European Financial Management, Vol. 8, No. 1, 2002, 75–101

European Mutual Fund Performance

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Abstract

This paper presents an overview of the European mutual fund industry and investigates mutual fund performance using a survivorship bias controlled sample of 506 funds from the five most important mutual fund countries. The latter is done using the Carhart (1997) 4-factor asset-pricing model. In addition we investigate whether European fund managers exhibit 'hot hands', persistence in performance. Finally the influence of fund characteristics on risk-adjusted performance is considered. Our overall results suggest that European mutual funds, and especially small cap funds are able to add value, as indicated by their positive after cost alphas. If we add back management fees, four out of five countries exhibit significant out-performance at an aggregate level. Finally, we detect strong persistence in mean returns for funds investing in the UK. Our results deviate from most US studies that argue mutual funds under-perform the market by the amount of expenses they charge.

Keywords: *mutual funds*; *performance evaluation*; *portfolio management*; *style analysis*.

JEL classification: *G*12, *G*20, *G*23

1. Introduction

By the end of 1998 the US mutual fund industry reached record levels with almost $5.2 trillion in assets. With the number of mutual funds being 60% larger than the number

*We would like to thank Martin Gruber (the referee), John Doukas (the editor), Edwin Elton, Kees Koedijk, Frans de Roon, Peter Schotman, Willem Verschoor, participants of the 1999 Finbeldag at Erasmus University Rotterdam, the 1999 EIASM Workshop on Performance Measurement in Brussels, the 2000 FMA European meeting in Edinburgh, the 2000 EFMA Meeting in Athens and the 2000 Asia Pacific Finance Association Meeting in Shanghai, for helpful comments. We are also grateful to the encouragement from the Financial Management Association Competitive Paper Award Committee. Furthermore we thank Bart Frijns for research assistance. All remaining errors are the sole responsibility of the authors. The views expressed in this paper are not necessarily shared by FundPartners and/or ING Group.

of listed securities and a 20% stake in total US financial assets, the attention mutual funds get in both the financial press and academia seems justified. Numerous academics for instance addressed the performance of professional money managers.

Starting with Jensen (1969), most academic studies conclude that the net performance of mutual funds (after expenses) is inferior to that of a comparable passive market proxy. During the late 80s and early 90s however some contradictory studies emerged. Grinblatt and Titman (1989, 1992) and Ippolito (1989) found mutual funds did possess enough private information to offset the expenses they made. Moreover Hendricks, Patel and Zeckhauser (1993), Goetzmann and Ibbotson (1994) and Brown and Goetzmann (1995) find evidence of persistence in mutual fund performance over short-term horizons. Carhart (1997) however argues that this effect is mainly attributable to simple momentum strategies, and not to superior fund management.

In two recent overview articles, Malkiel (1995) and Gruber (1996) claim that most of the older studies are subject to survivorship bias. When they adjust for this effect it is argued that mutual funds on average under-perform the market proxy, by the amount of expenses they charge the investor. Investing in a low cost index fund accordingly is preferred over choosing an actively managed fund.

All of these studies focus on the US market as long-term data is available and investor interest is well developed. The European market for mutual funds however lags the US market when it comes to both size and market importance. Nevertheless during the last 5 years the European market has experienced large inflows, which encourages us to carry out this study on European mutual fund performance evaluation.

As far as we know the only comprehensive study on European mutual fund performance is conducted by Grünbichler and Pleschiutschnig (1999). They investigate performance persistence by looking at a sample of surviving funds, investing in the European region. Our paper however will focus on the performance of European funds (both dead and surviving) only investing in their domestic market. We think this allows us to dig deeper into the determinants of mutual fund performance and enables us to consider the influence of investment style on fund performance. For instance to investigate whether the specialisation of mutual fund companies into growth or small cap stocks is based on any unique skill, or whether this is simply a marketing strategy to attract capital.

Although comprehensive European research is scarce, several authors have studied individual countries. For instance Dermine and Röller (1992) and McDonald (1973) study French mutual funds, Shukla and Imwegen (1995), Ward and Saunders (1976) and Blake and Timmerman (1998) consider UK funds. German funds are evaluated by Wittrock and Steiner (1995). Dutch funds are examined in Ter Horst, Nijman and De Roon (1998), and finally Dahlquist, Engström and Söderlind (2000) consider Swedish mutual funds.

The purpose of our paper is to give an overview of the largely unexploited European mutual fund area. To do this we evaluate fund performance using a unique survivorship bias controlled database that consists of 506 mutual funds from five different European countries. Applied are both unconditional and conditional versions of the Carhart (1997) 4-factor model. In addition we investigate whether past performance predicts future performance, the so-called 'hot hands effect'. Finally the influence of several fund characteristics (e.g., management expenses, fund assets, age) on risk-adjusted performance is considered.

Our overall results suggest that European mutual funds, and especially small cap funds are able to add value, as indicated by their positive after cost alphas. If we add back management expenses (before cost alphas) four out of five countries exhibit significant out-performance at an aggregate level. Finally we detect strong persistence in mean returns for funds investing in the UK. The strategy of buying last years winners and selling last years losers yields a return of 6.08% per year, which cannot be explained by common factors in stock returns.

The remainder of this paper is organised as follows. In Section 2 some basic features of the European mutual fund industry are described. Section 3 provides information on the data. The performance of European mutual funds will be discussed in Section 4. Section 5 considers persistence in performance, while Section 6 explores the influence of fund characteristics on risk-adjusted performance. Section 7 concludes the paper.

2. The European mutual fund industry

By the end of 1998 there was $2.66 trillion of assets under management in European mutual funds. This is about half the size of the US industry, which had almost $5.2 trillion in assets by the end of 1998.[1] From Table 1 some more interesting features of the European mutual fund industry arise. As a proxy for the European market we consider the six most important European mutual fund markets. Together they account for almost 90% of total mutual fund assets in Europe.[2]

Table 1

Characteristics of major mutual fund markets.

This table presents the characteristics of the major European mutual fund markets and the USA. All figures are obtained from FEFSI and are of 31 December, 1998. The first column presents the total market value (million US dollar). The second column the number of funds, the third column the average size and the last 5 columns the asset allocation of all mutual funds.

	Total assets	Number of funds	Average size	Asset allocation (in %)				
				Equity	Bond	Balanced	Money	Others
USA	5,149	7,123	723	55.1	15.2	6.9	22.7	0.1
Europe	1,830	10,828	256	39.5	31.3	11.7	16.4	1.1
France	599	5,581	107	18.1	26.3	24.3	31.3	0.1
Italy	435	703	618	18.2	50.5	7.8	19.0	4.8
UK	285	1,541	185	83.5	7.7	8.2	0.5	0.1
Spain	238	1,866	128	19.9	36.9	18.3	24.7	0.0
Germany	195	848	230	43.0	39.7	3.5	13.8	0.0
Netherlands	78	289	270	54.2	26.6	8.3	9.2	1.8

[1] See FEFSI statistics (1999).

[2] We exclude Luxemburg with $470 billion in assets as it mainly serves as an offshore centre, which is the result of fiscal and regulatory advantages. The domestic market itself is rather small.

It appears that while the six most important European mutual fund markets together account for less than half of the US mutual fund market, the European number of funds exceeds the US number of funds. If we combine the smaller total market size and the higher number of funds it is evident that the average size of the European mutual fund is much smaller than the average size of the US fund, $256 million as opposed to the average US fund which has $723 million in assets. Another striking difference between the US and the European mutual fund market is the dominance of equity-oriented funds in the US, while European investors also invest heavily in bond funds. We suspect this is due to a different equity culture, strong presence of banks and a different pension system.[3] Figure 1 however puts this observation into perspective. It gives the development of the asset allocation of European mutual funds through time. From this table it becomes clear that the percentage of assets invested in equity mutual funds actually has been rising dramatically from just over 10% in 1990 to almost 40% in 1998. This increase has mainly been at the expense of money market funds, which possessed 40% of the market in 1990 and only 16.4% in 1998.

