficient markets, momentum profits appear to persist (Jagadeesh and Titman 2001; Schwert 2003). The risk-based explanations of Conrad and Kaul (1998) suggest that momentum is a result of unexpected cross-sectional variations in expected returns due to variations in risk. Behavioural explanations of momentum have relied on cognitive bias (Daniel, Hirschleifer, and Subrahmanyam 1998; Hong and Stein 1999) and that this bias is manifested in Up-markets arising from overconfidence and self-attribution.

Extending regular price momentum research to fund managers and looking for evidence of fund momentum *styles* is a relatively recent finding. Barberis and Shleifer (2003) have demonstrated that stocks can co-vary because they are associated with a particular style. Boyer (2011) has recently shown, however, that economically meaningless index labels cause stock returns to covary in excess of fundamentals. This suggests that the act of categorisation alone is enough to alter returns. In a paper relevant to our own results, Chen and De Bondt (2004) report that style portfolios of US funds exhibit momentum related to market cycles. As an interesting and rather telling counterpoint, Chan, Dimmock, and Lakonishok (2009) undertake an analysis of fund style performance techniques (characteristics versus returns) that specifically excludes momentum on the grounds that it is not a style on which fund manager performance is assessed (institutional clients, they argue, benchmark to passive indices). We reject this approach since our basic hypothesis is that an undeclared style strategy is, in fact, operating and hence such an assumption, as used in Chan, Dimmock, and Lakonishok (2009) would be inappropriate in our circumstances.

2.3 *Research questions*

We first benchmark our data to a variety of standard market indices to ensure that our sample contains no idiosyncratic elements that may undermine inference and the basis of comparability of our results. Having adopted a returns-based, factor methodology we seek next to explain how specifically our research questions are addressed.

In examining the research question ‘is style investing profitable’, we estimate both the Fama and French (1993) 3F model and the Carhart (1997) four-factor (4F) model to benchmark our data to evidence on fund manager performance to other studies. This allows us to be confident in establishing what particular style aspects of our data are evident. The approach has two parts: the first part concerns an examination of the significance of style factors against widely used and known investment approaches (the ‘battery of style indexes’, referred to above). If we are to uncover intentionality in the fund industry with respect to style choices we must look, first, at what style declarations are made and, only then, examine whether styles are consistently followed. Our proposals are based on a rejection of declared style intentions and, hence, an examination of widely used investment approaches must be our starting point. The two key style categorisations are value–growth orientations and size. The metrics employed are B/M ratios and market capitalisation. The second part concerns a style declaration which is not generally reported but we suspect to be empirically important. That is, we report for the first time for the UK a significant role for momentum. The Carhart (1997) 4F model is then consequently adopted as our benchmark factor model for the subsequent analysis. The research question then looks to ascertain abnormal performance, as related to style, from the factor regressions we perform.

The next research question addressed is ‘do fund managers make consistent style choices’. The validity of inference, here, depends on the identification of meaningful factor loadings established in relation to the previous research question and then to an examination of investment styles being maintained over a period of time. In this context we look at the stability of factor loadings over time specifically in relation to the ranking position of a fund. The rankings are separated into quartiles which allows, we suggest, sufficient distinction between funds to recognise meaningful differences in style. That is, we accept that factor loadings may vary and which has been widely reported (e.g. Brown and Goetzmann 1997) but that fund positioning within a style category determined by rank should not vary if style positioning is constant: a change in factor ranking, we argue, is tantamount to a change in style. The degree to which ranking alters is subject to statistical tests and the inferences drawn by standard statistical methods. We do not leave the issue resting at this point and we then look for confirmatory evidence to back up assertions concerning style change which leads us to the next research question ‘what is the reason for style shifting’.

We conjecture that there exists a relation between past performance and style shift for UK unit trusts as the under-pinning of any incentive to alter style. We rank styles, as before, but further examine the role and impact of momentum. That is, we employ the same methodological approach to ensure inference is consistent between the two questions concerning style profitability and style consistency. The statistical approach we adopt is to sort unit trusts into portfolios on the basis of a two-way, within-group classification to accommodate examination of the impact of past performance as measured by momentum. We examine style rank changes conditioned on past performance. With meaningful separation of styles into quartiles, standard statistical tests then support inferential evaluations of our research question and we are able to conclude that poor past performance precedes style change.

Having established that styles alter as a result of poor past performance, we naturally then ask ‘what style is pursued’ in the face of poor past performance. Our results of analysing this question thus *close the loop*, as it were, on the evolution of style alteration. We look to the macro-economy for an explanation and test specifically for the impact of style cycles. There is some evidence for this in relation to Chen and De Bondt (2004), but there is no work, to our knowledge, that additionally places style shifting in the context of momentum and past poor performance as the underlying dynamic for style ‘management’. Importantly, we link this specifically to the debate concerning evaluations of superior information by hypothesising that alpha values derived from the Carhart (1997) 4F model and market state combine to determine fund switching. That is, fund style is ‘managed’ by switching style to a style more out-of-tune with Down-market characteristics and more in-tune with Up-market characteristics as determined by prior period performance. Our conjectures are supported by statistical tests that support our inferences that relate past performance, style change and market state. In a broad context, therefore, the consistency of our results emerges as a picture of style management that enables inferences concerning ubiquitous style changes in the face of past poor performance, overlaid by the impact of market conditions.

Our approach supports our research aim which is to provide a more complete story as to the motives and outcomes of fund style management. Our conclusions are based on a comprehensive examination of the investment styles of UK equity unit trusts over the 24-year period from 1987 to 2010 and find the following: a large fraction of the UK unit trusts employ a small size investment style approach with B/M values skewed towards high B/M values. We also find that small size trusts outperform big size trusts, while value-oriented trusts perform better than growth-oriented trusts. However, styles are not consistently held at individual fund level nor are they profitable after accounting for risk-adjusted returns in the Carhart (1997) 4F model. We demonstrate how poor prior fund performance then leads to style switching and identify which fund styles are likely to switch. We then relate this evidence to show how market states are actually the key drivers of fund style positioning.

3. Data and average fund performance

This study examines investment styles of UK unit trusts authorised for sale to the public from January 1987 through December 2010.[5] We identify our sample of unit trusts focusing their assets on UK equities during the sample period. A unit trust that was merged, wound up, changed the investment objective or changed to an Open-Ended Investment Company during the sample period is treated as a termination, while name change and transfer of a unit trust is treated as a continuation of the original trust. Our sample includes a maximum of 617 equity unit trusts, which exist for some or all of the entire data period. Therefore, data on dead unit trusts are available as well to control the presence of a survivorship bias, although this bias may be less worrisome when analysing fund styles (Chan, Chen, and Lakonishok 2002). Total return indices on unit trusts from the first Wednesday of 1987 to the last Wednesday of 2010 are collected for each week. The total return index collected from DataStream assumes that dividends are re-invested.

Table 1 reports the number of UK equity unit trusts at the end of each calendar year over the sample period. The size of the sample grows from a low of 52 at the end of 1987 to a high of 617 at the end of 2010, with particularly high growth during the early 2000s. To measure the aggregate performance of unit trusts, we calculate the equal-weighted weekly returns on all unit trusts and then compound to obtain the calendar year returns. In addition, this table compares the performance of our sample with the performance of a series of UK market indices, including the FTSE 100 Index, the FTSE 250 Index, the FTSE 350 Index, the FTSE All-Share Index and the FTSE SmallCap Index.[6] The average return on UK unit trusts of 9.90% per year over the sample period is higher than the average annual return on any of the market indices and is in contrast with that of US mutual funds reported by Chan, Chen, and Lakonishok (2002), and which may be a factor in explaining some differences in results we report below. In particular, the average annual over-performance of 2.12% relative to the FTSE All-Share Index is higher than 1.3–2.0%, the range of estimates of UK equity unit trusts' expense ratios. The standard deviation shows that unit trusts have a lower risk (standard deviation = 14.82% per year) compared with every other index.

