Performance of UK equity unit trusts

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Abstract We examine the performance of all UK unit trusts that concentrate their investments in UK equities. This study covers the period from January 1978 to December 1997. We compare the returns of these unit trusts with a three-factor model which takes into account their exposure to market, value and size risk. Once we control for these risk factors, we find that managers, net of expenses, reliably underperform the market. The news is worse for small-company unit trusts. Contrary to the notion that small-company shares offer abundant 'beat the market' opportunities, we find that small-company trusts are the worst performers. We also examine performance persistence. Net of expenses, good performance does not reliably persist, but bad performance does.

Keywords: *performance measurement; multi-factor models; persistence; passive management; unit trusts*

Introduction

Studies of money manager performance are the bottom line test of market efficiency. They do not claim to uncover specific types of market failure as do the 'anomalies' literature of the 1980s and the behavioural finance literature of today. Rather, money manager studies ask whether there are market failures, regardless of type, that are systematically exploitable. In our opinion, the conclusion of the literature to date is a resounding 'No'.

Nearly all the studies thus far confine themselves to managers' efforts to outperform the US equity markets. Among the more recent are those by Davis (1999), Carhart (1997a), Malkiel (1995) and Elton *et al.* (1993). There are few studies of non-US markets.[1] This paper closes that gap slightly by examining the performance of all UK

equity unit trusts that concentrate their investments in the UK. With respect to the UK market, this paper deals with two popular claims by money managers and consultants: (1) money managers can outperform markets; and (2) this is especially so in the case of small stocks. The evidence we present here contradicts both of these claims.

We organise the paper as follows. First, we give a general description of our data and the classification of unit trusts, followed by the details of the UK treatment of dividends and taxes and the way in which this affects the computation of rates of return for unit trusts. The models that we use for performance measurement and the performance results for portfolios of unit trusts are then presented. We base these portfolios on descriptive classifications and then on the unit trust's exposure to well-known risk factors. The penultimate section examines whether performance persists, and the final section gives the conclusion.

Data

This study examines all UK equity unit trusts (UTs) from the Micropal (now S & P Micropal) database that existed any time between 1978 and 1997 and were authorised for sale to the public. We include only those UTs that invest primarily in UK equities and are classified by the Association of Unit Trusts and Investment Funds (AUTIF) as Growth and Income, Growth, Equity Income or Smaller Companies. In order to qualify as 'UK' a UT must have at least 80 per cent of its investments in the UK. AUTIF defines the four equity-only sectors as follows (*Unit Trust Yearbooks*, 1992–1997):

— *Growth and Income*: to produce a combination of both growth and income with a dividend yield of between 80 and 100 per cent of the yield of the FTA All Share Index;
— *Growth*: to produce capital growth;
— *Equity Income*: to produce a dividend yield in excess of 110 per cent of the yield of the FTA All Share Index;
— *Smaller Companies*: to invest at least 80 per cent of their assets in those companies that form the Extended Hoare Govett Smaller Companies Index. The Hoare Govett Smaller Companies Index (HGSC) contains the smallest tenth by market capitalisation of the main UK equity market. The Extended HGSC also includes stocks quoted on the Unlisted Securities Market, which fall within the HGSC's market capitalisation limit.[2]

We exclude unauthorised UTs because we have insufficient information to determine their investment objectives. We also exclude all international, sector specialist, balanced and fixed income UTs. Authorised UTs are approved — authorised — for sale to the public, while unauthorised UTs are not. Micropal advises us that their dividend data on dead UTs prior to 1978 are incomplete. Because we want to work with total returns, which naturally includes dividends, we commence our sample period in January 1978. Overall, we have data for 473 UTs which were still alive at the end of 1997 and 279 UTs which existed for some period between January 1978 and December 1997 but were not alive in January 1998. At year-end 1997, the aggregate value of the UK equity unit trusts we study was about £163 billion and the entire domestic UK equity market was about £1.3 trillion. By comparison, at year-end 1997 US domestic equity mutual funds had an aggregate value of £973 billion and the entire US equity market was £6.0 trillion.

Because we have data on live and dead UTs, we believe our database is free of survivor bias. This bias afflicts nearly all commercial databases of manager performance, mutual fund or otherwise. Poorly performing funds often do not survive to the end of the sample period and get dropped from the database even though they are investment options while they exist. The opportunity set investors face through time is the combined universe of live and dead funds. This universe has lower returns than the set of surviving funds.

Micropal's time series

Micropal provides us with a monthly time series of returns for all the UTs covered by this study. There are several features of UK law, Micropal convention and data availability that complicate the computation of returns. These features involve the tax treatment of dividends, bid/offer spreads, and the reinvestment of dividends expense information.

Taxation of dividends

In the UK, a corporation paying a dividend of £1 would pay £0.2 in taxes, the Advance Corporation Tax (ACT), and distribute £0.8 to the unit trust with an accompanying tax credit for the ACT paid. The unit trust pays this money as a dividend by declaring a gross dividend of £1 and distributing £0.8 in cash and £0.2 as a tax credit. A taxable investor would report £1 dividend income and £0.2 taxes already paid. Note that the example is for an ACT rate of 20 per cent, the current rate. In 1978, the rate was 33 per cent and gradually fell to 20 per cent. These higher earlier rates explain why the difference between live gross and live net returns are so high, 1.36 per cent per year (Table 1). Until July 1997, a UK tax-exempt investor such as a pension fund could reclaim the tax credit as cash. In the budget of July 1997, the ability of such investors to reclaim the tax credit was abolished.

Because we want to evaluate the performance of the unit trusts, and not their investors, we use returns gross of the ACT. For surviving trusts, we have returns gross and net of the ACT. For dead trusts, only net returns are available. We are unable to gross up the dead trusts on an individual basis because individual dividend histories are unavailable. So we pursue a second-best approach of making an aggregate adjustment to the net returns of the dead trusts. Specifically, each month we calculate the difference between the gross and net return of the surviving trusts and add this difference to the net returns of the dead trusts. In the various tests we perform throughout the paper, we form portfolios. The adjustment that grosses up the net returns takes place on a portfolio by portfolio basis. The implied assumption is that there is no average difference between the dividend yields of surviving trusts and dead trusts. More on this later.

Bid/offer spreads

UTs are quoted on a bid/offer basis, where the offer price is the price at which the manager sells units, and the bid price is the price at which the manager buys them back. Among the items accounting for the difference between the bid and offer prices are the initial charge (sales load), typically 5–6 per cent, stamp duty (presently 0.5 per cent for purchases only), dealing charges (commissions) and the bid/offer spreads of the underlying securities. The returns that Micropal provides ignore bid/offer spreads at the point of initial investment, and therefore calculate returns bid price to bid price. This suits our purpose because we want to measure the

performance of the unit trust managers rather than that of the clients.

Dividend reinvestment

We have returns for two types of unit trusts, one that distributes dividends on a regular basis, an income unit, and one that accumulates dividends inside the unit trust, an accumulation unit. Generally, when both units are available, they are like two classes of shares for the same underlying portfolio. For income units, Micropal's return series assumes reinvestment of dividends at the offer price. This means that the investor pays the full bid/offer spread when reinvesting dividends. An investor's total return from a UT that reinvests dividends at the offer price is obviously less than if dividends are reinvested at the bid price. The latter case corresponds more closely to the investment performance of the UT manager. Unfortunately, this series is unavailable from Micropal. Fortunately, the effect on returns is trivial. At the end of February 1998 the average bid/offer spread was 5.0 per cent and the average yield was 2.1 per cent per year. The cost of investing these dividends at this spread is about 0.8 basis points per month. For Small Company UTs, the average monthly cost is 0.6 basis points because of their below-average dividend yields.