The results from the previous paragraph indicate that the European (equity) mutual fund market is smaller than the market in the USA. However, it is not necessarily true that Europeans have less exposure to the equity market as they can also purchase equities themselves or through other institutions like pension funds and insurance companies. Table 2 presents a statistic that indicates the importance of equity mutual funds at their domestic equity market. The statistic is calculated as the total market value of all equity mutual funds divided by the domestic market capitalization. The 1998 figure for the USA is 27%, which is roughly two-and-a-half times as big as the average European figure. Therefore the European mutual fund sector is indeed not as

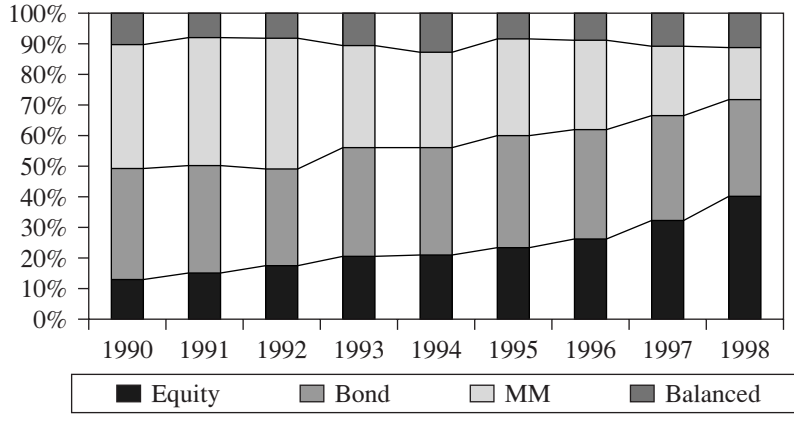

Fig. 1. Asset allocation of European mutual funds through time, 1990–1998.

Figure 1 provides the average asset allocation of the six main European mutual fund markets, being France, Germany, Italy, the Netherlands, Spain and the UK. Data are from 12/90 through 12/98 and are obtained from FEFSI Statistics 1999.

[3] We will not explore these issues in more detail, but others have investigated them. See for example Poterba, Venti and Wise (1998).

Table 2

Equity mutual funds as a percentage of total stock market capitalization.

This table presents the total market size of the equity mutual funds as a percentage of total stock market capitalization at the end of each year. Sources are FEFSI, ICI and Datastream.

	1992	1993	1994	1995	1996	1997	1998
USA	16	20	22	26	28	26	27
Europe	6	8	8	8	8	11	11
France	13	12	13	11	11	11	12
Germany	3	5	7	7	6	8	8
Italy	8	9	12	11	9	13	14
Netherlands	6	8	7	9	9	10	10
Spain	0	1	1	1	2	9	14
UK	10	11	11	11	10	11	11

important as its American counterpart indicating that individuals possibly purchase equities through other channels. Finally the increasing importance of the mutual fund sector in general can be derived from the increasing percentage through time, both in the USA and in Europe.

3. Data

3.1. *European mutual funds*

To study the performance of European mutual funds we construct a database containing the five most important mutual fund countries, which together cover over 85% of total assets in European funds.[4] We restrict our sample to pure domestic equity funds with at least 24 months of data. That is, we exclude balanced and guaranteed funds and equity funds that invest internationally. This leads to a sample of 506 open-ended equity mutual funds with monthly logarithmic returns from January 1991 through December 1998. All returns are in local currency.

To obtain information on the characteristics of the individual equity funds we use several sources: Standard and Poor's Micropal (France, Italy), Hoppenstedt Fondsführer 1998 (Germany), ABN-AMRO Beleggingsinstellingen (Netherlands) and the Unit Trust Yearbook 1998 (UK). Collected are fund type or investment style, size, age and management fees. Within a country we divide all funds using stated investment styles to test whether this yields differences in performance. Return data are collected from Datastream (Germany, Italy, the Netherlands and the UK) and Standard and Poor's Micropal (France). All returns are inclusive of any distributions, net of annual management fees and in local currency.

As several studies have shown before (see for example Brown *et al.* (1992)), survivorship issues can influence the results severely, that is when a database consists only of funds that have data available during the whole sample period. This derives from the fact that funds with bad performance are frequently being shut down or

[4] For Spain no comprehensive return data was available.

merged into another one. This 'kills' bad track records and gives an overestimation of the average performance as only surviving funds are evaluated. The only specialized commercial vendor of European mutual fund data, Standard and Poor's Micropal, however only collects data on surviving funds. It therefore is impossible to create a survivorship bias free database using this source. To circumvent this problem we use Datastream, which does collect data on dead funds for most countries. Through the national mutual fund publications (for instance the Unit Trust Yearbook for the UK) we were able to track dead funds. Return data for these funds was then collected from Datastream. Dead funds were included in the sample until they disappeared. After that the portfolios are re-weighted accordingly.

Table 3

Summary statistics for European mutual funds 1991–98.

The table reports summary statistics of the funds in our sample. The return data are annualised with reinvestment of all distributions, based on local currencies. All returns are net of expenses. Average fund sizes are in million US dollars as of 31/12/1997. Costs are presented as a percentage of the assets invested.

	No funds	Mean return	Stdev	Size	Exp. ratio
France					
Growth	55	10.9	14.2	396	1.1
Index	20	10.0	17.3	65	1.2
Smaller Companies	24	11.8	14.3	81	1.3
All funds	99	10.9	14.8	258	1.2
Germany					
General	45	14.3	17.6	369	0.8
Growth	5	12.5	17.5	125	0.8
Income	2	15.0	18.4	660	1.0
Smaller Companies	5	11.0	15.5	121	0.9
All funds	57	13.9	17.5	335	0.8
Italy					
Italian equity	21	14.2	18.2	261	2.0
Italian specialist	16	16.5	21.3	223	1.8
All funds	37	15.2	19.6	242	2.0
Netherlands					
Growth	5	22.1	16.2	500	0.6
Index	3	23.0	21.3	50	0.4
Smaller Companies	1	18.0	15.5	505	0.6
All funds	9	22.0	16.6	350	0.5
UK					
Growth/Income	79	12.6	13.6	326	1.1
Income	72	12.6	13.6	260	1.2
Growth	102	12.8	13.7	215	1.3
Smaller Companies	51	10.5	14.9	222	1.3
All funds	304	12.3	13.9	256	1.2

Table 4

Summary statistics for benchmarks used in the Carhart 4-factor model 1991–98.

The Market factor is the return on the total universe of the individual countries according to Worldscope. Companies smaller than $25 million are excluded. Number of companies; France (936), Germany (829), Italy (323), Netherlands (244), UK (2454). The excess return is calculated by subtracting the 1-month interbank rate. The *SMB* factor is constructed as the difference between the bottom 20% of market capitalization ranked by size minus the top 80% of market capitalization. *HML* is obtained by ranking all companies by their book-to-market and then take the return difference between the top 30% of market capitalization and the bottom 30%. *PR6m* is constructed by ranking all stocks on prior 6 months return and then take the top 30% of market capitalization minus the bottom 30%. All portfolios are cap weighted and rebalanced annually, except for the *Pr6m* portfolio which is rebalanced every 6 months. Returns and standard deviations are stated as annual figures in the table.