Our results are reported gross of fees and transactions costs. This is in common with many other researchers but we note some important observations on the work done by researchers who have looked in detail at the issues involved which are neither straightforward nor always immediately apparent. Wermers (2000) report that over the period 1975–1994, US fund managers, on average, beat the market by 1.3%, gross, but produced a negative return after average fees and transactions costs of 1.6%. Fund trading, as opposed to total return, is generally profitable for US managers in that stocks that are bought outperform the stocks sold by 2% per year (Chen, Jegadeesh, and Wermers 2000). Lesmond, Schill, and Zhou (2004) report that momentum profits are illusory because the stocks exhibiting greatest momentum have the highest trading costs giving rise to transaction costs as high as 12%. However, their paper is concerned with estimating transactions costs without reference to who the buyer is. In our case, it is a mutual fund.

Table 1. Description of sample of unit trusts and aggregate performance.

Year	Number	Unit trusts	FTSE100	FTSE250	FTSE350	FTALLSH	FTALSML
1987	52	16.19	4.81	10.14	6.23	6.64	–
1988	53	9.05	1.59	7.01	2.96	3.55	–
1989	61	27.25	34.02	20.92	30.80	29.16	–
1990	62	−13.19	−10.00	−19.30	−12.09	−13.01	–
1991	73	11.74	10.58	8.72	10.11	10.24	–
1992	77	22.23	18.79	23.82	19.79	18.86	–
1993	81	30.52	22.22	33.28	24.52	25.09	–
1994	100	−4.81	−10.58	−7.90	−10.00	−9.78	–
1995	112	20.72	18.75	14.08	17.69	17.20	–
1996	121	16.83	11.32	11.52	11.36	11.37	–
1997	137	21.41	25.49	7.33	21.62	20.52	–
1998	157	9.84	14.55	1.40	12.26	10.91	–
1999	191	28.36	16.21	32.15	18.54	19.79	56.92
2000	208	−2.25	−9.04	1.12	−7.55	−7.04	3.20
2001	237	−13.33	−16.74	−9.87	−15.87	−15.97	−17.02
2002	284	−21.73	−23.86	−26.57	−24.19	−24.34	−26.55
2003	315	24.60	13.57	35.15	16.05	16.60	40.03
2004	354	14.05	7.66	18.85	9.15	9.20	12.46
2005	415	22.63	16.66	26.82	18.01	18.07	19.65
2006	466	18.68	11.07	27.55	13.34	13.47	17.30
2007	505	2.53	3.75	−5.10	2.45	1.94	−12.07
2008	567	−31.24	−31.56	−39.92	−32.56	−44.68	−32.89
2009	617	29.10	21.73	46.31	24.16	52.85	24.66
2010	617	13.66	11.09	24.95	12.75	16.16	12.83
Mean (1987–2010)		9.90	6.75	6.82	7.06	7.78	8.12
Standard deviation		14.82	17.26	17.03	16.80	16.23	15.72

Notes: This table reports the number of the UK unit trusts with at least one observation on weekly return at the end of each calendar year from 1987 to 2010. The average weekly returns for the portfolio of unit trusts with available data are compounded over the calendar year to obtain annual return. Also reported are annual returns for the FTSE 100 Index (FTSE100), the FTSE 250 Index (FTSE250), the FTSE 350 Index (FTSE350), the FTSE All-Share Index (FTALLSH) and the FTSE SmallCap Index (FTALSML). The last two rows report the mean and standard deviation of annual returns on the portfolio of unit trusts and all market indices over the whole sample period. All returns are displayed in percentage.

There are two implications for this. First, they pay lower transactions costs than nearly every other buyer. Second, in the USA particularly, both closed-end, and even more so open-ended, funds are restricted in their buying of illiquid stocks.[7] The economic argument is straightforward: mutual funds must meet the liquidity requirements of the shareholders who wish to cash-in their mutual fund holdings. Hence, mutual funds are restricted in the purchases of illiquid stocks and so the results of Lesmond, Schill, and Zhou (2004) do not automatically transfer to mutual funds.

As to direct estimates of mutual fund costs, Karceski, Livingston, and O'Neal (2005) report total trading costs as a proportion of expense ratios for US equity funds for 2002. They report their analysis by investment style and estimate the highest proportion, unsurprisingly, for small growth funds at 123% of expense ratios. In the UK, expense ratios on average are no higher than 2% (see, e.g. Quigley and Sinquefield 2000) and, using Karceski, Livingston, and O'Neal (2005) estimate, would give rise to total, average round trip costs of 4.46% for the costliest of funds.[8] On the basis of the analysis to follow, only small-/high-value styles produce an alpha that would result in a return in excess of this.

4. Results

4.1 *Is style investing profitable?*

Our purpose in this section is to demonstrate that our data set has the characteristic relationship between style investing and performance that would be expected but go on to show in using these results why style rotation emerges as a response to poor performance. We achieve this by, first, benchmarking our data using both the Fama and French (1993) 3F model and the augmented model incorporating momentum to produce the Carhart (1997) 4F model. This allows us to compare our basic results with those published and to identify the specific relationship between style investment and unit trust performance for the data employed. Second, in comparing the 3F and 4F results we demonstrate how momentum adds to our understanding of fund behaviour. Our intention in separately reporting the 3F and 4F model results is to explicitly identify and report on the impact of momentum on alpha performance for our sample. We do this to identify the smoking gun that leads us to investigate why momentum plays the role it does: that is, in terms of being the outcome of previous decisions to switch styles as a result of previous poor fund performance.[9]

The returns-based analysis of mutual fund holdings use a number of factor models: the CAPM, the Fama and French (1993) 3F model, and the Carhart (1997) 4F model. In the 3F model unit trusts' loadings on market, size and B/M factors are derived from

$$R_{it} - R_{ft} = \alpha_i + b_i(R_{mt} - R_{ft}) + s_i \mathrm{SMB}_t + h_i \mathrm{HML}_t + e_{it}, \tag{1}$$

where R_i represents the return on unit trust i in week t, R_f represents the return on a three-month UK Treasury bill, R_m represents the return on the FTSE All-Share Index. SMB_t and HML_t represent the returns on zero-investment factor-mimicking portfolios for size and B/M, respectively. The factor sensitivities or loadings, b_i, s_i and h_i are the slopes in the time-series regression.

We separately report results using the Carhart (1997) 4F model:

$$R_{it} - R_{ft} = \alpha_i + b_i(R_{mt} - R_{ft}) + s_i \mathrm{SMB}_t + h_i \mathrm{HML}_t + m_i \mathrm{MOM}_t + e_{it}, \tag{2}$$

where MOM_t represents the return on a zero-investment factor-mimicking portfolio for price momentum (return over the prior year), other variables are as defined in Equation (1).

In estimating Equations (1) and (2), we construct portfolios that mimic the size and value factors in the UK stock market. On 30 June of each year t from 1987 to 2010, all available stocks listed on the LSE (excluding financial firms, such as banks, insurance firms, real estate firms, and other financial service firms) are divided into two size groups, small (S) or big (B), according to whether their market values are below or above the median market value of all stocks. All stocks are also divided into three value groups, high B/M (H), medium B/M (M) or low B/M (L), according to whether the values of their B/M at the end of year $t-1$ are included in the top 30, middle 40 or bottom 30 percentile, respectively. We then construct six portfolios from the intersections of two size groups and three value groups in June of year t and calculate weekly value-weighted returns on the six portfolios from July of year t to June of year $t+1$.

Following Jegadeesh and Titman (1993) and Carhart (1997), we construct the momentum factor (MOM). MOM represents the equal-weighted return on a zero-investment portfolio formed by subtracting the mean return on a loser portfolio composed of stocks with the lowest 10% 11-month returns lagged one month from the mean return on a winner portfolio composed of stocks with the highest 10% 11-month returns lagged one month.

