August 2007

Research Department

Working Papers - n°5

Can Hedge Fund Indices Be Classified as Financial Indices for the Purpose of UCITs?" A Reply

Noël Amenc,
Professor at EDHEC Business School, Director,
EDHEC Risk and Asset Management Research Centre,
Member of the Scientific Board of the French Financial Market Authority (AMF)

Felix Goltz
Senior Research Engineer,
EDHEC Risk and Asset Management Research Centre

AUTORITÉ DES MARCHÉS FINANCIERS
AMF

Introduction

Hedge fund indices have seen widespread growth over the past few years, reflecting both the general growth of the hedge funds industry and the strengthening position of indices over other investment vehicles, such as funds of funds. The interest in indices is mainly driven by institutional investors, who have a strong preference for low fee, transparent and risk controlled investments. Since derivatives, such as exchange-traded certificates based on hedge fund indices are available on the market, european investment funds could - in principle - use such instruments in their investment portfolio. For this to be the case, however, these instruments have to be made eligible by the regulator. A recently published paper by François Serge Lhabitant, has addressed the question of whether hedge fund indices should or should not be eligible for UCITS. We have chosen to reply to this paper for a number of reasons. First, the Lhabitant (2006) paper is quite exhaustive in terms of the arguments that have been put forward against the eligibility of hedge fund indices for UCITS. Second, the views presented in the document have been put forward by the French regulator, the *Autorité des marchés financiers* (AMF), which has published the paper in its working paper series and has promoted it vis-à-vis the Committee of European Securities Regulators (CESR). In turn, the CESR has adopted some of the views in its October 2006 issues paper 06-530 about hedge fund indices, in which it sought feedback from market participants prior to potential regulatory clarifications of the status of hedge fund indices. For these reasons, it seems interesting to us to use such a high quality document as a basis for a discussion of the issues relating to UCITS eligibility of hedge fund indices.

In this document, we will review the arguments put forward by the Lhabitant (2006) paper. In particular, we will examine whether the problems that are outlined for hedge fund indices do also exist for other indices that seem to be widely accepted. Our conclusion is that the limits of hedge fund indices that the Lhabitant (2006) paper points out indeed exist. However, in this document, we point out that solutions to the problems of hedge fund indices exist, or in other words, that currently, “quality hedge fund indices are available”, a possibility that the Lhabitant (2006) paper only acknowledges for the future. In addition, there seems to be confusion between investable and non-investable indices, as many problems underlined for non-investable indices (notably the data biases) are less severe for investable indices. It is thus surprising that the Lhabitant (2006) paper insists so much on the problems of database biases with non-investable indices, when the only type of index that is actually relevant for UCITS is the investable type, which is the only one that can be used as a support for derivatives that can easily be hedged.

What is more, we argue that most of the problems are not specific to hedge fund indices, but also exist with well accepted instruments such as stock market indices. Therefore, rejecting hedge fund indices seems to be inconsistent with the treatment of indices for other asset classes which face the same types of problems.

[1] *See Lhabitant (2006).*
[2] *See CESR (2006).*

For all these reasons, it would be regrettable to reject all hedge fund indices, without distinguishing between those that do provide quality indices, and those that only use the term “index” for marketing reasons without fulfilling the quality requirements.

It should also be noted that various types of hedge fund indices exist and one can classify existing indices along two lines. The first distinction is between non-investable and investable indices. We will show in this document that most of the criticism voiced in the Lhabitant (2006) paper applies to non-investable indices. However, we will also show that investable indices may avoid the database biases of non-investable indices and that methods to make such investable indices truly representative exist. The second distinction is between strategy indices for a given hedge fund style or strategy and global hedge fund indices that aggregate funds across all investment styles. The objective of constructing representative indices is far more feasible for strategy indices that may attain representativeness for a given style than it is for global indices, which cannot claim to be truly representative of the entire hedge fund universe.

The remainder of this document is organised as follows. First, we will review the critique that has been addressed at hedge fund indices and situate this critique within the context of the question of UCITS eligibility. Second, we will address whether the problems of hedge fund indices are really unique, by assessing the same quality criteria for stock market indices. A final section provides the main conclusions.