Factor portfolio	Excess return	Standard deviation	Cross correlations			
			Market	*SMB*	*HML*	*PR6m*
France						
Market	3.57	15.08	1.00			
SMB	−2.96	12.99	−0.16	1.00		
HML	−2.24	11.21	0.16	−0.10	1.00	
PR6m	−1.43	9.98	−0.30	−0.35	−0.44	1.00
Germany						
Market	7.38	15.24	1.00			
SMB	−7.99	8.84	−0.59	1.00		
HML	4.03	9.41	−0.03	0.06	1.00	
PR6m	−0.14	10.23	0.18	−0.35	−0.41	1.00
Italy						
Market	4.92	25.04	1.00			
SMB	−6.20	12.35	−0.20	1.00		
HML	1.87	13.10	0.24	0.49	1.00	
PR6m	12.00	14.55	0.01	−0.28	−0.33	1.00
Netherlands						
Market	14.59	14.98	1.00			
SMB	−4.57	8.17	−0.16	1.00		
HML	−0.41	12.15	0.27	0.30	1.00	
PR6m	9.02	11.81	−0.05	−0.31	−0.40	1.00
UK						
Market	7.49	13.58	1.00			
SMB	−4.86	11.31	−0.10	1.00		
HML	−3.24	8.67	0.15	0.34	1.00	
PR6m	11.49	9.24	−0.18	−0.36	−0.46	1.00

The percentage of disappearing funds throughout the sample period for Germany, Italy, the Netherlands and the UK was respectively 5%, 6%, 11% and 25%.[5] The influence of this becomes apparent if we compare the mean returns of all funds (dead + surviving) with the return on surviving funds only. Restricting our sample to surviving funds would lead us to overestimate average returns by 0.12% (Germany), 0.45% (Italy), 0.11% (Netherlands) and 0.15% (UK) per year. Table 3 gives a first impression of the data that we use in our subsequent analyses.

3.2. *Benchmarks*

In constructing our (European) version of the Carhart (1997) 4-factor model we consider all stocks that are in the Worldscope universe for each country.[6] For the excess market return we take all stocks in the Worldscope universe that are larger than $25 million, minus the 1-month interbank rate.[7] We then rank all stocks based on size and assign the bottom 20% of total market capitalisation to the small portfolio. The remaining part goes into the large portfolio. *SMB* is the return difference between small and large. For the *HML* factor all stocks are ranked on their book-to-market ratio. The top 30% of market capitalisation is assigned to the high book-to-market portfolio and the bottom 30% to the low book-to-market portfolio. *HML* is obtained by subtracting the low from the high book-to-market return. The momentum factor portfolio is formed by ranking all stocks on their prior 6-month return.[8] The return difference between the top 30% and bottom 30% by market capitalization then provides us with the *Pr6m* factor returns. Summary statistics on these portfolios are displayed in Table 4.

4. Performance measurement

4.1. *Mutual fund performance models*

Most mutual fund studies prior to the 90s make use of a CAPM based single index model.[9] The intercept of such a model, α_i, gives the Jensen alpha, which is usually

[5] Because Datastream does not cover French mutual funds we had to rely on Standard & Poor's Micropal for our French sample. As this source does not collect data on dead funds the French sample is possibly subject to survivorship bias.

[6] Worldscope covers over 98% of total market capitalization per country. Which is much broader than the average MSCI index (70%).

[7] Instead of Worldscope we also used similar local indices like the CAC40, DAX30, Mibtel, AEX and FTAllshare to test for benchmark sensitivity. We found this did not alter our conclusions.

[8] We choose not to use the 12-month momentum to stick as close as possible to Rouwenhorst (1998), who uses a 6-month momentum in his analysis of European momentum strategies.

[9] For an overview see Ippolito (1989).

interpreted as a measure of out- or under-performance relative to the used market proxy.[10]

$$R_{it} - R_{ft} = \alpha_i + \beta_i(R_{mt} - R_{ft}) + \varepsilon_{it} \quad (1)$$

where R_{it} is the return on fund i in month t, R_{ft} the return on a one month T-bill in month t, R_{mt} the return on the local equity benchmark in month t and ε_{it} an error term.

Such a CAPM based model however assumes that a fund's investment behaviour can be approximated using only one single market index. Because of the wide diversity of stated investment styles, ranging from growth to small cap, it is however preferable to use a multi-factor model to account for all possible investment strategies.

The rationale for using a multi-factor asset-pricing model lies in the recent literature on the cross-sectional variation of stock returns (see, e.g., Fama and French (1993, 1996) and Chan, Jegadeesh and Lakonishok (1996)). The results of these studies lead us to question the adequacy of a single index model to explain mutual fund performance. Therefore the Fama and French (1993) 3-factor model has been considered to give a better explanation of fund behaviour. Besides a value-weighted market proxy two additional risk factors are used, size and book-to-market. Although this model already improves average CAPM pricing errors, it is not able to explain the cross-sectional variation in momentum-sorted portfolio returns. Therefore Carhart (1997) extends the Fama-French model by adding a fourth factor that captures the Jegadeesh and Titman (1993) momentum anomaly. The resulting model is consistent with a market equilibrium model with four risk factors, which can also be interpreted as a performance attribution model, where the coefficients and premia on the factor-mimicking portfolios indicate the proportion of mean return attributable to four elementary strategies.

Formally

$$R_{it} - Rf_t = \alpha_i + \beta_{0i}(Rm_t - Rf_t) + \beta_{1i}SMB_t + \beta_{2i}HML_t + \beta_{3i}PR6m_t + \varepsilon_{it} \quad (2)$$

where

$R_{it} - Rf_t$	=	the excess fund return
$Rm_t - Rf_t$	=	the value weighted excess return on the market portfolio
SMB	=	the difference in return between a small cap portfolio and a large cap portfolio
HML	=	the difference in return between a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks
$PR6m$	=	the difference in return between a portfolio of past winners and a portfolio of past losers

Table 4 reports summary statistics on the factor portfolios we use for each country. Note that the premium on the SMB factor is negative in each country, indicating that small stocks suffered during the period examined. The momentum portfolio provides an interesting result, momentum strategies only add value in three out of five countries. Where especially in Italy and the UK momentum strategies offer huge returns, in France and Germany they seem to be absent or rather contrarian oriented. This is contrary to Rouwenhorst (1998) who documents positive momentum returns

[10] See Jensen (1968).

for all European countries. The fact that we consider a different sample period, 1991–98 as opposed to Rouwenhorst who uses the 1980–95 period, can partly explain this difference. Furthermore his sample covers MSCI stocks only, which are biased to the larger firms in each market. Because of the negative correlation between our *SMB* and *PR6m* factors (see Table 4) it could be that stock price momentum is more pervasive amongst large stocks than small stocks, at least during the 1991–98 period. The low cross-correlations in Table 4 suggest that multicollinearity does not substantially affect the estimated factor loadings. Results not reported in the table provide strong evidence for our 4-factor model as opposed to the single index model. For about 85% of the funds in the sample we reject the hypothesis that the *SMB*, *HML* and *Pr6m* factor are jointly 0 at the 5% level. The remaining 15% of funds mainly concerns index funds, for which it is self-evident that the market index should be the sole benchmark to use.

4.2. *Results*

Table 5 reports the results for the 4-factor model. For each country we form equally weighted portfolios containing all funds within a particular investment style. In addition we construct a portfolio consisting of all funds within a particular country (all funds). Because this only provides an aggregate picture of mutual fund performance we also estimate equation (2) for each fund individually. The last column of Table 5 presents the distribution of individually estimated αs per investment style. We report the percentage of significantly positive αs (+), significantly negative αs (−) and αs which are insignificantly different from zero (0).

A first glance at the factor loadings reveals significant positive *SMB* loadings for the majority of funds, indicating the returns of funds being driven relatively more by smaller stocks. The *HML* factor seems to add a little bit less explanatory power, as only half of the style loadings are significant (at the 5% level). On average funds seem to follow a more value oriented style. The fourth factor, P*r6m*, also shows up significantly in about half of the cases, while the sign of the coefficients is mostly negative, indicating contrarian strategies.