Previous style studies typically employ a 36-month rolling window to obtain s_i and h_i in each year, and then to calculate the average value of s_i and h_i over the whole sample period. Rekenthaler, Gambera, and Charlson (2006), however, argue that information or data based on a 36-month rolling window is restricted as fund managers may have changed their style during the 36-month period. That is, this sort of style analysis gives equal weighting to the 36-month returns, resulting in, on average, 18-month old information that risks saying little about the current style. In order to address this potential shortcoming and to give a more accurate analysis of investment style, we enhance the frequency of data employing a 52-week rolling window instead of a 36-month window. Obviously, there are 52 observations for each regression and the information is only, on average, six months old, which arguably gives a better view of the UK unit trust investment style.

We report in Table 2 the estimates for Equation (1), the 3F model, based on equal- and value-weighted portfolios. The equivalent estimates for Equation (2), the 4F model, are reported in Table 3. Using the 3F results alone, fund managers appear to produce significant alpha estimates using both equal and value-weighted portfolios. The average alpha estimate for equal-weighted funds in Panel A is 0.033% per week or 1.75% per year (1.27% per year for value-weighted funds in Panel B). This is predictably lower than the risk-unadjusted return reported for all funds in Table 1 of 2.12%. Importantly, at an average value 1.97%, the risk-adjusted estimated alphas are likely to be below fees and transactions costs for the average fund. This finding is consistent with previous studies that report fund managers underperforming the market after controlling for the market, size, and B/M factors. For example, Cuthbertson, Nitzsche, and O'Sullivan (2008) report that there are around 2–5% of top performing US and UK equity mutual funds which beat their benchmarks while around 20–40% of funds underperform their benchmarks. Moreover, alpha estimates vary by style, as we might expect. The evidence shows that value-oriented trusts outperform growth-oriented trusts by between 2.5% and 3.3% per year (2.5% for value weighting in Panel B; and 3.3% for equal weighting in Panel A). The findings are inconsistent with results shown in the USA. For example, Davis (2001) document that value-oriented funds obtained abnormal −2.75% returns. Chan, Chen, and Lakonishok (2002) also observe that in general, growth funds outperformed value funds by 1.72% per year in the US market. But our findings are consistent with Quigley and Sinquefield (2000), who examine the performance of all UK equity unit trusts over the period from 1978 to 1997 and record that value-oriented trusts outperform growth-oriented trusts. Our evidence further shows that the gap difference between value and growth trusts is mainly driven by a size effect with small unit trusts outperforming big trusts by 4.8% per year for equal-weighted results (3.3% per year for value weighted). That is, small firms with high value earn more than big firms with high value. On the other hand, small size trusts outperform big size trusts. The difference of the average alpha between the small and big size portfolios is 2.2% per year for equal-weighted trusts and 1.25% for value weighted. The size effect largely accounts for the differences we observe between value-weighted and equal-weighted funds (value-weighted returns are lower than equal-weighted returns, which is consistent with the evidence of better performance for small size funds).

The *t*-statistic estimates in Table 2 shows that alphas are only significantly different from zero as funds approach the value end of the style spectrum. Whilst alpha estimates are universally lower for the value-weighted results, the significance and inference of the estimates are largely unaltered. Our general conclusion in using the 3F model is that fund managers do outperform the market for small and value styles, but generally not in excess of reasonable estimates of fees and transactions costs.

This picture changes and the performance analysis radically alters when momentum is introduced, the results of which are reported in Table 3. In this case, average alpha performance falls to 0.57% per year for equal weighting (0.36% for value weighting) compared with the 1.75% (1.27% for value weighting) reported in Table 2. Overall, momentum seems to account for excess

Table 2. Performance of unit trusts based on the Fama and French (1993) 3F model, classified by investment styles.

		Growth – 25%		2 – 25%		3 – 25%		Value – 25%	
		Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
Panel A: The EW returns									
Big – 25%	Alpha	.0028	0.40	.0060	0.77	.0224	1.34	.0326	1.79*
	$R_m - R_f$	.7110	31.75***	.8187	32.42***	.8106	37.05***	.8405	30.80***
	SMB	−.2361	−3.33***	−.2049	−3.13***	−.2852	−3.94***	−.3172	−4.79***
	HML	−.3175	−2.71***	.1159	1.74*	.1141	1.81*	.2196	2.48**
	Adj. R^2	.518		.634		.575		.462	
2 – 25%	Alpha	.0054	0.66	.0113	1.12	.0379	1.95*	.0551	2.08**
	$R_m - R_f$	.6439	26.46***	.6880	36.73***	.8057	30.30***	.8914	31.68***
	SMB	−.0932	−2.01**	−.0746	−2.03**	−.0705	−1.95*	−.0878	−2.09**
	HML	−.5635	−3.39***	.1228	1.93*	.1781	2.35**	.3367	3.65***
	Adj. R^2	.525		.563		.449		.543	
3 – 25%	Alpha	.0058	0.76	.0184	1.44	.0431	2.14**	.0618	2.35**
	$R_m - R_f$	.6792	30.32***	.7748	34.92***	.8317	29.52***	.8472	33.26***
	SMB	.0418	2.22**	.0392	2.28**	.0458	2.20**	.0568	2.40**
	HML	−.6564	−3.55***	.1792	2.37**	.2319	2.55**	.4312	3.54***
	Adj. R^2	.559		.452		.557		.416	
Small – 25%	Alpha	.0096	1.01	.0358	1.89*	.0639	2.32**	.1256	3.40***
	$R_m - R_f$	.8151	28.67***	.8824	31.55***	.8940	28.17***	.9046	31.63***
	SMB	.2124	2.94***	.2993	3.14***	.3935	3.92***	.4043	3.97***
	HML	−.8221	−3.74***	.2038	2.46**	.3230	2.68***	.4786	3.11***
	Adj. R^2	.566		.497		.517		.446	
Panel B: The VW returns									
Big – 25%	Alpha	.0022	0.35	.0044	0.63	.0188	1.02	.0270	1.69*
	$R_m - R_f$	.6895	30.83***	.6848	34.15***	.7672	33.75***	.8200	31.95***
	SMB	−.2180	−3.09***	−.1948	−3.38***	−.2523	−3.33***	−.2855	−4.39***
	HML	−.2274	−2.36**	.1011	1.66*	.1210	1.77*	.2147	2.32**
	Adj. R^2	.502		.579		.538		.444	
2 – 25%	Alpha	.0040	0.54	.0083	1.06	.0260	1.61	.0418	2.30**
	$R_m - R_f$	.6487	27.17***	.7469	31.05***	.7983	28.69***	.8111	26.59***
	SMB	−.0808	−1.79*	−.0658	−1.71*	−.0601	−1.65*	−.0851	−1.93*
	HML	−.4664	−2.44**	.1132	1.85*	.1571	2.02**	.2576	2.82***
	Adj. R^2	.528		.461		.435		.489	
3 – 25%	Alpha	.0040	0.54	.0121	1.23	.0285	1.90*	.0486	2.23**
	$R_m - R_f$	.7362	26.75***	.8362	25.79***	.8022	25.58***	.9421	26.19***
	SMB	.0284	1.71*	.0322	1.78*	.0354	2.01**	.0435	2.09**
	HML	−.6131	−2.83***	.1390	1.98**	.1764	2.12**	.3199	3.33***
	Adj. R^2	.505		.450		.491		.514	
Small – 25%	Alpha	.0074	0.85	.0223	1.43	.0471	2.14**	.0898	3.20***
	$R_m - R_f$	.7714	30.71***	.8827	26.02***	.9406	29.40***	.9844	29.44***

(*Continued*)

Table 2. Continued

	Growth – 25%		2 – 25%		3 – 25%		Value – 25%	
	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
SMB	.1445	2.04**	.1676	2.09**	.2398	2.19**	.2814	2.35**
HML	−.8067	−3.61***	.1670	2.37**	.1969	2.53**	.3487	3.36***
Adj. R^2	.403		.569		.482		.483	

Notes: At the end of each year from 1988 to 2009, all UK unit trusts are first sorted by the size loadings and assigned into quartile. Within each of the four size classifications, all unit trusts are then sorted by the value loadings and assigned into quartile. Panels A and B report the EW and VW weekly returns, respectively, for each of the resulting 16 portfolios over the subsequent one year (which then takes our data period to the end of 2010). The factor loadings are estimated from the Fama and French (1993) 3F regressions: $R_{it} - R_{ft} = \alpha_i + b_i(R_{mt} - R_{ft}) + s_i\text{SMB}_t + h_i\text{HML}_t + e_{it}$, where $R_{it} - R_{ft}$ represents the excess weekly return on unit trust i; $R_{mt} - R_{ft}$ represents the excess weekly return on the FTSE All Share Index; R_{ft} represents the weekly 13-week UK Treasury Bill rate; SMB_t and HML_t represent weekly returns on the zero-investment factor-mimicking portfolios for size and B/M factors, respectively; ε_{jt} denotes the error term. EW, equally weighted and VW, value weighted.
*Significant at 10% level.
**Significant at 5% level.
***Significant at 1% level.

fund performance identified for the 3F model. In every case, the momentum coefficient estimate is statistically significant, with the highest significance exhibited at the value styles.[10] It would not be unreasonable to conclude that risk adjusting for momentum accounts for excess returns in the 3F model. Only one estimate of alpha is significant in Panel A and none remains significant in Panel B once momentum is accounted for.