1. The critique of hedge fund indices

1.1 The question of UCITS eligibility

The Committee of European Securities Regulators (CESR) has recently issued advice to the European Commission in which it clarifies the definition of eligible assets, including advice on hedge fund indices. The eligibility of hedge fund indices has been suspended for a period of 12 months and consultation is ongoing on the status that hedge fund indices should be given.

In order to be eligible, hedge fund indices have to be "financial indices" as defined by the CESR. A variety of criteria exist for an index to be able to be classified as a "financial index." These criteria are stated in the 2nd Consultation Paper, Level 2, Box 14, Para. 1, and the list below provides an overview.

- Transparency. The relevant rules, which include the methodologies involved in the construction of the index (i.e., calculation methodology, the weighting methodology, and rebalancing methodology, etc.) and component selection principle, should be disclosed clearly. Any further changes in those areas should be announced before being executed and any operational difficulties that will lead to inaccurate information should also be revealed. In addition, to reach the transparency standards, an index is also required to be published promptly.

- Diversification. The index should be sufficiently diversified; in other words, the underlying portfolio of the index cannot be concentrated on a single body, so that the index will not be influenced by changes in any small components. To ensure this diversification, the design of the construction methodology is the foundation, especially the weighting principle. The Directive set up the weighting limits for the investment funds in Article 25, which should also be the instructions for the indices.

- Representativeness. As a benchmark of the relevant market, the index should provide its users with meaningful and useful market information. The fluctuation of the index must describe the real changes in the related market. Maintaining the representativeness of an index is a continuous work, which includes periodical reviews and rebalancing.

The Lhabitant (2006) paper argues that, "as a result of their numerous biases, lack of representativity and/or

construction, […] existing hedge fund indices do not fulfil the three basic criteria required to become UCITS III eligible […]". The paper "therefore suggest[s] excluding them from the list of UCITS III eligible assets. Of course, in the future, this position could be revised once quality hedge fund indices are available […]."

1.2. Limits of hedge fund indices

The biases of hedge fund databases (self-reporting, database selection, survivorship and backfill bias) are a well known problem in hedge fund research. We fully agree with the view put forward in the Lhabitant (2006) paper that these biases are important when using information on hedge fund returns and assessing hedge fund performance. However, we believe that raising the issue of database biases stems from confusion over the distinction between investable and non-investable indices.

To recall the most prominent biases, we will briefly describe selection bias and survivorship bias. Selection bias is generated through the choice of funds that are included in the database. The special point in the construction of hedge fund indices is that hedge funds can decide whether they want to be included in an index or not. Lacking subjective selection standards, hedge funds may make the decision to their own benefit – they can decide not to be included in an index to avoid the exposure of their unsatisfactory performance or to hide their extremely good performance. Consequently, the index providers cannot measure the bias nor even estimate the direction of it.

Survivorship bias results from the exclusive inclusion of surviving funds in the index. The funds that stop reporting to the database are often excluded from the index calculation *ex-post*. Since most funds probably stop reporting returns because they close down following poor performance, this typically leads to an upward bias of returns. The estimations in Fung and Hsieh (2000) and Brown, Goetzmann and Ibbotson (1999), respectively 3% and 2.75%, are the most frequently used estimations in studies on hedge fund performance. However, survivorship bias could also be negative, since funds may stop reporting to the database because they are not actively seeking new investments and prefer to avoid disclosure of information. Such funds are typically the most successful in the past, leading to a downward bias from survivorship. Géhin and Vaissié (2004) cite estimations of survivorship bias in the range from -1.32% to 6.67%, depending on the observation period, the sample or the definition used to calculate the survivorship bias.

The problem of database biases is assuredly important when considering the information from non-investable hedge fund indices. These indices are based on large databases of hedge fund returns and the reported performance of such an index is indeed subject to the biases mentioned above. However, such indices do not give rise to actual investment products tracking them, as it is not feasible to actually invest in the large number of funds that the index contains (due to operational limits of the index provider as well as due to the fact that the funds may be closed for new investment). Such indices are used instead to represent

the broad hedge fund universe or in order to benchmark hedge fund performance. Therefore, the only indices that should be used in the context of UCITS are investable hedge fund indices. Such investable hedge fund indices typically rely on a small number of funds in order to allow for investability. The actual track record of such investable indices corresponds to the true returns that have been generated for investors by holding the index, and in that sense, are free of any biases. For example, a fund will be accounted for upon entering the index, with no possibility of "backfilling". Likewise, there is no possibility to exclude a defunct fund that has been included in the index. It is important to note that biases in the sense of "measurement error" do not occur for truly investable hedge fund indices, as far as the true track record is concerned.