At first these results provide some understanding of the preferences of mutual fund managers as revealed by their portfolio holdings. European mutual funds seem to prefer smaller stocks and stocks with high book-to-market ratios (value).[11] Carhart (1997) and Gruber (1996) examine US fund preferences and report funds prefer smaller stocks and stocks with low book-to-market ratios (growth).[12] Lakonishok, Shleifer and Vishny (1994) argue the latter is due to agency problems within institutions. Because Carhart's and Gruber's sample respectively ended in 1993 and 1994 they possibly did not pick up the influence of the Fama and French (1992) study, which demonstrated that high book-to-market stocks produce higher risk-adjusted returns than low book-to-market stocks do. As our sample ends in 1998, the value preference of most European funds seems relevant, based on the 1992 findings by Fama and French. Finally it seems European mutual funds are not employing simple momentum strategies like we have seen for US funds in Carhart (1997). The results are

[11] Except for France.

[12] Falkenstein (1996) also analyses fund preferences and concludes funds prefer large value stocks. His sample period however covers only 2 years of portfolio holdings, 1991 through 1992.

Table 5

Summary statistics for the Carhart 4 – factor model for the period 1991–98.

The table reports the results of the estimation of equation (2) for the period between 1991 and 1998. Reported are the OLS estimates for equally weighted portfolios per investment style.

$$R_t - Rf_t = \alpha + \beta_0(Rm_t - Rf_t) + \beta_1 SMB_t + \beta_2 HML_t + \beta_3 PR6m_t + \varepsilon_{it} \quad (2)$$

Where R_t is the fund return, Rf_t the risk-free rate, Rm the return on the total universe according to Worldscope, and SMB and HML the factor-mimicking portfolios for size and book-to-market. $Pr6m$ is a factor-mimicking portfolio for the 6-month return momentum. All alphas in the table are annualised. The last column gives the distribution of individually estimated αs for all funds in a specific investment style. Reported are the percentages of significantly positive αs (+), significantly negative αs (−) and αs which are insignificantly different from zero (0), at the 5% level. 'All funds' is an equally weighted portfolio of all mutual funds within a specific country. T-stats are heteroskedasticity consistent.

	α	M	SMB	HML	$Pr6m$	R^2_{adj}	No funds	α distribution +/0/−
France								
Growth	0.36	0.87***	0.00	−0.09***	−0.02	0.95	55	2/94/4
Index	−1.68	1.03***	−0.21***	−0.06*	−0.10**	0.97	20	0/75/25
Small companies	2.28*	0.78***	0.50***	−0.01	0.15***	0.91	24	33/63/4
All funds	0.22	0.89***	0.06***	−0.07***	0.01	0.97	99	
Germany								
General	−1.32	1.05***	−0.01	0.04	0.08**	0.96	45	2/84/14
Growth	−1.68	1.12***	0.00	0.07*	0.11**	0.95	5	0/100/0
Income	−2.40	1.04***	−0.03	0.05	0.08**	0.95	2	0/50/50
Small companies	0.56	1.21***	0.91***	−0.09*	−0.03	0.89	5	40/60/0
All funds	−1.20	1.07***	0.06	0.03	0.07**	0.97	57	
Italy								
Italian equity	0.72	0.67***	0.07*	0.10**	0.06**	0.95	21	5/95/0
Italian specialist	1.20	0.77***	0.04	0.12***	0.11***	0.95	16	0/94/6
All funds	0.84	0.71***	0.06	0.10***	0.08***	0.95	37	
Netherlands								
Growth	1.80	0.95***	0.18***	0.09***	0.01	0.94	5	0/100/0
Index	1.20	1.06***	0.14***	0.11***	−0.04	0.94	3	0/100/0
Small companies	3.96*	0.84***	0.80***	0.00	−0.06	0.76	1	0/100/0
All funds	1.80	0.95***	0.24***	0.08***	−0.01	0.95	9	
UK								
Growth/Income	0.84	0.95***	0.07***	0.08***	−0.05*	0.97	79	9/87/4
Income	1.56	0.92***	0.15***	0.14***	−0.05*	0.96	72	19/77/4
Growth	1.32*	0.98***	0.22***	0.00	−0.06**	0.98	102	16/79/5
Small companies	2.04**	0.87***	0.98***	−0.11***	0.05*	0.97	51	25/73/2
All funds	1.33**	0.94***	0.29***	0.04**	−0.04*	0.98	304	

*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

somewhat mixed as they suggest that European funds are both contrarian and momentum oriented.

Because we investigate European mutual fund performance we will now focus on 4-factor alphas. On an aggregate country level (all funds portfolio) we observe negative alphas for Germany, where all other countries produce positive alphas. Significant out-performance however can only be found with UK funds. If we take a closer look at investment style level we find that small cap funds deliver significant out-performance in three out of four countries. The individual results in the last column confirm this result as 28% of all small cap alphas are significantly positive (at the 5% level). So even after adjusting for size, book-to-market and short-term return momentum small cap funds seem to add value.[13] Finally the percentage of significantly positive alphas is rather high for UK funds. This may be driven by the negative exposure of most funds to the momentum portfolio, which yielded over 11% a year. In paragraph 4.3 we will explore this possibility further. All other investment styles perform as we would expect them to do, with alphas insignificantly different from zero.

4.3. *Robustness of the results*

The results observed before could be influenced by a missing factor in our analysis. Elton, Gruber, Das and Hlavka (1993) for instance propose the inclusion of a bond index in mutual fund performance assessment. They argue that some funds invest in higher yielding and risky bonds, which is not picked up by the risk-free rate (*Rf*). If corrected for the impact of bonds on mutual fund returns, they find this lowers risk-adjusted performance (alpha) for all mutual funds.

We test for this possible bias in our analysis by introducing the excess return on a local Government bond index in equation (2), which now consists of five factors. We find that European mutual funds are only to a small extent exposed to bond returns. While most bond betas are between -0.03 and 0.06, none of examined fund categories (on country and style level) produce significant loadings on the bond index.[14] More importantly the observed alpha estimates do not change significantly if we include a bond index. Therefore we think the exclusion of a bond index does not influence the conclusions to be drawn from our 4-factor model.

Instead of a *missing* factor another possibility could be *over*-specification of our model. While the Fama-French factors *SMB* and *HML* are both based on actual investment strategies, the momentum factor is not that clearly defined in asset management. Morningstar for instance only uses size and book-to-market to identify mutual fund styles. Moreover, empirical work by Elton, Gruber and Blake (1999) documented only weak support for a momentum factor, if compared to adding a mutual fund growth factor (*MGO*).

To consider the influence of the momentum factor we repeat our performance analysis using the Fama-French 3-factor model, so excluding the momentum variable. In Table 6 we compare the results using both the 3 and 4-factor model. Using the 3-factor model the performance (alpha) of Germany and the UK decreases, of Italy and

[13] An *F*-test to examine whether all small cap alphas (for four countries) jointly are equal to zero is rejected at the 5% level.

[14] Results are available upon request with the authors.

Table 6

Results Carhart 4-factor versus Fama-French 3-factor model.

This table presents alphas, R^2_{adj} and log L for both the Carhart 4-factor model (imported from Table 6) and the Fama-French 3-factor model. A # in the last column means that 2 times the difference in loglikelihood between the 3 and 4-factor model exceeds 3.84, the critical value of a $\chi^2_{5\%}$ (1).

