Style Neutral Funds of Funds: Diversification or Deadweight?

Michael Stein and Svetlozar T. Rachev

- Michael Stein, Email: michael.stein@statistik.uni-karlsruhe.de

Michael Stein is Doctoral Candidate at the Department of Econometrics, Statistics and Mathematical Finance, University of Karlsruhe (TH) and Karlsruhe Institute of Technology (KIT), Germany. His dissertation topic is "Statistical Methods of Strategic Portfolio Management for Fund of Funds (FoFs)". In addition, he is member of the Real Estate Strategy and Portfolio Solutions Group at Credit Suisse Asset Management Immobilien KAG in Frankfurt, Germany. At Credit Suisse he is responsible for the quantitative aspects of FoF portfolio management, real estate derivatives as well as for direct and indirect real estate investment strategies.

- Prof. Svetlozar T. Rachev (Corresponding Author): Chair of Econometrics, Statistics and Mathematical Finance, University of Karlsruhe (TH) and Karlsruhe Institute of Technology (KIT), Kollegium am Schloss, Bau II, 20.12, R210, Postfach 6980, D-76128, Karlsruhe, Germany & Department of Statistics and Applied Probability, University of California, Santa Barbara & FinAnalytica, USA. Email: svetlozar.rachev@statistik.uni-karlsruhe.de

Svetlozar T. Rachev is Professor of Econometrics, Statistics and Mathematical Finance, University of Karlsruhe (TH) and Karlsruhe Institute of Technology (KIT), Germany. He is author or co-author of over 300 articles and 13 books concerning Statistics, Probability Theory, Risk and Portfolio Management and Financial Econometrics. He serves as a member of 7 editorial boards of academic journals and is Fellow of the Institute of Mathematical Statistics, Elected Member of the International Statistical Institute, Foreign Member of the Russian Academy of Natural Science, Honorary Doctor of Science at St. Petersburg Technical University. In addition, he is Chief Scientist at FinAnalytica, USA and was founder and president of Bravo Group that was acquired by FinAnalytica.

Abstract

The current paper aims at answering whether style neutral portfolios build out of value and growth equity / mutual funds are delivering benefits in terms of returns and diversification or whether they result in costly benchmark tracking products. We analyze style-neutral portfolios by building synthetic funds of funds (FoFs) out of both value- and growth-oriented equity funds and contrast their properties with the applicable benchmark and with style FoFs. While a beneficial effect with respect to diversification and a resulting reduction in return dispersion can be seen, the simulated FoFs do not deliver a general risk-adjusted outperformance against the benchmark or the better performing style of a period. The variety of results is indicating that FoFs may indeed benefit from investing in a style-neutral portfolio of growth and value funds, but only given that FoF managers are able to select the well-performing funds of the respective styles. In addition, we find that being able to shift between styles over time may lead to better results than locking in FoFs at being style neutral.

Keywords: Style Neutral, Value, Growth, Funds of Funds, FoF, Diversification, Style Investing, R Ratio, Portfolio Deadweight

JEL Classification: G11

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1. Introduction

Style neutral portfolios are built by investing equally in opposing styles, the objective being to generate risk-adjusted returns that are superior to those obtained from investing with a tilt towards one or the other style. While there are many possible style classifications, we focus on a pair of the most important and widely accepted style classifications, namely "value" and "growth". Generally, the definition of "value" and "growth" stocks are as follows: Shares of companies classified as value stocks are shares for which the price-to-book ratio is low and those classified as growth stocks have a high price-to-book ratio. Value managers therefore are investors who expect upside potential in companies with a low price-to-book ratio, as those seem to be undervalued by the market.

The style of value investing has its origin in Graham and Dodd (1934, 1949) which had a tremendous influence on investment theory and practice, although the focus increasingly turned on price-to-earnings rather than price-to-book. In contrast to value investors, growth managers focus on capital appreciation with companies mainly reinvesting their earnings and with good prospects for further expansion. The value and growth classifications are not directly defined as mutually exclusive counterparts based on a single measure. The term growth at a reasonable price (GARP) further relates the price and expansion potential characteristics to each other.

Being defined that way, the value versus growth distinction has found its way into the three-factor model by Fama and French (1992 and 1993), with Fama and French (1998) providing evidence concerning value and growth investing. In the extension of the Capital Asset Pricing Model (CAPM), the factor "high-minus-low" with respect to the book-to-market ratio is used to control managers' performance against the benchmark for their growth

or value style. The other factor being used to augment the CAPM is the excess return of small capitalisation stocks over large capitalisation stocks ("small-minus-big")[i].

The discussion surrounding style investing has led to extensive research regarding timing styles and employing neutral approaches. Gerber (1994), Fan (1995), Sorensen and Lazzara (1995), Ahmed *et al*, (2002), and Amenc *et al*, (2003), for example, focus on style timing, mainly implemented in a market-neutral framework.

In this paper, we do not analyze value versus growth style investing within a market-neutral approach, but investigate the properties of style-neutral portfolios including both value and growth strategies. We analyze style-neutral portfolios by building synthetic funds of funds (FoFs) out of both value- and growth-oriented equity funds. This is also interesting in the light of two contrary notions regarding FoFs, namely, the view that style-neutral FoFs may deliver the best of both worlds against the view that they will result in costly benchmark replicators. The latter argument was brought forward by Connelly (1997) for FoFs in general and may be amplified in the case of style-based fund portfolio building. Connelly's view implies that the countering of styles results in obtaining a FoF that has countered and erased most or all active bets of the target fund managers, resulting in so-called portfolio deadweight.

Because the analysis in our paper is performed for funds rather than for individual common stocks has several implications. First, the identification problem of value and growth is more complicated, as not only fund managers must properly identify the respective stocks but FoF managers must also carefully select their target fund managers. This may cause a dampening of effects and a diluted result. Second, we need to take into account an extra layer of fees because FoF managers charge their own fees[ii].

Using a five-year sample of 25 value-oriented and 56 growth-oriented equity funds that focus on U.S. equities and are listed and classified in the Morningstar database and

eligible in Germany, we build style-neutral FoFs and compare them with their most representative benchmark, the S&P 500. As the analysis aims at finding an answer to the question of whether style-neutral FoFs investing in both value and growth strategies could be beneficial, we use a rolling window approach in order to see the time-changing properties of the style-neutral fund portfolios. To get insight into the sources of the results obtained, the respective value- and growth-style portfolios also have been analyzed.

We find that diversification benefits in terms of return dispersion occur when investing in at least six to eight funds, a finding which is in line with earlier studies. However, the first four moments of the simulated FoFs and the benchmark did not yield a conclusive picture of the benefits and disadvantages of the style-neutral FoFs. Whether they are well-diversified portfolios of use to investors or resulting in costly portfolios that are merely the result of portfolio deadweight was therefore investigated by using the R ratio which is a tail-dependent reward-to-risk measure.

The analysis shows that investing in more funds successively improves the R ratio in the style FoFs as well as in the style-neutral FoFs. However, the building of style neutral FoFs results in an averaging process with time-dependent differences. This points at the notion that on average it is not a priori beneficial to build style neutral FoFs , only when being able to select the best performing funds of the respective classes.

The paper is organized as follows: In Section 2 we discuss the theoretical aspects of diversification and deadweight as well as our approach to measure style-neutral FoFs against the benchmark. Section 3 is devoted to the presentation and discussion of the empirical findings. Our conclusions are summarized in Section 4.

2. Diversification and Deadweight

In this section, we briefly contrast the opposing views related to the general benefits and caveats of FoFs before discussing those in the context of style-neutral FoFs. While proponents claim the ability of FoFs' benefit from diversification effects and from picking the best managers and strategies, critics stress the danger of countering styles or inefficiencies due to the double layer of fees.

A general question related to FoF building is the one concerning the number of investments, as one may reduce both volatility over the course of time and terminal wealth dispersion by increasing the number of target funds. O'Neal (1997) shows that for growth equity funds, four funds may be sufficient to decrease most of the uncertainty concerning the FoF returns, whereas L'habitant and Learned (2002), for example, find the number to be between five and 10 for hedge fund portfolios. The effects of different fund portfolio sizes were also examined by Park and Staum (1998), Brands and Gallagher (2005), and Gallagher and Gardner (2006) among others.

Apart from the general possibility of diversification benefits delivered by FoFs, the danger of countering styles or the correlation of target managers' styles has led to work by diBartolomeo (1999) and Gallagher and Gardner (2006), who demonstrate that while providing diversification, fund portfolios may result in resembling the benchmark and an inability to outperform the index. Their results are in line with the theoretical arguments mentioned in Connelly (1997), who stresses the danger of countering the active bets of target fund managers. Connelly defines the measure of portfolio deadweight in a fund as the sum of the minima of each company's share in either the benchmark or the fund under consideration.[iii] Therefore, funds which have large off-benchmark holdings would have the lowest deadweight score.

Connelly (1997) in his critique of FoFs states that by investing in funds that have different styles and therefore bets against the benchmark, a FoF may end up as a costly

benchmark product. Labelling this problem as the *law of unintended indexing*, Connelly proposes the use of a benchmark tracking product and a future overlay. While this argument is generally appealing, we reject this proposal in our analysis of FoFs because we assume the FoF managers invest only in funds.

In the light of style-neutral FoFs, we find it of particular interest to analyze whether a fund portfolio that is balanced between value and growth target funds is delivering superior performance than the benchmark and/or fund portfolios focussing on one of the respective styles. As target fund managers select the stocks of their investment universe that best suit their style and for which they expect the best performance, it may be possible to benefit from their selection abilities through fund investments. By combining several managers with different styles, one could expect both diversification benefits and a superior benchmark-relative performance. On the other hand, correlations between stocks in the target markets as well as the countering of styles may result in the indexing schemes introduced above and a costly benchmark replication product.