Accumulation units do not pay the initial charge on the reinvestment of dividends. Where a UT provides accumulation units along with income units, the returns series of the accumulation units is preferable and is the one we use. Of the 279 non-surviving UTs, 83 are accumulation units and 196 are income units. For the 473 live funds, 93 are accumulation units and 376 are income units.

Expenses

Information on historical investment management fees and total expense ratios (TERs) are not readily available. The only source for TERs is the annual report of each UT, many of which no longer exist. Prior to 1998, there was no industry-wide publication that collected and reported this information. From 1998, Fitzrovia International Limited has published a book that includes TERs. In order to test performance gross of TERs, we choose a second-best approach. We collect a sample of 394 TERs that are closest to year-end 1996 and apply each TER as if it were constant over the life of the UT. The average TER for this sample is 1.35 per cent per year.

Time series tests

In the tests that follow, we form for each month equal weighted portfolios of UTs, using sorting and classification rules appropriate to each test. We avoid survivor bias by including each dead UT through the last month it reports a return. A portfolio that holds a UT that dies, equally weights the remaining UTs. This is similar to the methodology of Carhart (1997a).[3] We cannot purge all survivor bias, however. If a unit trust dies in the month following the last reported return, then the return in the month of death is omitted. That return is probably below the average return of the other unit trusts. This omission causes a small but unmeasurable overstatement of aggregate unit trusts' performance.

Performance measurement

Our primary model of performance measurement is the Fama–French three-factor model, which we compare with the Sharpe–Lintner Capital Asset Pricing Model (CAPM) (Sharpe, 1964; Lintner, 1965). Fama and French (1992, 1993)

show that, along with a market factor, size and value (book-to-market) factors help explain both the temporal and cross-sectional variation in stock returns.[4]

We estimate performance relative to the CAPM and Fama–French three-factor models as:

$$R_p(t) - R_f(t) = a + \beta[R_m(t) - R_f(t)] + e(t) \quad (1)$$

$$R_p(t) - R_f(t) = a + b[R_m(t) - R_f(t)] + sSMB(t) + hHML(t) + e(t) \quad (2)$$

where $R_p(t)$ is the return of a unit trust in month t, $R_f(t)$ is return of one month UK Treasury bills (henceforth month t is understood), and R_m is the total return of the FTA All Share Index (FTA). *SMB* is a size factor which is measured by the monthly return of the HGSC (ex investment trusts) minus the FTA total return (Dimson and Marsh, 1995–98). *HML* is a value (book-to-market) factor which is the return of the top 30 per cent of companies ranked by book-to-market minus the FTA total return. Details on the sources and construction of these series are in the Appendix.

In the above models, a is the regression intercept or alpha which estimates a portfolio's average excess return, that is, the return that is in excess of that which is caused by the portfolio's exposure to risk factors. In Equation (1), coefficient β measures the portfolio's exposure to a market factor in the CAPM. In Equation (2), b measures the portfolio's sensitivity to the market return, s to a size factor and h to a value factor. A positive s says the portfolio has net exposure to small stocks, while a negative value indicates net exposure to large stocks. A positive h indicates net exposure to value stocks, and a negative value indicates net exposure to growth stocks. Each of these coefficients comes with a t statistic that indicates how precisely the coefficient is estimated. The R^2 tells what portion of the variance of the dependent variable — the UT — is explained by the regression.

The economic environment and the performance of all UK equity unit trusts

Table 1 shows summary statistics for selected equity series, t-bills, the regression independent variables as well as the aggregate returns of all our UK UTs. The returns of all three equity series were high at roughly 18 per cent per year for both the market (FTA) and small stocks, and almost 21 per cent for value stocks (all returns are in sterling). By contrast, the MSCI World ex UK (net) returns 15 per cent per year for the same period. The cross correlations of the independent variables are near zero.

For the UTs, we calculate for each month an equal weighted average for five sets of data:

1. Live Gross — the gross (of tax) returns of all UTs that were still in existence at the end of 1997;
2. Live Net — the net (of tax) returns of all UTs that were still in existence at the end of 1997;
3. Dead Net — the net (of tax) returns of all UTs that were no longer in existence at the end of 1997;
4. Live and Dead Net — the net (of tax) returns of all UTs whether or not in existence at the end of 1997;
5. Live and Dead Gross — the gross (of tax) returns of all UTs whether or not in existence at the end of 1997. The earlier section on 'Taxation of dividends' describes how we estimate the gross returns for dead UTs.

The ACT tax — the difference between the Live Gross and the Live Net — costs investors 1.36 per cent per year

Table 1A Summary statistics for UK market, value and small stock indices, t-bills and factor returns in sterling, 1978–97

	UK market	UK value	UK small stocks	UK t-bills	Market factor	Value factor	Size factor
Average return monthly	1.53	1.73	1.50	0.84	0.69	0.20	−0.03
Standard deviation, monthly	4.87	5.29	4.72	0.27	4.87	2.25	2.67
Annual compound return	18.33	20.88	18.01	10.60	7.03	2.13	−0.79

Correlation of regression independent variables (factor returns):

	Market	Value	Size
Market	1.0		
Value	−0.03	1.0	
Size	−0.32	0.15	1.0

Table 1B Summary performance and CAPM and three-factor regressions of all UK equity unit trusts from 1978 to 1997 (regressions are based on monthly returns)

					CAPM					Three-factor model								
Survival	Tax status	Avg. No. funds	ACR	STD	alpha	*t*(alpha)	*b*	$t(b-1)$[a]	Adj. R^2	alpha	*t*(alpha)	*b*	$t(b-1)$	*s*	*t*(*s*)	*h*	*t*(*h*)	Adj. R^2
Live	Gross	262.5	17.60	12.40	0.01	0.16	0.88	−8.14	0.935	−0.04	−1.02	0.95	−6.95	0.37	25.71	0.07	4.25	0.984
Live	Net	262.5	16.24	12.21	−0.09	−1.17	0.88	−8.17	0.934	−0.14	−3.65	0.94	−7.00	0.37	25.34	0.07	4.37	0.983
Dead	Net	105.0	13.93	11.95	−0.25	−2.99	0.86	−8.40	0.917	−0.30	−7.23	0.93	−7.39	0.42	25.76	0.07	3.58	0.979
Live and Dead	Net	367.4	15.54	12.11	−0.13	−1.77	0.87	−8.30	0.930	−0.18	−4.85	0.94	−7.25	0.38	25.54	0.07	4.26	0.983
Live and Dead	Gross	367.4	16.89	12.28	−0.04	−0.48	0.87	−8.26	0.931	−0.09	−2.30	0.94	−7.23	0.38	25.98	0.07	4.14	0.983

Each month, we calculate the total returns of equal weight portfolios of the following categories of all UK equity unit trusts that invest in the UK.
Live Gross: those surviving through to December 1997, gross of UK income tax; Live Net: those surviving through to December 1997, net of UK income tax; Dead Net: those not surviving through to December 1997, net of UK income tax; Live and Dead Net: those surviving and those not surviving through to December 1997, net of UK income tax; Live and Dead Gross: those surviving and those not surviving through to December 1997, net of UK income tax plus the Live Gross return minus the Live Net return.