Our position on this issue is not unique. Asset management associations such as IMA (Investment Management Association) outlined already in a reply to the CESR that biases lead to a concern with regards to non-investable hedge fund indices rather than to investable hedge fund indices. Index providers have replied to the CESR saying that the database biases are not reflected in their investable indices. Standard & Poor's confirm that their investable hedge fund indices have been specifically constructed to avoid the issue of biases. Likewise, MSCI confirms no impact from survivorship bias on the investable indices over the calculation period because MSCI's investable hedge fund indices are active indices reflecting the performance of all funds that are constituents at each point in time. Consequently, the historical information cannot lead to a back-filling bias since new constituents do not impact the index performance before the publicly announced inclusion date.

It is clear that the comments in the Lhabitant (2006) paper seem to be – at least in part – driven by a misperception regarding investable hedge fund indices, and by confusion about the differences between non-investable hedge fund indices and investable hedge fund indices.

The biases that the Lhabitant (2006) paper puts forward for non-investable hedge fund indices are related to an actual measurement error. The main problem that the Lhabitant (2006) paper outlines for investable indices is a bias that does not refer to an actual "measurement error", but rather to the fact that an index may not give a "good" representation of the entire universe of hedge funds. This is the case for the "classification bias" and for the "sub-representativity bias", mentioned by the Lhabitant (2006) paper. The fact that investable hedge fund indices use only a limited number of funds that have been selected from the entire universe potentially leads to a representativeness problem. Likewise, the difficulty of style classification potentially leads to a problem of "style purity" of these indices. As a consequence, the different indices available on the market give a very different view of hedge fund performance. The concern over existing hedge fund indices not being representative of the universe should however be put into perspective, a point to which we will turn in the following section.

1.3. Innovative Solutions

While hedge fund indices based on large databases come with a large number of biases linked to the construction of the database itself, it should also be stressed that such indices are - by definition - not investable. As a response to this problem, numerous investable hedge fund indices have been created. Our suggestion would be to make only investable indices eligible as underlyings for derivatives to be used by UCITS, since these indices avoid a number of database problems associated with non-investable indices. However, in addition to the low number of funds used by investable indices, providers of investable hedge fund indices often employ the questionable practice of selecting the index constituents based on good performance over the past, which leads to indices that are not at all representative of the entire hedge fund universe for a given strategy. Therefore, one has to insure that these investable indices are also representative. Fortunately, while it may not be straightforward to assure representativeness given the constraint on investability, recent research shows that it is a feasible task to design hedge fund indices that fulfil both requirements, i.e that are representative and investable.

In particular, Goltz, Martellini and Vaissié (2007) examine how modern portfolio theory and factor analysis techniques can be used to build investable, yet representative, hedge fund indices. The results suggest that designing sound (i.e., both representative and investable) hedge fund indices is a feasible task given the specific features of the industry, in particular the lack of capacity and transparency.

A well-known methodology borrowed from empirical research in finance, the concept of factor replicating portfolios, is used to construct representative indices based on a limited number of funds, provided that funds are suitably selected. An optimally designed portfolio is then designed with the objective of replicating the common trend in hedge fund returns for a given strategy. Implementation of this technology would allow investors to reap the benefits of investing in hedge funds, without being subject to selection biases and implicit allocation choices of investment vehicles that are not fully representative. An overview of the results of this study is provided in the appendix of the present document.

Starting with a database of hedge fund returns, Goltz, Martellini and Vaissié (2007) extract the combination of funds that capture the largest possible fraction of the information contained in the data. Technically speaking, this amounts to using the first component of a Principal Component Analysis (PCA) of funds' returns as a candidate for a pure style index. It should be noted that the PCA is conducted on a universe of funds taken from a large database, where both funds that are open or closed to new investments are taken into account. Therefore, the result of the PCA is a factor that represents the entire universe for a given strategy, and biases linked to an exclusion of funds that are not actually investable do not occur.

