

Sail with Hedge Funds in the Storm? A New Approach

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Abstract

We provide a new approach to hedge fund replication that seeks to capture the non-linear dynamic factor exposures of hedge funds. Our approach constructs optimal benchmarks using liquid traded factors for a variety of hedge fund categories. We find that our benchmarks achieve good Sharpe ratios for a number of categories and are able to match the performance of about the 35th percentile of individual funds before fees. Thus, our approach provides a low-cost alternative to capturing the dynamic non-linear factor exposures of hedge funds. We show that most of the gains from hedge funds before and during the credit-crunch crisis could have been matched or even beaten by simply exploiting the information contained in publicly observable economic indicators, calling into question the issue of hedge fund manager skills.

JEL Classifications: G11, G12

Key Words: Hedge Fund Replication, Non-Linearity, Conditional Moments

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1. Introduction

Hedge fund replication, in a broad sense, seeks to capture the exposures of hedge fund indices using a small number of liquid traded factors. The goal is to achieve the returns on hedge funds at far lower cost than actual investing in the funds. The academic motivation is based on a number of studies starting with Fung and Hsieh (2004). There has been industry support for the viewpoint in recent years, with various industry figures, including investment consultants, arguing that hedge fund returns consist mostly of “alternative betas” with some outperformance, or alpha, which is relatively small after fees.

Our approach to hedge fund replication is different from previous approaches of Hasanhodzic and Lo (2007) which use the hedge funds’ factor exposure coefficients to construct “clones” of the funds. Instead, we focus on creating an optimal benchmark to evaluate the performance of hedge funds. This approach is particularly relevant in light of the recent performance of hedge funds, particularly in the fourth quarter of 2008 when virtually every hedge fund index category achieved negative returns. Our approach focuses on two quite general aspects of hedge fund strategies and tries to incorporate these to construct what may be regarded as an optimal “fund-of-funds”.

The first aspect is to try to capture non-linear features of hedge fund returns. We incorporate a new set of factors based on the square and cube of the equity market return to try to capture these nonlinearities. Our new factors are particularly relevant for categories such as equity long-short or market neutral, which may have low market beta or exposure but could well have exposure to higher moments of the market return. Several studies have analyzed the correlations between these categories and equity indices, but we are one of the first to analyze the higher moment risks. The second aspect is dynamic factor exposures, a characteristic of hedge funds, and an aspect that has been largely overlooked in hedge fund replication thus far. We first conduct an in-sample exercise to test how well an optimal dynamic factor model based on our factors together with dynamic factor loadings explains hedge fund returns. In addition to the equity market based factors we also incorporate bond and commodity factors for different categories. The factor loadings are assumed to be functions of various term structure variables as well as the VIX.

Overall this paper addresses one of the most serious criticisms of hedge fund replication, namely that it only “replicates” what already exists and hence even the lower cost of these strategies may not in fact be so low. Our optimal “fund-of-funds” attempts to optimize returns based on a given set of liquid traded factors and dynamic factor exposures. This approach could in principle be used to construct a new class of hedge fund strategies. Our strategy is possibly most similar to a global macro strategy, the category that fared the best in the fourth quarter of 2008.

We find that most hedge fund categories in-sample display exposures to our non-linear, bond and commodity factors. This is not surprising given the findings of Fung and Hsieh (2004), Agarwal and Naik (2004) and Hasanhodzic and Lo (2007). But we find wide variation in factor betas across funds, indicating that factor exposures are time varying. This provides justification for our approach.

We consider the out-of-sample performance of our benchmarks over the period between 2000 and 2005. Eight of the 12 categories achieve Sharpe ratios of around 0.65 while the other four (EMN, GM, MA and SS), the Sharpe ratios are lower at around 0.38. Hence there are 8 categories that might be considered “worth replicating” from our viewpoint in that our methodology leads to a low-cost strategy with relatively high Sharpe ratios, all this over a “bear market” period. Our benchmark portfolios typically match the median return of the fund sample, and in most cases beat the Sharpe ratio of at least 35% of the funds, before fees. Our strategies can be implemented using publicly available information, using basic asset classes that often require much lower transaction costs, and hence could be regarded as a low cost alternative that provides close to the median performance, certainly after fees.

Our benchmarks have relatively low correlation with the individual funds and equally weighted portfolios of these. This leads to high alphas with respect to our benchmarks that might be regarded as a drawback of our approach. Nonetheless the results illustrate that our methodology does not just capture what is “already there”, a practitioner criticism of hedge fund replication. Our benchmarks capture quite generic aspects of each hedge fund strategy, namely non-linear dynamic exposures and are able to replicate these at a relatively lower cost. In this sense our approach resembles Kat and Palaro (2006) who use dynamic trading strategies to match the risk profiles of hedge funds.

We also investigate the performance of both the fund indices as well as our dynamically managed benchmark portfolios during the “credit crunch” period from 2005 until December 2008 using the fund style index portfolios, as individual fund data is not available over the entire period. While the majority of hedge fund styles performed poorly over this period, several hedge fund styles, most notably Commodity Trading Advisors, Global Macro, Equity Long Short, did well. For all style classes, our respective benchmark portfolio achieves a higher Sharpe ratio than the corresponding hedge fund index. This shows

that most of the gains that hedge funds managed to achieve on the back of the crisis could have been matched or even beaten by much more “down-to-earth” investment strategies that simply exploit the information contained in publicly observable economic indicators, calling into question the issue of hedge fund manager skills.

The rest of the paper is organized as follows. In Section 2 we describe the methodology. The data and model are described in Section 3 while the results are described in Section 4, and finally Section 5 concludes.

2. Methodology

Our empirical analysis comprises 4 stages. The first stage involves using past data (“in-sample”) to analyze the characteristics of different groups of hedge funds, categorized by the “style” of the strategy employed by the fund (a list of the style groups is given in the Appendix). In particular, similar to Hasanhodzic and Lo (2007), we identify the priced risk factors that different types of hedge funds have a significant exposure to. We use a set of factors designed to capture both the general business cycle but also some of the more non-standard features of hedge fund strategies. Specifically, we consider the return on a market index portfolio (to capture the overall business cycle), a skewness and a kurtosis factor (to capture hedge funds’ tendency to “bet” on asymmetric or “extreme” market movements), a bond factor and a commodity factor (to capture hedge funds’ exposure to non-equity markets). Finally, we include the VIX volatility index in order to capture hedge funds taking positions on the basis of anticipated changes in volatility. A full list of the factors employed in this study is provided in the “Data” section below.

In the second stage, we estimate, for each style, a linear predictive model for the relevant factors and a set of predictive “instruments” using the “in-sample” data. To establish the relationship between the instruments and the factors, while at the same time taking into

account the possible autocorrelation in the instruments, we use the “in-sample” data to estimate a VAR predictive regression, similar to Wachter and Warusawitharana (2008):

$$\begin{pmatrix} r_t - r_f \\ z_t \end{pmatrix} = \begin{pmatrix} \mu \\ \nu \end{pmatrix} + \begin{pmatrix} b \\ a \end{pmatrix} z_{t-1} + \begin{pmatrix} \varepsilon_t \\ \eta_t \end{pmatrix} \quad (1)$$

where, r_t is the vector of returns on the factor portfolios, and z_t is the vector of predictive instruments. The vectors μ and ν capture the unconditional means of the factor returns r_t and the instruments z_t , respectively. The coefficients a and b capture the predictive relation between the instruments and the factors, and any auto-regressive component in the dynamics of the instruments, respectively. Note that we estimate the above equation simultaneously across all assets and instruments. In other words, while we assume the residuals ε_t and η_t to be serially uncorrelated, we do allow cross-sectional correlation. From the above regression, we obtain the conditional mean μ_{t-1} and variance-covariance matrix Σ_{t-1} of the factor returns, as functions of the realized values of the instruments, z_{t-1} .

Having obtained the representation of μ_{t-1} and Σ_{t-1} as functions of z_{t-1} from the above regressions, we then construct for each fund style a dynamically managed portfolio of a set of tradable factors that capture the exposures of different styles of hedge funds to different “priced” risks. We form efficient portfolios of the factors “out-of-sample”, using in each period the lagged values of the predictive instruments. Ferson and Siegel (2001) and Abhyankhar, Basu and Stremme (2008) show that the weights of any unconditionally efficient portfolio can be written as:

$$\theta_{t-1} = \frac{w - r_f}{1 + H_{t-1}^2} \cdot \Sigma_{t-1}^{-1} (\mu_{t-1} - r_f) \quad (2)$$

where $H_{t-1}^2 = (\mu_{t-1} - r_f)' \Sigma_{t-1}^{-1} (\mu_{t-1} - r_f)$ is the conditional maximum squared Sharpe ratio, w is a constant depending on the target mean or volatility of the portfolio. In our empirical applications, we choose w so that the ex-ante target mean return or volatility of the

benchmark portfolio matches the in-sample mean or volatility of the respective fund style index. Note that the portfolios we construct do not require the model to be re-estimated each period, as the “weights” θ_{t-1} in (2) are specified as a deterministic function of the instruments z_{t-1} , based on the coefficients of the in-sample predictive regression (1). However, note that the portfolios thus constructed are nonetheless “dynamically managed”, because the weights θ_{t-1} change as functions of the instruments z_{t-1} .

The portfolio weights (i.e. fractions invested in each of the factors) are determined as functions of one or more lagged “instruments” (i.e. variables that contain information about the future distribution of asset returns). As a result, the weights achieve the optimal time-varying asset allocation and that the portfolio is dynamically managed and optimally exploits the predictive relation between the instruments and the factors. Intuitively, the benchmark portfolio optimally manages the exposures to the relevant risk factors by using publicly available predictive information. In a nutshell, the benchmark for a given style reflects “the best we can do” using the given factors and public information, without any inside information and without paying a management fee.

The aim is to show that, by using risk factors similar to those relevant for the hedge fund, and by managing the exposures to these factors optimally, we can construct benchmark portfolios that achieve a performance similar to the hedge funds themselves. Moreover, our procedures require with much lower costs (both transaction costs as well as performance fees charged by hedge funds), and also using publicly available information and liquidly traded assets.

The last 2 stages involve estimating the performance of the funds in the “out-of-sample” period, first relative to a standard static model, and then against our dynamic benchmark. Having constructed the portfolio weights of the benchmark portfolios, we compute the returns on these portfolios in the “out-of-sample” period. To assess the

performance of individual funds or fund style index portfolios, we simply compare their out-of-sample returns with those of the corresponding benchmark. To obtain “beta” and “alpha”, we run a standard CAPM-style regression of fund excess returns on the excess returns of the associated benchmark portfolio using the CAPM, but we have also tested the fund performance against other models such as the Fama-French 3-factor model.

3. Data and the sample

3.1 Fund Data and Fund Indices

We perform empirical analyses using the indices of hedge fund strategies compiled from individual hedge funds for the period from January 1994 to December 2005. Monthly returns expressed in US dollars of individual hedge funds are collected from both Hedge Fund Research (HFR) and CISDM. We use the MSCI global market index, collected from Datastream, as a proxy for the global market portfolio. We compile the data in the universe of both CISDM and HFR into 12 hedge fund indices that capture the majority of hedge fund trading strategies. These are Commodity Trading Advisors (CTA) that invest mainly in futures markets, Distressed Securities (DS), Event Driven (ED), Equity Long Short (ELS) one of the most widely followed styles, Equity Market Neutral (EMN), Fixed Income (FI), Global Macro (GM), Merger Arbitrage (MA), Relative Value Arbitrage (RVA), Sector funds (SC) and Short Selling (SS).

For each category we consider individual funds as well as an equally weighted portfolio of funds. To avoid the incubation bias, the backfill bias and the survivorship bias (see Avramov, Kosowski, Naik and Teo, 2007), we also truncate the sample to start only from January 1994. Due to the availability of the predictive instruments, i.e., TB1M ... and VIX, the sample period ends at June 2005. We further exclude all funds that have returns existed in the database for less than 12 months which is the minimum number of time-series

observations required for performing a predictive regression. Finally, we end up with a total of 8,130 individual funds within which the largest strategy category (Fund of Funds) has 1,550 funds and the smallest strategy category (Short Selling) has 71 funds.

3.2 Factors and Instruments

The equity factors consist of the excess return on the CRSP Value Weighted index, a skewness factor and a kurtosis factor. The use of skewness and kurtosis to augment the standard market return has a long tradition in asset pricing, going back to Kraus and Litzenberger (1979) and more recently Harvey and Siddique (2000) and Dittmar (2002). The skewness and kurtosis factors are constructed as tradable factors using the basic Fama-French factor mimicking factor idea.

We compute conditional coskewness (γ_{it}) and cokurtosis (δ_{it}) of individual stocks at the end of each month t using the monthly equity data of all NYSE, AMEX and NASDAQ firms in the CRSP (Center for Research in Security Price) database as:

$$\begin{aligned}\gamma_{it} &= \left[\sum_{\tau=t-60}^{\tau=t-1} (r_{i\tau} - \bar{r}_{it})(r_{M\tau} - \bar{r}_{Mt})^2 \right] / \sum_{\tau=t-60}^{\tau=t-1} (r_{M\tau} - \bar{r}_{Mt})^3 \\ \delta_{it} &= \left[\sum_{\tau=t-60}^{\tau=t-1} (r_{i\tau} - \bar{r}_{it})(r_{M\tau} - \bar{r}_{Mt})^3 \right] / \sum_{\tau=t-60}^{\tau=t-1} (r_{M\tau} - \bar{r}_{Mt})^4\end{aligned}\quad (3)$$

where r_i and r_M are the returns on stock i and the market portfolio (the CRSP value-weighted portfolio of NYSE, AMEX and NASDAQ stocks) in excess of the one-month Treasury bill rate; and \bar{r}_{it} , and \bar{r}_{Mt} are the average excess returns in the preceding 60 months from $t = \tau - 60$ to $t = \tau - 1$ for the stock and the market.