ACR is the annual compound return of each portfolio. STD is the annual standard deviation of each portfolio. Alpha is expressed as per cent excess return per month. R^2 are adjusted for degrees of freedom.

[a] We test the *t*-statistic of $b-1$ to measure how reliably b differs from 1.

compounded and lowers the alpha from both the one-factor and the three-factor model 10 basis points per month.

Our estimate of survivorship bias is 0.7 per cent per year. This is the difference between the compound returns of the live UTs and the combined set of live and dead UTs. It is striking how poorly the non-surviving UTs perform. They underperform the survivors by 2.31 per cent per year and the full sample by 1.61 per cent per year. Other estimates of survivor bias are 1 per cent per year for US equity mutual funds from Carhart (1997b), and 1.4 per cent from Malkiel (1995). (See also Elton *et al.*, 1996; Brown *et al.*, 1992.)

The regression results reveal strong patterns. The three-factor model market betas are all higher than the CAPM betas. The same is true for the R^2 values. The UTs in aggregate have a high *SMB* exposure and a modest yet significant *HML* exposure. The alphas all shift down in the three-factor model results by about 5 basis points per month, indicating that the UTs' performance is lower once we take size and book-to-market exposures into account. After adding back taxes to the overall group — Live and Dead Gross — we get a three-factor alpha of −9 basis points per month with a *t*-statistic of −2.3. Our overall conclusion is that before bid/offer spreads but after expenses, these UTs, as a group, generate 20-year performance that is reliably negative relative to a three-factor model.

The average TER of 1.35 per cent per year, or 11 basis points per month, suggests that, gross of all expenses, the excess return of the average manager is around 2 basis points, which is not significantly different from zero (the standard error of the overall alpha is 3.74 basis points). Net of expenses, however, the average investor experiences a risk-adjusted loss of 9 basis points per month on a bid-to-bid basis, which excludes the initial costs of investing. No one invests costlessly. Even an index investor incurs custody and administration expenses of 2–3 basis points per month. The TERs include such costs.

Performance of UK equity unit trusts by sector

Table 2 shows the results when the UTs are arranged by AUTIF category. As in Table 1, the market betas and the R^2 in the three-factor model are systematically higher than in the one-factor model, and the alphas are correspondingly lower. For the group Live and Dead Gross, the Equity Income and Smaller Companies sectors exhibit the largest differences between the two models. In the case of Equity Income, it is the relatively high *HML* coefficient that causes the difference. For the Smaller Companies sector, the cause is the huge *SMB* exposure of 1.0 in the three-factor regression. Once we control for the size exposure, the beta increases to 0.96 from 0.8 and the R^2 goes up from 0.68 to 0.965. UK Smaller Company UTs live up to their name and do indeed concentrate on small-company stocks.

Overall, the three-factor model explains almost all of the variance in the returns of these UTs and is an improvement on the CAPM. Further, the three-factor model alphas say that in no AUTIF sector did UTs in aggregate beat the market.

Performance of UK equity unit trusts ranked by SMB and HML exposure

It is a common claim that markets for small stocks are less efficient than those for large stocks.[5] We test that proposition directly by comparing the performance of small-company UTs to that of

Table 2 Summary performance, CAPM and three-factor regressions of UK equity unit trusts from 1978 to 1997 by AUTIF sector (regressions are based on monthly returns)

						CAPM					Three-factor model								
AUTIF sector	Survival	Tax status	Avg. No. Funds	ACR	STD	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	Adj. R^2	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	*s*	*t*(*s*)	*h*	*t*(*h*)	Adj. R^2
Growth and income	Live	Gross	87.2	17.64	12.00	0.00	0.04	0.90	−9.71	0.971	−0.03	−0.74	0.93	−8.08	0.17	11.15	0.07	4.17	0.983
	Live	Net	87.2	16.26	11.81	−0.10	−1.95	0.90	−9.65	0.971	−0.13	−3.30	0.93	−8.01	0.17	11.06	0.07	4.28	0.982
	Dead	Net	29.3	14.77	11.78	−0.19	−3.05	0.86	−10.97	0.951	−0.23	−4.45	0.90	−9.57	0.18	8.94	0.10	4.56	0.967
	Live and Dead	Net	116.6	15.80	11.75	−0.13	−2.41	0.89	−10.49	0.967	−0.16	−3.86	0.92	−9.07	0.17	10.53	0.08	4.60	0.980
	Live and Dead	Gross	116.6	17.18	11.91	−0.03	−0.49	0.89	−10.57	0.968	−0.06	−1.42	0.92	−9.14	0.17	10.60	0.08	4.50	0.980
Growth	Live	Gross	82.7	17.33	12.37	−0.02	−0.28	0.90	−5.98	0.930	−0.06	−1.24	0.97	−2.84	0.37	18.51	0.03	1.33	0.972
	Live	Net	82.7	16.33	12.23	−0.09	−1.18	0.90	−6.04	0.930	−0.13	−2.66	0.97	−2.96	0.36	18.39	0.03	1.47	0.972
	Dead	Net	32.8	14.02	11.96	−0.27	−3.10	0.92	−4.45	0.921	−0.30	−5.60	0.99	−0.45	0.41	19.39	−0.02	−0.78	0.970
	Live and Dead	Net	115.5	15.51	12.10	−0.16	−2.00	0.91	−5.39	0.933	−0.19	−4.10	0.98	−1.84	0.38	20.23	0.01	0.60	0.976
	Live and Dead	Gross	115.5	16.49	12.22	−0.08	−1.09	0.92	−5.32	0.933	−0.12	−2.60	0.98	−1.71	0.38	20.47	0.01	0.45	0.976
Equity Income	Live	Gross	56.8	18.23	13.51	0.07	0.78	0.85	−8.53	0.912	−0.01	−0.12	0.91	−7.40	0.30	13.60	0.21	8.47	0.961
	Live	Net	56.8	16.22	13.27	−0.08	−0.93	0.85	−8.59	0.911	−0.15	−2.67	0.91	−7.49	0.30	13.50	0.21	8.50	0.960
	Dead[a]	Net	25.9	13.88	14.65	−0.22	−2.50	0.82	−9.76	0.897	−0.30	−4.55	0.87	−8.97	0.27	10.24	0.24	8.02	0.944
	Live and Dead	Net	82.5	15.44	13.10	−0.13	−1.50	0.84	−9.28	0.908	−0.20	−3.50	0.89	−8.51	0.30	12.95	0.22	8.74	0.958
	Live and Dead	Gross	82.5	17.44	13.32	0.02	0.20	0.84	−9.24	0.909	−0.06	−0.99	0.90	−8.44	0.30	13.09	0.22	8.73	0.959
Smaller Companies	Live	Gross	35.8	17.44	14.98	0.07	0.42	0.79	−5.95	0.669	0.00	0.00	0.96	−2.67	1.00	41.03	−0.09	−3.33	0.959
	Live	Net	35.8	16.52	14.83	0.01	0.04	0.79	−5.99	0.669	−0.07	−1.07	0.96	−2.77	1.00	40.92	−0.09	−3.18	0.959
	Dead	Net	17.1	12.81	16.12	−0.27	−1.52	0.81	−5.26	0.669	−0.35	−4.95	0.99	−0.93	1.01	36.18	−0.08	−2.42	0.949
	Live and Dead	Net	52.9	15.60	14.89	−0.07	−0.39	0.80	−5.73	0.682	−0.14	−2.47	0.97	−2.08	1.00	43.62	−0.07	−2.88	0.965
	Live and Dead	Gross	52.9	16.52	15.05	0.00	0.00	0.80	−5.69	0.682	−0.08	−1.31	0.98	−1.98	1.00	43.82	−0.08	−3.04	0.965

Each month, we calculated total returns of equal weight portfolios of the following categories of UK equity unit trusts grouped by AUTIF sectors. See Table 1 for abbreviations and explanations.