The results in Table 3 are consistent with the role of momentum described in Jegadeesh and Titman (1993). That is, small-cap or value-oriented unit trusts normally buy stocks with past good performance and hence benefit from the momentum effect, while the momentum effect works against big-cap or growth-oriented trusts, which generally invest in stocks with past poor performance. Thus, for example, the average value for the momentum loading in the equal-weighted (Panel A) growth portfolios is –0.007% per week, while the figure for the value portfolios is 0.052% per week. The average value for the big portfolio is –0.002% per week, while the figure for the small portfolio is 0.033% per week. All the figures are statistically significant and directional signs are consistent between equal- and value-weighted portfolios.

The role of momentum is thus important in scale, scope, direction and significance. It appears also to contribute to our understanding of fund performance. In Table 2 we observe significant alphas particularly with respect to value-positioned funds but that, once momentum is accounted for in Table 3, all of the excess return measured by alpha has disappeared with the exception of small value style combinations for equal-weighted portfolios (even this disappears for value weighting). The conclusion appears that fund managers do not generally offer returns above the risk factors identified in the 4F models. This result is reported gross of fees and transactions costs. Notwithstanding the difficulties of estimating actual total costs, our results confirm that for the style classifications we have identified, no fund would produce a profit (positive alpha) after reasonable costs are accounted for.

Our conclusion from this stage of analysis is that fund managers do not in general make excess risk-adjusted returns for their clients. Moreover, fund styling – in every style classification we observe – is subject to a statistically significant momentum effect. We also specifically observe excess risk-adjusted returns disappearing when moving from estimating the 3F model to the 4F

Table 3. Performance of unit trusts based on the Carhart (1997) 4F model, classified by investment styles.

		Growth – 25%		2 – 25%		3 – 25%		Value – 25%	
		Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
Panel A: The EW returns									
Big – 25%	Alpha	.0015	0.16	.0026	0.35	.0050	0.59	.0082	1.17
	$R_m - R_f$	.7037	30.40***	.7205	34.86***	.8958	39.98***	.8665	30.25***
	SMB	−.2239	−3.05***	−.2157	−3.28***	−.3275	−4.42***	−.3623	−4.92***
	HML	−.2968	−2.52**	.1128	1.86*	.1124	1.73*	.1888	2.47**
	MOM	−.0305	−2.82***	−.0191	−2.06**	.0150	1.85*	.0260	2.95***
	Adj. R^2	.583		.682		.628		.513	
2 – 25%	Alpha	.0021	0.23	.0034	0.46	.0066	0.66	.0134	1.18
	$R_m - R_f$	.6199	26.80***	.6274	28.56***	.7482	27.29***	.8531	32.67***
	SMB	−.0970	−2.18**	−.0857	−2.32**	−.0768	−2.29**	−.0866	−2.33**
	HML	−.4051	−2.92***	.1282	2.02**	.1346	2.42**	.2596	2.94***
	MOM	−.0290	−2.34**	.0143	1.99**	.0172	1.95*	.0342	3.03***
	Adj. R^2	.585		.610		.547		.577	
3 – 25%	Alpha	.0027	0.28	.0037	0.52	.0074	0.79	.0146	1.43
	$R_m - R_f$	.6250	25.78***	.7634	29.68***	.8103	29.51***	.8510	25.48***
	SMB	.0486	2.09**	.0440	2.21**	.0487	2.01**	.0551	2.11**
	HML	−.5995	−3.45***	.1832	2.19**	.1971	2.54**	.3481	3.57***
	MOM	.0184	2.16**	.0140	1.97**	.0181	1.95*	.0643	4.28***
	Adj. R^2	.591		.503		.650		.490	
Small – 25%	Alpha	.0035	0.64	.0145	1.30	.0185	1.57	.0268	1.66*
	$R_m - R_f$	.5433	23.46***	.6871	25.75***	.8071	24.08***	.8706	23.89***
	SMB	.2264	2.96***	.2943	3.22***	.3955	3.79***	.4231	3.41***
	HML	.7418	−3.76***	.1729	2.30**	.2833	2.85***	.4304	4.53***
	MOM	.0151	2.07**	.0120	1.66*	.0212	2.07**	.0843	4.69***
	Adj. R^2	.616		.582		.599		.508	
Panel B: The VW returns									
Big – 25%	Alpha	.0011	0.14	.0016	0.16	.0032	0.30	.0061	0.59
	$R_m - R_f$	.6710	29.29***	.7578	37.52***	.8004	37.46***	.6591	29.73***
	SMB	−.2102	−2.91***	−.1948	−3.06***	−.2551	−3.76***	−.3209	−4.75***
	HML	−.2623	−2.50**	.1215	1.87*	.1188	1.72*	.2236	2.14**
	MOM	−.0322	−2.68***	−.0175	−2.11**	.0148	1.94*	.0221	2.40**
	Adj. R^2	.614		.645		.585		.478	
2 – 5%	Alpha	.0016	0.22	.0024	0.30	.0039	0.37	.0104	1.07
	$R_m - R_f$	.6444	27.87***	.6230	26.86***	.6861	26.91***	.7958	27.08***
	SMB	−.0891	−2.41**	−.0783	−2.27**	−.0633	−2.29**	−.0836	−2.59***
	HML	−.5411	−2.85***	.1481	2.04**	.1547	2.17**	.3142	2.62***
	MOM	−.0315	−2.54**	−.0159	−1.90*	.0228	2.01**	.0347	3.01***
	Adj. R^2	.550		.533		.540		.582	
3 – 25%	Alpha	.0020	0.28	.0030	0.37	.0052	0.69	.0116	1.22
	$R_m - R_f$	.6212	26.01***	.7457	29.53***	.8164	29.57***	.8349	31.43***
	SMB	.0424	2.05**	.0387	2.00**	.0434	2.17**	.0445	2.38**
	HML	−.7635	−3.43***	.1572	2.01**	.1662	2.35**	.3494	3.19***
	MOM	−.0202	−2.24**	−.0156	−2.09**	.0213	2.02**	.0674	4.19***
	Adj. R^2	.530		.523		.545		.565	

(*Continued*)

Table 3. Continued

		Growth – 25%		2 – 25%		3 – 25%		Value – 25%	
		Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat	Coeff.	*t*-Stat
Small – 25%	Alpha	.0028	0.34	.0110	1.32	.0126	1.43	.0166	1.56
	$R_m - R_f$	.5535	24.40***	.6515	22.59***	.7240	25.43***	.8729	28.96***
	SMB	.1912	2.81***	.2493	2.65***	.3490	2.84***	.4037	3.29***
	HML	−.8279	−3.86***	.1884	2.55**	.2150	2.69***	.4131	4.27***
	MOM	−.0130	−2.00**	−.0114	−1.74*	.0249	2.14**	.0898	4.82***
	Adj. R^2	.500		.591		.534		.559	