3. Data and Methodology

To examine the opposing effects and structures discussed in the preceding section, we focus on the return patterns of the funds in the analysis due to the limitation that fund holdings are available only from time to time, and often for differing dates. While the top positions in a mutual fund are usually reported on a monthly basis, complete fund compositions can be observed only once or twice a year in most regulated fund markets (with different reporting deadlines for different fund business years), making a holding structure analysis impossible or at least highly complicated.

We used Morningstar's database for selection purposes that includes solely funds that are permitted for distribution in Germany, with a total of about 15.000 funds. As we need to base our analysis on comparisons with a sensible and representative benchmark, we have chosen to do the analysis for equity funds with a focus on the United States. This stems from the fact that for this group the number of funds was largest and is not broken down into sub-regions as it can be seen for European focused funds (EU-15, EU-27, Eurozone or Europe-ex-UK are examples). Using U.S. dollar-denominated funds is straightforward with the chosen country focus and rules out conversion or hedging distortions. We used the S&P 500 as the benchmark. Accordingly, we restricted the sample further to large capitalization focused funds, ruling out any biases stemming from size tastes of fund managers. This was done by using Morningstar's 3-by-3 fund classification matrix, which indicates whether a fund is focussing on small, mid or large capitalization stocks and whether the fund management is pursuing a value, blend or growth investment approach. The Morningstar fund classifications resulted in 47 value and 84 growth funds.

Our approach is sensible in the way that we can rule out any distortions and biases due to legal or regulatory constraints, have no currency conversion issues, and can rule out any size effects, home or foreign biases.[iv]

We considered a time span of five years to be sufficient for the analysis, and have therefore chosen the sample time from July 1, 2003 to June 30, 2008. Because data were not available for the 47 plus 84 funds for the entire five-year period[v], our sample was reduced to 25 value and 56 growth funds that were in existence prior to the commencement of the study period.

Using total return data from DataStream Financial Thomson in weekly frequency, we have 261 weeks of performance data as our basis. The use of weekly data is beneficial as the results are not cursed by accounting discrepancies. This means that the funds' return series

and therefore those of the synthetic FoFs can be compared more easily to the benchmark as there need not be done any time shifts induced by pricing differences[vi]. The latter problem would be even further complicated as we use funds that have their investment focus in a time-zone other than the fund domicile's time-zone.

Checking how style-neutral FoFs performed against the benchmark was done by using synthetic style-neutral FoFs and the S&P 500 Composite Index. Although not all funds included in the analysis have the S&P 500 as their official benchmark, the index serves as the most important benchmark in evaluating fund managers. With respect to the used sample, it is straightforward to use the index representing the 500 U.S. companies with the largest capitalization to serve as orientation for FoFs with a large set of U.S. focused target equity funds.

To gain insight into the behaviour of the synthetic FoFs, we perform a time-varying analysis. With the 261 weekly fund and benchmark returns, the analyses were done by rolling 209 spans of 52 weekly returns through the sample. By comparing the characteristics of the style neutral FoFs and the benchmark over time this enables us to carefully assess pros and cons of the style neutral FoF investments.

As we want to analyze style-neutral FoFs we have to use even numbers of funds included in the portfolios. Furthermore, because there are only 25 value funds, we cannot compare the neutral FoFs to style FoFs containing more than 25 funds for an unbiased picture. These limitations have led to the bounds of 2 and 24 funds for the simulated portfolios. Consisting of 1 to 12 funds for each investment style, we build style-neutral funds by assigning 50% weight to each investment style class. Accordingly, we have built synthetic style neutral FoFs and style FoFs of the same sizes between 2 and 24 funds for the sake of comparison.

Using this approach, we rule out the possibility of short selling and fulfill the constraint of full investment, as those constraints are most representative for real- world investment bounds. We generate 10.000 synthetic portfolios for each of the 3 FoF types, 209 time periods and 12 portfolio sizes. Afterwards, the return series of the synthetic FoFs are generated and compared with the benchmark. This is done to see how style-neutral funds in all varieties of compositions and sizes behave in comparison with the used benchmark and the style based FoFs. Analyzing windows of observations that are rolled through the sample enables us to see whether the findings are robust in different market periods.

The comparison of the simulated FoFs with the benchmark is done in various ways. As the stated arguments both in favour and against FoFs in general and style neutral FoFs in particular are related to the diversification argument as well as performance considerations, we use not only dispersion measures for the portfolio and benchmark returns, but employ more sophisticated measures to examine the nature of the simulated FoFs.

Focussing on the tails and extreme returns is done by using the Rachev ratio (R ratio). For extensive discussions and applications concerning the R ratio and related risk and performance measures see Biglova *et al* (2004), Rachev *et al* (2005), Okuyama and Francis (2007), Rachev *et al*, (2008) and Farinelli *et al*, (2009).

To understand the R ratio, it is necessary to consider first the measure of expected tail loss (ETL, equivalent to the conditional value at risk, CVaR, for continuous distributions), which accounts for the concentration in the tails of the distribution. While the traditional value at risk (VaR) measure only indicates the value of the distribution at the threshold and therefore the maximum loss not to be exceeded with a certain confidence, the ETL measures the expected loss in the case of a tail event.

$$(1) \qquad ETL_{1-\alpha}(r_p) = E\left(\max\left(-r_p, 0\right) \middle| -r_p > VaR_{1-\alpha}\left(r_p\right)\right)$$

Therefore, $ETL_{1-\alpha}(r_p)$ is the expected tail loss with tail probability α for portfolio returns r_p. Common choices for α are 1% or 5% in accordance with common choices of the 99% and 95% confidence levels used for VaR measures. Of course, the ETL for any given probability or confidence is always higher than the respective VaR. In the R ratio, the ETL of the difference of any portfolio's returns in comparison with the benchmark is serving as the denominator, giving a term for the severity of portfolio underperformance against the benchmark. By choosing the measure in that way, one does obtain a benchmark relative portfolio risk measure.

While the ETL based measure is used for the downside, a corresponding measure for the additional gains versus the benchmark is also needed. The ETL of the difference between the benchmark returns and the portfolio returns therefore serves as a relative gain measure and represents the nominator of the R ratio. Therefore, the R ratio may be interpreted as a benchmark relative reward to risk measure. Below the R ratio is expressed with confidence levels α and β for the two measures on the lower and upper tail of the performance differences between FoFs and the benchmark:

$$R(r_p) = \frac{ETL_{1-\alpha}(r_b - r_p)}{ETL_{1-\beta}(r_p - r_b)} \tag{2}$$

As we will analyze the portfolios versus the benchmark, r_p and r_b denote the corresponding return series. With the R ratio we have a very flexible performance measure at our disposal, which is free from distributional assumptions or comparable flaws. Sensible percentages for α are, for example, 30% to 40% to adequately measure the extra portfolio gain while β could be chosen to be 1% or 5% to control for the severity of underperformances against the benchmark[vii].

4. Simulated Style (Neutral) Funds of Funds Analysis

In this Section we present the empirical results of the analysis of the synthetic FoFs against the benchmark and against their style-focused FoF counterparts. Starting with the first four statistical moments of the respective return distributions, i.e. the mean, the standard deviation, the skewness and the kurtosis we compare the FoFs over time and with differing portfolio sizes. Following the first statistical examinations, we used the R ratio to deliver a conclusive picture of the benefits and disadvantages from building style neutral FoFs.

Figure 1 shows the difference of the average annualised geometric mean return between the style neutral FoFs and the S&P 500. The synthetic FoFs seem to be outperforming and underperforming against the benchmark, depending on the time period analyzed, although FoF underperformance seems to occur more often, and the underperformance periods are more severe than outperformance periods. As the average of the geometric mean returns represents a cross-sectional average of the first moment, the straight line for 2 to 24 funds for any period is natural and shows that a reasonable number of simulations was chosen. Looking at the respective style FoFs in Figures 1a and 1b (i.e. the value and growth FoFs), we can see that there is a large difference in the performances of the two styles over time, as expected. While the performance against the benchmark of the value FoFs is much centered around zero until the later time periods, the growth funds exhibit more pronounced periods of better or worse performance. Interestingly, during the sub-prime crisis beginning in 2007, the growth funds performed much better against the benchmark while the value funds have underperformed, indicating that the value funds had more exposure to companies being related with the financial market crisis and the following credit crunch.

- Figures 1 about here -

However, the fact that the style-neutral FoFs result in the picture we see in Figure 1, seems to show the effect of style countering that may be beneficial or disadvantageous

depending on the time interval. While the general effect of more pronounced underperformance may be due to a general inability of fund managers to beat the benchmark, the comparison between the style FoFs and the style neutral FoFs is showing that combining the two styles is resulting in a general process of averaging. In addition, the extra layer of fees induced by FoFs would lead to an even lower net performance against the S&P 500.
By analyzing the minimum and maximum geometric mean returns, i.e. the worst and best style neutral FoFs and the respective style class FoFs in Figures A1 in the appendix, we can see again that the value funds are more stable over time when being compared to the benchmark than their growth counterparts.

The next important step when analyzing the synthetic FoFs over time and sizes is to take into account the resulting standard deviation of the FoFs and the benchmark, represented in Figure 2. As most of the reduction in the standard deviation is obtained with six to eight funds in the synthetic portfolios, this is roughly in line with other empirical findings. The synthetic FoFs seem to provide a reduction in the return dispersion against the benchmark in most time intervals.

- Figures 2 about here -

What is striking in this analysis is that the most favourable reduction in the returns' dispersion is obtained during the sub-prime meltdown and the following credit crunch. Two possible explanations for this observation are most likely: First, during pronounced downturn phases and crashes, fund managers tend to hold more cash than during other phases. Second, the credit crisis was hitting most the companies and financial intermediaries that were exposed to the mortgage market, were highly leveraged or were related with the real estate market and fund managers could have reduced their holdings in these companies and sectors.