[a]Series ends 10/97.

large-company UTs. We then make the same comparison for value and growth UTs.

We investigate the small-stock argument by forming portfolios based on prior *SMB* exposure. Each year we rank all UTs based on their *SMB* exposure over the prior three-year period. If a UT starts within the three-year period, we include it if it has at least 30 months of returns. Based on these rankings, we form ten equal weight portfolios, each containing the same number of UTs. We gross up the net-of-tax returns of the dead UTs in each portfolio by the difference between Live Gross and Live Net returns for that portfolio. ANOVA tests confirm that UTs that are most alike in a sorting variable, in this case *SMB*, have the least cross-sectional disparity in pre-tax dividend yield. We follow this procedure for all tests in this paper. We hold the ten portfolios for one year and then reform them at the start of the next year. This produces a time series of portfolios of UTs. The top *SMB* portfolio will always contain the UTs with the highest *SMB* exposure over the preceding three-year period and the lowest SMB portfolio will always contain the UTs with the lowest *SMB* exposure over the preceding three-year period. If a UT in a portfolio drops out of the database over the following year, we include its return through the last month it reports. The return of the portfolio in the next month is the equally weighted average of the remaining UTs. We use data from the 1975–77 period, even though the dividend information is unreliable, because the dividends do not appear to affect three-factor risk estimates (for example, these are almost identical for the Live Gross and Live Net series in Tables 1 and 2). Since we need three years to generate the first rank, our series will start in January 1978 so that, when we test the portfolios, the UT returns have correct dividend data.

We use the three-factor model to compare and evaluate the performance of these ten *SMB* portfolios. The results are in Table 3. The degree of *SMB* exposure of these portfolios is in exactly the same order as the pre-formation ordering. The portfolio of UTs with the highest prior three-year *SMB* exposure produces the highest post-formation *SMB* exposure (0.97), and the portfolio of UTs with the lowest prior three-year *SMB* exposure produces the lowest post-formation *SMB* exposure (0.03). The relative exposure to *SMB* over a three-year period is a strong predictor of relative exposure in the following year, and there is a wide spread of *SMB* exposure among UTs. The three-factor alphas of these portfolios tell us how well they perform relative to the size and book-to-market (value) risks they assume. The four small-company portfolios have excess returns (alphas) that are reliably negative. The claim that small-company stocks, at least those in the UK, are inefficiently priced in exploitable ways is a myth. If the small-company UTs were horses, they would be glue.

While the risk-adjusted and absolute returns of the top five *SMB* exposure portfolios become worse as *SMB* exposure increases, there is no pattern to either the risk-adjusted or absolute returns of the bottom five *SMB* portfolios. However, all of the three-factor alphas are negative.

We perform a similar analysis to see how well 'value' managers perform. Each year we rank all UTs based on their *HML* exposure over the prior three-year period, and we form ten portfolios in exactly the same way as we did for *SMB* ranking above. So our top *HML* portfolio will always contain the UTs with the highest *HML* exposure over the preceding three-year period, and the

Table 3 Portfolios of unit trusts from 1978 to 1997 based on prior three-year three-factor model SMB loadings (regressions are based on monthly returns)

				CAPM					Three-factor model								
SMB decile	Avg. No. funds	ACR	STD	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	Adj. R^2	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	*s*	*t*(*s*)	*h*	*t*(*h*)	Adj. R^2
High	31.0	15.39	15.57	−0.08	−0.48	0.80	−5.52	0.681	−0.17	−2.48	0.98	−1.59	0.97	34.89	0.00	0.07	0.949
2	30.8	15.57	14.41	−0.09	−0.58	0.81	−6.29	0.755	−0.16	−3.10	0.96	−3.59	0.83	40.23	0.00	−0.02	0.969
3	31.3	16.43	13.13	−0.05	−0.47	0.85	−6.76	0.856	−0.12	−2.19	0.95	−4.28	0.56	25.34	0.09	3.71	0.963
4	31.2	16.49	12.17	−0.06	−0.69	0.86	−7.98	0.910	−0.12	−2.47	0.93	−6.38	0.40	21.02	0.11	5.30	0.972
5	31.0	17.71	12.14	0.02	0.22	0.88	−7.69	0.933	−0.04	−0.68	0.94	−5.64	0.30	14.82	0.11	4.95	0.969
6	30.9	16.98	12.12	−0.05	−0.65	0.90	−6.79	0.942	−0.09	−1.71	0.95	−4.39	0.26	12.75	0.09	4.05	0.969
7	31.1	17.11	12.33	−0.04	−0.76	0.92	−7.05	0.961	−0.08	−1.84	0.95	−4.97	0.19	10.56	0.10	5.12	0.976
8	31.2	17.25	12.46	−0.04	−0.80	0.92	−7.56	0.972	−0.07	−1.73	0.95	−5.77	0.13	8.18	0.09	5.04	0.981
9	30.9	16.18	12.14	−0.12	−2.67	0.94	−6.29	0.976	−0.14	−3.15	0.96	−4.66	0.08	4.73	0.04	1.78	0.979
Low	31.3	17.03	11.94	−0.06	−1.33	0.93	−7.29	0.977	−0.07	−1.44	0.94	−6.38	0.03	1.59	0.01	0.56	0.977

Each year we rank all unit trusts based on their three-factor *SMB* exposure over the prior three-year period. If a unit trust starts within the three-year period, it is included if it has at least 30 months of returns. Based on these rankings, we form ten portfolios with the same number of unit trusts in each portfolio. The ten portfolios are held for one year and then reformed each year. If a unit trust ends during a year, it is included until the last month it reports a return. A monthly total return series is estimated for each portfolio by calculating each month the average post-tax return of the live and dead unit trusts and adding the difference between the average pre-tax return and the average post-tax return of the live unit trusts.

See Table 1 for abbreviations.

Table 4 Portfolios of unit trusts from 1978 to 1997 based on prior three-year three-factor model HML loadings (regressions are based on monthly returns)

				CAPM					Three-factor model								
HML decile	Avg. No. funds	ACR	STD	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	Adj. R^2	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	*s*	*t*(*s*)	*h*	*t*(*h*)	Adj. R^2
High	30.9	17.19	12.84	0.00	0.02	0.85	−7.41	0.873	−0.08	−1.25	0.93	−5.54	0.43	17.54	0.20	7.02	0.953
2	31.2	17.19	12.96	−0.02	−0.26	0.88	−7.19	0.926	−0.08	−1.39	0.94	−5.07	0.30	13.63	0.14	5.62	0.964
3	31.2	16.75	12.46	−0.06	−0.78	0.89	−7.13	0.936	−0.11	−2.43	0.95	−5.00	0.31	17.09	0.13	6.16	0.975
4	30.9	17.00	12.36	−0.04	−0.63	0.90	−7.38	0.947	−0.09	−1.91	0.95	−5.13	0.28	15.74	0.09	4.32	0.976
5	31.1	16.72	12.76	−0.06	−0.92	0.89	−8.19	0.949	−0.10	−2.13	0.94	−6.14	0.26	14.34	0.07	3.43	0.974
6	31.1	17.05	12.05	−0.03	−0.45	0.88	−7.92	0.938	−0.07	−1.74	0.95	−5.99	0.35	21.87	0.03	1.65	0.980
7	31.3	16.34	11.76	−0.09	−1.34	0.90	−6.95	0.946	−0.13	−2.97	0.96	−4.36	0.31	18.11	0.04	2.22	0.978
8	31.3	16.09	12.06	−0.11	−1.44	0.90	−6.22	0.934	−0.14	−2.99	0.97	−3.15	0.36	19.26	0.00	−0.17	0.975
9	30.8	15.94	12.45	−0.11	−1.08	0.88	−6.17	0.892	−0.14	−2.70	0.97	−2.99	0.49	23.33	−0.03	−1.12	0.967
Low	31.0	16.48	12.57	−0.04	−0.34	0.84	−6.58	0.832	−0.10	−1.73	0.95	−3.82	0.64	27.99	0.00	−0.07	0.962

Each year we rank all unit trusts based on their three-factor *HML* exposure over the prior three-year period.