Notes: At the end of each year from 1988 to 2009, all UK unit trusts are first sorted by the size loadings and assigned into quartile. Within each of the four size classifications, all unit trusts are then sorted by the value loadings and assigned into quartile. Panels A and B report the EW and VW weekly returns, respectively, for each of the resulting 16 portfolios over the subsequent one year (which then takes our data period to the end of 2010). The factor loadings are estimated from the Carhart (1997) 4F regressions: $R_{it} - R_{ft} = \alpha_i + b_i(R_{mt} - R_{ft}) + s_i\mathrm{SMB}_t + h_i\mathrm{HML}_t + m_i\mathrm{MOM}_t + e_{it}$, where MOM_t represents the weekly returns on the zero-investment factor-mimicking portfolios for momentum factor; other variables are as defined in Table 2.
*Significant at 10% level.
**Significant at 5% level.
***Significant at 1% level.

model. In other words, all funds are momentum funds to one degree or another and are associated with zero excess returns when momentum is incorporated into the analysis. When momentum is not accounted for, positive alphas appear for value-orientated funds. In the light of the evidence of a pervasive momentum effect and zero alpha performance, we examine how investment style adapts to prior performance. That is, with momentum an important factor, we assess what happens to investment style when fund performance varies. There is no logic in a fund manager using momentum to chase losses and every incentive for an inactive fund manager to continue with a winning momentum formula. The former would naturally shift or rotate styles, the latter would not. The next section then looks at the evidence of style switching followed by an exploration of the reasons for style shifting.

4.2 *Do fund managers make consistent style choices?*

This paper uses a style classification scheme that is widely used in the mutual fund and pension fund industry.[11] Specifically, the style categories are based on two dimensions: the market capitalisation (size) and the value–growth (B/M) orientations and which reflects the patterns of allocation of much of investor savings (Chan, Chen, and Lakonishok 2002). In this section, we examine the style consistency of UK unit trusts by comparing the *rank* of a unit trust's past and future regression loadings instead of directly comparing regression loadings. This is because a trust's regression loading figure with respect to size and B/M may fluctuate over the years, but the unit trust's style rank may stay the same over a number of years and which, we argue, is more suggestive of style consistency. This remains within the spirit of Brown and Goetzmann (1997) who allow variable factor loadings in their model of trust returns and also recognises the large amount of evidence which shows that fund managers vary their investment objectives over time (see, e.g. Gallo and Lockwood 1999).[12]

Having established the role of momentum, we now only report results based on the 4F model and use this as our benchmark model. We also report only results for equal-weighted portfolios.[13]

Table 4. Correlations and average absolute differences between past and future unit trusts styles.

	Size				B/M			
	Corr.	SE-Corr.	Abs. diff.	SE-diff.	Corr.	SE-corr.	Abs. diff.	SE-diff.
Big size – 25%	.6465	.0273**	.1296	.0568**	.2638	.1552*	.2616	.1128**
Small size – 25%	.6804	.0324**	.0950	.0559*	.2970	.1768*	.2396	.1235*
Value – 25%	.6933	.0312**	.1043	.0596*	.2891	.1681*	.2357	.1228*
Growth – 25%	.6045	.0267**	.1278	.0576**	.2503	.1517*	.2731	.1115**
All	.6559	.0290**	.1198	.0631*	.2831	.1609*	.2481	.1154**

Notes: At the end of each year from 1988 to 2009, the past style of each UK unit trust is compared with its future style. The past style of a unit trust is measured from its weekly returns over the most recent prior one-year period, and its future style is measured from weekly returns over the subsequent one-year period (which then takes our data period to the end of 2010). The style of unit trusts with respect to size and to B/M is its loadings on the size and B/M factors, respectively, estimated from the Carhart (1997) 4F regressions. All variables are as defined in Tables 2 and 3. Style measures (past or future) for all unit trusts are ranked each year and rescaled from zero (the lowest-ranked unit trust) to one (the highest-ranked unit trust). This table reports the simple correlation between past and future style ranks pooled over unit trusts and over years. Also reported is the average absolute difference between past and future style ranks, along with the pooled SE reported for all unit trusts, big size and small size groups (unit trusts in the top 25% and bottom 25%, respectively, when sorted each year by style ranks on size), as well as value and growth groups (unit trusts in the top 25% and bottom 25% when sorted each year by style ranks on B/M). At the end of each year, the SE of correlation coefficient and difference between the past and future ranks are calculated. For example, the SE of the correlation coefficient at the end of 1988 is computed as

$$\mathrm{SE}_{1988} = \left[\frac{1 - r_{1988}^2}{n_{1988} - 2}\right]^{1/2}, \quad \text{with } n_{1988} - 2 \text{degreesoffreedom},$$

where n_{1988} is the number of observations of weekly returns at the end of 1988.
The pooled SE for each year from 1988 to 2009 is computed as

$$\mathrm{SE}_{\mathrm{pooled}} = \left[\frac{(n_{1988} - 1)\mathrm{SE}_{1988}^2 + (n_{1989} - 1)\mathrm{SE}_{1989}^2 + \cdots + (n_{2009} - 1)\mathrm{SE}_{2009}^2}{n_{1988} + n_{1989} + \cdots + n_{2009} - 22}\right]^{1/2}.$$

SE, standard error.
*Significant at 10% level.
**Significant at 5% level.

At the end of each calendar year we estimate the 4F model for every unit trust with a complete history of weekly returns over the prior one year. The estimated loadings on either size or B/M factor are ranked and scaled to fall between zero (for the lowest-ranked unit trust) and one (for the highest-ranked unit trust). In particular, as the lowest rank is set at 0, the second lowest rank is $0 + [(1 - 0)/$ (the number of the trusts)$] \times 1$; the third lowest rank is $0 + [(1 - 0)/$ (the number of the trusts)$] \times 2$; until the highest rank 1. A high (low) rank indicates that the unit trust is relatively more extreme in its orientation towards small (big) size equities or towards value (growth) equities. Style consistency is measured as the correlation between a trust's current style rank measured at year end and its future style rank measured at the end of the following year. A high correlation is interpreted as a high level of style consistency.

Table 4 reports the results on the basis of the pooled sample of unit trust-year observations. The style consistency for all unit trusts is relatively high for the size dimension but low for the B/M dimension. For example, the correlations between the current and future loadings are 65.59%

(standard error = .0290) for the size dimension and 28.31% (standard error = .1609) for the B/M dimension. We further investigate style consistency with respect to size and B/M characteristics: size ranks are divided into big-cap trusts (trusts in the top 25% with the highest style rank on size) and small-cap trusts (trusts in the bottom 25% with the lowest style rank on size). B/M ranks are divided into value trusts (trusts in the top 25% with the highest style rank on B/M) and growth trusts (trusts in the bottom 25% with the lowest style rank on B/M). Style correlations are calculated for each group. The results show that correlations for size are consistently higher than they are for value although for both size and value there are statistically significant differences between past and future style positioning. For example, for the size dimension, big-cap trusts have an average absolute correlation difference of 12.96% (standard error = .0568) between past and future style ranks at the 5% significance level, while for the B/M dimension, growth trusts have a correlation difference of 27.31% (standard error = .1115) at the 5% significance level. The average absolute differences in style ranks provide consistent information that mutual funds do not exhibit consistent factor loadings; in fact, they vary sufficiently to alter their ranking. What we observe are changes in fund style positioning that recognises the significant role that momentum plays in fund performance. In this context, it would appear that fund managers are changing fund style but the question remains as to what is driving this change. The next stage in our analysis looks to determine which individual factor can help explain fund rotation.

4.3 *What is the reason for style shifting?*

Prior US studies reveal that funds with poor past performance are more likely to change their investment styles (see, e.g. Chan, Chen, and Lakonishok 2002; Lynch and Musto 2003). We conjecture that there exists a relation between past performance and style shift for UK unit trusts. To test this, we sort unit trusts into portfolios on the basis of a two-way within-group classification. The first sort is by a unit trust's past performance (the compounding return on the unit trust over the prior one year), and the second sort is by the unit trust's size and B/M loadings. We then compare each group's current style rank with its future style rank (measured in the subsequent one year) and calculate the mean absolute difference of ranks. We interpret large mean absolute relative differences as evidence of greatest style change.