Again, looking at the style FoFs in Figures 2a and 2b reveals further insight, as the value FoFs are always less volatile than the benchmark, while the growth FoFs seem to be

more or less dispersed in their returns compared to the benchmark depending on the time interval under consideration.

Analyzing the minimum and maximum annualized standard deviations, i.e. the best diversifying and worst diversifying style neutral FoFs and the respective style counterparts in Figures A2 in the appendix, we obtain the usual picture of more stable value and more dynamic growth funds versus the benchmark.

Having analyzed the first and second moments of the synthetic FoFs versus the benchmark, we can state the following intermediate results: The average return of the fund portfolios against the benchmark shows that over- and under-performance change during the course of time and under-performance versus the benchmark appears to be first, more likely and second, more severe. The more dynamic and time-dependent nature of the growth funds is partially offset by the value funds, which holds true for both the mean returns as well as the returns' dispersion. For the measure of dispersion (i.e. the standard deviation), we find that building style-neutral fund portfolios is indeed reducing the volatility of returns when being compared to the S&P 500. The clear reduction however, is merely the result of the fact that the value funds are less volatile than the index in almost all periods.

Considering only the first two moments of the portfolio and benchmark returns does not yield a satisfactorily clear picture of whether a style-neutral FoF may be advantageous over a benchmark investment or style FoFs and whether the benefits of diversification are more powerful than the disadvantages caused by countering styles and the so-called portfolio deadweight. A deeper insight is possible by taking into account higher moments of the returns and the tail behaviour.

Looking at the skewness differences in Figures 3a and 3b, we can see that in contrast to the mean and standard deviation graphs, the value and growth parts that constitute the style neutral FoFs are more similar to each other with respect to the behaviour against the

benchmark over time. In addition, we see that the building of style neutral fund portfolios does not result in a significant smoothing of the returns skewness. This may stem from the fact that the skewness of the funds is a more characteristic and time-dependent measure than a style or skill dependent measure for asset returns (although more variation is seen in the growth sub parts again).

- Figures 3 about here -

The difference in kurtosis for the FoFs and their sub-parts are shown in Figures 4a and 4b. Although we can see a similarity to the skewness difference plots above with the two styles not differing as largely as when being investigated via the first two statistical moments, we see that the kurtosis is not reduced against the benchmark returns' kurtosis. This result is puzzling due to the following reasons: As one might expect that the building of style-neutral FoFs should result in a reduction in the tail concentration and a return distribution more centered around the mean, the expected result on the kurtosis is ambiguous. The technical fact that the kurtosis measure is increasing for larger tail concentration as well as for higher probability around the mean does not allow for a final conclusion concerning the style neutral FoF behaviour, as the two expected effects have opposing influences on the value of the kurtosis.

- Figures 4 about here -

As for the mean and standard deviation plots, we have left the minimum and maximum plots in the Appendix, where in Figures A3 are the skewness differences, and in Figures A4 the kurtosis plots are found.

The fact that the amplitude of all results is greater for the growth sub FoFs may be the result of either the fact that the growth funds had a larger variation against the benchmark over time and portfolio sizes or because of the fact that the sample size consisted of more

growth than value funds (making the possible range larger although restricting single portfolio sizes to 24) or a combination of both. Besides delivering interesting insights, having analyzed the first four moments separately did not yield a final conclusion concerning the appropriateness and usefulness of building style neutral FoFs. We therefore take the analysis to the field of performance and risk measures. As described in Section 2, the R ratio serves as a measure that takes into account both reward and risk, while not being flawed by any assumptions and restrictions, like many classical risk and reward measures. Furthermore, the behaviour of FoFs against the benchmark is adequately tracked by this reward to risk ratio, a feature that is highly desirable when considering equity markets in general and especially when recalling the somehow puzzling results from the kurtosis plots.

For the analysis of the R ratio over time, we have chosen to use 40% and 1% as the percentages for the reward (or outperformance) term and the risk (or underperformance) measures that constitute the R ratio. In the explained interpretation, the ratio serves as a measure that is putting the "average" excess returns against the risk of severe underperformances on the weekly horizon. Put another way, it is the average excess returns in the nominator controlled for misplaced aggressive bets of fund managers that lead to underperformance as measured by the denominator.

The R ratio in this context is informative on whether we can expect that building style-neutral FoFs is resulting in a controlled outperformance of the benchmark. As there is no pre-defined number indicating whether the ratio is high or low, we can compare the ratios of value, growth and neutral FoFs with each other, thereby getting a glance at the differences in the benchmark-relative performance. Figures 5a to 5d depict the R ratio over time. We can see the direct comparison in Figure 5b, where the style-neutral FoFs are covered by the dark value and growth FoF R ratios. Only in periods where the light-gray surface is above the dark coverings, the style neutral FoFs have outperformed both types of style FoFs with the same

number of funds included. As we can see, this seldom happens, pointing towards the notion of a countering of styles and therefore a mediocre mixture of both investment styles.

- Figures 5 about here -

While it comes as no surprise that the mixture of differing styles results in an averaging out of characteristics, we can state that the "best of both worlds" may perhaps be obtained, but seemingly not with a 50/50 allocation to the two opposing strategies. As the differing styles are resulting in largely differing return and risk schemes in the various periods, we expect a FoF shifting between styles to be superior to a FoF locked in at 50/50 - given the ability to identify the best time to shift, of course. This result is related to the findings from the geometric mean analysis, where a similar pattern of time-depending performance differences was observed and pointed at an averaging process that may be beneficial or harmful, depending on the time period analyzed.

The implication of an averaging process caused by the mixture of both styles in equal proportion is further strengthened when building the average for all statistics over all 209 periods. Getting rid of the time-dependent effects, we present in Tables A1, A2 and A3 the average of the mean, minimum and maximum of the descriptive statistics and the R ratio for the 10.000 simulated portfolios of each class.

We can see that there is no a priori benefit of building style-neutral FoFs when analyzing the mean returns, the returns' standard deviations and the R ratios that are obtained on average, as seen in Table A1. While both classes seem to underperform against the benchmark, the neutral FoFs do so too, of course. The averaging process and the effects of diversification nevertheless reduce the volatility of the returns, but to a moderate degree only. Regarding the R ratio, we can state that the process is leading to a result that again implies that style-neutrality is not generally beneficial to risk adjusted returns, although we need to

take into account that the average values are not telling the whole story concerning the risk-adjusted performance measure. Therefore, the respective minimum and maximum values for the respective statistics for the 10.000 FoFs of all classes are shown in Tables A2 and A3.

A large dispersion of results is obtained, implying that it greatly depends on which funds were selected by the random number generation for the time spans. For the R ratio as an example, the measure is becoming very low for the worst FoFs, while the highest ratios are more than twice the average. While this is seemingly in contrast to the implied notion of countering styles and cancelling out of active bets of target fund managers as discussed above, one may not interpret these results as evidence against those notions. This is because the average values for minimum and maximum achieved results are very unlikely to be obtained in practice, as it is most unlikely that a fund selection process would result in the minimum or maximum attainable of the respective statistic *all of the time*. In addition, the fact that the neutral FoFs maximum R ratios are higher than those for their style counterparts, but the minimum R ratios are lower, points in the direction that the extrema are merely based on the respective FoF mixture, rather than due to a general effect. However, the extreme values averages over time show how dispersed the results may be, owing to the large differences in the fund sample selected.

5. Conclusion

By building simulated FoFs for the classes of value, growth and style-neutral, we analyze whether those fund portfolios are able to outperform the benchmark and how they compare with each other. Choosing a simulation size of 10.000 portfolios for any of the 3 types of FoFs, 209 windows of 52 weeks and 12 fund sizes, we first separately analysed the mean, standard deviation, skewness and kurtosis of the resulting synthetic portfolios.

While one could conclude that the average mean return, in comparison to the benchmark, is very time-dependent and differing between the style FoFs, the style-neutral FoFs seem to average out these characteristics. The combining effect is more beneficial when looking at the standard deviation, as the standard deviation of the style-neutral FoFs is reduced versus the benchmark. However, this effect is strongly influenced by the generally lower dispersion of returns in the value sector.

As the skewness and kurtosis effects are not as easy to judge as the first two moments, and since the kurtosis results are especially difficult to interpret, we focused on the tails of the synthetic FoF benchmark relative return distributions, using the R ratio. Being informative on the average outperformance distribution of a portfolio versus the benchmark and controlling for severe underperformances, the R ratio shows that building style- neutral FoFs do indeed result indeed in an averaging process, i.e. the style neutral FoFs are merely composites of two opposing styles. This indicates that a mixture of those is not yielding a structure of style-neutral FoFs outperforming *both* styles in a period.

We can therefore conclude that building style-neutral FoFs is reducing uncertainty and the amplitude of various return and risk measures, but a distinctive "best of all worlds" effect is not obtained. For a FoF manager willing to achieve a mediocre and stable pattern of returns, the style neutral approach may serve the purpose, but for strong and risk-adjusted outperformance – and this has to be the aim for any manager – a shifting between the styles could yield more favourable results if the timing is right. However, as most combinations analyzed in the study already underperform the benchmark, there is no need to dig into fee discussions or any survivorship bias effects.

Further research could be done in the field of shifting between styles in FoFs, or put another way, how to find the optimal proportion of the style and growth allocation in a FoF that is investing in both styles and is not locked in at 50/50. In addition, the ongoing financial

market crisis and the credit crunch with severe drawdowns in global equity markets have surely had their impact on the results, which was obvious in the mid and late 2007 periods as well as in the beginning of 2008. While the fund managers could, of course, have chosen to hold more cash and to reduce the holdings of companies most affected, the crisis had its impact not only through the raw performances but through the changing of valuations of companies and therefore a changing picture of price-to-book ratios. While the rapid decline in prices of stock led to a decline in this ratio, companies may have become more of the value type in general until depreciations are made and book values change or the markets recover. This makes the identification of value and growth more complicated and the shifting in the funds' compositions would be highly interesting in case of data availability.