	Carhart 4-factor alpha	R^2_{adj}	log L	FF 3-factor alpha	R^2_{adj}	log L
France						
Growth	0.36	0.95	−101.00	0.37	0.95	−101.17
Index	−1.68	0.97	−105.61	−1.41	0.96	−108.43#
Small companies	2.28*	0.91	−123.74	1.95	0.89	−127.00#
All funds	0.22	0.97	−88.63	0.23	0.96	−88.67
Germany						
General	−1.32	0.96	−125.61	−1.40	0.96	−127.65#
Growth	−1.68	0.95	−144.33	−1.85	0.95	−147.37#
Income	−2.40	0.95	−163.11	−2.96*	0.92	−163.38
Small companies	0.56	0.89	−168.73	0.42	0.89	−168.81
All funds	−1.20	0.97	−122.98	−1.32	0.96	−124.74
Italy						
Italian equity	0.72	0.95	−151.55	1.45	0.94	−153.48#
Italian specialist	1.20	0.95	−161.72	2.42	0.94	−166.76#
All funds	0.84	0.95	−154.77	1.81	0.94	−157.88#
Netherlands						
Growth	1.80	0.94	−138.26	1.90	0.94	−138.32
Index	1.20	0.94	−153.96	0.88	0.94	−154.46
Small companies	3.96*	0.76	−187.42	3.44*	0.75	−187.69
All funds	1.80	0.95	−133.54	2.02*	0.95	−133.65
UK						
Growth/Income	0.84	0.97	−86.16	0.35	0.97	−87.69
Income	1.56	0.96	−102.84	1.00	0.96	−103.97
Growth	1.32*	0.98	−80.35	0.67	0.97	−83.15#
Small companies	2.04**	0.97	−91.76	2.55***	0.97	−93.13
All funds	1.33**	0.98	−71.62	0.93*	0.98	−73.00

*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

the Netherlands improves, while finally French fund performance seems unaffected. The two biggest changes occur with Italian and UK funds. This can be explained as follows; Italian funds exhibit a positive 4-factor loading on the momentum factor (see Table 5) while the return of this momentum portfolio is quite high (see Table 4). Dropping the momentum factor therefore increases alpha c.p. UK funds on the other hand produce a negative loading on the momentum factor (see Table 5) while the return on the momentum portfolio is also quite high (see Table 4). Deleting the

momentum factor drives their alpha down c.p. This causes the significance of overall UK out-performance to drop to the 10% level, instead of the 5% level before.

The question remains which model is better able to explain European mutual fund performance. To examine this we turn to the R^2_{adj} of both the 3 and 4-factor model. From Table 6 we learn that the R^2_{adj} of the 3-factor model is equal to or lower than the R^2_{adj} of the 4-factor model in all cases. In addition to this we report loglikelihoods of both models, which enable us to perform a standard LR test (see Table 6, last column). This confirms the results of examining the differences in R^2_{adj}. All loglikelihoods of the 3-factor model are lower, and in even 8 out of 21 cases *significantly* lower than the ones obtained from the 4-factor model.

Based on the influence on alpha and fit, we do not think our main conclusion until now, out-performance of small cap funds, is driven by the inclusion of the Carhart (1997) momentum factor. Therefore the remaining analyses, unless stated otherwise, are based on 4-factor results.[15]

It is well known that biases can arise if managers trade on publicly available information, in other words if dynamic strategies are employed. Average alphas calculated using a fixed beta estimate for the entire performance period are highly unreliable if expected returns and risks vary over time. Therefore Chen and Knez (1996) and Ferson and Schadt (1996) advocate conditional performance measurement.

Consider the following case were $\mathbf{Z}_{t-1}$ is a vector of lagged pre-determined instruments. Assuming that the beta for a fund varies over time, and that this variation can be captured by a linear relation to the conditional instruments, then $\beta_{it} = \beta_{i0} + \mathbf{B}_i'\mathbf{Z}_{t-1}$, where $\mathbf{B}_i'$ is a vector of response coefficients of the conditional beta with respect to the instruments in $\mathbf{Z}_{t-1}$. For a single index model the equation to be estimated then becomes

$$R_{it} - Rf_t = \alpha_i + \beta_{i0}(Rm_t - Rf_t) + \mathbf{B}_i'\mathbf{Z}_{t-1}(Rm_t - Rf_t) + \varepsilon_{it} \tag{3}$$

This equation can easily be extended to incorporate multiple factors, which results in a conditional Carhart 4-factor model with time-varying betas. The instruments we use are publicly available and proven to be useful for predicting stock returns by several previous studies. Introduced are (1) the 1 month *T*-bill rate, (2) dividend yield on the market index, (3) the slope of the term structure and finally (4) the quality spread, by comparing the yield of government and corporate bonds. All instruments are lagged 1 month and collected for each country separately.

Table 7 presents the results of the conditional Carhart 4-factor model for the individual countries. While column 2 repeats the unconditional alphas from Table 5, the conditional alphas are in column 4. Although in over two thirds of the cases the hypothesis of constant betas can be rejected at the 5% level (see Wald test statistics in column 6), the estimated conditional alphas do not differ that much from the unconditional ones. On average they increase and make several investment style portfolios significant out-performers. From this we conclude that our results are not driven by time-variation in betas. Nevertheless from now on we report results on subsequent tests for both unconditional and conditional models, as it seems the conditional model adds sufficiently explanatory power in most cases.

As a final robustness check we consider the influence our fund-weighting scheme exerts on the results observed in Section 4.2. For that reason we construct portfolios

[15] All 3-factor results are however available upon request from the authors.

Table 7

Unconditional versus conditional performance evaluation.

This table presents the results from the unconditional (column 2 and 3) and conditional (column 4 and 5) performance model. The results from the unconditional model are imported from Table 6 column 2, the conditional model results stem from the multifactor version of equation (3). Here we allow the market, *SMB*, *HML* and *PR6m* betas to vary over time as a function of (1) the 1 month *T*-bill rate, (2) dividend yield (3) the slope of the term structure and (4) the quality spread. The last column of Table 7 provides results for heteroskedasticity-consistent Wald tests to examine whether the conditioning information adds marginal explanatory power to the unconditional model. All alphas are annualised.

	Unconditional alpha	R^2_{adj}	Conditional alpha	R^2_{adj}	Wald (*p*-value)
France					
Growth	0.36	0.95	0.81	0.96	0.027
Index	−1.68	0.97	−1.95	0.96	0.904
Small companies	2.28*	0.91	3.74**	0.93	0.003
All funds	0.22	0.97	0.80	0.97	0.001
Germany					
General	−1.32	0.96	−2.15	0.97	0.022
Growth	−1.68	0.95	−2.68	0.96	0.074
Income	−2.40	0.95	−2.98	0.94	0.001
Small companies	0.56	0.89	0.18	0.91	0.007
All funds	−1.20	0.97	−2.17	0.97	0.028
Italy					
Italian equity	0.72	0.95	0.51	0.96	0.000
Italian specialist	1.20	0.95	0.90	0.97	0.000
All funds	0.84	0.95	0.43	0.97	0.000
Netherlands					
Growth	1.80	0.94	2.74**	0.96	0.000
Index	1.20	0.94	1.35	0.94	0.303
Small companies	3.96*	0.76	6.49**	0.80	0.011
All funds	1.80	0.95	3.08**	0.96	0.006
UK					
Growth/Income	0.84	0.97	0.73	0.98	0.062
Income	1.56	0.96	1.51	0.97	0.012
Growth	1.32*	0.98	1.04	0.98	0.253
Small companies	2.04**	0.97	2.96**	0.97	0.275
All funds	1.33**	0.98	1.40**	0.98	0.080

*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

of funds based on individual asset size and examine 4-factor alphas. From results not reported in the paper it appears that on average fund alphas rise by about 0.4% a year if capitalization weighted portfolios are used instead of equally weighted portfolios.[16] We therefore think the use of equally weighted portfolios does not severely influence the earlier results, as cap weighting only strengthens our results.

4.4. *Management fees*

Until now we have only considered mutual fund returns net of costs. This means management fees were already deducted from the fund's return.[17] From US evidence we know that most mutual funds are quite able to follow the market, with alphas insignificantly different from zero. If however management fees are deducted funds under-perform the market by the amount of fees they charge the investor. To examine the influence of fees on European mutual fund performance we first present average country alphas (after costs) for both the unconditional and conditional model. From Table 8 column 2 we learn that most funds perform as we would expect them to do,

Table 8

Performance *after* and *before* management fees that are deduced.

This table gives both unconditional and conditional average country alphas *after* costs are deducted (column 2) and *before* (column 3) costs are deducted from fund returns. All alphas are annualised.