See Table 3 for explanation.

See Table 1 for abbreviations.

lowest *HML* portfolio will always contain the UTs with the lowest *HML* exposure over the preceding three-year period. The results are in Table 4. The three-factor model results show that there is some persistence in relative exposure to *HML* in these portfolios, but it is weak with a spread of only 0.2 between the highest and lowest *HML* portfolios. This suggests that there are few, if any, UK UTs that have a consistently high exposure to value stocks or a consistently high exposure to growth stocks.

There is some inadvertent connection between the unconditional sorts on *SMB* and *HML*. The highest and lowest *SMB* portfolios have the lowest *HML*s and the highest and lowest *HML* portfolios have the highest *SMB*s. To control for interaction effects, we perform a joint sort. At the start of each year, we sort UTs on prior three-year *SMB* exposure into three equal groups. Within each *SMB* group, we sort on *HML* exposure into three sub-groups, creating nine *SMB*/*HML* portfolios. We calculate the returns for these portfolios in the same way as before, reforming portfolios each year. The results of this analysis are in Table 5.

As expected, the portfolios in each *SMB* group in Table 5 have roughly the same *SMB* exposure. Within each *SMB* group, the spread in *HML* exposure is roughly the same, but about 65 per cent of what it was in the unconditional *HML* sort. There is a bit of a performance pattern in that the smaller-company UTs have significantly negative alphas in all three *HML* subgroups. If there are inefficiencies in the small-company UK stocks, the unit trust managers studied here do not exploit them. In the two remaining *SMB* groups, three of six alphas are reliably negative. Davis (1999) performs a similar analysis of US mutual funds and finds that there is no evidence of outperformance in any style group.

Persistence of performance

Our analysis of performance persistence first looks at raw return. Each year, we form ten portfolios of UTs based on the rank of their total return over the previous year. The results, in Table 6, show a marked persistence in return over a one-year period. The spread in annual performance between best and worst one-year return portfolios is 3.54 per cent. These results might suggest a market failure and thus an easy beat-the-market strategy. However, this lusty interpretation seems to fall flat.

First, the turnover from this strategy is over 80 per cent per year. The average bid/offer spread is 5 per cent. Together, these two would wipe out all gains even if the pattern in Table 6 repeats itself perfectly.

Secondly, the three-factor alphas of the top two portfolios, while positive, are not statistically significant. The three-factor regressions distinguish between performance due to market, size and value risk factors and that due to the managers' ability to generate returns above those he gets for simple risk bearing. The returns that result from risk bearing are in principle available from structured or index-like portfolios. The three-factor alphas imply that even the best of the UTs did not earn returns above these kinds of strategies. By contrast, the negative alphas of the bottom four portfolios are all significant at the 5 per cent level. This echoes studies of US mutual funds, notably Carhart (1997a) and Malkiel (1995), which show that poor performance persists but good performance does not.

Now we examine persistence in risk-adjusted performance. We sort UTs on three-year three-factor alphas

Table 5 Portfolios of unit trusts from 1978 to 1997 based on prior three-year three-factor model SMB and HML loadings (regressions are based on monthly returns)

					CAPM					Three-factor model								
SMB tritile	*HML* tritile	Avg. No. funds	ACR	STD	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	Adj. R^2	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	*s*	*t*(*s*)	*h*	*t*(*h*)	Adj. R^2
	High	34.4	15.97	14.15	−0.07	−0.50	0.82	−6.42	0.792	−0.15	−2.38	0.95	−3.67	0.69	27.40	0.10	3.65	0.953
High	Med.	34.6	15.38	13.65	−0.11	−0.83	0.82	−6.59	0.796	−0.18	−3.42	0.95	−4.17	0.73	35.03	0.02	0.85	0.968
	Low	34.5	16.00	14.03	−0.06	−0.39	0.82	−5.85	0.754	−0.13	−2.19	0.97	−2.38	0.83	34.75	−0.01	−0.36	0.960
	High	34.6	17.13	12.97	−0.03	−0.35	0.89	−7.16	0.929	−0.09	−1.66	0.94	−5.27	0.28	13.18	0.17	7.27	0.966
Med.	Med.	34.5	18.11	11.90	0.04	0.65	0.88	−8.53	0.946	0.00	−0.02	0.93	−6.73	0.27	14.81	0.09	4.43	0.975
	Low	34.5	16.36	11.97	−0.09	−1.24	0.91	−6.12	0.937	−0.13	−2.42	0.96	−3.25	0.31	14.67	0.04	1.77	0.968
	High	34.7	17.47	12.35	−0.01	−0.24	0.91	−7.86	0.960	−0.05	−1.05	0.93	−6.35	0.13	6.65	0.13	5.61	0.971
Low	Med.	34.5	16.94	11.97	−0.07	−1.63	0.94	−7.32	0.980	−0.09	−2.16	0.95	−5.80	0.07	4.55	0.05	2.82	0.983
	Low	34.6	16.30	12.07	−0.12	−2.72	0.95	−5.82	0.979	−0.12	−2.91	0.96	−4.38	0.07	3.92	0.00	−0.23	0.980

Each year we rank all unit trusts based on their three-factor *SMB* exposure over the prior three-year period. If a unit trust starts within the three-year period, it is included if it has at least 30 months of returns. Based on these rankings, we form three groups with the same number of unit trusts in each group. Within each group we rank all unit trusts according to their *HML* exposure over the same three-year period and then form three *HML*-based portfolios with each containing the same number of unit trusts. This produces nine *SMB*/*HML* portfolios. We hold them for one year and then repeat the formation process. If a unit trust ends during a year, it is included until the last month it reports a return. A monthly total return series is estimated for each portfolio by calculating each month the average post-tax return of the live and dead unit trusts and adding the difference between the average pre-tax return and the average post-tax return of the live unit trusts.

See Table 1 for abbreviations.