However, the general results found and conclusions made are fairly stable over time and are not the result of the particular stage of time of the credit crisis. The fact that the style-neutral FoFs are protecting from the worst, but make the best unattainable, holds throughout the time span analyzed, only with changing levels.

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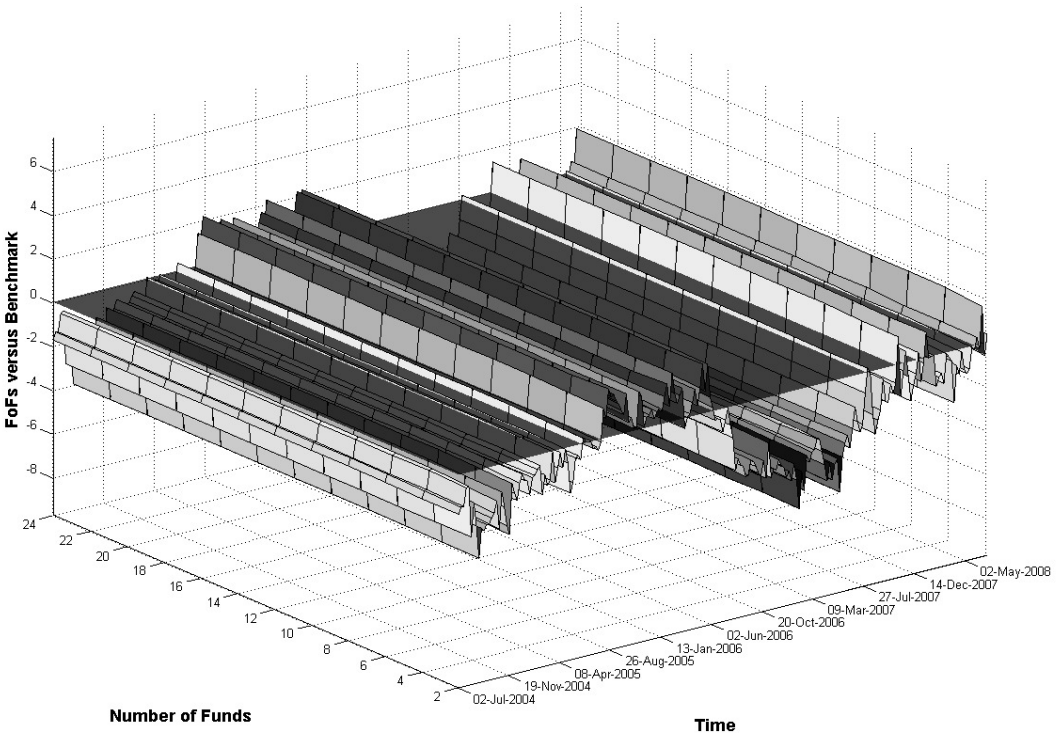

Figure 1: Difference in average annualized geometric mean return for style neutral FoFs against the benchmark

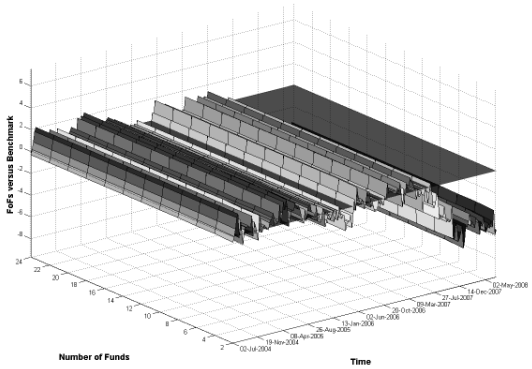

Figure 1a: Difference in average annualized geometric mean return for value FoFs against the benchmark

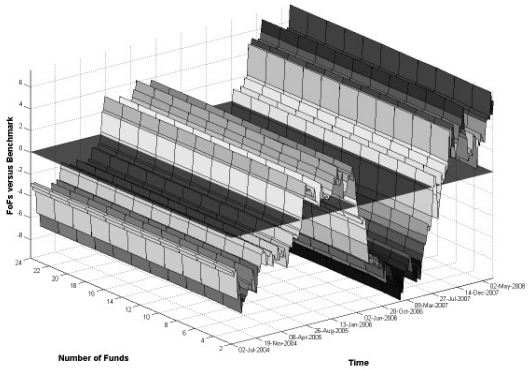

Figure 1b: Difference in average annualized geometric mean return for growth FoFs against the benchmark

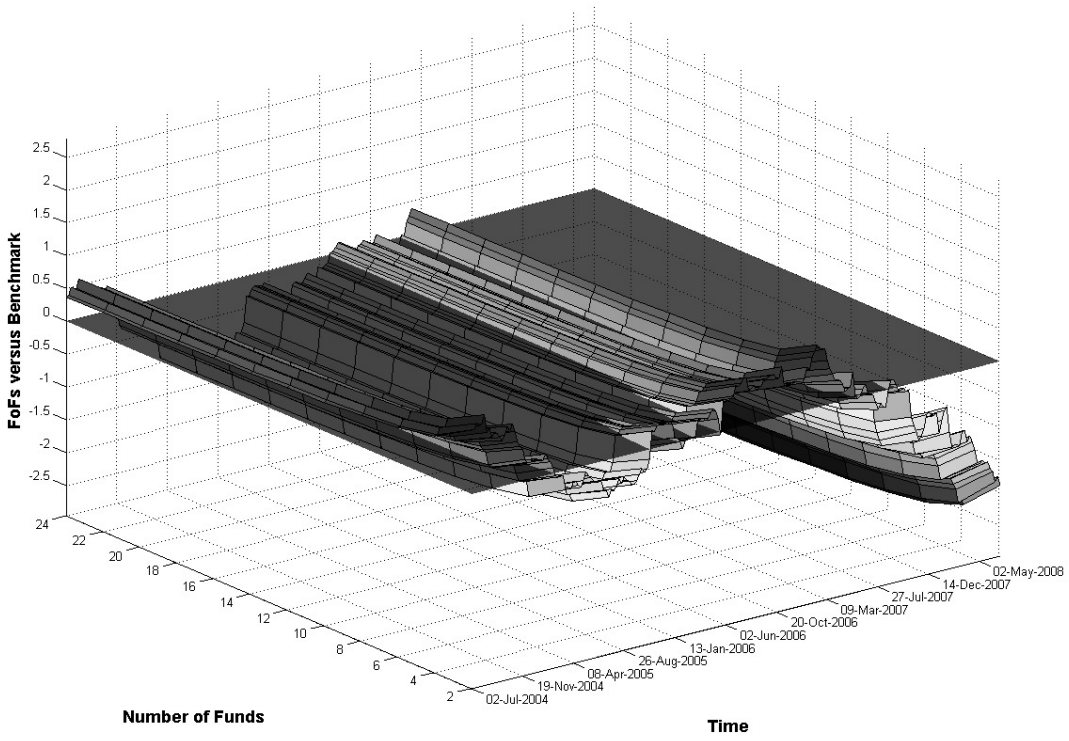

Figure 2: Difference in average annualized standard deviation for style neutral FoFs against the benchmark

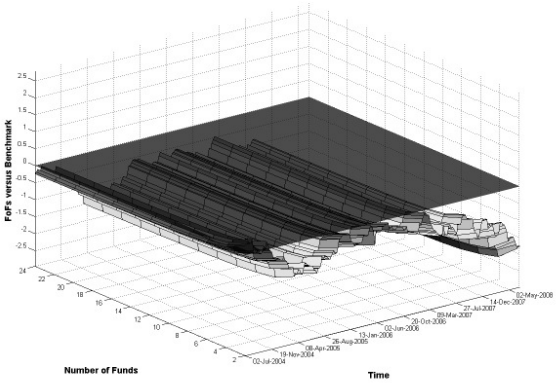

Figure 2a: Difference in average annualized standard deviation for value FoFs against the benchmark

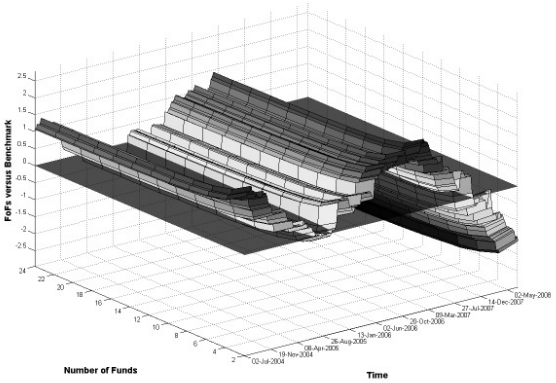

Figure 2b: Difference in average annualized standard deviation for growth FoFs against the benchmark