We then rank, in each month, all sample stocks into 3 groups based on their coskewness and cokurtosis estimates. The high (low) coskewness and cokurtosis groups, respectively, comprised of the stocks with the top (bottom) 30% of coskewness and cokurtosis estimates. We compute equally weighted portfolio returns for the month following

portfolio formation and then the portfolios are re-constructed. The factor mimicking portfolios of coskewness and cokurtosis, *HLS* and *HLK*, respectively, are the monthly return differences between the portfolios of the high and low coskewness and cokurtosis.

We use the return on the Lehman U.S. Corporate AA Intermediate Bond Index to capture bond market risk; to capture a credit risk factor we use the return on the Lehman U.S. Corporate BAA Intermediate Bond Index in excess of the return on the Lehman U.S. Treasury index; the return on the Goldman Sachs Commodity index captures commodity market risk. Finally, we also include the return on the VIX.

The predictive instruments are the 3 month Treasury Bill rate (TBIM), the term spread which is the difference in return between the 10 year Treasury bond and the 1 year Treasury bill, the credit spread which is the difference in return between 1 year AAA corporate bonds and Treasury bonds and finally the level of the VIX. These comprise readily available public information about the state of the economy.

4. Empirical Results

4.1 Hedge Fund Performance

We separate our data sample into two sub-periods: we use the “in-sample” data from 1994:01 to 2000:06 to identify the relevant risk factors, estimate the predictive model, and construct our benchmark portfolios. We evaluate the performance of the funds and the benchmark portfolios in the “out-of-sample” period from 2000:07 to 2005:06. Table 1 reports the performance of the hedge funds, relative to a standard CAPM. The performance statistics were estimated over the “out-of-sample” period from 2000:07 to 2005:06, to provide a benchmark for our analysis. Throughout this period, the market portfolio has earned a return of only 30 basis points per annum on average, even though the volatility was about 16.5% per

annum. The Sharpe ratio of the market portfolio during this period is negative at -0.125 . Not surprisingly hence, most of the hedge funds in our sample have out-performed the market index by a considerable margin. With few exceptions, all hedge funds have achieved positive “alphas” relative to the market index. More importantly, most hedge funds have achieved Sharpe ratios between 0.5 and 2.0.

From Table 1, we can see that the dispersion of “betas” relative to the market index is immense, even within any one given style class (e.g. for “CTA”, beta ranges from -1.0 to almost $+2.0$, and for “ELS” the maximum beta is $+2.5$). In other words, the exposure to the standard CAPM market portfolio is insufficient to explain the size and inter-temporal variation in hedge fund returns. In fact, the adjusted R^2 of the CAPM regressions (not reported in the tables) rarely exceed 10%. Also, in a cross-sectional regression (similar to Fama and BacBeth) of fund returns on their own CAPM betas, in most cases no more than 5% of the cross-sectional variation in returns is explained by variations in the CAPM beta. The conclusions we can draw from these results are either that (a) hedge funds on average indeed provide abnormal returns and are hence worth their exorbitant management and performance fees, or that (b) the returns earned by hedge funds are due to exposure to risk factors that are not captured by the CAPM market portfolio.

4.2 Hedge Fund Risk Factor Exposure

We postulate that much of the “abnormal” returns achieved by hedge funds is not necessarily due to superior management skill or inside information, but instead can be explained (and hence replicated) by the funds’ exposure to non-standard priced risk factors (e.g. capturing non-normality in return distributions, asymmetries in investors’ preferences, or other factors “missed” by standard models), and also by the time-varying (actively managed) nature of the funds’ exposure to these factors. Our aim is thus to first identify the risk factors that are

relevant for different classes of hedge funds, and then use this information to construct a benchmark portfolio for each fund class that optimally manages the exposure to these factors.

To select the appropriate factors for each hedge fund style, we use the “in-sample” data to regress the returns of funds in a particular group on all factors. We then select for each fund style group the factors for which the respective coefficients of this regression are significant. In Table 2, we report the results of regressing fund returns on a set of factors. To avoid any “data mining”, we estimate this regression using only the “in-sample” data (1994:01 to 2000:06). As factors, we include,

- the excess return on the market portfolio (as in the standard CAPM)
- the skewness and kurtosis factors
- the change in the VIX
- indices capturing bond returns and credit spreads
- a commodity index

For each class of hedge funds, we report the coefficients for all factors, and for each factor the corresponding p-value (obtained from the t -statistic), as well as the overall adjusted R^2 . In most cases, the results from Table 2 are consistent with the intuition. For example, for the “DS” (distressed securities) class, the significant factors are the market index, the bond and the credit index. Conversely, for “ELS” (equity long-short), the significant factors are the market index, the VIX, and the skewness and kurtosis factors. The only exception is the “CTA” (commodity trading advisor) class, for which none of the factors is significant. Based on the results of this exercise, we select a set of factors for each class of hedge funds.

4.3 Constructing Fund Class Benchmarks

Once the factors for each fund class are chosen, we construct a benchmark portfolio for each class. To do this, we first estimate a linear predictive model for each set of factors, using the

“in-sample” data (1994:01 – 2000:06). To select the appropriate predictive instruments for each class, we use the “in-sample” data to estimate a predictive regression of factor returns on all instruments, and choose the instruments that have significant predictive power for the chosen factors. The latter is done by using the “difference in squared Sharpe ratio” test (see Abhyankar, Basu, and Stremme, 2008), which allows us to ascertain if any given predictive instrument provides significant economic gain for an active investor who exploits the instrument’s predictive information.

Using the methodology developed in Ferson and Siegel (2001) and Abhyankar, Basu and Stremme (2007), we then construct a dynamically managed portfolio, which optimally allocates funds across the factors on the basis of the information contained in the predictive instruments. Table 3 summarizes the chosen factors and predictive instruments for each group of hedge funds. We then leverage this portfolio up or down using the risk-free asset so as to match the median return of the respective fund class (note that the match will not be exact as we are using the in-sample data to determine the leverage ratio, and hence the out-of-sample mean might deviate from the chosen target).

4.4 Fund Performance Relative to Class Benchmarks

With the fund style benchmark portfolios constructed, we repeat the analysis of Section 4.1, using the benchmark portfolios in place of the market portfolio. Table 4 reports the results of this exercise. In each case, the benchmark portfolio is constructed from an optimally managed portfolio using the factors and predictive instruments relevant for the respective class, leveraged to match the median fund return of the respective class.

The first aspect of these results that we focus on is the actual performance of the benchmark. For 8 of the 12 categories these achieve Sharpe ratios of around 0.65 while for the other four (EMN, GM, MA and SS), they are lower at around 0.38. Hence there are 8

categories that might be considered “worth replicating” from our viewpoint in that our methodology leads to a low-cost strategy with relatively high Sharpe ratios, all this over a “bear market” period.

The second aspect of our results is how well these benchmarks match up against the individual funds in each category, before fees. Here the performance varies from around the 70th percentile to as low as the 14th percentile. For example, for class “CTA” the average return of the benchmark portfolio is slightly higher (at 50.6% percentile) than the median of the sample. However, the benchmark portfolio achieves a Sharpe ratio of 0.64, which beats 69% of the funds in the sample. For Distressed Securities it achieves a Sharpe ratio of 0.64 again, but this only beats 14% of the funds in this category.

Overall, our dynamically managed benchmark portfolios typically match the median return of the fund sample, and in most cases beat the Sharpe ratio of at least 35% of the funds. Of course, this means that we cannot claim that our benchmark portfolios beat the hedge funds in most cases. However, our strategies can be implemented using publicly available information, using basic asset classes that often require much lower transaction costs, and do not incur a 20% performance fee (as many hedge funds would). Hence these benchmarks may be regarded as a low cost alternative to several hedge fund categories.

The final aspect is that the individual hedge funds and equally weighted portfolios continue to have high alphas relative to these benchmarks. Hence our methodology does not “replicate” many of the categories in the conventional sense. However the low correlation may also be seen as an advantage as we are not just capturing what is “already there”. Our benchmarks capture quite generic aspects of each hedge fund strategy, namely non-linear dynamic exposures and are able to replicate these at a relatively lower cost.

4.5 Performance during the “Credit Crunch”

As a final exercise, we investigated the performance of both the fund indices as well as our dynamically managed benchmark portfolios during the “credit crunch” period from 2005 until now. Due to the un-availability of individual fund-level data for this period, we focused on the fund style index portfolios.

To construct our benchmark portfolios, we estimated the predictive VAR model as described earlier, using monthly data on factors and instruments (see Section 3.2) over the period from 1997 to the end of 2004. We then use the results from this estimation to construct optimally managed benchmark portfolios. As before, we chose the ex-ante target mean or volatility of the benchmark portfolios to match the in-sample mean or volatility of the corresponding fund index. We then analyze the performance of the fund index portfolios in relation to the benchmark portfolios over the “out-of-sample” period from 2005 to the end of 2008 (covering the “credit crunch” period).

The results of this exercise are presented in Table 5. From the last columns of Panel A, we see that the market portfolio (we used the CRSP value-weighted index as proxy) did very poorly over this period (with an average annual return of about -8% and a volatility of almost 15% , resulting in a negative Sharpe ratio of about -0.8). Interestingly, all fund index portfolios (Panel B) still managed to earn positive returns, but in most cases at the cost of rather high volatility. Most fund indices (except for “FI” and “RV”) managed to out-perform the risk-free asset, but the Sharpe ratios are less than impressive in most cases. Notable exceptions to the latter are “CTA”, “ELS”, “EMN”, “GM”, “MA”, and “SS”.

The latter results are not entirely surprising: the period under consideration saw some of the most dramatic price rallies for certain commodities (first metals, in particular copper, then oil, and finally gold), which could explain the performance of “CTA” strategies. And with rumors of yet another bank being in trouble arriving almost on a daily basis, “ELS” strategies surely were a good idea. And with an economic crisis looming, “GM” strategies

could bet on falling interest rates. And with the “frenzy” of takeovers in particular in the financial industry, there were plenty of opportunities for “MA” strategies. Finally, facing an economic downturn, “SS” strategies are likely to be profitable (in fact, short selling by hedge funds was in part blamed for accelerating the crisis).

However, the performance of the fund indices relative to our benchmarks is rather mixed. For all style classes, our respective benchmark portfolio achieves a higher Sharpe ratio than the corresponding hedge fund index. This shows that most of the gains that hedge funds managed to achieve on the back of the crisis could have been matched or even beaten by much more “down-to-earth” investment strategies that simply exploit the information contained in publicly observable economic indicators. Note in particular that the way in which our benchmark strategies are constructed is “dumb”, based purely on statistical relationships without exploiting any “inside knowledge” about the economic situation. In light of these findings, it is questionable whether the “skill” of hedge fund managers adds any real value for the investor.

Finally, Table 5 shows that about half of the fund style index portfolios have achieved positive “alphas” relative to their respective benchmarks. While on the face of it, this seems to contradict the discussion of the preceding paragraph, all of the fund indices with positive alphas have either very low or highly leveraged “betas”. In other words, the performance of these funds is driven by exposure to risk factors that are not captured by the respective benchmark. Admittedly, this indicates that in these cases, our benchmarks are not perfect “replicators” of the risk exposure of the respective fund group. On the other hand however, in all cases the benchmark portfolio beat the fund index in terms of absolute performance. This suggests that the fund performance is largely driven by idiosyncratic risks (as also indicated by the very low information ratios). Clearly, if the absolute performance of these

funds can be matched or exceeded without exposure to such risks, this would be preferable from the investor's point of view.

5. Conclusion

The issue of hedge fund replication has attracted considerable interest from both practitioners and academics alike. Hedge fund replication, in a broad sense, seeks to capture the exposures of hedge fund indices using a small number of liquid traded factors. The goal is to achieve the returns on these indices at far lower cost.

We focus on two generic aspects of hedge fund trading strategies, namely non-linear and dynamic factor exposures. Our methodology seeks to replicate these aspects of hedge funds at a relatively lower cost. For 8 out of 12 hedge fund categories considered our benchmarks achieve out of sample Sharpe ratios of 0.65 over the 200-2005 period, a bear market. They achieve the performance level of 35% of funds in most categories, before fees. Unusually the benchmarks display low ex-post correlations with individual funds, indicating that our approach does not merely replicate what is "already there".

Our evidence shows that most of the gains that hedge funds managed to achieve on the back of the crisis could have been matched or even beaten by much more "down-to-earth" investment strategies that simply exploit the information contained in publicly observable economic indicators, calling into question the issue of hedge fund manager skills.