Specifically, it is better to conduct PCA on standardised returns (so that they all have mean zero and variance one) because this removes differences in variances caused by leverage differences. For example, two funds employing the exact same trading strategy but different leverage will have different return variances.

One may use the method to describe each variable as a linear function of a reduced number of factors. To that end, one needs to select a number of factors *I* such that the first *I* factors capture a large fraction of asset return variance, while the remaining part can be regarded as statistical noise. By taking *I=1*, this method can be used to generate "the best one-dimensional summary" of a set of individual funds.

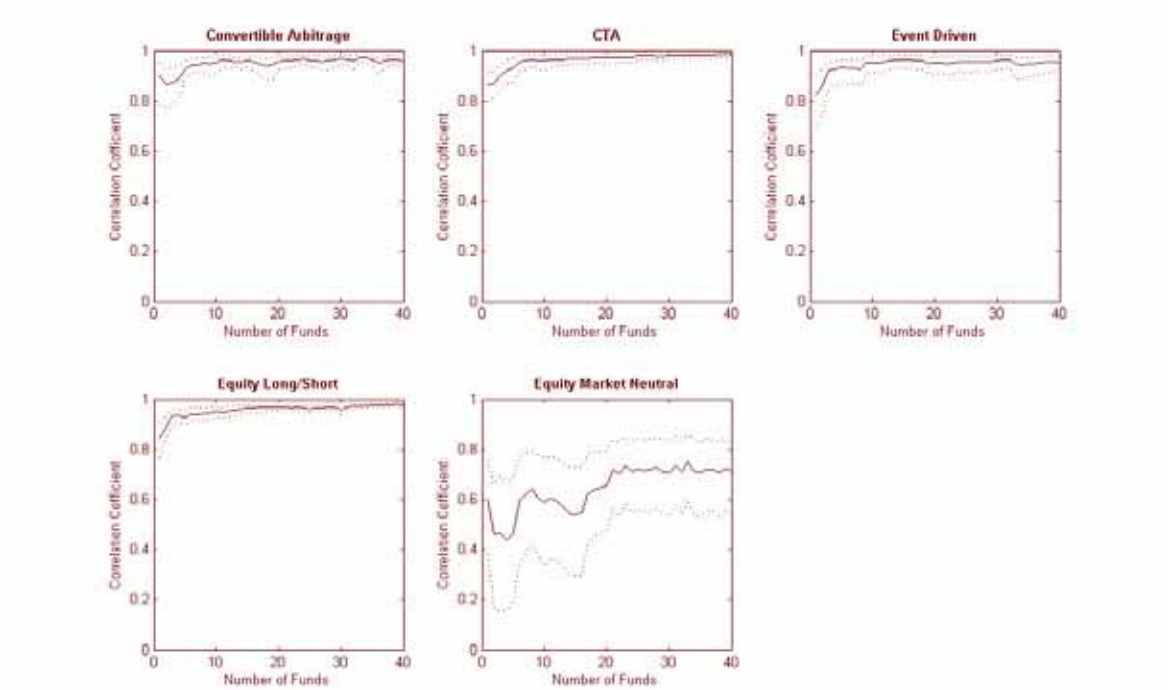
Once the common factor has been extracted, the aim is to replicate this common factor, which represents the entire universe, through a portfolio of a few funds that have the constraint of being open to new investments. Goltz, Martellini and Vaissié (2007) suggest using the following two-stage methodology for building factor-replicating portfolios (FRPs):

- Selection stage: For each strategy, a portfolio is formed using the 10 hedge funds in the corresponding category that are most correlated to the first principal component in the first 3-year calibration period.
- Optimisation stage: The portfolio weights are chosen so that the portfolio returns have maximal correlation with the corresponding principal component.

This two-stage procedure is repeated every year, and the performance of FRPs is examined during an out-of-sample period stretching over 3 years.

In order to judge the representativeness obtained with their factor replicating portfolios (FRPs), the authors examine the correlation coefficient they obtain with respect to the first principal component (PC1). They implement their two-stage procedure, selecting between 1 and 40 funds for each strategy. The correlation coefficients calculated between the first principal components and FRPs composed of different numbers of funds, are shown in the figure below. The 5% and 95% confidence bounds for the out-of-sample correlation coefficient are also indicated.