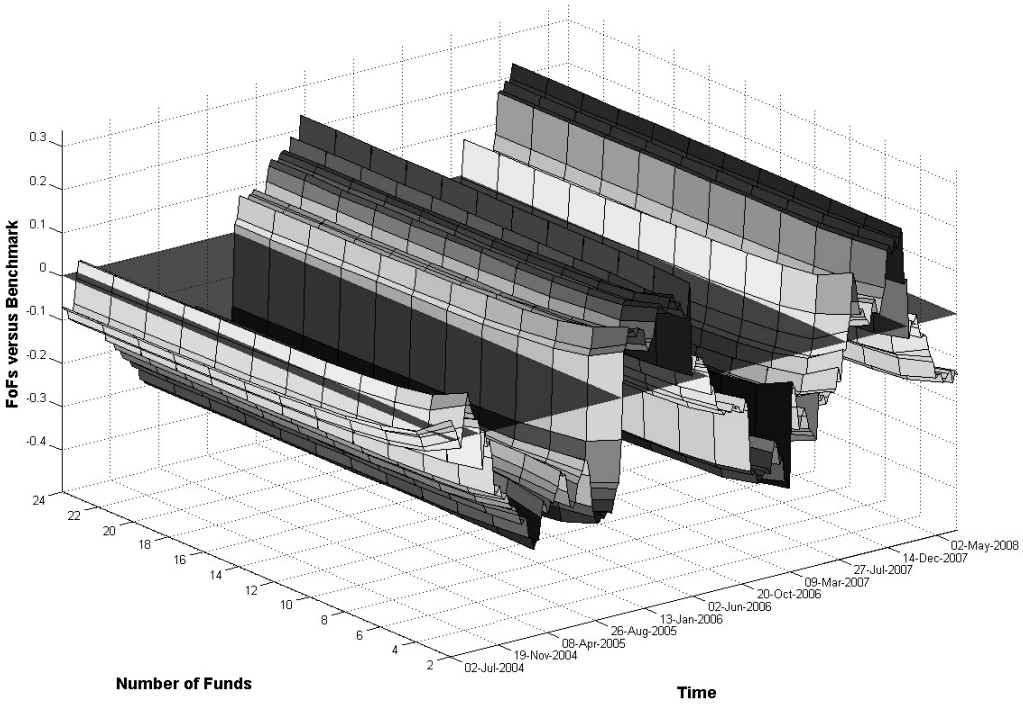

Figure 3: Difference in average skewness for style neutral FoFs against the benchmark

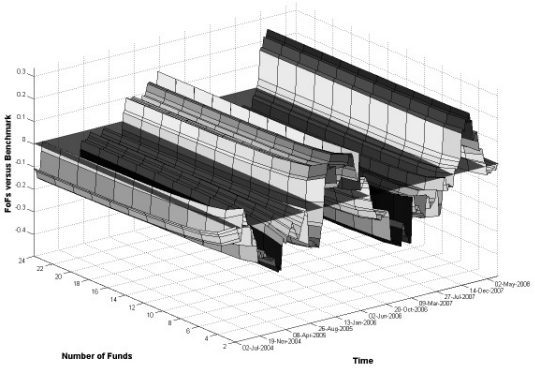

Figure 3a: Difference in average skewness for value FoFs against the benchmark

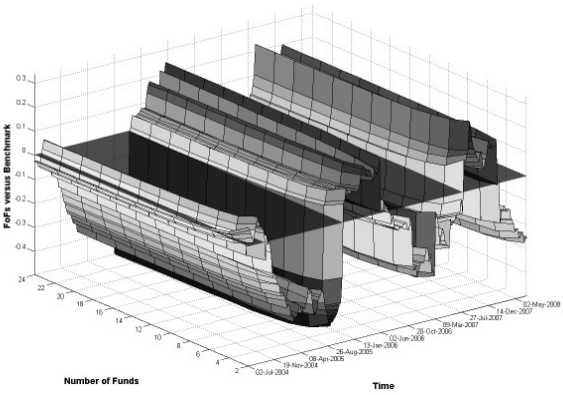

Figure 3b: Difference in average skewness for growth FoFs against the benchmark

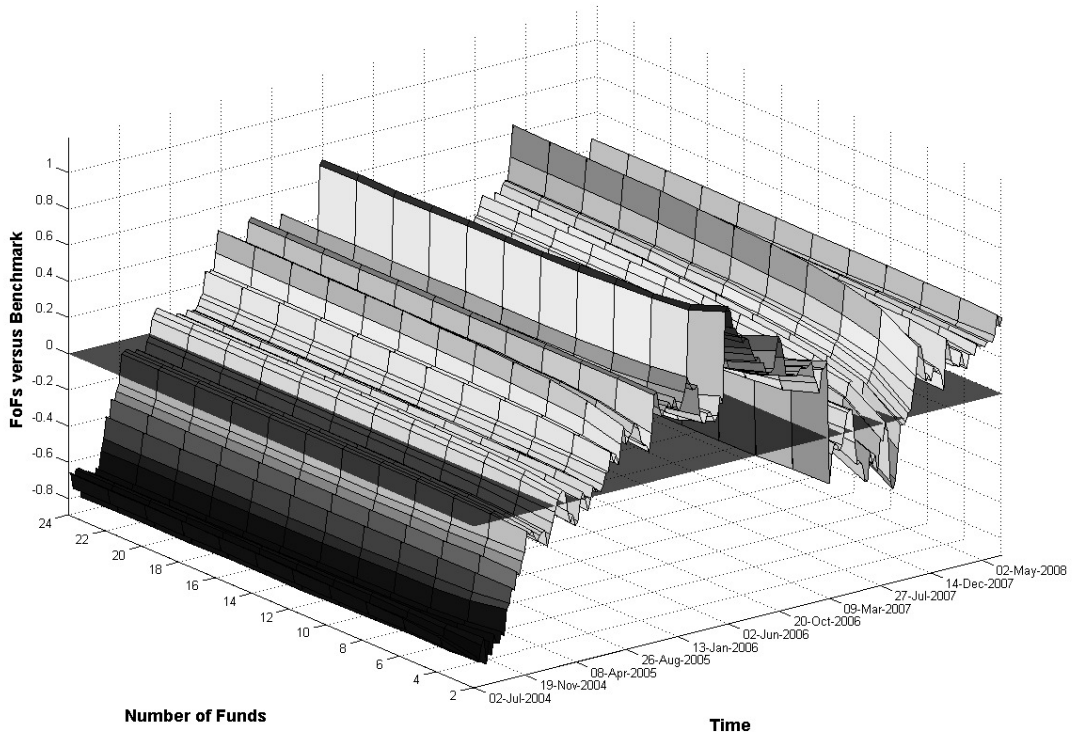

Figure 4: Difference in average kurtosis for style neutral FoFs against the benchmark

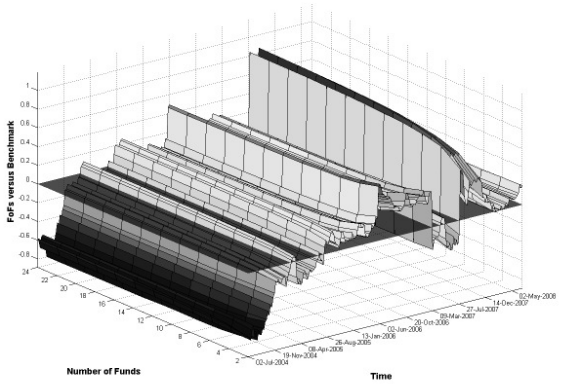

Figure 4a: Difference in average kurtosis for value FoFs against the benchmark

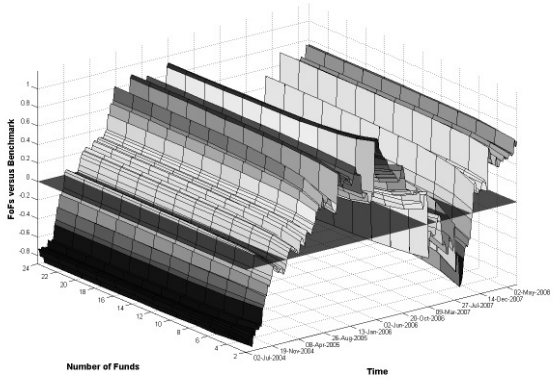

Figure 4b: Difference in average kurtosis for growth FoFs against the benchmark

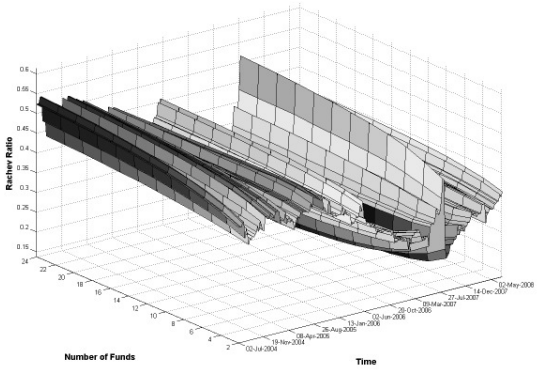

Figure 5a: Average R ratio of the style-neutral funds of funds.

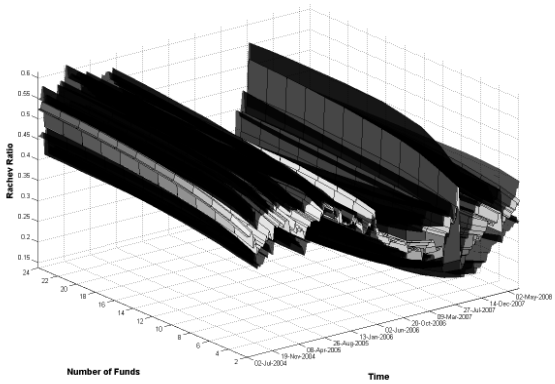

Figure 5b: Average R ratio of the style-neutral funds of funds and the sub funds of funds

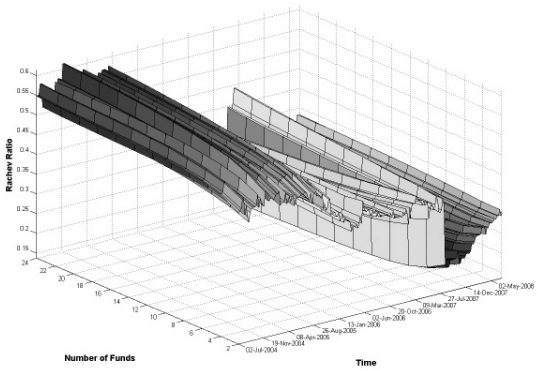

Figure 5c: Average R ratio of the value sub funds of funds.