In the classification by past unit trust performance, there are four groups: Group 1 (winners) comprises the top quartile of unit trusts with the highest past returns; Group 2 comprises the next lowest quartile, and so on until losers are defined as Group 4. Within each of these four groups, unit trusts are sorted by their rank with respect to size or B/M and assigned into one of four quartiles. The style of unit trusts with respect to size and to B/M is its loadings on the size and B/M factors, respectively, estimated from the Carhart (1997) 4F regressions. The past style of each portfolio with respect to size and B/M is then compared with its future style. For each of the resulting 16 portfolios, the simple average for the size or B/M ranks across all member unit trusts is calculated at the end of the portfolio formation year to give the portfolio's past style and at the end of the subsequent year to give its future style. The weighted average across all portfolio formation years is reported, where the weights are the number of unit trusts in each year. Also reported is the weighted average of the mean absolute differences between the past and future characteristic ranks across all unit trusts within each portfolio.[14]

Panel A of Table 5 reveals the relation between style drift with respect to the size dimension and past performance. Panel B reports the relation between style drift with respect to the B/M dimension and past performance. What is clear in both panels is that style ranking is most likely to differ if losses are incurred in fund performance. Irrespective of investment style, positioning

Table 5. Shifts in unit trust styles based on the two-way within-group classifications.

		Alpha	*t*-Alpha	Past ranking	Future ranking	Abs. diff.	*t*-Diff.
Panel A: Unit trust styles with respect to size							
Winner – 25%	Big – 25%	.0137	1.08	.6985	.6438	.1071	1.69**
	2 – 25%	.0169	1.25	.4246	.3233	.0859	0.89
	3 – 25%	.0170	1.44	.2785	.2610	.0822	0.88
	Small – 25%	.0195	1.64	.1330	.1284	.0703	0.66
2 – 25%	Big	.0056	0.41	.7373	.6219	.1581	2.52**
	2	.0075	0.65	.4941	.3812	.1445	2.35**
	3	.0082	0.75	.3989	.3104	.1186	1.78*
	Small	.0097	0.96	.1725	.1258	.0809	0.71
3 – 25%	Big	.0045	0.44	.7621	.6330	.1522	2.46**
	2	.0051	0.53	.4743	.3842	.1356	2.34**
	3	.0049	0.50	.3772	.2807	.1199	1.95*
	Small	.0067	0.63	.1627	.1196	.0926	1.67*
Loser – 25%	Big – 25%	.0025	0.37	.8272	.6511	.1981	2.87***
	2 – 25%	.0038	0.40	.5239	.3658	.1861	2.42**
	3 – 25%	.0036	0.41	.5101	.3739	.1790	2.32**
	Small – 25%	.0046	0.44	.2022	.1360	.1294	2.02**
Panel B: Unit trust styles with respect to B/M							
Winner – 25%	Value – 25%	.0199	1.75*	.8316	.7693	.1710	1.11
	2 – 25%	.0168	1.63	.6608	.6109	.2052	1.58
	3 – 25%	.0163	1.57	.6463	.5570	.2224	1.74*
	Growth – 25%	.0116	1.15	.4583	.5245	.2505	2.16**
2 – 25%	Value	.0102	1.06	.7979	.7533	.2067	1.46
	2	.0099	0.97	.5931	.6186	.2298	1.89**
	3	.0098	0.92	.5475	.6112	.2619	2.54**
	Growth	.0076	0.78	.3783	.4331	.3038	3.34***
3 – 25%	Value	.0075	0.86	.6127	.6866	.2078	1.61
	2	.0064	0.68	.3962	.4478	.2235	1.87*
	3	.0061	0.59	.3642	.4170	.2721	2.55**
	Growth	.0047	0.50	.2606	.3391	.3137	3.60***
Loser – 25%	Value – 25%	.0056	0.66	.5074	.6189	.2365	1.93*
	2 – 25%	.0046	0.53	.2722	.3453	.2454	2.08**
	3 – 25%	.0042	0.47	.2254	.3178	.2978	3.20***
	Growth – 25%	.0037	0.37	.1275	.2868	.3860	3.84***

Notes: At the end of each year from 1988 to 2009, all UK unit trusts are first sorted by the past one-year compounding returns and assigned into quartile. Within each of the four past return classifications, all unit trusts are then sorted by the size rankings in Panel A or B/M rankings in Panel B and assigned into quartile. The style of unit trusts with respect to size and to B/M is its loadings on the size and B/M factors, respectively, estimated from the Carhart (1997) 4F regressions. The past style of each portfolio with respect to size and B/M is then compared with its future style. For each of the resulting 16 portfolios, the simple average for the size or B/M characteristic ranks across all member unit trusts is calculated at the end of the portfolio formation year to give the past style of the portfolio and at the end of the subsequent year to give its future style (which then takes our data period to the end of 2010). The weighted average across all portfolio formation years is reported in the table, where the weights are the number of unit trust observations in each year. Also reported is the weighted average of the mean absolute differences over years between the past and future characteristic ranks across all unit trusts within a portfolio.

*Significant at 10% level.

**Significant at 5% level.

***Significant at 1% level.

is likely to change if prior past year returns are in the lowest quartile. In fact, outside of the top quartile for both size and B/M, statistically significant differences in style ranking are observed across big/small and value/growth characteristics. Given that nearly all funds are loss making from the evidence of Tables 2 and 3 in combination with anticipated fees and expenses, the extent of style rotation is not surprising. It would be a safe conclusion to say that it is loser funds that switch, and more broadly it would not be unreasonable to conclude that most funds switch. This evidence is consistent with that of the USA and reported in Chan, Chen, and J. Lakonishok (2002) and Lynch and Musto (2003), and also consistent with more recent work that shows that very few funds offer a persistent performance sufficient to warrant a no-change strategy (Barras, Scaillet, and Wermers 2010). In answering our research question, style shifting is associated with the lowest levels of fund returns and funds shift styles to improve fund returns. We would argue, and evidence in the following section, that this is not active fund management *within styles* but a level of active management *in pursuit* of a style.

4.4 *What style is pursued?*

Our evidence so far indicates that the style of choice is likely to be altered in the face of poor performance. The indications are that this effect occurs irrespective of the existing style, so that no style choice is immune to being altered. We look in this section to ascertain what then might be the style of choice when funds perform badly and have to rotate. An appropriate clue is provided in Chen and De Bondt (2004) who examine all firms within the S&P-500 index between 1976 and 2000 and provide evidence of style momentum in a cyclical framework. They find that stocks with characteristics that are currently in favour outperform stocks with characteristics that are currently out of favour. They assert that one possible explanation for this sort of profit could be as a result of cyclical and structural changes in the macro economy.[15] It is also well documented that investors chase performance in such a manner (Berk and Green 2004; Pastor and Stambaugh 2010) and that funds seek to attract investors based on past performance (Jain and Wu 2000). We extend this evidence on the grounds that it seems appropriate to explore on the basis of defining a ‘currently in favour’ characteristic as ‘past winners’ and a currently out-of-favour characteristic as ‘past losers’, as calibrated by prior period alpha values. Our expectation is that a combination of alpha value and market state will affect fund switching and that, should they switch, they will switch to a style more out-of-tune with Down-market characteristics and more in-tune with Up-market characteristics as determined by prior period performance. This is part index tracking and part index-avoidance. Such a view is consistent with viewing style investing as product differentiation such that and out-of-sync positioning in relation to a market index is required for Down markets and in-sync positioning is required for Up-markets (Chen and De Bondt 2004).

Our analysis thus focuses on market state as a conditioning variable in fund style choice. We employ the definition of market state proposed by Cooper, Gutierrez, and Hameed (2004). We define an Up-market when the market return is non-negative and a Down market when the market return is negative. We use past two-year cumulative returns on the FTSE all-share total return index (including dividend) to calculate the market return of the UK stock market.