Appendix

Glossary: Definition of Fund Style Classifications

Num	Name	Description
1	CTA	Commodity Trading Advisor
2	DS	Distressed Securities
3	ED	Event Driven
4	ELS	Equity Long-Short
5	EM	Emerging Markets
6	EMN	Equity Market-Neutral
7	FI	Fixed Income
8	FOF	Fund-of-Funds (excluded)
9	GM	Global Macro
10	MA	Merger Arbitrage
11	MS	Multi-Strategy (excluded)
12	RV	Relative Value Arbitrage
13	SC	Sector
14	SS	Short-Selling

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Table 1
Summary Performance Statistics (Fund Level)

This table (continued on the following pages) reports the summary performance statistics of the individual funds and the index portfolio in each of the fund style groups (see “Glossary” in the appendix). Each panel below corresponds to one of the style groups. The performance statistics are estimated using monthly data over the period from 2000:07 to 2005:06¹. We report the average return, the realized volatility, and the Sharpe ratio. The “alpha” and “beta” coefficients are obtained from a CAPM regression of the excess returns on each fund on the excess returns of the market portfolio (we use the CRSP value-weighted index as provided on Kenneth French’s website. The information ratio (“info”) is calculated by dividing “alpha” by an unbiased estimate of the residual standard deviation of the regression. The first 12 rows in each panel summarize the distribution (minimum and maximum observation, mean, as well as the decile cutoff points). The following row (“portf”) shows the corresponding results for the style index portfolio, which is constructed as an equally weighted portfolio of all funds in the group (see Section “Data and Methodology” above). The last row in each panel (“benchm”) reports the corresponding results for the market benchmark portfolio. All figures are annualized.

Panel 1: Fund Style Group “CTA”

213 established after 2000:07, 567 “died” before 2005:06, 326 of 1,106 funds remaining

	return	vol	sharpe	beta	alpha	info
min	-0.0622	0.0061	-0.8373	-1.0432	-0.0870	-0.8328
max	0.4578	0.6231	4.6834	1.1807	0.4161	4.9999
mean	0.1214	0.1825	0.5079	-0.1300	0.0923	0.5401
prctile(10)	0.0312	0.0689	0.0624	-0.4171	0.0036	0.0435
prctile(20)	0.0550	0.1004	0.2118	-0.2988	0.0290	0.2087
prctile(30)	0.0734	0.1235	0.3284	-0.2329	0.0476	0.3455
prctile(40)	0.0878	0.1444	0.4113	-0.1610	0.0599	0.4306
prctile(50)	0.1024	0.1703	0.4888	-0.1046	0.0756	0.5157
prctile(60)	0.1210	0.1891	0.5670	-0.0728	0.0897	0.5976
prctile(70)	0.1451	0.2146	0.6431	-0.0258	0.1157	0.6847
prctile(80)	0.1817	0.2505	0.7596	0.0160	0.1515	0.8092
prctile(90)	0.2364	0.3257	0.8788	0.1112	0.2059	0.9677
fund style index portfolio						
portf	0.1109	0.0899	0.9164	-0.0923	0.0830	0.9424
market benchmark						
benchm	0.0030	0.1647	-0.1254	1.0000	0.0000	

Panel 2: Fund Style Group “DS”

99 established after 2000:07, 52 “died” before 2005:06, 70 of 221 funds remaining

	return	vol	sharpe	beta	alpha	info
min	0.0153	0.0185	-0.0490	-0.0331	0.0000	0.0000
max	0.2956	0.2644	3.8978	0.7356	0.2680	4.1793
mean	0.1432	0.0926	1.4844	0.1470	0.1200	1.7147
prctile(10)	0.0815	0.0395	0.4415	0.0034	0.0579	0.4752
prctile(20)	0.1037	0.0427	0.8321	0.0513	0.0833	1.0089
prctile(30)	0.1116	0.0561	1.1503	0.0801	0.0890	1.3468
prctile(40)	0.1172	0.0588	1.3054	0.0990	0.0926	1.5827
prctile(50)	0.1261	0.0814	1.4248	0.1239	0.1037	1.6516
prctile(60)	0.1424	0.0958	1.4771	0.1407	0.1213	1.6811
prctile(70)	0.1641	0.1254	1.8189	0.1731	0.1386	2.1353
prctile(80)	0.1793	0.1313	2.1182	0.2428	0.1521	2.4129
prctile(90)	0.2331	0.1770	2.4814	0.3160	0.2093	2.9493
fund style index portfolio						
portf	0.1374	0.0514	1.9953	0.176	0.115	2.6017
market benchmark						
benchm	0.0030	0.1647	-0.1254	1.0000	0.0000	

¹ We excluded any funds for which there was not a continuous series of observations covering the entire sample period (i.e. funds established after 2000:07 or funds that “died” before 2005:06).

Table 1 (Cont'd)
Panel 3: Fund Style Group "ED"

140 established after 2000:07, 37 "died" before 2005:06, 118 of 295 funds remaining

	return	vol	sharpe	beta	alpha	info
min	-0.0385	0.0103	-0.4912	-0.0813	-0.0506	-0.5481
max	0.4253	0.6595	2.9583	1.4298	0.4070	3.1208
mean	0.1022	0.1010	0.9525	0.3073	0.0835	1.2745
prctile(10)	0.0365	0.0385	0.1610	0.0389	0.0113	0.2160
prctile(20)	0.0525	0.0465	0.3449	0.0999	0.0330	0.6594
prctile(30)	0.0609	0.0509	0.5250	0.1235	0.0410	0.7420
prctile(40)	0.0672	0.0609	0.6554	0.1578	0.0476	0.9364
prctile(50)	0.0860	0.0672	0.8092	0.2025	0.0637	1.1805
prctile(60)	0.1072	0.0775	1.0262	0.2419	0.0883	1.3791
prctile(70)	0.1175	0.0941	1.2223	0.3498	0.0993	1.6072
prctile(80)	0.1423	0.1255	1.4718	0.4900	0.1289	2.0826
prctile(90)	0.1802	0.1838	2.2083	0.7322	0.1617	2.5371
fund style index portfolio						
portf	0.1043	0.0568	1.317	0.2693	0.0846	2.3255
market benchmark						
benchm	0.0030	0.1647	-0.1254	1.0000	0.0000	

Panel 4: Fund Style Group "ELS"

523 established after 2000:07, 696 "died" before 2005:06, 327 of 1,546 funds remaining

	return	vol	sharpe	beta	alpha	info
min	-0.2735	0.0163	-1.5398	-0.8141	-0.2792	-1.5179
max	0.5949	0.7491	3.0796	2.4966	0.5607	3.4943
mean	0.1005	0.1482	0.6106	0.4343	0.0845	0.8370
prctile	-0.0048	0.0576	-0.1840	-0.0114	-0.0187	-0.1572
prctile(20)	0.0238	0.0812	-0.0020	0.0883	0.0099	0.1023
prctile(30)	0.0511	0.0987	0.2084	0.1584	0.0319	0.3589
prctile(40)	0.0643	0.1137	0.3482	0.2410	0.0462	0.5542
prctile(50)	0.0806	0.1282	0.5581	0.3652	0.0646	0.7733
prctile(60)	0.1124	0.1507	0.7077	0.4926	0.0930	1.0277
prctile(70)	0.1486	0.1639	0.9117	0.5986	0.1269	1.2506
prctile(80)	0.1835	0.1921	1.1241	0.7599	0.1640	1.5356
prctile(90)	0.2193	0.2639	1.5281	0.9260	0.2055	1.9554
fund style index portfolio						
portf	0.0730	0.0759	0.6093	0.4177	0.0570	1.7038
market benchmark						
benchm	0.0030	0.1647	-0.1254	1.0000	0.0000	

Panel 5: Fund Style Group "EM"

103 established after 2000:07, 180 "died" before 2005:06, 169 of 425 funds remaining

	return	vol	sharpe	beta	alpha	info
min	-0.0513	0.0314	-0.4323	-0.0747	-0.0598	-0.4555
max	0.6722	0.5960	4.2668	2.0696	0.6516	5.4582
mean	0.2036	0.1835	0.9875	0.5680	0.1899	1.3461
prctile(10)	0.0298	0.0601	0.0392	0.1044	0.0152	0.1713
prctile(20)	0.0682	0.0768	0.3359	0.1663	0.0566	0.4897
prctile(30)	0.1040	0.0958	0.5640	0.2531	0.0830	0.8646
prctile(40)	0.1175	0.1297	0.8146	0.3659	0.0976	1.1694
prctile(50)	0.1582	0.1610	1.0101	0.5592	0.1386	1.3623
prctile(60)	0.2134	0.1952	1.1328	0.7049	0.1912	1.5719
prctile(70)	0.2682	0.2460	1.2400	0.7649	0.2588	1.6582
prctile(80)	0.3581	0.2854	1.4318	0.8764	0.3507	1.9173
prctile(90)	0.4084	0.3361	1.9288	1.0485	0.3965	2.3333
fund style index portfolio						
portf	0.1639	0.1067	1.1924	0.5087	0.1488	2.1992
market benchmark						
benchm	0.0030	0.1647	-0.1254	0.0000	0.0000	0.0000

Table 1 (Cont'd)
Panel 6: Fund Style Group “EMN”

317 established after 2000:07, 163 “died” before 2005:06, 350 of 810 funds remaining

	return	vol	sharpe	beta	alpha	info
min	-0.1818	0.0041	-0.8918	-0.9372	-0.1802	-1.8669
max	0.3574	0.4802	31.6135	2.0043	0.3372	33.1953
mean	0.0730	0.1233	0.6158	0.2494	0.0534	0.7401
prctile(10)	-0.0166	0.0456	-0.2716	-0.1110	-0.0297	-0.2548
prctile(20)	0.0171	0.0594	-0.0631	-0.0289	-0.0030	-0.0237
prctile(30)	0.0361	0.0728	0.1315	0.0176	0.0132	0.1850
prctile(40)	0.0510	0.0827	0.3100	0.0749	0.0289	0.3535
prctile(50)	0.0645	0.1014	0.3928	0.1648	0.0440	0.5415
prctile(60)	0.0774	0.1181	0.5746	0.2505	0.0565	0.7470
prctile(70)	0.0989	0.1397	0.7514	0.3614	0.0767	0.9584
prctile(80)	0.1207	0.1740	0.9855	0.5121	0.1024	1.2307
prctile(90)	0.1674	0.2376	1.3072	0.7949	0.1485	1.6104
fund style index portfolio						
portf	0.0630	0.0384	0.9677	0.1769	0.0420	1.6592
market benchmark						
benchm	0.0030	0.1647	-0.1254	0.0000	0.0000	0.0000

Panel 7: Fund Style Group “FP”

348 established after 2000:07, 789 “died” before 2005:06, 236 of 789 funds remaining

	return	vol	sharpe	beta	alpha	info
min	-0.1656	0.0045	-1.0896	-0.2567	-0.1650	-1.6300
max	0.3564	0.5945	15.0006	1.3767	0.3244	15.9068
mean	0.0850	0.0693	1.4717	0.0819	0.0614	1.5881
prctile(10)	0.0221	0.0187	-0.0826	-0.0579	-0.0023	-0.0818
prctile(20)	0.0468	0.0285	0.3847	-0.0366	0.0225	0.4497
prctile(30)	0.0566	0.0345	0.6782	-0.0253	0.0318	0.7429
prctile(40)	0.0637	0.0410	0.7819	0.0011	0.0392	0.9138
prctile(50)	0.0700	0.0482	0.9652	0.0126	0.0455	1.1085
prctile(60)	0.0875	0.0557	1.2202	0.0255	0.0625	1.4185
prctile(70)	0.1104	0.0741	1.5327	0.0531	0.0855	1.6547
prctile(80)	0.1259	0.0937	1.9813	0.1279	0.1016	2.1101
prctile(90)	0.1426	0.1359	3.4960	0.3111	0.1174	3.6972
fund style index portfolio						
portf	0.0838	0.0241	2.3605	0.0666	0.0599	2.7935
market benchmark						
benchm	0.0030	0.1647	-0.1254	0.0000	0.0000	0.0000

Panel 9²: Fund Style Group “GM”

137 established after 2000:07, 139 “died” before 2005:06, 106 of 382 funds remaining

	return	vol	sharpe	beta	alpha	info
min	-0.1585	0.0387	-0.5299	-0.6138	-0.1475	-0.6576
max	0.3954	0.4862	4.9451	1.7602	0.3944	7.0486
mean	0.1120	0.1294	0.6854	0.1431	0.0892	0.8336
prctile(10)	0.0204	0.0552	-0.0334	-0.2077	0.0032	0.0259
prctile(20)	0.0442	0.0670	0.2364	-0.0743	0.0230	0.2663
prctile(30)	0.0628	0.0901	0.3506	-0.0351	0.0385	0.3961
prctile(40)	0.0753	0.0997	0.5423	0.0342	0.0519	0.6292
prctile(50)	0.0965	0.1139	0.6446	0.1294	0.0750	0.7406
prctile(60)	0.1115	0.1312	0.6850	0.1995	0.0881	0.8777
prctile(70)	0.1349	0.1442	0.8437	0.2382	0.1114	1.0026
prctile(80)	0.1929	0.1739	1.0001	0.4202	0.1686	1.1980
prctile(90)	0.2381	0.2412	1.6441	0.4915	0.2053	1.7686
fund style index portfolio						
portf	0.0873	0.0423	1.3935	0.1459	0.0651	1.8195
market benchmark						
benchm	0.0030	0.1647	-0.1254	0.0000	0.0000	0.0000

² Fund group #8 is “FOF”. We excluded this group from our analysis but kept the original numbering.