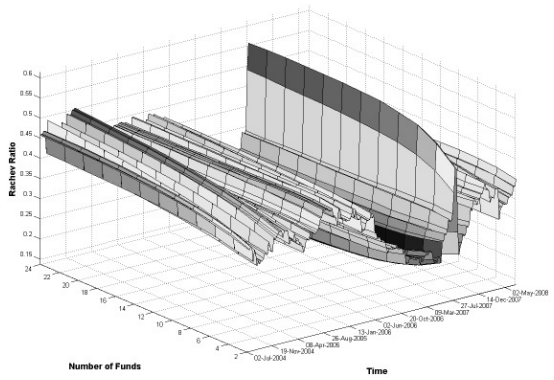

Figure 5d: Average R ratio of the growth sub funds of funds.

Appendix

Number Funds	Mean Return	Mean Return	Mean Return	Standard Deviation	Standard Deviation	Standard Deviation	R ratio	R ratio	R ratio
	Neutral	Value	Growth	Neutral	Value	Growth	Neutral	Value	Growth
2	-1,14%	-0,84%	-1,39%	0,02%	-0,56%	0,75%	0,36	0,38	0,35
4	-1,10%	-0,81%	-1,34%	-0,30%	-0,82%	0,39%	0,36	0,38	0,36
6	-1,08%	-0,80%	-1,32%	-0,40%	-0,91%	0,26%	0,36	0,39	0,36
8	-1,08%	-0,79%	-1,31%	-0,46%	-0,95%	0,20%	0,36	0,39	0,36
10	-1,07%	-0,79%	-1,31%	-0,49%	-0,98%	0,16%	0,36	0,39	0,36
12	-1,07%	-0,79%	-1,31%	-0,52%	-1,00%	0,13%	0,36	0,39	0,36
14	-1,07%	-0,79%	-1,30%	-0,53%	-1,01%	0,12%	0,36	0,39	0,36
16	-1,07%	-0,79%	-1,30%	-0,54%	-1,02%	0,10%	0,36	0,40	0,36
18	-1,07%	-0,78%	-1,30%	-0,55%	-1,03%	0,09%	0,36	0,40	0,36
20	-1,06%	-0,78%	-1,30%	-0,56%	-1,03%	0,08%	0,36	0,40	0,36
22	-1,06%	-0,78%	-1,30%	-0,57%	-1,04%	0,08%	0,36	0,40	0,36
24	-1,06%	-0,78%	-1,30%	-0,57%	-1,04%	0,07%	0,36	0,38	0,36

Table A1: Average statistics for FoFs versus the S&P 500 over all 209 time periods of the average of the respective statistic for 10.000 simulated portfolios for value, growth and neutral FoFs

Number Funds	Mean Return	Mean Return	Mean Return	Standard Deviation	Standard Deviation	Standard Deviation	R ratio	R ratio	R ratio
	Neutral	Value	Growth	Neutral	Value	Growth	Neutral	Value	Growth
2	-11,56%	-8,51%	-12,60%	-2,57%	-2,29%	-2,48%	0,12	0,17	0,13
4	-9,47%	-6,99%	-10,13%	-2,44%	-2,22%	-2,25%	0,11	0,17	0,14
6	-7,99%	-5,82%	-8,47%	-2,22%	-2,07%	-1,94%	0,14	0,20	0,16
8	-6,98%	-4,99%	-7,42%	-2,06%	-1,93%	-1,73%	0,16	0,23	0,18
10	-6,28%	-4,33%	-6,70%	-1,92%	-1,83%	-1,56%	0,18	0,25	0,20
12	-5,79%	-3,81%	-6,15%	-1,81%	-1,73%	-1,41%	0,19	0,27	0,21
14	-5,37%	-3,36%	-5,68%	-1,73%	-1,65%	-1,31%	0,20	0,29	0,22
16	-5,01%	-2,96%	-5,32%	-1,66%	-1,57%	-1,20%	0,21	0,31	0,23
18	-4,75%	-2,57%	-4,98%	-1,59%	-1,50%	-1,11%	0,22	0,32	0,24
20	-4,49%	-2,18%	-4,71%	-1,54%	-1,41%	-1,03%	0,23	0,34	0,25
22	-4,27%	-1,72%	-4,45%	-1,49%	-1,30%	-0,96%	0,24	0,36	0,26
24	-4,09%	-1,14%	-4,23%	-1,44%	-1,15%	-0,90%	0,24	0,38	0,26

Table A2: Average statistics for FoFs versus the S&P 500 over all 209 time periods of the minimum of the respective statistic for 10.000 simulated portfolios for value, growth and neutral FoFs

Number Funds	Mean Return Neutral	Mean Return Value	Mean Return Growth	Standard Deviation Neutral	Standard Deviation Value	Standard Deviation Growth	R ratio Neutral	R ratio Value	R ratio Growth
2	10,45%	7,01%	11,70%	4,29%	2,21%	5,55%	0,77	0,68	0,74
4	8,22%	5,60%	8,44%	2,92%	1,35%	3,99%	0,80	0,70	0,73
6	6,40%	4,42%	6,49%	2,13%	0,78%	3,10%	0,72	0,63	0,67
8	5,31%	3,54%	5,28%	1,67%	0,40%	2,58%	0,67	0,59	0,63
10	4,52%	2,86%	4,44%	1,35%	0,11%	2,22%	0,63	0,56	0,59
12	3,91%	2,33%	3,82%	1,11%	-0,11%	1,95%	0,60	0,53	0,57
14	3,47%	1,86%	3,34%	0,94%	-0,28%	1,75%	0,58	0,52	0,55
16	3,09%	1,43%	2,92%	0,80%	-0,42%	1,60%	0,56	0,50	0,53
18	2,79%	1,05%	2,55%	0,68%	-0,56%	1,43%	0,54	0,48	0,52
20	2,53%	0,64%	2,22%	0,58%	-0,68%	1,32%	0,53	0,47	0,51
22	2,28%	0,20%	1,98%	0,48%	-0,81%	1,21%	0,52	0,45	0,50
24	2,05%	-0,41%	1,73%	0,42%	-0,96%	1,12%	0,51	0,42	0,49

Table A3: Average statistics for FoFs versus the S&P 500 over all 209 time periods of the maximum of the respective statistic for 10.000 simulated portfolios for value, growth and neutral FoFs

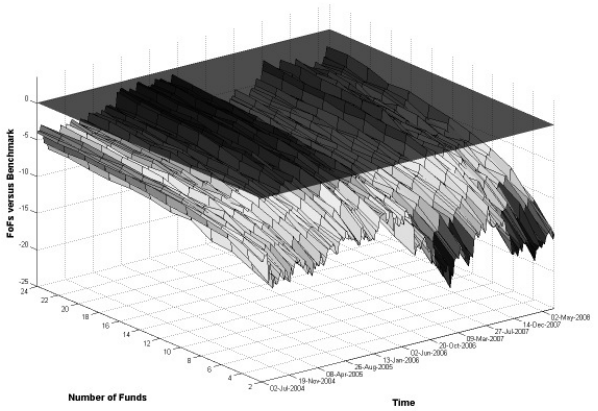

Figure A1a: Difference in lowest annualized geometric mean return for style neutral FoFs against the benchmark

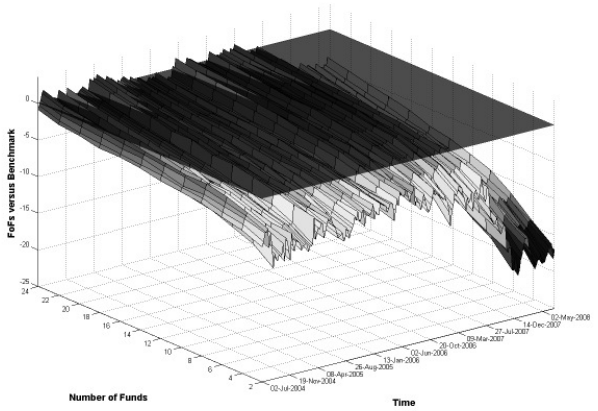

Figure A1b: Difference in lowest annualized geometric mean return for value sub FoFs against the benchmark

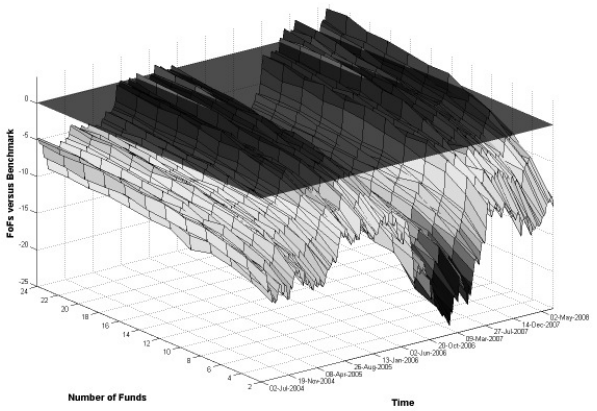

Figure A1c: Difference in lowest annualized geometric mean return for growth sub FoFs against the benchmark

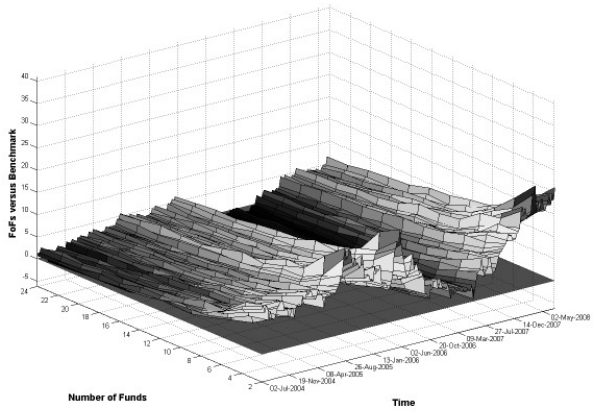

Figure A1d: Difference in highest annualized geometric mean return for style neutral FoFs against the benchmark