Country	*After* fees alpha	*Before* fees alpha
France		
unconditional	0.22	1.40*
conditional	0.80	2.04**
Germany		
unconditional	−1.20	−0.36
conditional	−2.17	−1.32
Italy		
unconditional	0.84	2.88**
conditional	0.43	2.32**
Netherlands		
unconditional	1.80	2.64*
conditional	3.08**	3.59***
UK		
unconditional	1.33**	2.56***
conditional	1.40**	2.59***

*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

[16] Results are available upon request from the authors.

[17] Loads however are not considered.

with alphas insignificantly different from zero. The only exception to this are UK funds, which out-perform significantly using both models.

If we now add back management fees (observable from Table 3) to fund returns and repeat our analysis, column 3 appears. This column reports average country alphas before costs are deducted. Most funds now exhibit positive alphas on the models that are adapted. Only German funds still under-perform, though insignificantly. The number of significantly out-performing countries increases. UK and Italian funds out-perform at the 5% level and French and Dutch funds at the 10% level, using the unconditional Carhart 4-factor model. Based on conditional model results even four out of five countries out-perform at the 5% level. This suggests that European funds (in contrast to US funds) are sufficiently successful in finding and implementing new information to offset their expenses, and therefore add value for the investor.

5. Persistence

The hypothesis that mutual funds with an above average return in this period will also have an above average return in the next period is called the hypothesis of persistence in performance. This topic has been well documented in the finance literature. Hendricks *et al.* (1993) and Brown and Goetzmann (1995) find evidence of persistence in mutual fund performance over short-term horizons where Grinblatt and Titman (1992) and Elton, Gruber, Das and Blake (1996) document mutual fund return predictability over longer horizons. Carhart (1997) shows that this 'hot hands' effect is mainly due to persistence in expense ratios and the pursuing of momentum strategies. Contrary evidence comes from Jensen (1969), who does not find predictive power for alpha estimates. The importance of persistence analysis is stressed by Sirri and Tufano (1998) who document large money inflows into last year's top performers and extractions from last year's losers. Finally Zheng (1999) finds that this newly invested money is able to predict future fund performance, in that portfolios of funds that receive more money subsequently perform significantly better than those that lose money.

To investigate whether persistence in mutual fund performance is also present for European funds we rank all funds within a specific country, based on past 12-month return. Funds with the highest previous 12-month return (selection period) go into portfolio 1 and funds with the lowest past 12-month return go into portfolio 3 (Germany and Italy), 4 (France) or 10 (UK).[18] For France and the UK the high and low portfolios are further subdivided on the same measure, for added detail. These equally weighted portfolios are then held for 1 year (performance period) before we rebalance them again, based on their last 12-month return. This is continued throughout the sample period until we get a time series of monthly returns on these portfolios. Funds that disappear during the year are included until they disappear, after which portfolio weights are re-adjusted accordingly. Table 9 reports the result of this exercise in column two, where excess returns on the rank portfolios are given. For all examined countries we observe a monotonically decreasing excess return if we move from the high- to the low-past performance portfolio. The average spread between the high- and low-portfolios ranges from 0.83% per year for France to 6.08%

[18] Because we only have 9 Dutch funds in our sample we do not examine Dutch mutual fund persistence.

Table 9

Mutual fund persistence based on 12-month lagged return, 4-factor model.

Each year, all funds are ranked based on their previous 12-month return. The portfolios are equally weighted and weights are readjusted (monthly) whenever a fund disappears. Funds with the highest previous 12-month return go into portfolio 1 and funds with the lowest go into portfolio 3 (Germany and Italy), 4 (France) or 10 (UK). For France and the UK the high and low portfolios are further subdivided on the same measure. Columns 4 through 9 present the results for the unconditional model and column 10 and 11 for the conditional model. The last column provides results for heteroskedasticity-consistent Wald tests to examine whether the conditioning information adds marginal explanatory power to the unconditional model.

			Unconditional 4-factor model						Conditional 4f		
Portfolio	Excess return	Stdev	Alpha	Market	*SMB*	*HML*	*PR6m*	R^2_{adj}	Alpha	R^2_{adj}	Wald *P*-value
France											
1A	4.65	13.36	1.77	0.87***	0.26***	−0.03	0.08*	0.90	1.87	0.92	0.067
1B	3.10	13.42	0.05	0.88***	0.16***	−0.03	0.03	0.95	0.59	0.95	0.250
1 (high)	3.88	13.31	0.91	0.88***	0.21***	−0.03	0.06	0.93	1.23	0.94	0.129
2	3.81	14.15	0.38	0.91***	0.00	−0.08***	−0.05	0.96	−1.06	0.96	0.559
3	3.79	14.55	0.25	0.92***	−0.05	−0.11***	−0.11**	0.96	0.21	0.96	0.072
4 (low)	3.56	14.40	−0.03	0.90***	0.01	−0.13**	−0.14**	0.92	2.36	0.93	0.083
4A	3.29	14.77	−0.44	0.92***	−0.02	−0.14**	−0.15**	0.92	1.39	0.93	0.176
4B	3.83	14.10	0.39	0.88***	0.04	−0.11**	−0.12**	0.90	3.32	0.92	0.041
1−4 spread	0.32	6.10	0.94	−0.02	0.20***	0.10*	0.19**	0.11	−1.13	0.26	0.053
1A−4B spread	0.83	7.30	1.38	−0.01	0.22***	0.09	0.21**	0.07	−1.45	0.27	0.024
Germany											
1 (high)	8.76	17.21	−0.89	1.07***	0.01	0.07*	0.08**	0.96	−1.69	0.97	0.012
2	8.43	17.17	−1.33	1.04***	−0.06	0.02	0.04	0.96	−2.17	0.96	0.020
3 (low)	7.23	16.31	−1.61	1.06***	0.08	0.02	−0.01	0.97	−2.85	0.97	0.015
1−3 spread	1.53	2.93	0.71	0.01	−0.07	0.05	0.09**	0.15	1.16	0.23	0.018

Italy											
1 (high)	8.51	19.77	1.56	0.72***	0.08*	0.12**	0.14***	0.93	0.45	0.96	0.000
2	7.01	19.75	1.08	0.73***	0.06	0.10**	0.06*	0.94	−0.83	0.96	0.000
3 (low)	4.78	19.12	−0.36	0.71***	0.00	0.09**	−0.01	0.96	−0.74	0.96	0.048
1−3 spread	3.73*	4.78	1.92	0.01	0.08*	0.03	0.15***	0.18	1.19	0.61	0.006
UK											
1A	9.59	12.83	6.53***	0.84***	0.54***	−0.04	−0.05	0.90	7.68***	0.92	0.000
1B	8.34	12.70	4.48***	0.87***	0.43***	−0.07	−0.08	0.95	6.05***	0.93	0.002
1C	8.68	12.20	4.03***	0.86***	0.47***	−0.06	0.06	0.93	4.14***	0.95	0.000
1 (high)	8.88	12.45	5.13***	0.86***	0.48***	−0.06	−0.02	0.96	5.94***	0.95	0.000
2	7.29	12.72	2.98***	0.91***	0.34***	−0.04	−0.07**	0.96	3.42***	0.96	0.046
3	7.46	12.73	2.29***	0.92***	0.20***	0.01	−0.07**	0.90	2.31***	0.97	0.000
4	7.84	12.75	2.51***	0.93***	0.19***	0.02	−0.06*	0.95	2.84***	0.97	0.063
5	7.22	13.03	1.26	0.95***	0.24***	0.03	−0.04	0.93	1.39**	0.98	0.202
6	7.30	13.23	1.74**	0.96***	0.18***	0.04	−0.06**	0.96	0.94	0.98	0.135
7	6.73	13.47	1.13	0.98***	0.23***	0.02	−0.05*	0.96	0.56	0.97	0.019
8	6.93	13.61	0.91	0.99***	0.27***	0.04	0.01	0.96	0.06	0.97	0.078
9	5.50	13.24	0.46	0.94***	0.35***	0.07*	−0.01	0.92	−0.38	0.96	0.001
10 (low)	4.50	14.14	−0.23	0.96***	0.49***	0.12**	0.01	0.92	−1.14	0.95	0.000
10A	5.97	14.70	0.71	1.00***	0.42***	0.15***	0.01	0.96	−0.51	0.93	0.003
10B	3.97	14.40	−0.83	0.98***	0.46***	0.09*	−0.02	0.92	−0.32	0.94	0.000
10C	3.50	13.77	−0.75	0.90***	0.58***	0.12**	0.06	0.90	−2.81**	0.93	0.001
1−10 spread	4.37*	6.63	5.36**	−0.10**	−0.01	−0.18**	−0.04	0.06	7.08***	0.48	0.000
1A−10C spread	6.08**	7.20	7.28***	−0.06	−0.04	−0.16*	−0.11	0.03	10.49***	0.39	0.000

*** Significant at the 1% level ** Significant at the 5% level * Significant at the 10% level

Table 10

Mutual fund persistence based on 12-month lagged return, 3-factor model.