Table 1 (Cont'd)
Panel 10: Fund Style Group "MA"

34 established after 2000:07, 78 "died" before 2005:06, 58 of 170 funds remaining

	return	vol	sharpe	beta	alpha	info
min	0.0182	0.0149	-0.0774	0.0069	-0.0018	-0.0378
max	0.1106	0.0991	1.6584	0.2179	0.0864	1.9435
mean	0.0503	0.0372	0.7583	0.0688	0.0272	0.8716
prctile(10)	0.0282	0.0207	0.1153	0.0090	0.0067	0.1609
prctile(20)	0.0332	0.0277	0.2759	0.0222	0.0097	0.2846
prctile(30)	0.0361	0.0294	0.3500	0.0333	0.0123	0.3636
prctile(40)	0.0389	0.0309	0.4531	0.0367	0.0154	0.5808
prctile(50)	0.0426	0.0321	0.6019	0.0417	0.0196	0.7646
prctile(60)	0.0506	0.0391	0.9464	0.0740	0.0269	1.0258
prctile(70)	0.0564	0.0442	1.0624	0.0798	0.0321	1.1882
prctile(80)	0.0620	0.0472	1.3765	0.1052	0.0379	1.5962
prctile(90)	0.0959	0.0525	1.5413	0.1744	0.0733	1.7741
fund style index portfolio						
portf	0.0468	0.0263	0.8599	0.0865	0.0241	1.1345
market benchmark						
benchm	0.0030	0.1647	-0.1254	0.0000	0.0000	0.0000

Panel 12³: Fund Style Group "RV"

55 established after 2000:07, 15 "died" before 2005:06, 69 of 179 funds remaining

	return	vol	sharpe	beta	alpha	info
min	-0.0093	0.0041	-0.5193	-0.2987	-0.0301	-0.5470
max	0.2183	0.4544	31.2784	1.1587	0.1960	32.8048
mean	0.0810	0.0598	1.7313	0.1010	0.0580	1.8877
prctile(10)	0.0354	0.0202	0.1890	-0.0236	0.0085	0.2331
prctile(20)	0.0487	0.0224	0.5075	-0.0065	0.0254	0.5297
prctile(30)	0.0574	0.0243	0.9240	0.0067	0.0334	1.1305
prctile(40)	0.0655	0.0315	1.1803	0.0200	0.0408	1.3151
prctile(50)	0.0704	0.0361	1.2408	0.0312	0.0514	1.5146
prctile(60)	0.0830	0.0432	1.4767	0.0583	0.0596	1.6537
prctile(70)	0.0994	0.0540	1.7993	0.0755	0.0739	1.9265
prctile(80)	0.1175	0.0796	2.0961	0.1227	0.0963	2.1711
prctile(90)	0.1326	0.1158	2.5053	0.3155	0.1246	2.7173
fund style index portfolio						
portf	0.0839	0.0232	2.5134	0.0756	0.0602	3.1826
market benchmark						
benchm	0.0030	0.1647	-0.1254	0.0000	0.0000	0.0000

Panel 13: Fund Style Group "SC"

138 established after 2000:07, 175 "died" before 2005:06, 146 of 459 funds remaining

	return	vol	sharpe	beta	alpha	info
min	-0.3463	0.0425	-0.9101	-0.2803	-0.3400	-1.1116
max	0.9124	0.5005	3.0098	2.2474	0.8957	3.6031
mean	0.1107	0.1793	0.6236	0.5871	0.0976	0.8388
prctile(10)	-0.0478	0.0685	-0.2704	0.0799	-0.0513	-0.2851
prctile(20)	0.0124	0.0919	-0.0916	0.1987	-0.0023	-0.0286
prctile(30)	0.0516	0.1139	0.1467	0.2581	0.0381	0.2276
prctile(40)	0.0665	0.1255	0.3594	0.3383	0.0532	0.5461
prctile(50)	0.0927	0.1391	0.5767	0.4337	0.0766	0.7264
prctile(60)	0.1384	0.1744	0.8174	0.5711	0.1182	1.0363
prctile(70)	0.1770	0.1972	0.9846	0.7342	0.1584	1.2171
prctile(80)	0.2107	0.2517	1.1483	0.9375	0.1915	1.5400
prctile(90)	0.2845	0.3706	1.8573	1.2385	0.2610	2.3706
fund style index portfolio						
portf	0.0663	0.1002	0.4009	0.5464	0.0532	1.1819
market benchmark						
benchm	0.0030	0.1647	-0.1254	0.0000	0.0000	0.0000

³ Fund group #11 is "MS". We excluded this group from our analysis but kept the original numbering.

Table 1 (Cont'd)**Panel 13: Fund Style Group "SS"**

14 established after 2000:07, 31 "died" before 2005:06, 26 of 71 funds remaining

	return	vol	sharpe	beta	alpha	info
min	-0.0376	0.0610	-0.3960	-1.6992	-0.0758	-0.9047
max	0.2200	0.3275	0.5427	0.7840	0.1528	0.8311
mean	0.0929	0.2347	0.2647	-1.0887	0.0435	0.2968
prctile(10)	0.0605	0.1263	0.1647	-1.6992	0.0115	0.1173
prctile(20)	0.0640	0.1989	0.1941	-1.4410	0.0156	0.1822
prctile(30)	0.0724	0.2172	0.2214	-1.1847	0.0224	0.2497
prctile(40)	0.0742	0.2198	0.2298	-1.1697	0.0264	0.2981
prctile(50)	0.0784	0.2205	0.2308	-1.1652	0.0355	0.2990
prctile(60)	0.0982	0.2782	0.3145	-1.1566	0.0364	0.3250
prctile(70)	0.0982	0.2783	0.3683	-1.1411	0.0602	0.4070
prctile(80)	0.1344	0.3023	0.3768	-0.9029	0.0822	0.4515
prctile(90)	0.1613	0.3074	0.4285	-0.5518	0.1070	0.4893
fund style index portfolio						
portf	0.075	0.1575	0.3127	-0.8632	0.0313	0.5055
market benchmark						
benchm	0.0030	0.1647	-0.1254	0.0000	0.0000	0.0000

Table 2
FACTOR BETAS (Fund Level)

Panel 1: Fund Style Group “CTA”

194 of 1,106 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-0.8213	0.0001	-0.2129	0.0000	-1.9337	0.0080	-3.3744	0.0041	-11.3829	0.0001	-11.3622	0.0005	-0.4698	0.0000	0.0932
max(1)	0.8888	0.4997	0.1780	0.4999	3.2264	0.4999	1.5038	0.4975	13.3782	0.4975	10.5285	0.4997	1.1430	0.4999	0.5244
mean(1)	0.0031	0.2493	0.0090	0.2197	0.1767	0.2536	-0.2324	0.2394	1.1353	0.2254	-0.5026	0.2502	0.0663	0.2673	0.2079
prctile(1)	-0.4310	0.0324	-0.0582	0.0172	-0.2271	0.0474	-0.6598	0.0465	-4.0492	0.0260	-4.8065	0.0374	-0.1023	0.0609	0.1304
prctile(2)	-0.2195	0.0695	-0.0246	0.0645	-0.1104	0.0890	-0.5519	0.0880	-1.6227	0.0589	-2.5820	0.0871	-0.0599	0.1048	0.1494
prctile(3)	-0.0757	0.1197	-0.0077	0.1155	-0.0307	0.1645	-0.4226	0.1161	-0.4718	0.1324	-1.8235	0.1490	-0.0134	0.1769	0.1623
prctile(4)	-0.0296	0.1736	0.0040	0.1626	0.0538	0.2157	-0.3102	0.1734	0.3622	0.1693	-1.2282	0.2308	0.0020	0.2272	0.1739
prctile(5)	0.0091	0.2550	0.0118	0.1954	0.1589	0.2609	-0.1833	0.2404	0.8372	0.2200	-0.4714	0.2608	0.0314	0.2776	0.1934
prctile(6)	0.0459	0.3389	0.0190	0.2552	0.2387	0.3067	-0.0966	0.2998	1.4654	0.2595	0.0151	0.2906	0.0633	0.3285	0.2121
prctile(7)	0.1162	0.3759	0.0366	0.3243	0.3208	0.3586	-0.0252	0.3442	2.3320	0.3359	0.6492	0.3335	0.0968	0.3653	0.2292
prctile(8)	0.2407	0.4211	0.0548	0.3742	0.4846	0.3985	0.0562	0.4003	3.8398	0.3851	2.0149	0.3994	0.1397	0.4229	0.2601
prctile(9)	0.3707	0.4553	0.0736	0.4456	0.6994	0.4474	0.1737	0.4397	6.5688	0.4338	4.4162	0.4535	0.2562	0.4676	0.3082
EW portf	-0.0018	0.4935	0.0070	0.3484	0.1078	0.2701	-0.1407	0.2067	0.7632	0.2905	-0.2915	0.4147	0.0483	0.2187	0.1623

Panel 2: Fund Style Group “DS”

25 of 221 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-0.0480	0.0001	-0.0437	0.0076	-0.4777	0.0319	-0.2140	0.0206	-9.7166	0.0001	-1.1331	0.0002	-0.1424	0.0005	0.1679
max(1)	0.6070	0.4593	0.0056	0.4862	0.5136	0.4015	0.5153	0.4667	1.0826	0.2252	8.6546	0.2494	0.1935	0.4575	0.4942
mean(1)	0.1605	0.1323	-0.0114	0.2856	-0.0115	0.2277	0.0116	0.2333	-2.9474	0.0608	2.7238	0.0693	0.0153	0.2375	0.3271
prctile(1)	0.0065	0.0023	-0.0337	0.0487	-0.3455	0.0368	-0.1764	0.0429	-7.0899	0.0002	0.8238	0.0002	-0.0490	0.0952	0.2306
prctile(2)	0.0501	0.0132	-0.0276	0.1233	-0.1731	0.0851	-0.1256	0.1034	-4.9710	0.0005	1.1030	0.0008	-0.0355	0.1077	0.2479
prctile(3)	0.0715	0.0290	-0.0201	0.1864	-0.0572	0.1440	-0.0850	0.1409	-2.9782	0.0013	1.1984	0.0027	-0.0203	0.1300	0.2826
prctile(4)	0.0961	0.1007	-0.0093	0.2509	0.0382	0.2391	-0.0555	0.1668	-2.6145	0.0105	1.4932	0.0073	-0.0177	0.1471	0.3068
prctile(5)	0.1801	0.1050	-0.0052	0.3067	0.0489	0.2688	-0.0455	0.2548	-1.7268	0.0265	1.5572	0.0362	-0.0019	0.2196	0.3118
prctile(6)	0.1882	0.1156	-0.0030	0.3860	0.0641	0.2759	-0.0373	0.2836	-1.6128	0.0305	2.2788	0.0460	0.0124	0.2975	0.3475
prctile(7)	0.1919	0.1428	0.0003	0.3997	0.0694	0.2961	-0.0321	0.3157	-1.5040	0.0768	3.1825	0.1110	0.0440	0.3239	0.4039
prctile(8)	0.2323	0.2162	0.0016	0.4142	0.1001	0.3172	0.1838	0.3776	-1.3605	0.1471	4.8754	0.1615	0.0696	0.3803	0.4122
prctile(9)	0.3827	0.3810	0.0021	0.4720	0.1718	0.3904	0.2905	0.3979	-0.7286	0.1968	6.7670	0.2258	0.1108	0.4544	0.4241
WE portf	0.2330	0.0000	-0.0040	0.3320	0.1026	0.1262	-0.0298	0.3665	-2.5067	0.0003	2.3707	0.0005	0.0098	0.3777	0.6312

Table 2 (Cont'd)
Panel 3: Fund Style Group "ED"

42 of 295 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-2.6879	0.0000	-0.5191	0.0076	-2.2734	0.0126	-0.5073	0.0550	-38.4451	0.0003	-0.8096	0.0003	-0.2273	0.0437	0.1405
max(1)	1.4903	0.4564	0.0949	0.4674	0.8656	0.4853	1.5980	0.4996	0.3139	0.4058	43.2305	0.4866	0.0976	0.4886	0.7613
mean(1)	0.2831	0.0627	-0.0058	0.2658	-0.0115	0.2696	0.0168	0.2875	-3.3657	0.0814	3.3043	0.0875	-0.0172	0.2956	0.4257
prctile(1)	0.0098	0.0000	-0.0128	0.0927	-0.1320	0.0925	-0.2167	0.0977	-4.2951	0.0006	0.3515	0.0013	-0.0648	0.1200	0.2492
prctile(2)	0.0729	0.0001	-0.0114	0.1744	-0.0628	0.1366	-0.1150	0.1613	-3.7820	0.0012	0.7871	0.0015	-0.0456	0.1464	0.3424
prctile(3)	0.1298	0.0003	-0.0075	0.2119	-0.0456	0.1782	-0.0506	0.1829	-2.9077	0.0023	1.4519	0.0028	-0.0364	0.1983	0.3559
prctile(4)	0.2339	0.0006	-0.0024	0.2205	-0.0177	0.2308	-0.0331	0.2393	-2.3969	0.0035	1.7945	0.0043	-0.0272	0.2612	0.3591
prctile(5)	0.2772	0.0030	0.0022	0.2735	0.0152	0.2819	-0.0062	0.3158	-2.1877	0.0190	2.0375	0.0182	-0.0185	0.3155	0.3827
prctile(6)	0.2829	0.0062	0.0028	0.3190	0.0359	0.3098	0.0144	0.3691	-2.0249	0.0359	2.2504	0.0622	-0.0049	0.3499	0.4174
prctile(7)	0.3023	0.0137	0.0060	0.3540	0.0689	0.3689	0.0711	0.3831	-1.7687	0.0693	2.6307	0.0765	-0.0011	0.3762	0.4966
prctile(8)	0.4321	0.1332	0.0123	0.3831	0.1153	0.4250	0.0887	0.4232	-0.9736	0.1754	3.6136	0.1820	0.0038	0.4358	0.5840
prctile(9)	0.9978	0.2074	0.0207	0.4096	0.1996	0.4602	0.1086	0.4384	-0.5888	0.2916	4.0368	0.2770	0.0404	0.4769	0.6172
EW portf	0.3252	0.0000	-0.0056	0.2906	0.0143	0.4430	-0.0066	0.4729	-2.8552	0.0003	2.7119	0.0004	0.0049	0.4442	0.6629