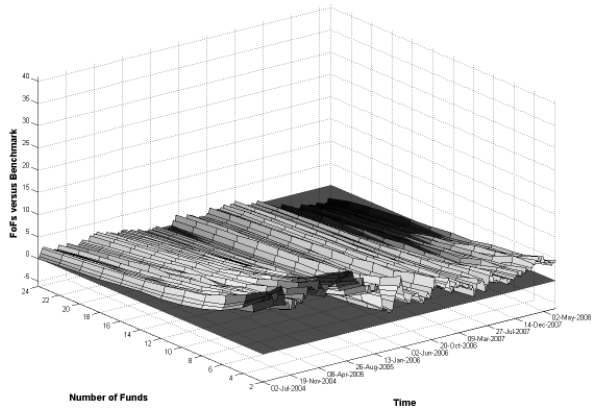

Figure A1e: Difference in highest annualized geometric mean return for value sub FoFs against the benchmark

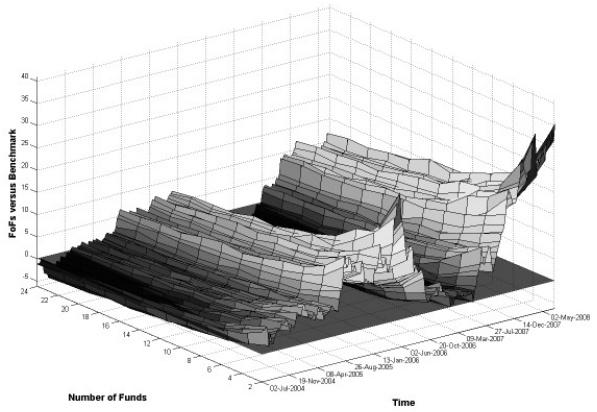

Figure A1f: Difference in highest annualized geometric mean return for growth sub FoFs against the benchmark

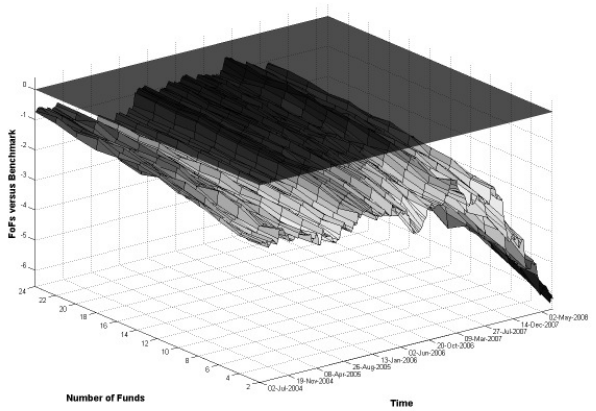

Figure A2a: Difference in lowest annualized standard deviation for style neutral FoFs against the benchmark

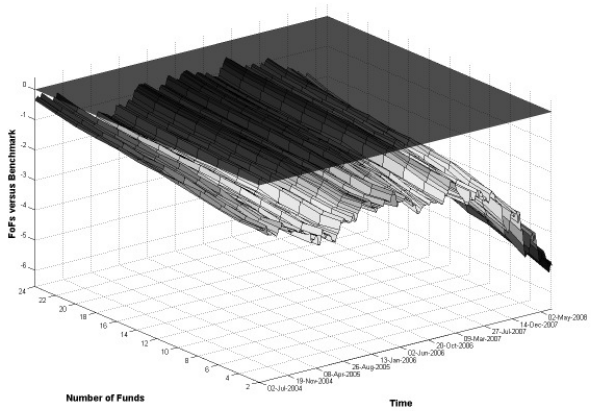

Figure A2b: Difference in lowest annualized standard deviation for value sub FoFs against the benchmark

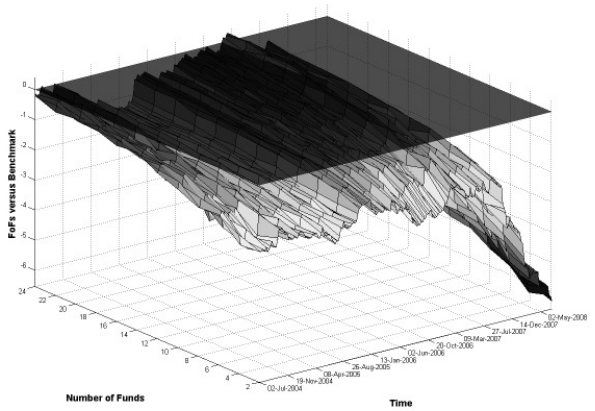

Figure A2c: Difference in lowest annualized standard deviation for growth sub FoFs against the benchmark

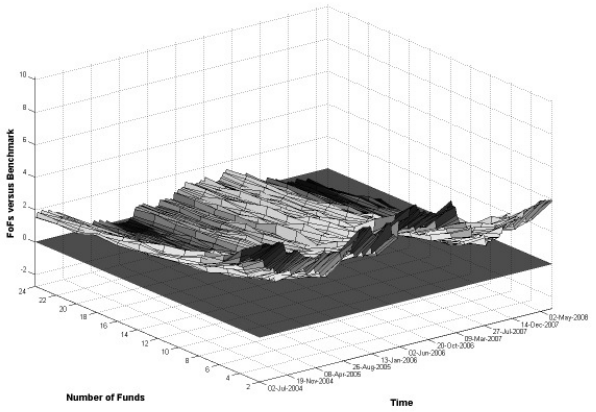

Figure A2d: Difference in highest annualized standard deviation for style neutral FoFs against the benchmark

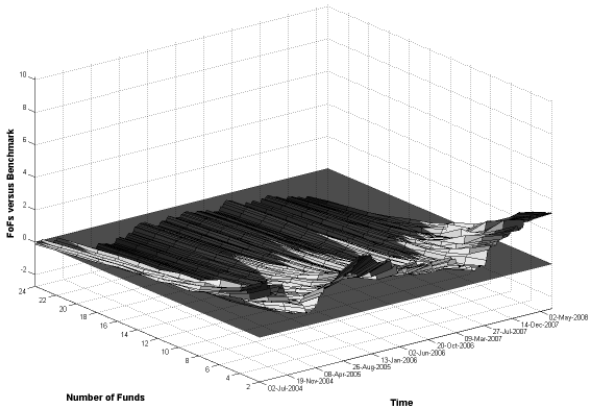

Figure A2e: Difference in highest annualized standard deviation for value sub FoFs against the benchmark

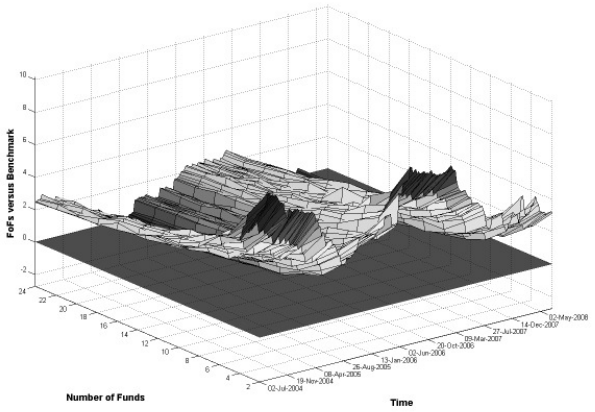

Figure A2f: Difference in highest annualized standard deviation for growth sub FoFs against the benchmark

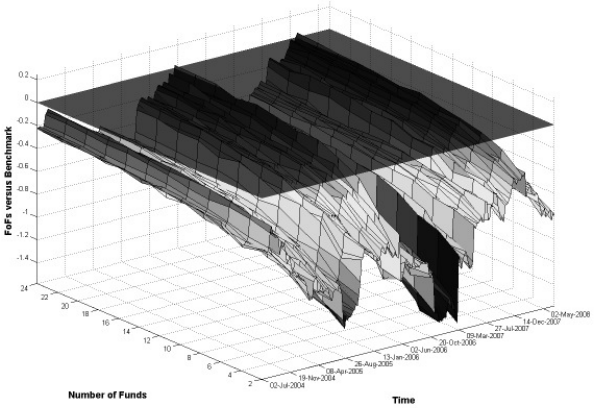

Figure A3a: Difference in lowest skewness for style neutral FoFs against the benchmark

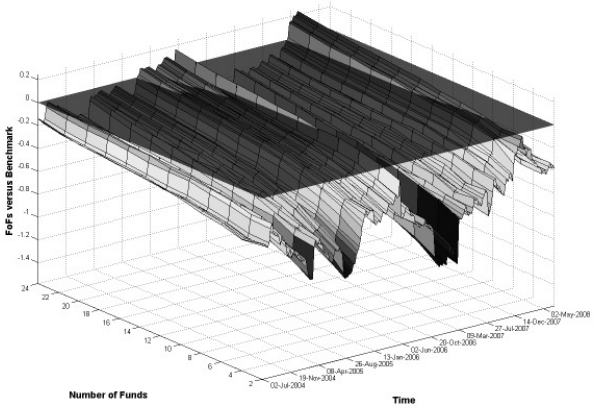

Figure A3b: Difference in lowest skewness for value sub FoFs against the benchmark