Each year, all funds are ranked based on their previous 12-month return. The portfolios are equally weighted and weights are readjusted (monthly) whenever a fund disappears. Funds with the highest previous 12-month return go into portfolio 1 and funds with the lowest go into portfolio 3 (Germany and Italy), 4 (France) or 10 (UK). For France and the UK the high and low portfolios are further subdivided on the same measure. Columns 4 through 9 present the results for the unconditional model and column 10 and 11 for the conditional model. The last column provides results for heteroskedasticity-consistent Wald tests to examine whether the conditioning information adds marginal explanatory power to the unconditional model.

			Unconditional 3-factor model					Conditional 3f		
Portfolio	Excess return	Stdev	Alpha	Market	*SMB*	*HML*	R^2_{adj}	Alpha	R^2_{adj}	Wald *P*-value
France										
1A	4.65	13.36	1.66	0.86***	0.23***	−0.06	0.90	1.49	0.92	0.003
1B	3.10	13.42	0.02	0.88***	0.15***	−0.04	0.95	0.20	0.96	0.021
1 (high)	3.88	13.31	0.84	0.87***	0.19***	−0.05	0.93	0.85	0.95	0.007
2	3.81	14.15	0.45	0.92***	0.02	−0.06**	0.96	−0.03	0.96	0.365
3	3.79	14.55	0.39	0.94***	−0.01	−0.07**	0.96	0.49	0.96	0.024
4 (low)	3.56	14.40	0.15	0.92***	0.06	−0.08*	0.92	1.42	0.92	0.103
4A	3.29	14.77	−0.24	0.94***	0.03	−0.09**	0.92	0.85	0.92	0.180
4B	3.83	14.10	0.54	0.90***	0.09**	−0.07*	0.90	1.99	0.91	0.050
1–4 spread	0.32	6.10	0.70	−0.05	0.13**	0.03	0.11	−0.57	0.25	0.008
1A–4B spread	0.83	7.30	1.12	−0.04	0.14**	0.02	0.07	−0.49	0.27	0.002
Germany										
1 (high)	8.76	17.21	−0.99	1.06***	0.04	0.03	0.96	−1.35	0.97	0.035
2	8.43	17.17	−1.37	1.04***	−0.08	0.00	0.96	−1.74	0.96	0.033
3 (low)	7.23	16.31	−1.60	1.06***	0.09*	0.03	0.97	−2.02	0.97	0.204
1–3 spread	1.53	2.93	0.61	0.00	−0.13**	0.00	0.09	0.67	0.24	0.008

Italy										
1 (high)	8.51	19.77	3.53*	0.73***	0.07	0.06	0.92	1.11	0.96	0.000
2	7.01	19.75	1.92	0.73***	0.06	0.08*	0.93	−0.68	0.96	0.000
3 (low)	4.78	19.12	−0.52	0.71***	0.00	0.10**	0.96	−0.61	0.96	0.189
1–3 spread	3.73*	4.78	4.05***	0.02	0.07	−0.04	0.02	1.72	0.48	0.000
UK										
1A	9.59	12.83	6.07***	0.85***	0.55***	−0.03	0.88	6.88***	0.92	0.000
1B	8.34	12.70	4.07***	0.88***	0.45***	−0.04	0.91	5.16***	0.93	0.000
1C	8.68	12.20	4.61***	0.85***	0.46***	−0.09	0.93	3.92***	0.95	0.000
1 (high)	8.88	12.45	4.92***	0.86***	0.48***	−0.05	0.92	5.31***	0.95	0.000
2	7.29	12.72	2.26**	0.92***	0.36***	−0.01	0.96	2.96***	0.96	0.004
3	7.46	12.73	1.64*	0.93***	0.21***	0.03	0.96	2.09**	0.97	0.030
4	7.84	12.75	1.95**	0.93***	0.20***	0.04	0.97	2.71***	0.97	0.013
5	7.22	13.03	0.87	0.95***	0.15***	0.04	0.97	1.23	0.98	0.244
6	7.30	13.23	1.14	0.97***	0.20***	0.06	0.97	1.29	0.98	0.524
7	6.73	13.47	0.66	0.99***	0.24***	0.04	0.97	0.78	0.97	0.026
8	6.93	13.61	1.02	0.99***	0.26***	0.03	0.96	0.20	0.97	0.142
9	5.50	13.24	0.39	0.94***	0.36***	0.07*	0.95	−0.12	0.96	0.001
10 (low)	4.50	14.14	−0.09	0.96***	0.48***	0.12**	0.92	−0.86	0.95	0.000
10A	5.97	14.70	0.78	1.00***	0.42***	0.15**	0.91	−0.30	0.93	0.000
10B	3.97	14.40	−1.04	0.98***	0.46***	0.10*	0.91	−0.55	0.94	0.000
10C	3.50	13.77	−0.17	0.90***	0.57***	0.10**	0.90	−1.90*	0.93	0.000
1–10 spread	4.37*	6.63	5.01**	−0.10**	−0.00	−0.17**	0.07	6.17***	0.48	0.000
1A–10C spread	6.08**	7.20	6.24**	−0.05	−0.02	−0.13*	0.01	8.78***	0.39	0.000

***Significant at the 1% level **Significant at the 5% level * Significant at the 10% level

per year for the UK. The only significant spread however is exhibited by UK funds. A cause for this weak persistence for France, Germany and Italy could be the rather small number of funds in the sample, respectively 99, 57 and 37. This makes it much harder to detect a persistent pattern using only three or four portfolios. That is probably why the UK, with over 300 funds, does allow us to infer significant conclusions from this persistence analysis.

Because it could be argued that the funds in portfolio 1 receive higher returns because they take on more risk, we then use the unconditional Carhart (1997) 4-factor model to control for several risk factors. Columns 4–9 (Table 9) report the results of this analysis. Controlling for market risk, book-to-market, size and stock price momentum does not consume the spread between the high and low portfolios. As before however, the only significant result is observed with UK funds, which exhibit a 7.28% spread in yearly risk-adjusted returns between portfolio 1A and portfolio 10C. This is in line with for instance Blake and Timmerman (1998) who document similar results for the UK. Columns 10 and 11 report the results for the conditional model that was derived in Section 4.3. Conditioning on publicly available information does not alter our conclusions, France, Germany and Italy still exhibit weak or no persistence. UK funds show even stronger persistence using the conditional model. Note that the more elaborate conditional model is especially strong, compared to the unconditional model, when explaining the spread portfolios, judging from the heteroskedasticity-consistent Wald tests in the last column of Table 9.