Panel 4: Fund Style Group "ELS"

147 of 1,546 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-0.7558	0.0000	-0.2390	0.0010	-1.0154	0.0001	-1.2335	0.0000	-13.9818	0.0000	-8.4666	0.0000	-0.2406	0.0016	0.1535
max(1)	2.4002	0.4993	0.1215	0.4931	1.5587	0.4993	1.4132	0.4852	10.0462	0.4985	11.6943	0.4994	0.5181	0.4960	0.9299
mean(1)	0.5739	0.0444	0.0089	0.2289	0.1607	0.1868	-0.0003	0.1878	-0.6349	0.1964	0.4562	0.2071	0.0473	0.2131	0.5146
prctile(1)	0.0034	0.0000	-0.0230	0.0392	-0.3304	0.0165	-0.4495	0.0130	-3.6509	0.0174	-3.3583	0.0130	-0.0853	0.0144	0.2524
prctile(2)	0.2295	0.0000	-0.0144	0.0807	-0.0858	0.0403	-0.3128	0.0400	-2.4267	0.0588	-1.3626	0.0477	-0.0399	0.0438	0.3249
prctile(3)	0.4063	0.0000	-0.0043	0.1274	0.0141	0.0709	-0.1916	0.0605	-1.8266	0.0927	-0.4230	0.0946	-0.0121	0.1129	0.4217
prctile(4)	0.4988	0.0000	0.0021	0.1739	0.0866	0.1184	-0.0869	0.0924	-1.2957	0.1299	0.2736	0.1441	0.0106	0.1563	0.4630
prctile(5)	0.5767	0.0001	0.0093	0.2169	0.1451	0.1531	-0.0420	0.1323	-0.8558	0.1978	0.7090	0.1987	0.0419	0.2077	0.5227
prctile(6)	0.7080	0.0008	0.0138	0.2725	0.2097	0.2057	0.0245	0.2210	-0.3843	0.2214	1.1340	0.2537	0.0614	0.2435	0.5758
prctile(7)	0.8040	0.0035	0.0217	0.3255	0.2854	0.2683	0.1314	0.2910	0.5761	0.3047	1.6026	0.2873	0.0833	0.3057	0.6477
prctile(8)	0.9164	0.0403	0.0315	0.3699	0.3611	0.3262	0.2932	0.3623	1.2230	0.3290	2.1032	0.3745	0.1136	0.3732	0.6890
prctile(9)	1.0942	0.2065	0.0465	0.4305	0.6779	0.4054	0.5524	0.4305	3.4114	0.3748	3.4539	0.4201	0.2094	0.4431	0.7585
WE portf	0.5464	0.0000	0.0107	0.0858	0.1242	0.0530	0.1187	0.0568	-0.4455	0.2288	0.1264	0.4146	0.0203	0.2261	0.8881

Table 2 (Cont'd)

Panel 5: Fund Style Group "EM"

31 of 452 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-0.2225	0.0000	-0.0585	0.0052	-0.8806	0.0095	-0.8236	0.0106-15.0955	0.0060	-7.2407	0.0096	-0.2295	0.0061	0.1516	
max(1)	1.5011	0.4525	0.1443	0.4248	0.8743	0.4881	1.0922	0.4917	4.2816	0.4866	13.7276	0.2961	0.4306	0.4826	0.6060
mean(1)	0.7948	0.0674	0.0009	0.2493	0.2577	0.2275	-0.1401	0.2415	-8.0537	0.0661	6.7873	0.0754	0.0376	0.3166	0.3597
prctile(1)	0.0532	0.0003	-0.0531	0.0510	-0.3541	0.0928	-0.7148	0.0927	-14.7912	0.0082	2.0312	0.0108	-0.1237	0.1578	0.2141
prctile(2)	0.3672	0.0016	-0.0458	0.0981	-0.2027	0.1314	-0.5322	0.1319	-13.2012	0.0095	3.4874	0.0176	-0.0707	0.2185	0.2654
prctile(3)	0.6251	0.0022	-0.0374	0.1313	0.0146	0.1738	-0.4715	0.1874	-12.4755	0.0105	4.5370	0.0205	-0.0266	0.2426	0.2969
prctile(4)	0.6916	0.0026	-0.0287	0.1742	0.2493	0.1987	-0.3299	0.1998	-8.2547	0.0127	5.3212	0.0244	0.0117	0.3188	0.3313
prctile(5)	0.7602	0.0071	-0.0163	0.3047	0.3330	0.2144	-0.2698	0.2325	-6.6493	0.0132	5.7442	0.0327	0.0366	0.3440	0.3604
prctile(6)	0.9416	0.0204	-0.0103	0.3369	0.4062	0.2605	-0.0376	0.2534	-6.0917	0.0298	7.9197	0.0513	0.0726	0.3639	0.3792
prctile(7)	1.0527	0.0239	0.0109	0.3555	0.4778	0.2879	0.1088	0.2832	-5.5391	0.0445	10.8481	0.0824	0.0917	0.3937	0.4039
prctile(8)	1.2929	0.0780	0.0452	0.3981	0.7472	0.3191	0.3077	0.3327	-4.1848	0.1133	11.5991	0.1502	0.1049	0.4253	0.4471
prctile(9)	1.3739	0.3264	0.0920	0.4066	0.8402	0.3321	0.4864	0.4199	-2.9594	0.1934	12.5087	0.2120	0.1738	0.4582	0.5419
EW portf	0.8505	0.0000	0.0008	0.4887	0.2775	0.1688	-0.1726	0.2703	-7.3083	0.0009	5.9620	0.0044	-0.0408	0.3445	0.5668

Panel 6: Fund Style Group "EMN"

91 of 810 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-2.5458	0.0000	-0.3022	0.0017	-4.1722	0.0001	-1.2335	0.0001	-51.5644	0.0024	-7.7588	0.0039	-0.3989	0.0016	0.1114
max(1)	1.4544	0.4965	0.1216	0.4990	1.4799	0.4972	4.0786	0.4877	6.0338	0.4984	57.1341	0.4918	0.5181	0.4908	0.9138
mean(1)	0.3972	0.0932	0.0120	0.2303	0.1306	0.1957	0.0278	0.1771	-0.7380	0.2281	0.6053	0.2322	0.0362	0.1872	0.4525
prctile(1)	-0.1323	0.0000	-0.0171	0.0294	-0.1987	0.0063	-0.5422	0.0056	-3.2369	0.0175	-3.2840	0.0240	-0.1020	0.0115	0.1867
prctile(2)	0.0196	0.0000	-0.0064	0.0747	-0.1042	0.0326	-0.2838	0.0279	-1.8014	0.0572	-2.0470	0.0454	-0.0621	0.0295	0.2365
prctile(3)	0.0752	0.0001	-0.0003	0.1237	-0.0257	0.0693	-0.1440	0.0643	-1.2888	0.1102	-0.8293	0.1148	-0.0236	0.0602	0.2840
prctile(4)	0.1740	0.0009	0.0060	0.1651	0.0284	0.1118	-0.0938	0.1183	-0.4032	0.1772	-0.2419	0.1592	0.0121	0.1297	0.3390
prctile(5)	0.4325	0.0041	0.0119	0.2023	0.0897	0.1739	-0.0509	0.1467	-0.0075	0.2232	-0.0590	0.2265	0.0389	0.1783	0.4257
prctile(6)	0.5972	0.0528	0.0143	0.2551	0.2048	0.2232	0.0310	0.1801	0.3514	0.2941	0.4122	0.2876	0.0540	0.2268	0.5380
prctile(7)	0.7128	0.1124	0.0205	0.3304	0.3273	0.2849	0.2009	0.2519	1.0269	0.3249	0.9087	0.3511	0.0914	0.2785	0.5974
prctile(8)	0.7984	0.1868	0.0313	0.4211	0.3634	0.3708	0.2991	0.3393	1.6672	0.3960	1.5584	0.4071	0.1346	0.3326	0.6738
prctile(9)	1.0969	0.3198	0.0542	0.4547	0.8084	0.4268	0.5371	0.4081	3.1015	0.4369	2.5505	0.4440	0.2125	0.3906	0.7639
EW portf	0.3457	0.0000	0.0091	0.1282	0.1198	0.0631	0.0121	0.4368	-0.4789	0.2169	0.2749	0.3229	0.0126	0.3229	0.7285

Table 2 (Cont'd)

Panel 7: Fund Style Group "FI"

61 of 789 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-0.2527	0.0000	-0.0987	0.0053	-1.3673	0.0050	-0.8144	0.0020	-5.4699	0.0000	-4.5175	0.0000	-0.1205	0.0022	0.1313
max(1)	0.9582	0.4953	0.0726	0.4903	0.9990	0.4930	1.5030	0.4846	4.7510	0.4711	5.3722	0.4983	0.3772	0.4844	0.8831
mean(1)	0.1161	0.2023	0.0044	0.2511	0.0550	0.2355	-0.0109	0.2155	-0.9850	0.1727	1.0408	0.1629	-0.0014	0.2292	0.3251
prctile(1)	-0.0486	0.0002	-0.0098	0.0564	-0.0952	0.0311	-0.2277	0.0370	-3.5383	0.0002	-0.4202	0.0001	-0.0726	0.0256	0.1429
prctile(2)	-0.0213	0.0262	-0.0042	0.1078	-0.0391	0.0833	-0.1051	0.0667	-2.3023	0.0107	-0.0363	0.0063	-0.0514	0.0648	0.1564
prctile(3)	-0.0026	0.0485	-0.0009	0.1747	-0.0180	0.1541	-0.0772	0.1337	-1.5882	0.0203	0.1036	0.0282	-0.0307	0.0921	0.1662
prctile(4)	0.0096	0.0880	0.0006	0.2110	-0.0058	0.1969	-0.0503	0.1640	-1.2354	0.0447	0.5936	0.0531	-0.0160	0.1587	0.1988
prctile(5)	0.0277	0.1628	0.0023	0.2481	0.0244	0.2325	-0.0115	0.1842	-0.7149	0.1412	0.7837	0.0916	-0.0116	0.2386	0.2507
prctile(6)	0.0494	0.2923	0.0072	0.2863	0.0545	0.2898	0.0127	0.2317	-0.4621	0.2094	1.2309	0.1696	-0.0071	0.2774	0.3463
prctile(7)	0.1142	0.3442	0.0137	0.3427	0.0984	0.3357	0.0486	0.2892	-0.1179	0.2736	1.5494	0.2252	0.0017	0.3425	0.3846
prctile(8)	0.2226	0.3819	0.0171	0.3752	0.1800	0.3975	0.0958	0.3619	0.0715	0.3386	2.6140	0.3329	0.0186	0.3827	0.4731
prctile(9)	0.4217	0.4476	0.0211	0.4664	0.3428	0.4192	0.1727	0.4256	0.7323	0.4216	3.4892	0.4612	0.0755	0.4402	0.6354
EW portf	0.0985	0.0025	0.0029	0.3014	0.0572	0.1468	-0.0395	0.2281	-1.7595	0.0000	1.7823	0.0000	-0.0205	0.1433	0.5143

Panel 8: Fund Style Group "FOF"

148 of 1550 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-0.4236	0.0000	-0.1130	0.0035	-0.9692	0.0003	-0.3737	0.0017	-7.0099	0.0000	-3.3215	0.0000	-0.3221	0.0020	0.1375
max(1)	0.8760	0.4962	0.0609	0.4842	0.8185	0.4850	1.2270	0.4817	5.0231	0.5000	7.8157	0.4989	0.2898	0.4952	0.8461
mean(1)	0.3137	0.0650	0.0060	0.2498	0.2125	0.1279	-0.0659	0.2459	-1.3564	0.1368	1.3154	0.1449	0.0062	0.2448	0.4786
prctile(1)	0.0246	0.0000	-0.0126	0.0413	0.0201	0.0046	-0.2540	0.0420	-3.8923	0.0041	-0.5382	0.0044	-0.0590	0.0395	0.2166
prctile(2)	0.0770	0.0000	-0.0052	0.0891	0.0745	0.0166	-0.1892	0.0911	-2.6973	0.0110	0.2784	0.0146	-0.0410	0.1148	0.2537
prctile(3)	0.1971	0.0000	-0.0019	0.1392	0.1247	0.0331	-0.1400	0.1540	-1.9565	0.0314	0.5490	0.0362	-0.0205	0.1815	0.3609
prctile(4)	0.2328	0.0001	0.0013	0.1940	0.1556	0.0517	-0.1003	0.2016	-1.6233	0.0606	0.9539	0.0760	-0.0016	0.2111	0.4426
prctile(5)	0.3407	0.0008	0.0046	0.2545	0.2024	0.0769	-0.0746	0.2460	-1.3920	0.0999	1.2748	0.1057	0.0088	0.2285	0.4954
prctile(6)	0.3891	0.0059	0.0094	0.2976	0.2458	0.0895	-0.0396	0.2825	-0.9863	0.1462	1.6439	0.1349	0.0244	0.2637	0.5347
prctile(7)	0.4666	0.0162	0.0117	0.3791	0.3015	0.1536	-0.0156	0.3347	-0.6901	0.1754	2.0006	0.2186	0.0324	0.3261	0.5985
prctile(8)	0.5228	0.1332	0.0158	0.4086	0.3471	0.2500	0.0160	0.4092	-0.1676	0.2489	2.4897	0.2749	0.0486	0.4081	0.6786
prctile(9)	0.6223	0.2762	0.0237	0.4474	0.4304	0.3713	0.0626	0.4453	0.7129	0.3421	3.5401	0.3550	0.0754	0.4624	0.7261
EW portf	0.2646	0.0000	0.0040	0.3102	0.1567	0.0256	-0.0371	0.3162	-1.1868	0.0300	1.1379	0.0327	0.0065	0.4076	0.6716