Table 6 shows that all fund styles exhibit change in Down market states. Whilst we separate winners from losers during Down markets there are no significant alpha values for any of the styles reported. Based on past performance, all investment styles therefore change. This is evidenced by the significance of all estimates for the absolute difference in ranking with t-statistics mostly reported as corresponding to a 1% significance level (small style winners are likely to change with a t-statistic at the 10% significance level). The picture for Up-markets is different. Significant alphas

Table 6. Shifts in unit trust styles following market states.

		Down markets						Up markets						Test for equality
		Alpha	*t*-Alpha	Past ranking	Future ranking	Abs. Diff.	*t*-Diff.	Alpha	*t*-Alpha	Past ranking	Future ranking	Abs. Diff.	*t*-Diff.	(down – up) *t*-Diff.
Panel A: The style of unit trusts with respect to size														
Winner – 25%	Big – 25%	.0077	0.57	.7148	.5735	.2307	3.11***	.0203	1.72**	.6543	.5613	.0791	1.02	2.11**
	2 – 25%	.0083	0.73	.4824	.3604	.1655	2.01**	.0229	1.85*	.4400	.3951	.0679	0.85	2.11**
	3 – 25%	.0099	0.74	.3615	.2323	.1472	1.93*	.0247	2.21**	.3875	.3343	.0681	0.88	2.19**
	Small – 25%	.0110	1.16	.2167	.1632	.1371	1.92*	.0303	2.57***	.1331	.1066	.0593	0.51	1.79*
2 – 25%	Big	.0037	0.46	.7428	.5774	.2403	2.25**	.0112	1.39	.7064	.5987	.1271	1.85*	2.12**
	2	.0054	0.51	.4926	.3518	.2045	2.01**	.0163	1.46	.4303	.3683	.1069	1.63	2.18**
	3	.0056	0.52	.4643	.2892	.2023	1.98**	.0167	1.47	.3219	.2896	.0932	1.45	2.22**
	Small	.0067	0.59	.2152	.1278	.1542	1.94*	.0201	1.73*	.1551	.1252	.0718	1.22	2.36**
3 – 25%	Big	.0026	0.38	.7778	.5884	.2661	2.54**	.0078	1.15	.6717	.6147	.1573	2.31**	2.26**
	2	.0035	0.43	.5079	.3999	.2186	2.26**	.0106	1.36	.4788	.3809	.1358	2.05**	2.36**
	3	.0045	0.46	.4736	.3207	.2071	2.13**	.0135	1.75*	.2744	.2571	.1193	1.99**	2.38**
	Small	.0055	0.63	.1996	.1028	.1716	1.99**	.0165	1.91*	.1770	.1320	.0885	1.42	2.44**
Loser – 25%	Big – 25%	.0012	0.21	.8602	.6159	.3148	3.63***	.0056	0.74	.7928	.6594	.1654	2.49**	2.61***
	2 – 25%	.0015	0.23	.5533	.3764	.2533	3.01***	.0061	0.86	.5146	.4590	.1419	2.25**	2.68***
	3 – 25%	.0016	0.28	.5563	.2623	.2489	2.82***	.0064	0.99	.4118	.3494	.1318	2.01**	2.70***
	Small – 25%	.0018	0.29	.3473	.1415	.2252	3.06***	.0073	1.06	.1841	.1453	.1313	1.88*	2.05**
Panel B: The style of unit trusts with respect to B/M														
Winner – 25%	Value – 25%	.0111	1.06	.7904	.5770	.2327	2.57***	.0349	2.69***	.8649	.6812	.0652	1.01	1.83*
	2 – 25%	.0100	1.02	.5968	.4435	.2638	2.64***	.0251	1.98**	.6393	.5174	.1543	1.29	2.25**
	3 – 25%	.0098	0.99	.5677	.4238	.3230	3.01***	.0220	1.82*	.6060	.4417	.1865	1.65**	2.27**
	Growth – 25%	.0090	0.94	.4061	.2301	.3780	3.47***	.0178	1.81*	.5022	.3644	.1116	1.91*	2.36**
2 – 25%	Value	.0059	0.65	.6785	.5109	.2649	2.65***	.0222	1.89*	.8281	.6048	.1818	1.66*	2.23**
	2	.0047	0.59	.5354	.4261	.2825	2.89***	.0142	1.74*	.5763	.4405	.2031	1.78*	2.33**
	3	.0042	0.56	.5069	.4116	.3008	3.12***	.0114	1.52	.5217	.4254	.2183	1.85*	2.36**
	Growth	.0031	0.44	.3048	.1864	.3376	3.26***	.0077	0.89	.3116	.3365	.2367	1.99**	2.47**
3 – 25%	Value	.0039	0.62	.5256	.5910	.2703	2.68***	.0116	1.56	.6423	.5556	.1944	1.74*	2.34**
	2	.0035	0.58	.3435	.3021	.2929	2.99***	.0102	1.48	.4422	.3357	.2033	1.88*	2.56***
	3	.0034	0.41	.3264	.2979	.3057	3.15***	.0098	1.00	.4329	.3064	.2349	2.01**	2.68***
	Growth	.0023	0.26	.1907	.2227	.3275	3.26***	.0059	0.75	.2556	.2679	.2538	2.23**	2.74***

(*Continued*)

Table 6. Continued

		Down markets						Up markets						Test for equality
		Alpha	*t*-Alpha	Past ranking	Future ranking	Abs. Diff.	*t*-Diff.	Alpha	*t*-Alpha	Past ranking	Future ranking	Abs. Diff.	*t*-Diff.	(down – up) *t*-Diff.
Loser – 25%	Value – 25%	.0026	0.21	.4871	.6604	.3478	3.16***	.0085	1.11	.5606	.6383	.2127	2.61**	2.13**
	2 – 25%	.0021	0.20	.2619	.2642	.3446	3.34***	.0070	1.01	.2441	.2696	.2439	1.98**	2.99***
	3 – 25%	.0020	0.19	.2477	.2304	.3676	3.55***	.0066	0.88	.2265	.2758	.2566	2.25**	3.01***
	Growth – 25%	.0018	0.17	.1073	.3212	.4190	3.78***	.0049	0.71	.1579	.3155	.2825	3.17***	2.74***

Notes: At the end of each year from 1988 to 2009, all UK unit trusts are first sorted by the past one-year compounding returns and assigned into two classifications (Winner and Loser contain unit trusts in the top 25% and the bottom 25%, respectively). Within each classification, all unit trusts are then sorted by the size rankings in Panel A or B/M rankings in Panel B and assigned into two classifications (big and small contain unit trusts in the top 25% and the bottom 25%). The style of unit trusts with respect to size and to B/M is its loadings on the size and B/M factors, respectively, estimated from the Carhart (1997) 4F regressions. The past style of each portfolio with respect to size and B/M is then compared with its future style for each of the resulting eight portfolios, following the Up and Down markets. Like Cooper, Gutierrez, and Hameed (2004), we define an Up (Down) market when past two-year cumulative returns of the FTSE All-Share Index is non-negative (negative). The simple average for the size or B/M characteristic ranks across all member unit trusts is calculated at the end of the portfolio formation year to give the past style of the portfolio and at the end of the subsequent year to give its future style. The weighted average across all portfolio formation years is reported in the table, where the weights are the number of unit trust observations in each year. The weighted average of the mean absolute differences over years between the past and future characteristic ranks across all unit trusts within a portfolio is reported. Also reported are the robust *t*-statistics for the test of the equality of adjusted profits and mean absolute differences across Down and Up markets.

*Significant at 10% level.

**Significant at 5% level.

***Significant at 1% level.

are reported for winner portfolios in both size and value styles and for three out of four winner styles there are no significant results reported for changes in associated style rankings (Winner-Growth styles are likely to change with an alpha of 0.018% per week (t-statistic $= 1.81$)). For the loser funds during Up-market states, no significant alphas are reported but the associated style rankings report significant changes (all at 1% significance level). Thus, all portfolios in both Up and Down markets that report alphas not significantly different from zero are subject to change. The change in style is more extensive in Down compared to Up-market states. The difference of the difference in rankings between Up and Down markets is observable in all style categories and all estimates are statistically significant. The interpretation is that, for Down markets, the extent of change in styles is significantly larger than it is for Up markets.