Table 6 Portfolios of unit trusts from 1981 to 1997 based on prior one-year return (regressions are based on monthly returns)

PR1YR decile	Avg. No. funds	Turn-over	ACR	STD	CAPM					Three-factor model								
					alpha	*t*(alpha)	*b*	*t*(*b* − 1)	Adj. R^2	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	*s*	*t*(*s*)	*h*	*t*(*h*)	Adj. R^2
High	35.6	83.0	18.57	12.64	0.08	0.58	0.90	−3.72	0.836	0.07	0.87	0.99	−0.70	0.60	20.06	−0.02	−0.55	0.946
2	35.3	88.0	18.04	12.28	0.04	0.41	0.88	−5.92	0.895	0.02	0.29	0.94	−4.42	0.44	18.56	0.04	1.46	0.962
3	35.7	87.7	17.54	12.41	−0.01	−0.11	0.90	−6.21	0.935	−0.04	−0.78	0.95	−4.95	0.32	16.36	0.07	3.09	0.974
4	35.4	88.7	17.52	12.63	−0.02	−0.25	0.91	−6.04	0.949	−0.05	−0.93	0.95	−4.62	0.28	14.92	0.06	2.86	0.977
5	35.3	92.7	17.65	12.59	−0.01	−0.11	0.91	−5.82	0.946	−0.05	−0.99	0.95	−4.56	0.26	13.17	0.11	4.92	0.974
6	35.3	90.2	17.60	12.63	−0.01	−0.13	0.91	−6.14	0.945	−0.05	−0.98	0.94	−4.98	0.26	12.91	0.11	4.64	0.973
7	34.8	88.0	16.84	12.87	−0.07	−0.91	0.92	−5.28	0.943	−0.11	−2.24	0.96	−3.75	0.29	15.74	0.10	4.71	0.977
8	35.1	89.3	16.45	13.66	−0.08	−0.98	0.89	−6.30	0.927	−0.12	−2.04	0.94	−5.02	0.33	14.86	0.08	3.11	0.967
9	34.8	89.0	15.28	13.45	−0.16	−1.58	0.88	−5.50	0.896	−0.18	−2.70	0.95	−3.67	0.42	16.35	0.03	0.94	0.956
Low	34.3	82.7	15.03	15.48	−0.17	−1.31	0.88	−4.62	0.843	−0.20	−2.56	0.96	−2.38	0.54	17.90	0.06	1.75	0.941

Each year we rank all unit trusts based on their prior one-year total return. If a unit trust starts within the year, we exclude it. Based on these rankings, we form ten portfolios with the same number of unit trusts in each portfolio. We hold the ten portfolios for one year and then reform them at the end of each year. If a unit trust ends during a year, we include it through the last month it reports a return. We calculate a time series for each portfolio by calculating each month the average post-tax return of the live and dead unit trusts and adding the difference between the average pre-tax return and the average post-tax return of the live unit trusts.

See Table 1 for abbreviations.

(PR3YA), form ten portfolios as before and compute returns over the next 12 months. We repeat this procedure for the end of each December. The first three-year regression period is 1978–80, so the monthly time series runs from 1981 to 1997. The results, in Table 7, are similar to those in Table 6, namely, a clear persistence in both absolute and risk-adjusted return over a one-year period. The spread in annual compound returns between the top and bottom PR3YA portfolios is now 2.95 per cent, and the spread in three-factor model alphas for these portfolios is 0.27 per cent per month. Again as in Table 6, only the top two PR3YA portfolios have positive three-factor model alphas, neither of which is remotely reliable. Even the largest alpha, for the highest prior-alpha portfolio is only 4 basis points, 0.6 standard errors, above zero. The other eight PR3YA portfolios have negative three-factor model alphas, and the bottom two are significant beyond the 5 per cent level.

To see whether the patterns in Table 7, weak though they are, persist through time, we compare the performance of PR3YA sorted portfolios at different periods after formation. For the three-year regression 1978–80, post-formation year 1 is 1981, year 2 is 1982 and year 3 is 1983. The next three-year regression is 1979–81, and the post-formation years are 1982, 1983, and 1984 and so on. We keep the post-formation sample sizes the same so the 'year 1' periods run from 1981 to 1995, 'year 2' periods from 1982 to 1996 and 'year 3' from 1983 to l997. Table 8 gives the results.

Year 1 results obviously repeat the pattern in Table 7, even though the point estimates differ because of the change in sample sizes. By year 2 the pattern of persistence attenuates somewhat, and by year 3 it disappears entirely. The rank correlation between pre- and post-formation alphas drops from 0.94 in year 1, 0.72 in year 2 to an insignificant −0.12 in year 3. One final test compares the 'high' portfolio with first, the 'low' portfolio, and then with the entire sample. The '1–10 alpha' comes from the three-factor regression of the 'high minus low' portfolio, and the '1–All' alpha from the regression of the 'high' minus the 'Live and Dead Gross' series from Table 1. Only in year 1 are these alphas significant, and this is clearly due to the low returns of the poorest performing portfolios.

Table 8 also shows the results of this experiment where the returns are grossed up by an estimate of total annual expenses. Recall that expense information is available only for surviving trusts, so we estimate the gross-of-expense returns for each of the ten portfolios by adding back to each portfolio the average expense of just the survivors of each group.

Now finally, there is some evidence that winners repeat. The top two 'high' portfolios have significant alphas in the year after portfolio formation, although we will soon see that this persistence is confined to just one size group of firms. Losers also repeat. Even giving expenses back to the 'low' portfolio does not prevent a nearly significant negative alpha. We will see that this phenomenon is not confined to one size group. The persistence in year one is strong but falls off quickly thereafter.

Because there is a wide range in the size exposure of UTs, we repeat these tests of persistence but condition them on size. First, we form three groups based on prior three-year *SMB* loading and then, within each group, we sort based on PR3YA. Table 9 gives the net-of-expense results. The persistence of poor performance does not discriminate by size. In each of the

Table 7 Portfolios of unit trusts from 1981 to 1997 based on prior three-year three-factor model alpha (regressions are based on monthly returns)

					CAPM					Three-factor model								
PR3YA decile	Avg. No. funds	Turn-over	ACR	STD	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	Adj. R^2	alpha	*t*(alpha)	*b*	*t*(*b* − 1)	*s*	*t*(*s*)	*h*	*t*(*h*)	Adj. R^2
High	31.4	53	17.82	12.78	0.04	0.34	0.85	−5.53	0.836	0.04	0.59	0.95	−4.03	0.62	26.93	−0.03	−0.96	0.965
2	31.4	75	17.82	12.62	0.03	0.31	0.87	−7.10	0.911	0.01	0.20	0.93	−6.57	0.41	20.94	0.02	1.05	0.973
3	31.6	80	17.29	12.49	−0.02	−0.30	0.89	−6.30	0.933	−0.05	−1.04	0.94	−5.08	0.33	16.98	0.06	2.76	0.974
4	31.2	87	17.33	12.94	−0.04	−0.51	0.92	−5.26	0.950	−0.07	−1.43	0.96	−3.57	0.28	15.46	0.07	3.49	0.978
5	31.0	87	17.46	12.87	−0.03	−0.39	0.92	−5.48	0.952	−0.05	−1.13	0.96	−3.78	0.28	15.97	0.05	2.59	0.980
6	31.3	84	17.72	12.94	−0.01	−0.10	0.92	−5.83	0.952	−0.04	−0.83	0.96	−4.41	0.27	15.11	0.08	3.68	0.979
7	30.9	86	17.18	12.90	−0.04	−0.55	0.91	−5.44	0.941	−0.08	−1.50	0.96	−3.88	0.29	14.33	0.09	3.87	0.973
8	31.2	80	16.99	13.09	−0.05	−0.64	0.91	−5.39	0.932	−0.10	−1.96	0.96	−3.99	0.33	16.88	0.12	5.24	0.975
9	30.3	78	16.33	13.25	−0.10	−1.04	0.91	−4.76	0.914	−0.14	−2.26	0.96	−2.80	0.37	16.10	0.09	3.34	0.965
Low	30.4	53	14.87	13.83	−0.18	−1.57	0.88	−5.20	0.867	−0.23	−3.50	0.95	−3.50	0.51	20.47	0.10	3.40	0.960

Each year we rank all unit trusts based on their three-factor alpha over the prior three-year period.