Table 2 (Cont'd)

Panel 9: Fund Style Group "GM"

29 of 382 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-0.3440	0.0000	-0.0550	0.0230	-0.7944	0.0094	-1.2363	0.0212	-5.8929	0.0042	-7.7548	0.0052	-0.2749	0.0000	0.1226
max(1)	1.7081	0.4547	0.0546	0.4834	1.6297	0.4804	0.5493	0.4953	8.1546	0.4508	4.8014	0.4995	1.0155	0.4507	0.8623
mean(1)	0.3734	0.1198	-0.0009	0.2356	0.2238	0.2070	-0.0563	0.2452	0.5122	0.1958	-0.2782	0.2147	0.0260	0.2435	0.3701
prctile(1)	-0.0017	0.0000	-0.0395	0.0741	-0.1571	0.0229	-0.3464	0.0685	-3.3570	0.0345	-3.3017	0.0420	-0.1239	0.0517	0.1464
prctile(2)	0.0391	0.0002	-0.0283	0.0819	-0.0574	0.0502	-0.2147	0.1186	-1.5488	0.0690	-2.1491	0.0800	-0.0663	0.1340	0.1694
prctile(3)	0.1055	0.0019	-0.0131	0.0895	-0.0031	0.0865	-0.1540	0.1835	-0.6887	0.0764	-1.4536	0.0851	-0.0414	0.1839	0.1890
prctile(4)	0.2339	0.0047	-0.0037	0.1414	0.0687	0.1387	-0.1089	0.2167	0.3082	0.1064	-0.6036	0.1106	-0.0358	0.2120	0.2588
prctile(5)	0.2680	0.0186	-0.0005	0.2593	0.1466	0.2096	-0.0809	0.2542	0.6461	0.2157	-0.2352	0.2141	-0.0313	0.2260	0.3206
prctile(6)	0.3862	0.1016	0.0103	0.2834	0.2421	0.2531	0.0074	0.2854	1.0562	0.2478	-0.0252	0.2625	0.0100	0.3022	0.4432
prctile(7)	0.5387	0.1596	0.0171	0.3356	0.3684	0.2861	0.1056	0.3051	1.7811	0.2700	0.9170	0.3011	0.0416	0.3135	0.5034
prctile(8)	0.6138	0.2887	0.0211	0.4042	0.5089	0.3845	0.1804	0.3419	2.3185	0.3426	2.0269	0.3949	0.0720	0.3536	0.5653
prctile(9)	0.9093	0.3757	0.0312	0.4559	0.7911	0.4071	0.3858	0.4287	3.3126	0.3969	3.4799	0.4220	0.1503	0.4141	0.6513
EW portf	0.2431	0.0000	0.0043	0.3238	0.1457	0.0564	0.0296	0.3695	0.5861	0.2070	-0.3108	0.3289	0.0076	0.4070	0.6372

Panel 10: Fund Style Group "MA"

21 of 170 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-0.0593	0.0004	-0.0318	0.0039	-0.3221	0.0112	-0.2484	0.0261	-2.4627	0.0023	-0.5627	0.0029	-0.0509	0.0360	0.1767
max(1)	0.1861	0.4447	0.0297	0.2532	0.3438	0.4540	0.2660	0.4990	1.0189	0.4792	2.7440	0.4573	0.0180	0.4794	0.4789
mean(1)	0.0761	0.1350	-0.0061	0.0964	-0.0403	0.1828	0.0387	0.2632	-0.6490	0.1895	0.6091	0.2387	-0.0053	0.3228	0.3324
prctile(1)	0.0124	0.0006	-0.0214	0.0041	-0.2207	0.0413	-0.0664	0.0397	-2.3603	0.0131	-0.2567	0.0059	-0.0374	0.2224	0.2180
prctile(2)	0.0285	0.0096	-0.0191	0.0120	-0.0997	0.0638	-0.0063	0.0991	-1.1860	0.0343	-0.1441	0.0849	-0.0266	0.2599	0.2456
prctile(3)	0.0588	0.0254	-0.0151	0.0137	-0.0928	0.0659	-0.0013	0.1514	-0.9118	0.0728	0.0563	0.1305	-0.0188	0.2728	0.2772
prctile(4)	0.0631	0.0295	-0.0143	0.0534	-0.0740	0.0784	0.0059	0.1635	-0.7931	0.1171	0.1309	0.1774	-0.0021	0.3242	0.3165
prctile(5)	0.0716	0.0621	-0.0109	0.0829	-0.0679	0.1803	0.0333	0.1715	-0.3478	0.2061	0.3092	0.2187	0.0064	0.3452	0.3476
prctile(6)	0.0837	0.1117	-0.0074	0.1040	-0.0367	0.2104	0.0599	0.3337	-0.3102	0.2390	0.5790	0.3248	0.0070	0.3528	0.3579
prctile(7)	0.1086	0.2056	0.0059	0.1671	0.0196	0.2918	0.0638	0.4542	-0.2782	0.2533	0.7364	0.3937	0.0080	0.3653	0.3683
prctile(8)	0.1299	0.2801	0.0079	0.1773	0.0270	0.3157	0.0849	0.4626	0.0341	0.2776	1.0246	0.4139	0.0114	0.3789	0.4007
prctile(9)	0.1395	0.3915	0.0143	0.2082	0.1307	0.3650	0.2120	0.4796	0.5173	0.4249	2.4082	0.4518	0.0152	0.4512	0.4515
EW portf	0.1381	0.0004	-0.0092	0.0802	-0.0045	0.4718	0.0091	0.4418	-0.0943	0.4250	0.0228	0.4814	-0.0048	0.4150	0.4476

Table 2 (Cont'd)
Panel 11: Fund Style Group "MS"

8 of 101 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-0.7156	0.0000	-0.2777	0.0003	-0.4967	0.0126	-0.6407	0.0468	-7.5294	0.0076	-6.3515	0.0112	-0.4648	0.0416	0.1252
max(1)	0.6607	0.4177	0.0600	0.4833	0.7797	0.4147	0.4732	0.4937	6.8551	0.3701	6.9149	0.3735	0.1932	0.4271	0.5643
mean(1)	0.0282	0.2133	-0.0485	0.2293	0.2168	0.1536	-0.1285	0.2257	-0.2066	0.1319	0.0074	0.1539	-0.0485	0.2307	0.2599
prctile(1)	-0.5564	0.0163	-0.2283	0.0010	-0.4283	0.0169	-0.6400	0.0507	-6.5261	0.0092	-6.0190	0.0149	-0.3599	0.0674	0.1326
prctile(2)	-0.1745	0.0556	-0.1053	0.0106	-0.2430	0.0275	-0.6030	0.0633	-4.0399	0.0137	-4.8378	0.0237	-0.1121	0.1288	0.1530
prctile(3)	-0.0909	0.0650	-0.0430	0.0741	-0.0377	0.0321	-0.3195	0.0912	-2.8798	0.0192	-1.5939	0.0255	-0.0880	0.1372	0.1784
prctile(4)	-0.0149	0.1366	-0.0188	0.1903	0.1178	0.0408	-0.1703	0.1052	-1.8943	0.0256	-0.4857	0.0294	-0.0566	0.1814	0.2043
prctile(5)	0.0235	0.2181	-0.0091	0.2518	0.2378	0.0974	-0.0875	0.1847	-0.6638	0.0433	0.6408	0.0621	-0.0204	0.2162	0.2250
prctile(6)	0.0461	0.2942	-0.0055	0.2773	0.3620	0.1613	-0.0377	0.2734	0.5187	0.1129	1.7024	0.1653	0.0074	0.2598	0.2520
prctile(7)	0.1094	0.3551	-0.0031	0.3173	0.5269	0.2038	0.0230	0.3185	1.7249	0.2475	2.2678	0.3341	0.0255	0.3267	0.2925
prctile(8)	0.3896	0.3768	-0.0006	0.4450	0.7294	0.3430	0.2140	0.4227	5.5438	0.3108	2.3782	0.3390	0.0989	0.3519	0.3159
prctile(9)	0.5899	0.4062	0.0419	0.4766	0.7722	0.3984	0.4026	0.4763	6.6049	0.3547	5.5580	0.3633	0.1676	0.4055	0.4907
EW portf	0.0786	0.2244	-0.0102	0.2732	0.1390	0.2003	-0.0967	0.2743	0.2289	0.4299	-0.1657	0.4481	0.0162	0.3906	0.1360

Panel 12: Fund Style Group "RV"

8 of 179 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2							
min(1)	-0.0952	0.0350	-0.0056	0.2002	-0.0397	0.0475	-0.2974	0.0405	-7.1408	0.0010	0.3736	0.0014	-0.1645	0.0446	0.1823
max(1)	0.1123	0.4806	0.0082	0.4785	0.2908	0.4259	0.0929	0.4644	-0.4965	0.4051	6.7808	0.3890	0.0289	0.4700	0.3628
mean(1)	0.0122	0.3284	0.0008	0.2840	0.1166	0.2414	-0.0851	0.2346	-1.7965	0.0969	1.6809	0.1041	-0.0349	0.2075	0.2319
prctile(1)	-0.0685	0.1014	-0.0056	0.2002	-0.0252	0.0475	-0.2655	0.0406	-5.4742	0.0026	0.4381	0.0054	-0.1617	0.0501	0.1825
prctile(2)	-0.0059	0.2564	-0.0054	0.2015	0.0099	0.0583	-0.1908	0.0511	-1.5578	0.0061	0.6304	0.0147	-0.1422	0.0636	0.1833
prctile(3)	-0.0040	0.2564	-0.0035	0.2112	0.0202	0.1438	-0.1905	0.1332	-1.3353	0.0061	0.9656	0.0147	-0.0376	0.0682	0.1836
prctile(4)	-0.0035	0.2851	-0.0027	0.2278	0.0214	0.1671	-0.0766	0.1589	-1.3075	0.0164	1.0129	0.0233	-0.0100	0.0943	0.1837
prctile(5)	0.0117	0.3516	-0.0020	0.2344	0.1040	0.2573	-0.0278	0.2481	-1.1607	0.0544	1.0611	0.0725	-0.0033	0.1052	0.2150
prctile(6)	0.0267	0.4093	0.0014	0.2378	0.1867	0.3507	-0.0266	0.3307	-1.0123	0.0986	1.1070	0.1186	0.0022	0.1759	0.2494
prctile(7)	0.0281	0.4233	0.0080	0.2677	0.1938	0.3707	-0.0229	0.3337	-0.9587	0.1234	1.1430	0.1226	0.0156	0.3531	0.2565
prctile(8)	0.0392	0.4720	0.0082	0.4442	0.2498	0.3707	-0.0169	0.3579	-0.5614	0.1243	1.4316	0.1457	0.0274	0.4502	0.2565
prctile(9)	0.0908	0.4799	0.0082	0.4748	0.2806	0.4093	0.0602	0.4333	-0.5011	0.3209	5.1869	0.3169	0.0289	0.4677	0.3309
EW portf	0.0723	0.0262	0.0012	0.4230	0.0280	0.3169	-0.0056	0.4612	-1.0599	0.0120	0.9214	0.0221	0.0132	0.2621	0.3331

Table 2 (Cont'd)
Panel 13: Fund Style Group "SC"

41 of 459 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2		
min(1)	-6.8699	0.0000	-0.3582	0.0097-16.6823	0.0010 -0.8565	0.0000-26.6126	0.0001 -4.6863	0.0001 -2.6938	0.0168	0.1645
max(1)	1.5441	0.2864	0.1675	0.4974 1.6390	0.4820 16.8447	0.4648 4.4583	0.4884 45.7820	0.4915 0.1913	0.4623	0.8310
mean(1)	0.4635	0.0290	0.0044	0.2153 -0.2699	0.2860 0.5419	0.1151 -2.1170	0.1953 2.4034	0.1807 -0.0718	0.2154	0.5693
prctile(1)	-0.1401	0.0000	-0.0307	0.0323 -0.1313	0.0508 -0.6415	0.0003 -7.8765	0.0013 -2.4215	0.0013 -0.1266	0.0601	0.2926
prctile(2)	0.3042	0.0000	-0.0163	0.0507 -0.0658	0.1013 -0.5384	0.0019 -5.2636	0.0183 -1.5903	0.0174 -0.1138	0.0684	0.4203
prctile(3)	0.4296	0.0000	-0.0090	0.0988 -0.0508	0.1519 -0.3738	0.0060 -2.2794	0.0761 -1.2370	0.0547 -0.0782	0.1244	0.4782
prctile(4)	0.4839	0.0001	-0.0002	0.1331 -0.0272	0.2279 -0.0587	0.0079 -1.7302	0.1389 -0.5294	0.1246 -0.0128	0.1758	0.6101
prctile(5)	0.6697	0.0002	0.0074	0.1574 0.0154	0.3595 0.0564	0.0283 -0.6428	0.1785 1.2025	0.1901 0.0099	0.1993	0.6433
prctile(6)	0.7918	0.0004	0.0220	0.2436 0.0846	0.3938 0.2036	0.0504 -0.0168	0.1999 1.3237	0.2136 0.0506	0.2187	0.6540
prctile(7)	0.9219	0.0066	0.0257	0.3322 0.1944	0.4109 0.4839	0.1235 0.9765	0.2590 2.1588	0.2617 0.0613	0.2591	0.6686
prctile(8)	0.9375	0.0334	0.0320	0.3925 0.2633	0.4349 0.8471	0.2989 1.3974	0.3719 5.2514	0.3204 0.0792	0.3406	0.7050
prctile(9)	1.0692	0.1202	0.0581	0.4586 0.5677	0.4724 1.2113	0.3799 2.8017	0.4792 7.2279	0.3897 0.1284	0.4517	0.7503
EW portf	0.5279	0.0000	-0.0037	0.3820 0.0651	0.2953 0.3335	0.0030 -1.2229	0.1005 1.1299	0.1136 0.0961	0.0136	0.8607