In paragraph 4.3 we considered the influence of using the 3-factor Fama-French model instead of the 4-factor Carhart model. Although the influence on alpha was moderate, our persistence analysis is potentially more sensitive to this. This can best be illustrated by looking at the UK momentum loadings for the top portfolios compared to the bottom portfolios (1a–10c: −0.11). This obviously increases alpha because of the high return on *Pr6m* (11.49%) and could therefore induce spurious persistence. To examine this we repeat our analysis after dropping the momentum factor. These results are reported in Table 10. From this some interesting conclusions can be drawn. First, the persistence of France and Germany remains weak. Second, Italian funds now exhibit strong and significant persistence using the 3-factor model. This result however seems to be driven by time-variation in betas, as the conditional alpha is not significantly different from zero. Finally the persistence of UK funds is somewhat lowered by the exclusion of the momentum factor, but still remains strongly significant.

From this we conclude that most European funds provide only weak evidence of persistence in performance, except for UK funds.[19] Buying last year's top portfolio of UK mutual funds and selling last year's bottom portfolio of funds yields a return of 6.08% per year. This spread cannot be explained by common factors or time-varying risk.[20] This is contrary to Carhart (1997), who finds that half of the spread for US funds can be explained by common factors.

[19] We also used a 6-month rebalancing period (instead of 12 months) but found that this did not alter our findings.

[20] Here we do not consider the transaction costs of such a strategy, which of course lowers profits.

6. The influence of fund characteristics on risk-adjusted performance

In general mutual fund managers claim that expenses do not reduce performance, since investors are paying for the quality of the manager's information. So if management expenses are high one would expect returns to increase as well, relative to a low cost fund. To evaluate this claim we measure the marginal effect of expense ratio's and other variables on risk-adjusted performance.

Estimated is:

$$\alpha_i = c_0 + c_1 \text{Expense ratio}_i + c_2 \text{LN Assets}_i + c_3 \text{LN Age}_i + \varepsilon_i \quad (4)$$

where

α_i	=	conditional 4-factor alpha for fund i
Expense ratio$_i$	=	Expense ratio for fund i (end 1998)
LN Assets$_i$	=	LN of total fund assets for fund i (end 1998)
LN Age$_i$	=	LN of fund is age in number of years (end 1998)

The results in Table 11 indicate a strong relationship between expense ratio, assets under management and to a lesser extent fund age. Contrary to what mutual fund managers often claim, the relationship between management expenses and risk-adjusted performance (alpha) is significantly negative in three out of four European countries.[21] Ippolito (1989) found risk-adjusted returns are unrelated to expense

Table 11

The influence of fund characteristics on risk-adjusted performance.

Reported are the results for the following estimation:

$$\alpha_i = c_0 + c_1 \text{ Expense ratio}_i + c_2 \text{ LN Assets}_i + c_3 \text{ LN Age}_i + \varepsilon_i \quad (4)$$

where α_i is the conditional 4-factor alpha for fund i, expense ratio$_i$ is the funds's expense ratio (end 1998), LN Assets$_i$ is based upon total fund assets at the end of 1998 and LN Age$_i$ is a fund's age in years. The table gives the estimated coefficients with heteroskedasticity robust t-statistics within parentheses.

Country	Constant	Expense ratio	LN Assets	LN Age	R^2_{adj}
France	−2.52	−0.32	0.80***	−0.64	0.04
	(−1.01)	(−0.33)	(2.68)	(−0.91)	
Germany	0.83	−3.19***	0.32**	−0.85**	0.15
	(0.53)	(−2.76)	(2.03)	(−1.99)	
Netherlands	2.51	−3.05**	0.50**	−0.01	0.53
	(0.80)	(−2.06)	(2.38)	(−0.01)	
UK	3.03**	−1.11**	0.54***	−1.02***	0.08
	(2.12)	(−2.14)	(3.93)	(−3.54)	

*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

[21] Because individual fund characteristics were not available for Italian funds we do not report results for Italy.

ratio for US funds. Elton *et al.* (1993) however adjust for style and then find a negative correlation between expense ratios and risk-adjusted performance. This result is confirmed by Carhart (1997). Malkiel (1995) also reports a negative relationship. If he however splits the total expense ratio up into investment advisory and non-advisory expenses, he finds the former to be positively related to risk-adjusted performance, whereas non-advisory expenses (for instance marketing costs) are negatively related.

The second fund characteristic that is used to explain risk-adjusted return is total fund assets. As all countries show a significantly positive relationship between the log of fund assets and risk-adjusted performance we suspect there are still economies of scale available in the European fund market. If we consider the size of the average European fund, $256 million compared to $723 million for the average US fund, it seems European funds still have to grow to reach an efficient asset size. If funds however get too large diseconomies of scale become apparent, like we for instance learned from the closedown of the Fidelity Magellan fund.[22]

Finally the influence of fund age is considered. From the results in Table 11 we tend to believe younger funds perform better than older funds. While all coefficients are negative, only two countries show a significantly negative relation between fund age and risk-adjusted performance.

7. Summary and conclusions

This paper gives an overview of the European mutual fund industry and investigates mutual fund performance using both unconditional and conditional models. Using data on the six most important European mutual fund countries we find that the European industry is still lagging the US industry when it comes to both total asset size and market importance. Furthermore the average size of European funds is much smaller. When we compare the asset allocation of the European and US industry it appears Europeans prefer fixed income mutual funds where US investors invest more in equity funds.

The performance of European equity funds is investigated using a survivorship bias controlled sample of 506 funds from the five most important mutual fund countries. For this we employ the Carhart (1997) 4-factor asset-pricing model. This model enables us to correct mutual fund performance by using factor-mimicking portfolios for size, book-to-market and stock price momentum. Some interesting results follow from the 4-factor model. First of all it reveals a preference of European funds for small and high book-to-market stocks (value). Second, we show that small cap mutual funds as an investment style out-perform their benchmark, even after we control for common factors in stock returns. Finally four out of five countries deliver positive aggregate alphas, where only UK funds out-perform significantly. These observations

[22] Because we use end of 1998 data on fund characteristics, it could be argued that our results suffer from self-induced correlation. For instance if well performing funds attract positive inflows through out the sample period, these funds would show up as large funds at the end of 1998 and therefore create a positive correlation with risk-adjusted performance. Of course it therefore would be preferable to use time series of fund characteristics. This however is not possible for European funds, because the best one can get is a yearly snapshot.

appeared to be quite robust to the inclusion of a bond index, the weighting scheme of portfolios, time-variation in betas and the exclusion of the momentum factor.

The search for a 'hot hands' effect provided only weak evidence of persistence in mutual fund performance, except for UK funds. Buying last year's top portfolio of UK mutual funds and selling last year's bottom portfolio of funds yields a return of 6.08% per year, which cannot be explained by common factors, stock price momentum or time-varying risks.

From US evidence, we know that most funds are able to follow the market before costs are deducted, with alphas insignificantly different from zero. We therefore examine European fund returns with costs added back. Now an interesting picture appears. French, Italian, Dutch and UK funds out-perform significantly, while German funds still under-perform the market, though not significantly.

Finally, we investigate the influence of fund characteristics on risk-adjusted performance. We find expense ratio and age to be negatively related to risk adjusted performance, while fund assets are positively related.

Our results suggest that most European mutual funds, besides the obvious advantages of easy diversification and lower transaction costs, also deliver positive risk-adjusted performance to their investors. Contrary to most US evidence, the majority of European funds seems to be able to find and implement new information to offset their expenses, and therefore add value for the investor. A factor influencing this could be the smaller market importance of the European versus the US industry. While the US industry holds almost 30% of the domestic equity market, European funds are rather small players (up to 11% domestic market importance). If the mutual fund sector grows larger, relative to the market, it becomes more difficult to out-perform the market as a group. Because of their smaller market importance European mutual funds might be in a better position to follow or even beat the market. Especially European small cap funds seem to be able to profit from their market niche, as they significantly out-perform the market as a group. Along these lines it would be interesting to see what happens to European fund performance when the relative importance of this market grows in the future.

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