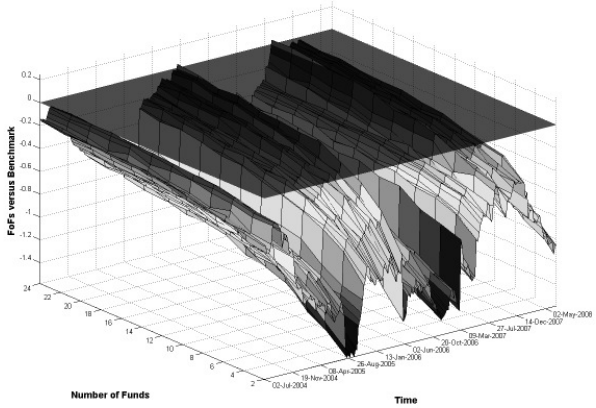

Figure A3c: Difference in lowest skewness for growth sub FoFs against the benchmark

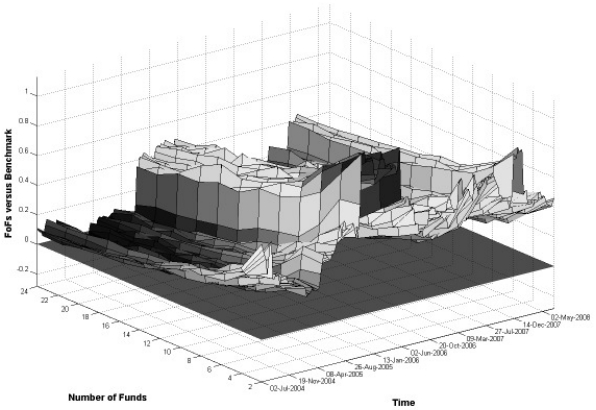

Figure A3d: Difference in highest skewness for style neutral FoFs against the benchmark

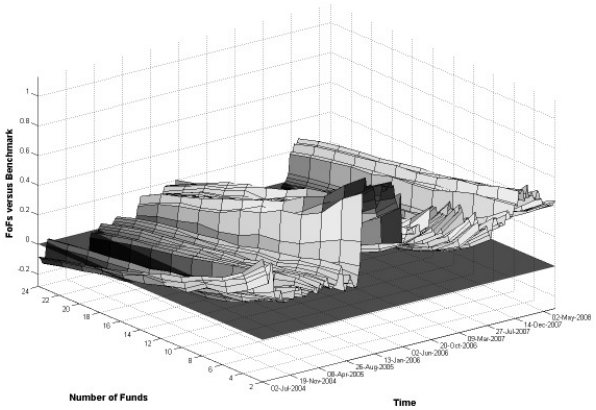

Figure A3e: Difference in highest skewness for value sub FoFs against the benchmark

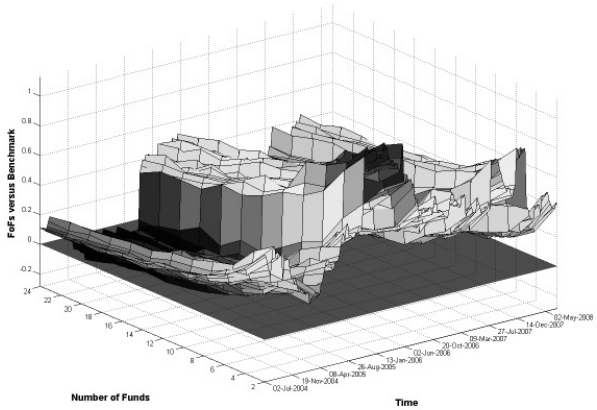

Figure A3f: Difference in highest skewness for growth sub FoFs against the benchmark

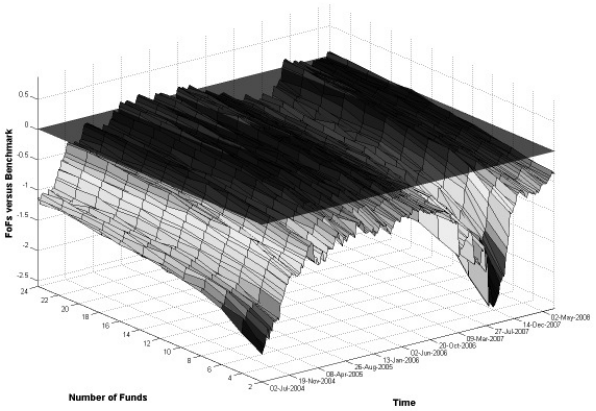

Figure A4a: Difference in lowest kurtosis for style neutral FoFs against the benchmark

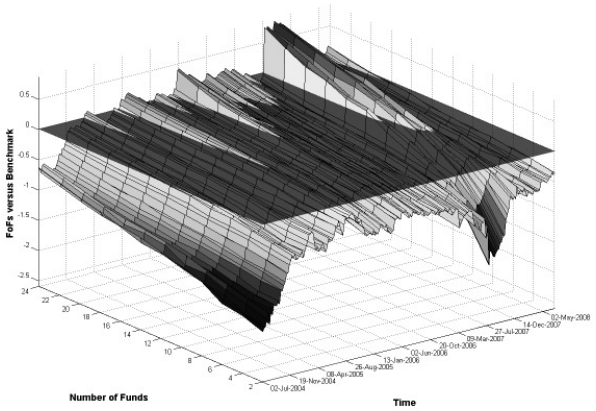

Figure A4b: Difference in lowest kurtosis for value sub FoFs against the benchmark

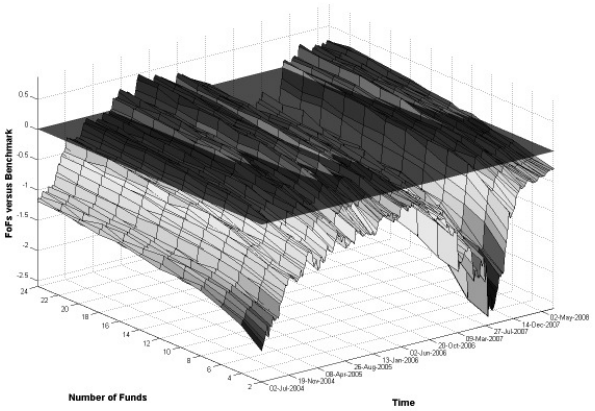

Figure A4c: Difference in lowest kurtosis for growth sub FoFs against the benchmark

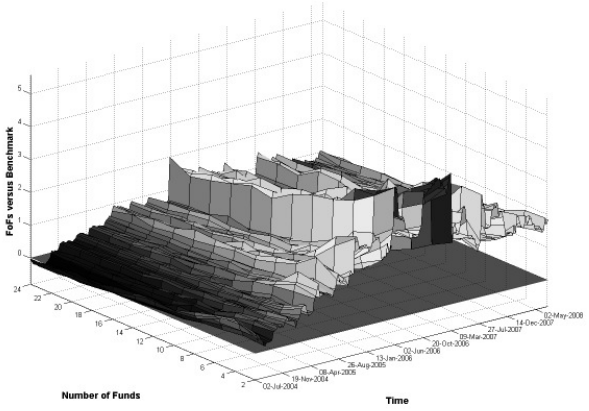

Figure A4d: Difference in highest kurtosis for style neutral FoFs against the benchmark funds

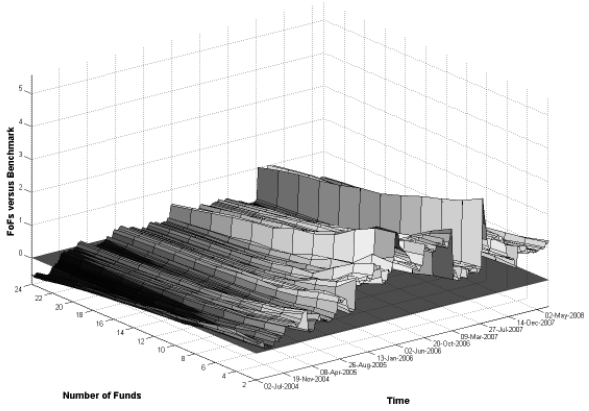

Figure A4e: Difference in highest kurtosis for value sub FoFs against the benchmark

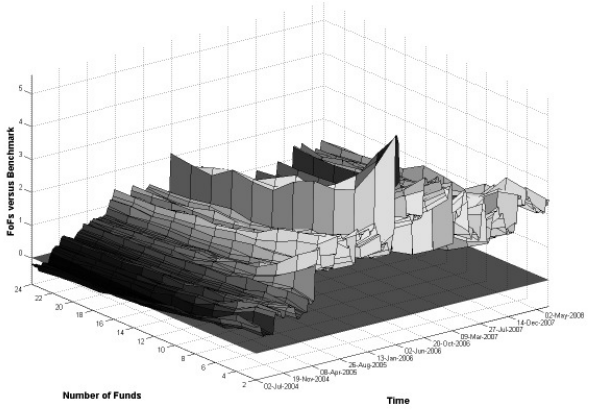

Figure A4f: Difference in highest kurtosis for growth sub FoFs against the benchmark

[i] Another popular extension is provided by the four factor model of Carhart (1997) who augmented the analysis with a momentum factor. See Haugen and Baker (1996) for a discussion of 50 possibly influencing factors.

[ii] See Brown *et al* (2004) for a discussion of fees on fees in FoFs.

[iii] Connelly acknowledges that this measure is obtained from a presentation by William Jacques at a conference on active versus passive investment management sponsored by the Institute for International Research.

[iv] See Chan et al. (2005) for an examination of managers' foreign and domestic biases.

[v] According to information from Morningstar, 3 value and 13 growth funds were obsolete from the dataset chosen. The aim of the study is on the effect of style-neutrality however, such that the survivorship influence is not crucial.

[vi] While some funds report prices end of the day, others report prices for the day before. The latter method being called forward-pricing aims at preventing speculative trading against the fund.

[vii] Other possibilities include setting the upper and lower percentage to equal values in order to get a symmetric reward-to-risk measure rather than one that controls for large underperformances that serve as risk measures in the denominator.