Panel 13: Fund Style Group "SS"

11 of 71 funds remaining in the sample period: 1994:01 - 2000:06

	MMRF (p-val)	RVIX (p-val)	SKEW (p-val)	KURT (p-val)	BOND (p-val)	CRED (p-val)	CMDTY (p-val)	adj_R2		
min(1)	-2.2487	0.0000	-0.0193	0.1187 0.0338	0.0035 -1.3693	0.0000 -2.6011	0.1580 -1.1627	0.0908 -0.2211	0.0617	0.4318
max(1)	0.8414	0.0584	0.0542	0.4560 1.6393	0.4336 -0.0195	0.4607 1.2998	0.4671 3.4028	0.4990 0.0451	0.4068	0.7656
mean(1)	-0.7873	0.0098	0.0098	0.2666 0.7121	0.0701 -0.8536	0.0977 -0.6767	0.3023 1.4507	0.2531 -0.1110	0.1923	0.6331
prctile(1)	-1.6156	0.0000	-0.0193	0.1217 0.1146	0.0035 -1.3692	0.0000 -2.6008	0.1580 -0.8138	0.0908 -0.1948	0.0617	0.4361
prctile(2)	-1.0935	0.0000	-0.0180	0.1371 0.1909	0.0040 -1.3589	0.0000 -2.3777	0.1746 -0.1721	0.1021 -0.1773	0.0641	0.5378
prctile(3)	-1.0506	0.0000	-0.0174	0.2337 0.3033	0.0042 -1.3545	0.0000 -2.2820	0.1817 0.2910	0.1070 -0.1754	0.0651	0.5934
prctile(4)	-1.0399	0.0000	0.0003	0.2811 0.8278	0.0120 -1.1998	0.0038 -1.3129	0.2205 0.6288	0.1291 -0.1749	0.1414	0.6146
prctile(5)	-1.0387	0.0000	0.0059	0.2839 0.8832	0.0155 -1.1749	0.0044 0.1067	0.2288 1.7510	0.2231 -0.1640	0.1519	0.6287
prctile(6)	-0.5233	0.0000	0.0115	0.2884 0.8878	0.0191 -1.0303	0.0603 0.2539	0.4105 2.1008	0.3015 -0.1438	0.2008	0.7189
prctile(7)	-0.4542	0.0000	0.0206	0.2970 0.8986	0.0623 -0.1554	0.1695 0.4417	0.4240 3.0633	0.3728 -0.0232	0.2723	0.7220
prctile(8)	-0.4492	0.0147	0.0444	0.3236 0.9527	0.1135 -0.1466	0.1881 0.7215	0.4441 3.1650	0.4337 -0.0038	0.3296	0.7340
prctile(9)	0.0707	0.0527	0.0524	0.4139 1.2429	0.2429 -0.0837	0.3112 1.0113	0.4608 3.4025	0.4734 0.0296	0.3975	0.7466
EW portf	-0.8318	0.0000	-0.0047	0.3992 0.1070	0.2757 -0.5984	0.0005 -0.4195	0.3830 0.8544	0.2683 -0.0018	0.4884	0.8289

Table 3
Summary of Dynamic Factor Benchmark Portfolios

This table summarizes the factors and instruments used in the construction of the 6 dynamically managed benchmark portfolios. Each column corresponds to one of the benchmark portfolios, and the asterisks ('*') indicate which of the factors and predictive instruments are included in the construction of the respective benchmark portfolio. The third panel also indicates which benchmark portfolio is used for each of the fund style classes.

Factors and Instruments used in the Construction of Benchmark Portfolios

benchm:	MSK	MSKC	MBC	MVSK	MSKBC	MSKBCC
factor (factors included in each of the benchmark portfolios)						
M	*	*	*	*	*	*
VIX				*		
SKEW	*	*		*	*	*
KURT	*	*		*	*	*
BOND			*		*	*
CRED			*		*	*
CMDTY		*				*
instr (predictive instruments used to construct the benchmark portfolio)						
TB1M	*	*	*	*	*	*
TSPR	*	*	*	*	*	*
CSPR	*	*	*	*	*	*
VIX	*			*		
class (benchmark portfolio used for each of the hedge fund classes)						
CTA		*				
DS			*			
ED			*			
ELS				*		
EM			*			
EMN	*					
FI			*			
GM	*					
MA				*		
RV			*			
SC						*
SS	*					

Table 4
Fund Performance Relative to Dynamic Factor Benchmark

This table (continued on the following pages) reports the performance statistics of the individual funds and the index portfolio in each of the fund style groups (see “Glossary” in the appendix), in relation to our dynamic factor benchmark portfolio. Each panel below corresponds to one of the style groups. The benchmark portfolios are constructed as described in Section “Factor Benchmark Portfolios” above, using monthly data over the period from 1994:01 to 2000:06. The performance statistics are then estimated using the out-of-sample data from 2000:07 to 2005:06⁴. We report the average return, the realized volatility, and the Sharpe ratio. The “alpha” and “beta” coefficients are obtained from a CAPM-style regression of the excess returns on each fund on the excess returns of the benchmark portfolio. The information ratio is calculated by dividing “alpha” by an unbiased estimate of the residual standard deviation of the regression. The first 12 rows in each panel summarize the distribution (minimum and maximum observation, mean, as well as the decile cutoff points). The following row (“portf”) shows the corresponding results for the style index portfolio, which is constructed as an equally weighted portfolio of all funds in the group (see Section “Data and Methodology” above). The next row (“benchm”) in each panel reports the performance of the benchmark portfolio. The final row (“rank”) reports for each performance figure the percentile within the distribution across all funds that corresponds to the respective result for the benchmark portfolios (for example, in Panel 1 below, about 56.8% of all funds earned an average return lower than that achieved by the benchmark portfolio). All figures are annualized.

Panel 1: Fund Style Group “CTA” (Benchmark: “MSKC”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	-0.0622	0.0061	-0.8373	-0.8560	-0.0886	-0.7468
max	0.4578	0.6231	4.6834	1.0089	0.3943	4.8186
mean	0.1214	0.1825	0.5079	0.0121	0.0942	0.5410
prctile(10)	0.0312	0.0689	0.0624	-0.1698	0.0026	0.0545
prctile(20)	0.0550	0.1004	0.2118	-0.0950	0.0286	0.2166
prctile(30)	0.0734	0.1235	0.3284	-0.0493	0.0477	0.3202
prctile(40)	0.0878	0.1444	0.4113	-0.0178	0.0646	0.4330
prctile(50)	0.1024	0.1703	0.4888	-0.0014	0.0786	0.5061
prctile(60)	0.1210	0.1891	0.5670	0.0206	0.0940	0.5899
prctile(70)	0.1451	0.2146	0.6431	0.0727	0.1175	0.6970
prctile(80)	0.1817	0.2505	0.7596	0.1440	0.1545	0.8006
prctile(90)	0.2364	0.3257	0.8788	0.2075	0.2121	0.9762
fund style index portfolio						
portf	0.1109	0.0899	0.9164	0.0138	0.0839	0.9391
dynamic factor benchmark portfolio						
benchm	0.1046	0.1182	0.6408	0.0000	0.0000	0.0000
rank	0.5061	0.2761	0.6902	0.5061	0.0890	0.0890

⁴ We excluded any funds for which there was not a continuous series of observations covering the entire sample period (i.e. funds established after 2000:07 or funds that “died” before 2005:06).

Table 4 (Cont'd)

Panel 2: Fund Style Group “DS” (Benchmark: “MBC”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	0.0153	0.0185	-0.0490	-0.1294	-0.0328	-0.1932
max	0.2956	0.2644	3.8978	0.4851	0.2664	4.1039
mean	0.1432	0.0926	1.4844	0.0858	0.1065	1.4742
prctile(10)	0.0815	0.0395	0.4415	-0.0212	0.0506	0.4845
prctile(20)	0.1037	0.0427	0.8321	0.0280	0.0661	0.8226
prctile(30)	0.1116	0.0561	1.1503	0.0454	0.0747	1.0432
prctile(40)	0.1172	0.0588	1.3054	0.0609	0.0841	1.2598
prctile(50)	0.1261	0.0814	1.4248	0.0695	0.0902	1.3292
prctile(60)	0.1424	0.0958	1.4771	0.1072	0.1053	1.5222
prctile(70)	0.1641	0.1254	1.8189	0.1182	0.1344	1.8379
prctile(80)	0.1793	0.1313	2.1182	0.1535	0.1480	2.1774
prctile(90)	0.2331	0.1770	2.4814	0.1892	0.1966	2.5450
fund style index portfolio						
portf	0.1374	0.0514	1.9953	0.1068	0.0983	1.9724
dynamic factor benchmark portfolio						
benchm	0.1406	0.1676	0.6443	0.0000	0.0000	0.0000
rank	0.6000	0.8857	0.1429	0.1429	0.0143	0.0143

Panel 3: Fund Style Group “ED” (Benchmark: “MBC”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	-0.0385	0.0103	-0.4912	-0.0604	-0.0873	-0.7235
max	0.4253	0.6595	2.9583	0.9646	0.3509	2.9898
mean	0.1022	0.1010	0.9525	0.2406	0.0577	0.8370
prctile(10)	0.0365	0.0385	0.1610	0.0217	-0.0017	-0.0128
prctile(20)	0.0525	0.0465	0.3449	0.0922	0.0095	0.1576
prctile(30)	0.0609	0.0509	0.5250	0.1091	0.0178	0.3070
prctile(40)	0.0672	0.0609	0.6554	0.1409	0.0290	0.4800
prctile(50)	0.0860	0.0672	0.8092	0.1588	0.0370	0.6896
prctile(60)	0.1072	0.0775	1.0262	0.2104	0.0627	0.9510
prctile(70)	0.1175	0.0941	1.2223	0.3243	0.0744	1.1347
prctile(80)	0.1423	0.1255	1.4718	0.3781	0.0927	1.3876
prctile(90)	0.1802	0.1838	2.2083	0.5210	0.1323	2.1982
fund style index portfolio						
portf	0.1043	0.0568	1.3170	0.2239	0.0610	1.1824
benchm	0.1020	0.1137	0.6443	0.0000	0.0000	0.0000
dynamic factor benchmark portfolio						
rank	0.5678	0.7542	0.3983	0.0508	0.1102	0.1102

Panel 4: Fund Style Group “ELS” (Benchmark: “MVSK”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	-0.2735	0.0163	-1.5398	-0.3309	-0.2940	-1.4346
max	0.5949	0.7491	3.0796	0.6694	0.5594	3.1354
mean	0.1005	0.1482	0.6106	0.0754	0.0707	0.6322
prctile(10)	-0.0048	0.0576	-0.1840	-0.0439	-0.0365	-0.2308
prctile(20)	0.0238	0.0812	-0.0020	-0.0065	-0.0048	-0.0474
prctile(30)	0.0511	0.0987	0.2084	0.0197	0.0212	0.1640
prctile(40)	0.0643	0.1137	0.3482	0.0465	0.0369	0.3414
prctile(50)	0.0806	0.1282	0.5581	0.0671	0.0508	0.5560
prctile(60)	0.1124	0.1507	0.7077	0.0860	0.0800	0.7022
prctile(70)	0.1486	0.1639	0.9117	0.1094	0.1182	0.9467
prctile(80)	0.1835	0.1921	1.1241	0.1563	0.1500	1.2026
prctile(90)	0.2193	0.2639	1.5281	0.2104	0.1954	1.6433
fund style index portfolio						
portf	0.0730	0.0759	0.6093	0.0550	0.0448	0.5873
dynamic factor benchmark portfolio						
benchm	0.0797	0.1699	0.3124	0.0000	0.0000	0.0000
rank	0.4954	0.7278	0.3761	0.2171	0.2110	0.2110

Table 4 (Cont'd)

Panel 5: Fund Style Group “EM” (Benchmark: “MBC”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	-0.0513	0.0314	-0.4323	-0.1694	-0.1163	-0.7220
max	0.6722	0.5960	4.2668	0.7671	0.6674	4.7651
mean	0.2036	0.1835	0.9875	0.1583	0.1541	0.9808
prctile(10)	0.0298	0.0601	0.0392	-0.0067	-0.0240	-0.1302
prctile(20)	0.0682	0.0768	0.3359	0.0169	0.0271	0.1829
prctile(30)	0.1040	0.0958	0.5640	0.0372	0.0513	0.4612
prctile(40)	0.1175	0.1297	0.8146	0.0749	0.0843	0.6966
prctile(50)	0.1582	0.1610	1.0101	0.1236	0.1185	1.0043
prctile(60)	0.2134	0.1952	1.1328	0.1911	0.1675	1.1997
prctile(70)	0.2682	0.2460	1.2400	0.2297	0.2041	1.3593
prctile(80)	0.3581	0.2854	1.4318	0.2769	0.2984	1.5206
prctile(90)	0.4084	0.3361	1.9288	0.3984	0.3551	2.0962
fund style index portfolio						
portf	0.1639	0.1067	1.1924	0.1506	0.1157	1.1120
dynamic factor benchmark portfolio						
index	0.1603	0.1945	0.6443	0.0000	0.0000	0.0000
rank	0.5089	0.5917	0.3373	0.1124	0.1598	0.1598