See Table 3 for explanation.

See Table 1 for abbreviations.

Table 8 Three-factor-model alphas for portfolios that are formed based on prior three-year three-factor-model alphas, net and gross of total annual expenses[a]

			Net of total annual expenses						Gross of total annual expenses					
			Number of years after portfolio formation						Number of years after portfolio formation					
PR3YA decile	Avg. PR3YA	Ann. exp.	1		2		3		1		2		3	
Test period			1981–95		1982–96		1983–97		1981–95		1982–96		1983–97	
High	0.52	1.36	0.03	(0.45)	−0.03	(−0.54)	−0.10	(−1.83)	0.14	(2.19)	0.08	(1.37)	0.02	(0.34)
2	0.16	1.27	0.02	(0.29)	−0.05	(−0.95)	−0.10	(−1.73)	0.12	(2.17)	0.05	(1.02)	0.01	(0.12)
3	0.02	1.26	−0.05	(−0.87)	−0.08	(−1.64)	−0.08	(−1.51)	0.06	(0.99)	0.02	(0.40)	0.03	(0.51)
4	−0.08	1.29	−0.07	(−1.40)	−0.03	(−0.59)	−0.07	(−1.40)	0.03	(0.64)	0.08	(1.47)	0.04	(0.75)
5	−0.15	1.28	−0.05	(−1.11)	−0.10	(−2.00)	−0.10	(−2.08)	0.05	(1.04)	0.00	(0.09)	0.01	(0.12)
6	−0.23	1.31	−0.04	(−0.77)	−0.05	(−0.95)	−0.08	(−1.69)	0.07	(1.36)	0.06	(1.26)	0.03	(0.62)
7	−0.31	1.31	−0.08	(−1.41)	−0.10	(−1.85)	−0.04	(−0.65)	0.03	(0.51)	0.01	(0.18)	0.07	(1.19)
8	−0.42	1.33	−0.12	(−2.20)	−0.06	(−1.06)	−0.07	(−1.33)	−0.01	(−0.17)	0.05	(0.93)	0.04	(0.80)
9	−0.56	1.44	−0.16	(−2.39)	−0.13	(−1.85)	−0.06	(−0.93)	−0.04	(−0.58)	−0.01	(−0.09)	0.06	(0.90)
Low	−0.96	1.49	−0.26	(−3.74)	−0.11	(−1.60)	−0.08	(−1.18)	−0.14	(−1.95)	0.02	(0.25)	0.05	(0.73)
Average	−0.20	1.33	−0.08		−0.07		−0.08		0.03		0.04		0.03	
rank *r*		−0.53	0.94**		0.72*		−0.12		0.92**		0.62		−0.76*	
1–10			0.29	(3.40)	0.08	(0.85)	−0.02	(−0.24)	0.28	(3.27)	0.06	(0.73)	−0.03	(−0.39)
1–All alpha			0.08	(1.53)	0.02	(0.31)	−0.04	(−0.89)	0.08	(1.54)	0.02	(0.32)	−0.04	(−0.87)

[a]The test portfolios correspond respectively to all first years following portfolio formation, all second years following formation and all third years following formation. Regressions use monthly data. *t*-statistics are in parentheses.

Each year we rank all unit trusts based on their three-factor alphas over the prior three-year period. If a unit trust starts with the three-year period, we include it if it has at least 30 months of returns. Based on these rankings, we form ten portfolios with the same number of unit trusts in each portfolio. The ten portfolios are held for one year and then re-formed each year. If a unit trust ends during a year, it is included until the last month it reports a return. A monthly total return series is estimated for each portfolio by calculating each month the average post-tax return of the live and dead unit trusts and adding the difference between the average pre-tax return and the average post-tax return of the live unit trusts. Annual expenses are estimated for each portfolio by calculating the average TER of those unit trusts for which a TER is available. Returns gross of total annual expenses are calculated by adding one-twelfth of the annual expenses to the net-of-expenses returns.

We then examine this time series in three parts. First, we examine the set of years where each year is the first year following portfolio formation. We then examine the set of years where each year is the second year following portfolio formation, and then the set where each year is year three following portfolio formation. For example, for alphas based on 1978–80, year 1 return is 1981, year 2 is 1982, etc.

PR3YA is the average prior three-year three-factor alpha of the UTs in each decile. Rank *r* is the Spearman rank correlation coefficient between the pre-formation deciles and the post-formation alphas. The 1–10 alpha is the three-factor-model alpha of the series produced by subtracting the monthly return of the top PR3YA decile portfolio from that of the bottom PR3YA decile portfolio. The 1–All alpha is the three-factor-model alpha of the series produced by subtracting the monthly return of the top PR3YA decile portfolio from that of the portfolio of all unit trusts.

*Denotes significance at five per cent level for a two-sided test.
**Denotes significance at one per cent level for a two-sided test.

Table 9 Three-factor-model alphas, net and gross of total expenses, for portfolios that are formed first on the prior three-year SMB, and then on the prior three-year three-factor-model alphas[a]

				Net of total annual expenses						Gross of total annual expenses					
				Number of years after portfolio formation						Number of years after portfolio formation					
SMB tritile	PR3YA tritile	Avg. PR3YA	Ann. exp.	1		2		3		1		2		3	
Test period				1981–95		1982–96		1983–97		1981–95		1982–96		1983–97	
	High	0.27	1.32	0.03	(0.44)	−0.07	(−1.22)	−0.11	(−1.98)	0.14	(2.23)	0.04	(0.60)	0.00	(0.00)
High	Med.	−0.27	1.28	−0.03	(−0.58)	−0.10	(−1.49)	−0.11	(−1.74)	0.07	(1.26)	0.00	(0.07)	0.00	(−0.02)
	Low	−0.81	1.48	−0.26	(−3.72)	−0.09	(−1.43)	−0.07	(−1.11)	−0.14	(−1.98)	0.03	(0.45)	0.05	(0.84)
	High–Low	1.08	−0.16	0.29	(4.01)	0.02	(0.27)	−0.04	(−0.62)	0.28	(3.83)	0.01	(0.10)	−0.05	(−0.83)
	High–Med.	0.54	0.04	0.06	(1.11)	0.03	(0.49)	0.00	(−0.04)	0.06	(1.17)	0.03	(0.54)	0.00	(0.02)
	High	0.16	1.29	−0.01	(−0.09)	−0.02	(−0.31)	−0.06	(−1.08)	0.10	(1.63)	0.09	(1.48)	0.05	(0.78)
Med.	Med.	−0.21	1.26	−0.04	(−0.76)	−0.05	(−0.85)	−0.05	(−1.00)	0.06	(1.06)	0.06	(1.08)	0.05	(0.92)
	Low	−0.60	1.40	−0.12	(−2.15)	−0.07	(−1.30)	−0.04	(−0.79)	−0.01	(−0.11)	0.05	(0.85)	0.07	(1.37)
	High–Low	0.76	−0.10	0.12	(2.25)	0.05	(0.92)	−0.02	(−0.42)	0.11	(2.08)	0.04	(0.77)	−0.03	(−0.60)
	High–Med.	0.37	0.04	0.04	(0.81)	0.03	(0.62)	−0.01	(−0.19)	0.04	(0.87)	0.03	(0.69)	−0.01	(−0.13)
	High	0.10	1.29	−0.05	(−0.86)	−0.07	(−1.29)	−0.06	(−1.25)	0.06	(1.04)	0.04	(0.66)	0.04	(0.82)
Low	Med.	−0.18	1.33	−0.07	(−1.56)	−0.07	(−1.53)	−0.09	(−1.94)	0.04	(0.75)	0.04	(0.78)	0.02	(0.50)
	Low	−0.47	1.36	−0.15	(−3.09)	−0.12	(−2.53)	−0.10	(−1.88)	−0.04	(−0.79)	−0.01	(−0.21)	0.01	(0.25)
	High–Low	0.57	−0.07	0.10	(2.17)	0.05	(1.12)	0.04	(0.79)	0.10	(2.05)	0.05	(1.00)	0.03	(0.66)
	High–Med.	0.28	−0.05	0.03	(0.71)	0.00	(0.07)	0.02	(0.71)	0.02	(0.61)	0.00	(−0.03)	0.02	(0.60)

[a]See Table 8.