We should note the existence of significant alphas during Up markets. Whilst particularly significant results are obtained for value and small size winner funds in neither case are they likely to threaten any reasonable estimates of transactions costs. The value alpha is 0.035% per week (1.82% per year) and the small size alpha is 0.030% per week (1.58% per year). Notwithstanding these results, of course, fund managers invariably report raw returns in annual reports and hence the impression of performance in relation to a style benchmark might be somewhat different.

The result confirms Chen and De Bondt's (2004) observation that no style is optimal for all periods and circumstances and also that style momentum *is style rotation*. That is, fund managers might track style indices but these are quickly subordinated to momentum when alpha performance deteriorates. Our results add to those of Chen and De Bondt (2004) inasmuch that we specifically evidence style rotation and report the behaviour of styled funds over different market states to reveal how and when momentum justifies style rotation. Thus, alpha performance varies most clearly during market changes and, hence, what we observe in the results presented here is market-momentum styling or performance-chasing as largely determined by market states. This is not simple index tracking as observed by many researchers, but a story of investment style shifting as determined by a momentum adjustment process. What we have managed to report is to show which styles rotate, why they rotate, and when they rotate.

5. Conclusions

This study reports evidence relating to the UK unit trust investment styles over the period 1987–2010 using a near-population sample. We examined fund performance, style preferences, style consistency and what incentives might exist to explain style inconsistency. In relation to fund performance, we generally do not observe excess returns when the Carhart (1997) 4F model is employed thus reporting a significant role in the UK for momentum. This is an unusual finding for the UK and we attribute our different results to the particular severity of some of the Down markets during our sample period which have yet to be widely investigated. We examined which investment styles were likely to be rotated and found that loser portfolios with low prior period returns as measured by alpha were most likely to change. However, this result appeared irrespective of style (all loser styles changed) and, hence, what became clear is that all future style choices are subordinated to past performance. We examined further what role market states play in style rotation and confirmed that style conditioning based on prior performance was important in explaining changes in style with market states naturally determining the extent of available excess returns.

Our general conclusion is to confirm that mutual funds chase performance. Our contribution is to show why this happened (under poor past performance), how this was brought about (by style rotation using a momentum styling) and under what conditions it was most likely to occur (during market down turns). Style rotation, we reported, is determined by momentum such that the momentum factor loadings we report are, in fact, adjustment processes that are used by funds to search for performance. Momentum investing therefore manifests as style rotation. The question of whether this is a strategic intention or strategic default may be addressed, but not perhaps conclusively answered, by looking at the evidence of market states: momentum is not a style of choice but a style of circumstance. By adopting momentum, fund managers are subordinating style choice to a very limited set of criteria: specifically, a single criterion. The only choice that fund managers can therefore exercise over a single criterion reduces to whether or not momentum should be adopted. At the risk of losing fund inflow and facing fund outflow, all of the managerial incentives and the evidence reported here point to one conclusion: adopting momentum is not a choice, and style selection is achieved not by *strategic intent* but by *strategic default* to prevailing circumstances.

Notes

1. It is theoretically inappropriate because it is logically inconsistent with superior information as it assumes homogenous expectations and, as a consequence, abnormal performance can only be observed due to the mean-variance inefficiency. CAPM is empirically unsuitable because of the varied and well-documented anomalies presented in its application. Additionally, the failing of CAPM in fund performance is that it demonstrates that the market portfolio is mean-variance efficient but cannot offer a prescription about which subsets of the economy are mean-variance efficient.
2. The method of calculation of abnormal returns requires the construction of a benchmark portfolio with near-identical style characteristics as that of the fund being examined. The method then proceeds in one of two directions. The first direction involves the calculation of returns of both actual and benchmarked portfolios over the sampling frequency period to produce a time series from which a regression abnormal performance may be detected. In this respect, the approach of calculating abnormal performance is identical to the factor method (Grinblatt and Titman 1989a). The factor loadings from the regression then determine portfolio weights from which abnormal returns are detected. The second direction matches each stock to a benchmark, based on style characteristics, as before. A return difference between the two is then calculated and, in the additional step that justifies the label 'direct', the actual portfolio weights are applied to the differences to form abnormal performance or benchmark-adjusted calculations of fund performance (Daniel et al. 1997).
3. This relates to the question of fund manager timing ability which can produce Jensen measures that are difficult to interpret. Consistent with nearly every researcher who has looked at this issue, we do not find timing ability of fund managers in our sample. In common with Grinblatt and Titman (1989a), we reject the impact of the sensitivity of the Jensen measure to timing issues as being empirically unimportant.
4. The only requirement in such instances is that the k-factors are locally mean-variance efficient (Grinblatt and Titman 1985).
5. We exclude unauthorised unit trusts due to the insufficient information to confirm their investment objectives. UK equity unit trusts have at least 80% of the fund invested in the UK equities. By restricting funds to those investing in UK equity, more accurate market benchmarks may be used (Cuthbertson, Nitzsche, and O'Sullivan 2008).
6. The FTSE 100 Index includes the largest 100 blue-chip companies, representing approximately 80% of the capitalisation of the UK market. The FTSE 250 Value Index comprises the mid-capitalised 250 value stocks in the market, while the FTSE 250 Growth Index contains the mid-capitalised 250 growth companies. The FTSE All-Small Index is a combination of the FTSE SmallCap Index and the FTSE Fledging Index. The FTSE SmallCap Index includes all the companies, representing the bottom 2% of the market capitalisation and the FTSE Fledging Index, which contains companies that are too small to be included in FTSE All-Share Index. Finally, the FTSE All-Share Index is an aggregation of the FTSE 100, the FTSE 250 and the FTSE All-Small Indices. Statistically, the index represents 98–99% of the UK market capitalisation. The FTSE 100 Value Index, the FTSE 100 Growth Index, the FTSE 250 Value Index, and the FTSE 250 Growth Index have been replaced by the FTSE Style Index in 2008.
7. See http://www.sec.gov/answers/mfclose.htm – refer to the 5th bullet point on this page.
8. Thus, profitable momentum might be 'feasible' in the face of transaction costs, we would argue, but the detail is impossible for any researcher to determine with accuracy for the following reason: no known measure of 'soft dollar' costs looks to be observable but which is a generally agreed component of transactions costs for most funds (see, e.g. Haslem 2006).

9. Employing the null that alpha is equal to zero in a 3F model is equivalent to saying that unsystematic risk captured by the error term is un-priced (Ferson and Harvey 1999). As we will show, this null is likely to be rejected in the 3F model but is likely to be accepted in the 4F model, thus validating our approach to employ momentum as a device explaining fund style rotation.
10. A total of 489 and 427 unit trusts have a significant momentum variable in Tables 2 and 3, respectively.
11. The basis of approach is adopted by major fund trackers, such as Morningstar and Lipper. Chan, Chen, and Lakonishok (2002) also analyse the style of mutual funds along similar dimensions.
12. We calculate but do not report style timing results using the Fama and French (1993) 3F model. Overall, we conclude that the trust managers do not possess the ability to time market, size or value factors. Our results are consistent with previous literature which is why we do not report them (see, e.g. Treynor and Mazuy 1966; Henriksson and Merton 1981; Chang and Lewellen 1984; Chan, Chen, and Lakonishok 2002 for US mutual funds; and Fletcher 1995; Byrne, Fletcher, and Ntozi-Obwale 2006; Cuthbertson, Nitzsche, and O'Sullivan 2008 for UK unit trusts).
13. Results from the Fama and French (1993) 3F model and value weighting are available on request. The results do not alter any of the conclusions to follow.
14. The *t*-statistic is the difference of the average between the past and future characteristic ranks. Its estimated standard error is the standard error of the difference between two ranks.
15. Based on a sample of the FTSE 350 stocks, Aarts and Lehnert (2005) investigate the profitability of style momentum strategies but find less profitable and more risky returns compared with regular momentum strategies, the results of which contrast with the evidence in the USA reported by Chen and De Bondt (2004).

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