Panel 6: Fund Style Group “EMN” (Benchmark: “MSK”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	-0.1818	0.0041	-0.8918	-0.7424	-0.2307	-0.9592
max	0.3574	0.4802	31.6135	1.4694	0.3143	32.7117
mean	0.0730	0.1233	0.6158	0.1513	0.0421	0.6106
prctile(10)	-0.0166	0.0456	-0.2716	-0.0881	-0.0540	-0.3352
prctile(20)	0.0171	0.0594	-0.0631	-0.0028	-0.0136	-0.1329
prctile(30)	0.0361	0.0728	0.1315	0.0150	0.0089	0.1036
prctile(40)	0.0510	0.0827	0.3100	0.0568	0.0192	0.2583
prctile(50)	0.0645	0.1014	0.3928	0.0855	0.0376	0.3820
prctile(60)	0.0774	0.1181	0.5746	0.1289	0.0511	0.5629
prctile(70)	0.0989	0.1397	0.7514	0.1990	0.0671	0.7454
prctile(80)	0.1207	0.1740	0.9855	0.3093	0.0938	1.0339
prctile(90)	0.1674	0.2376	1.3072	0.4536	0.1387	1.3731
fund style index portfolio						
portf	0.0630	0.0384	0.9677	0.1081	0.0339	0.9104
dynamic factor benchmark portfolio						
benchm	0.0637	0.0994	0.3834	0.0000	0.0000	0.0000
rank	0.4939	0.4758	0.4939	0.2182	0.2636	0.2636

Panel 7: Fund Style Group “FI” (Benchmark: “MBC”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	-0.1656	0.0045	-1.0896	-0.9165	-0.2674	-1.3854
max	0.3564	0.5945	15.0006	2.3891	0.3396	15.5873
mean	0.0850	0.0693	1.4717	0.0458	0.0580	1.5867
prctile(10)	0.0221	0.0187	-0.0826	-0.2370	-0.0011	-0.0493
prctile(20)	0.0468	0.0285	0.3847	-0.1449	0.0209	0.3636
prctile(30)	0.0566	0.0345	0.6782	-0.0827	0.0318	0.6861
prctile(40)	0.0637	0.0410	0.7819	-0.0507	0.0398	0.8078
prctile(50)	0.0700	0.0482	0.9652	-0.0256	0.0459	1.0450
prctile(60)	0.0875	0.0557	1.2202	0.0047	0.0662	1.3273
prctile(70)	0.1104	0.0741	1.5327	0.0624	0.0860	1.7913
prctile(80)	0.1259	0.0937	1.9813	0.1670	0.1039	2.3748
prctile(90)	0.1426	0.1359	3.4960	0.4231	0.1261	3.8068
fund style index portfolio						
portf	0.0838	0.0241	2.3605	0.0319	0.0570	2.3721
dynamic factor benchmark portfolio						
benchm	0.0693	0.0666	0.6443	0.0000	0.0000	0.0000
rank	0.4873	0.6737	0.2797	0.5847	0.1144	0.1144

Table 4 (Cont'd)

Panel 9: Fund Style Group “GM” (Benchmark: “MSK”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	-0.1585	0.0387	-0.5299	-0.3171	-0.2099	-0.6352
max	0.3954	0.4862	4.9451	0.5724	0.3413	5.4387
mean	0.1120	0.1294	0.6854	0.0427	0.0832	0.7111
prctile(10)	0.0204	0.0552	-0.0334	-0.0808	-0.0038	-0.0362
prctile(20)	0.0442	0.0670	0.2364	-0.0382	0.0208	0.1949
prctile(30)	0.0628	0.0901	0.3506	-0.0123	0.0345	0.3401
prctile(40)	0.0753	0.0997	0.5423	0.0047	0.0523	0.5215
prctile(50)	0.0965	0.1139	0.6446	0.0339	0.0662	0.6391
prctile(60)	0.1115	0.1312	0.6850	0.0464	0.0800	0.7426
prctile(70)	0.1349	0.1442	0.8437	0.0863	0.1071	0.8446
prctile(80)	0.1929	0.1739	1.0001	0.1303	0.1596	1.0432
prctile(90)	0.2381	0.2412	1.6441	0.1740	0.2144	1.6843
fund style index portfolio						
portf	0.0873	0.0423	1.3935	0.0526	0.0582	1.3782
dynamic factor benchmark portfolio						
benchm	0.0944	0.1740	0.3834	0.0000	0.0000	0.0000
rank	0.4906	0.8019	0.3302	0.3774	0.1132	0.1132

Panel 10: Fund Style Group “MA” (Benchmark: “MVSK”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	0.0182	0.0149	-0.0774	-0.1941	-0.0096	-0.1517
max	0.1106	0.0991	1.6584	0.3311	0.0822	1.6836
mean	0.0503	0.0372	0.7583	0.0815	0.0244	0.7516
prctile(10)	0.0282	0.0207	0.1153	-0.0671	0.0037	0.0862
prctile(20)	0.0332	0.0277	0.2759	-0.0014	0.0092	0.2775
prctile(30)	0.0361	0.0294	0.3500	0.0145	0.0107	0.3846
prctile(40)	0.0389	0.0309	0.4531	0.0582	0.0123	0.4388
prctile(50)	0.0426	0.0321	0.6019	0.0641	0.0176	0.5931
prctile(60)	0.0506	0.0391	0.9464	0.0843	0.0248	0.9178
prctile(70)	0.0564	0.0442	1.0624	0.1406	0.0314	1.0470
prctile(80)	0.0620	0.0472	1.3765	0.1645	0.0373	1.3873
prctile(90)	0.0959	0.0525	1.5413	0.2686	0.0679	1.5524
fund style index portfolio						
portf	0.0468	0.0263	0.8599	0.0998	0.0207	0.8232
dynamic factor benchmark portfolio						
benchm	0.0397	0.0484	0.3124	0.0000	0.0000	0.0000
rank	0.4310	0.8448	0.2241	0.2069	0.0690	0.0690

Panel 12: Fund Style Group “RV” (Benchmark: “MBC”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	-0.0093	0.0041	-0.5193	-0.6202	-0.0387	-0.6004
max	0.2183	0.4544	31.2784	0.8986	0.1650	32.3960
mean	0.0810	0.0598	1.7313	0.1117	0.0506	1.7295
prctile(10)	0.0354	0.0202	0.1890	-0.0739	0.0104	0.1633
prctile(20)	0.0487	0.0224	0.5075	-0.0131	0.0191	0.5040
prctile(30)	0.0574	0.0243	0.9240	0.0033	0.0240	0.7560
prctile(40)	0.0655	0.0315	1.1803	0.0397	0.0348	1.1146
prctile(50)	0.0704	0.0361	1.2408	0.0574	0.0412	1.1744
prctile(60)	0.0830	0.0432	1.4767	0.0801	0.0556	1.3677
prctile(70)	0.0994	0.0540	1.7993	0.1140	0.0710	1.7550
prctile(80)	0.1175	0.0796	2.0961	0.1705	0.0770	2.1546
prctile(90)	0.1326	0.1158	2.5053	0.4721	0.1088	2.5715
fund style index portfolio						
portf	0.0839	0.0232	2.5134	0.0722	0.0553	2.4929
dynamic factor benchmark portfolio						
benchm	0.0693	0.0666	0.6443	0.0000	0.0000	0.0000
rank	0.4493	0.7681	0.2464	0.2754	0.0580	0.0580

Table 4 (Cont'd)

Panel 13: Fund Style Group “SC” (Benchmark: “MSKBCC”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	-0.3463	0.0425	-0.9101	-0.2753	-0.3908	-1.0869
max	0.9124	0.5005	3.0098	2.1593	0.8981	3.2454
mean	0.1107	0.1793	0.6236	0.4609	0.0587	0.5581
prctile(10)	-0.0478	0.0685	-0.2704	-0.0126	-0.1223	-0.5364
prctile(20)	0.0124	0.0919	-0.0916	0.0524	-0.0389	-0.3109
prctile(30)	0.0516	0.1139	0.1467	0.1201	-0.0000	-0.0002
prctile(40)	0.0665	0.1255	0.3594	0.1964	0.0343	0.2400
prctile(50)	0.0927	0.1391	0.5767	0.2883	0.0620	0.4740
prctile(60)	0.1384	0.1744	0.8174	0.4681	0.0968	0.7545
prctile(70)	0.1770	0.1972	0.9846	0.6474	0.1303	0.9918
prctile(80)	0.2107	0.2517	1.1483	0.7930	0.1640	1.1581
prctile(90)	0.2845	0.3706	1.8573	0.9590	0.2478	1.9487
fund style index portfolio						
portf	0.0663	0.1002	0.4009	0.4633	0.0140	0.1508
dynamic factor benchmark portfolio						
index	0.0845	0.0868	0.6560	0.0000	0.0000	0.0000
rank	0.4521	0.1849	0.5479	0.1096	0.3014	0.3014

Panel 14: Fund Style Group “SS” (Benchmark: “MSK”, see Table 3)

	return	vol	sharpe	beta	alpha	info
min	-0.0376	0.0610	-0.3960	-0.7186	-0.0510	-0.3304
max	0.2200	0.3275	0.5427	0.2751	0.2327	0.7430
mean	0.0929	0.2347	0.2647	-0.4323	0.0898	0.3781
prctile(10)	0.0605	0.1263	0.1647	-0.7176	0.0384	0.2535
prctile(20)	0.0640	0.1989	0.1941	-0.6144	0.0559	0.2650
prctile(30)	0.0724	0.2172	0.2214	-0.5696	0.0619	0.3237
prctile(40)	0.0742	0.2198	0.2298	-0.5682	0.0694	0.3440
prctile(50)	0.0784	0.2205	0.2308	-0.4624	0.0713	0.3749
prctile(60)	0.0982	0.2782	0.3145	-0.3572	0.1097	0.3775
prctile(70)	0.0982	0.2783	0.3683	-0.3567	0.1097	0.5121
prctile(80)	0.1344	0.3023	0.3768	-0.2696	0.1383	0.5199
prctile(90)	0.1613	0.3074	0.4285	-0.1238	0.1652	0.5743
fund style index portfolio						
portf	0.0663	0.1002	0.4009	0.4633	0.0140	0.1508
dynamic factor benchmark portfolio						
benchm	0.0738	0.1242	0.3834	0.0000	0.0000	0.0000
rank	0.3846	0.1154	0.8077	0.9615	0.0385	0.0385

Table 5
Performance during the “Credit Crunch”

This table reports the performance statistics of each of the fund style (see “Glossary” in the Appendix) indices, in relation to the respective dynamic factor benchmark portfolio, during the “Credit Crunch” period from 2005:01 until now (our data covers the period until 2008:12). Panel A shows the performance of the benchmark portfolio for each style group, while Panel B shows the performance of the corresponding fund index. The benchmark portfolios are constructed as described in Section “Factor Benchmark Portfolios” above, using the “in-sample” data over the period from 1997:01 to 2004:12. The benchmark portfolios were constructed to match the in-sample mean return or volatility of the corresponding fund index. The performance statistics are then estimated using the out-of-sample data from 2005:01 to 2008:12. We report the average return, the realized volatility, and the Sharpe ratio. The “alpha” and “beta” coefficients are obtained from a CAPM-style regression of the excess returns on each fund style index on the excess returns of the corresponding benchmark portfolio. The information ratio is calculated by dividing “alpha” by an unbiased estimate of the residual standard deviation of the regression. The last two columns of Panel A report the performance of the market portfolio (proxied by the CRSP value-weighted index) and the risk-free asset (we use the return on the 1-month T-Bill). All figures (except “beta”) are annualized.

fund style:	CTA	DS	ED	ELS	EM	EMN	FI	GM	MA	RV	SS	market	risk-free
benchmark ⁵ :	MSKC	MBC	MBC	MVSK	MBC	MSK	MBC	MSK	MVSK	MBC	MSK		
panel A: performance of dynamic style benchmark portfolio:													
return	8.4%	6.2%	6.2%	11.9%	10.2%	11.3%	5.2%	12.5%	9.0%	4.7%	5.4%	-7.9%	3.6%
volatility	2.3%	8.4%	8.4%	3.3%	19.1%	3.2%	5.7%	3.6%	2.2%	4.3%	0.9%	14.5%	
Sharpe ratio	1.95	0.30	0.30	2.28	0.33	2.21	0.28	2.24	2.19	0.26	1.80	-0.82	
panel B: performance of fund style group index:													
return	7.1%	4.1%	4.5%	3.9%	5.3%	5.1%	0.8%	6.5%	6.3%	3.3%	7.6%		
volatility	7.9%	6.5%	6.8%	8.0%	12.5%	2.9%	5.9%	5.0%	4.1%	5.8%	11.6%		
Sharpe ratio	0.42	0.08	0.13	0.04	0.13	0.52	-0.48	0.55	0.65	-0.06	0.32		
beta	0.33	0.55	0.48	-0.50	0.35	0.03	0.76	-0.03	-0.24	0.91	1.91		
alpha	+1.9%	-0.8%	-0.3%	+4.2%	-0.6%	+1.2%	-3.9%	+3.0%	+4.0%	-1.3%	+0.6%		
information ratio	0.07	-0.06	-0.02	0.16	-0.02	0.12	-0.30	0.17	0.28	-0.09	0.01		

⁵ The factors and instruments used to construct each of the benchmark portfolios are summarized in Table 3.