Each year we rank all unit trusts based on their three-factor *SMB* exposure over the prior three-year period. If a unit trust starts within the three-year period, we include it if it has at least 30 months of returns. Based on these rankings, we form three groups with the same number of unit trusts in each group. Within each of these groups we rank on the basis of the three-factor alphas from the prior three-year period and form three equal weight portfolios. This produces nine *SMB*/PR3YA portfolios. We estimate a monthly total return series for each portfolio by calculating each month the average post-tax return of the live and dead unit trusts and adding the difference between the average pre-tax return and the average post-tax return of the live unit trusts. Annual expenses are estimated for each portfolio by calculating the average TER of those unit trusts for which a TER is available. Returns gross of total annual expenses are calculated by adding one-twelfth of the annual expenses to the net-of-expenses returns.

We then examine each time series as described in Table 8.

PR3YA is the average prior three-year three-factor alpha of the UTs in each tritile. High–Low alphas are the three-factor-model alphas of the series produced by subtracting the monthly return of the High PR3YA tritile portfolio from the Low PR3YA tritile portfolio within each *SMB* group. High–Med. alphas are the three-factor-model alphas of the series produced by subtracting the monthly return of the High PR3YA tritile portfolio from the Med. PR3YA tritile portfolio within each *SMB* group.

size groups, significant negative alphas persist through year one. For big firms, those with low *SMB* exposure, such alphas make it to year two. In a similar analysis of US mutual funds, Davis (1999) finds no evidence of positive persistence but, in the case of funds with high *SMB* exposure, reliable evidence of persistence of negative alphas. There is some correlation between expenses and performance. In each size group, the worst performing portfolio has the highest expenses (Table 9). The correlation may be stronger than it appears because we do not have annual expenses for dead trusts. These trusts may well have higher average expenses than survivors. What happens when we add back expenses?

Table 9 also gives the gross-of-expense results. Again, as in Table 8, we have some evidence of positive as well as negative persistence, both of which occur in the high *SMB* group. The negative persistence needs no explanation. However, the positive persistence of the high PR3YA small-stock trusts calls for one. Market efficiency would seem to preclude such persistence. In defence of market efficiency, however, the observed persistence, even if it continues, is not exploitable. The bid/offer spreads of these UTs are almost three times as large as the alphas in year one. So from a practical viewpoint, the persistence is useless, even though from a theoretical viewpoint it is intriguing. One possible explanation is that of Carhart (1997a), who shows that the persistence of US mutual funds occurs because of persistence in the underlying stocks they buy. However, he also shows that when managers try to exploit this persistence effect (by buying the previous year's winner stocks), they fail to generate higher absolute returns than managers who do not. It would require further research to determine whether this explanation applied to UK UTs.[6]

Summary and conclusions

This examination of UK equity unit trusts says that UK money managers are unable to outperform markets in any meaningful sense, that is, once we take into account their exposure to market, value and size risk. This result is analogous to most studies of US money managers. Even more dramatic than these overall results are the findings for the small-company UTs. Contrary to the notion that small-company shares offer abundant 'beat-the-market' opportunities, we find that small-company UTs are the worst performers. In fact, their performance failure is persistent and reliable.

In methodology, this study leans heavily on the same kind of three-factor model that Fama and French find well describes the behaviour of US equity markets. For the UK market, the three-factor model has better explanatory power than a one-factor model, especially for UTs that invest heavily in small companies.

Does performance persist? Yes, but only poor performance. As others find for US mutual funds, so we find in the UK. Losers repeat, winners do not. Only after adding back estimated expenses can we find evidence that the most successful UTs repeat their winning performance. (Ironically, so do the losers.) The winners' repeat performance, gross of expenses, is intriguing but not exploitable because of high turnover costs.

Overall, this study, like all mutual fund studies, does not enlighten us about what kinds of market failures occur. It does say that if there are any, UK equity managers do not exploit them.

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Notes

1 In the course of writing this paper, we were made aware of another paper that examines the performance of a broad array of unit trusts, including those covered here. There are differences in time period of coverage and methodology. That paper is by David Blake and Alan Timmerman (1998) 'Mutual Fund Performance: Evidence from the UK', *European Finance Review*, 2, 57–77.

2 The Unlisted Securities Market was closed in December 1996 and most of the companies in this market moved to either a full listing or to the Alternative Investment Market.

3 We equal-weight the monthly returns, since this gives the average return of the UTs in a portfolio each month. This is the standard approach in studies of this kind. An alternative is to weight each UT return by the value of assets in the UT. However, we do not have a database with the history of the value of assets for each UT.

4 For an application of the Fama–French cross-sectional methodology to UK stock returns, see Strong and Xu (1997).

5 See, for example, '25 Years of Indexing: An Analysis of the Costs and Benefits', PricewaterhouseCoopers and Barclays Global Investors, pp. 18–20, where an analysis is made of the returns of small-company funds compared with small-company benchmarks, suggesting that the funds outperform the benchmarks by more than 2 per cent p.a.

6 We have looked at non-overlapping three-year sub-period analyses of the above sorting procedures, which we do not show in the interests of brevity (details are available on request). For the nine *SMB*/PR3YA portfolios, there is no three-year sub-period where the alpha of the net returns is significantly positive. Interestingly, however, the average non-overlapping three-year alpha is three basis points less than the average full-period alpha across all nine portfolios.

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Appendix: Sources and descriptions of data

— Risk free rate is the return of one month UK Treasury bills and was supplied by BZW (now Barclays Capital).

— The market return is the total return of the Financial Times Actuaries All Share Index (FTA) and was supplied by BZW.

— The UK Value Index from 1978 to 1995 was supplied by Fama and French and was calculated by ranking UK companies in the MSCI Index based on their book-to-market ratios at the start of July each year and forming a market capitalisation weighted

portfolio from the top 30 per cent of companies ranked by book to market, holding for one year and reforming the portfolio each year. From January 1996, it is the monthly return of the UK section of the DFA International Value Series. The DFA International Value Series buys the top 30 per cent of companies ranked by book to market in each market it invests in and weights each company in proportion to its market capitalisation. It will continue to hold a company until it moves below the 50th percentile of companies ranked by book to market.

— The *SMB* (small minus big) series for the three-factor model tests is the return of the Hoare Govett Smaller Companies Index (total return, ex investment trusts) minus the FTA total return.

— The *HML* (high minus low book-to-market) series from 1978 to 1995 for the three-factor model tests is the monthly return of the UK Value index minus the FTA total return.