Figure 1: Correlation coefficients and confidence bounds between FRPs and PC1 as a function of the number of funds included in the FRP



Source : Goltz, Martellini, et Vaissié (2006)

As can be seen from the figure, the out-of-sample correlations with the first principal component are very robust with respect to the number of funds in the FRP. Even when only five to ten funds are used, correlations are very high. On the other hand, choosing more than 10 funds does not significantly increase the correlation. The only case where correlation drops considerably when selecting fewer than 10 funds is the Equity Market Neutral FRP.

2. Are these problems specific to hedge funds?

While we have shown that innovative solutions can tackle the shortcomings of hedge fund indices, it is important to note that the numerous limits of hedge fund indices are not necessarily specific to hedge funds, but may be found in other indices as well. This section assesses some of the problems that have been pointed out with hedge fund indices by looking at the case of stock market indices. The objective is to check whether similar problems arise with stock market indices or whether – on the contrary – the problems really are limited to the area of hedge funds.

2.1. Problem of representativeness

The concern over existing hedge fund indices not being representative of the universe should be put into perspective. In fact, a lack of representativeness is not necessarily specific to hedge funds. It has often been noted that the mechanism of capitalisation-weighting that is applied in stock market indices actually leads to portfolios that are not representative of the entire market (see e.g. Strongin, Petsch and Sharenow (2000), who find that the number of significant stocks in cap-weighted indices is low compared to the actual number of constituents). What is more, some widely accepted indices only contain a small number of stocks in the first place (see also section 2.8. below). In order to directly assess the representativeness of stock market indices, we use the criterion introduced above, i.e. the correlation of index returns with the first principal component. The first principal component has to be constructed using a large number of stocks, and the index returns may then be compared against this factor, which is representative of the entire stock market.

We used monthly returns for the stocks traded on the NYSE, as well as for the Eurostoxx 600 components, to construct the first principal component of stock returns. We then assessed the correlation coefficient of the S&P 500, and respectively the Eurostoxx 50 index returns, with the first principal component (PC1) constructed. The results shown in Table 1 below indicate that the correlation achieved is actually fairly low when compared to the correlation coefficients for investable hedge fund indices with the corresponding first principal component referred to above.

Table 1: Stock Market Indices - Correlation with PC1

	S&P 500 Index	Eurostoxx 50 index
Correlation with PC1 of NYSE components	0.749	-
Correlation with PC1 of Stoxx 600 components	-	0.945

The data used are monthly returns data for the period 01/2003 to 12/2006 for components of the NYSE and for components of the DJ Eurostoxx 600, as well as the monthly returns for the S&P 500 and the Eurostoxx 50 index for the same period.

It should also be noted that the correlation is especially weak in the case of the S&P 500, where we construct the PC1 from stocks traded on the NYSE. For the case of the Eurostoxx 50 index, we do not dispose of such an exhaustive set of stock returns data and have to limit ourselves to the 600 Stoxx components to construct the PC1. It is obvious that in this case, the correlation with the PC1 will be higher. Overall, we may however conclude from table 1 that even the widely accepted stock market indices provide but a limited representation of the universe of traded stocks.

2.2. Problem of return heterogeneity between different providers

In order to further assess the question of the representativeness of hedge fund indices in comparison with stock market indices, we compared the heterogeneity of hedge fund style indices to that of equity style indices (see Amenc and Goltz, 2006). The table below reproduces the results.

Table 2: Heterogeneity of Equity Style and Hedge Fund Strategy Indices

	Equity Style Indices		Hedge Fund Strategy Indices				
	Growth	Value	Convertible Arbitrage	CTA	Event Driven	Equity Market Neutral	Long/Short Equity
Max. Return Difference	2.9%	7.8%	2.0%	7.2%	2.7%	2.2%	2.9%
Index 1 (Return)	4.7%	-3.3%	-1.7%	7.6%	4.0%	2.6%	0.5%
Index 2 (Return)	1.8%	-11.1%	-3.7%	0.4%	1.3%	0.4%	3.4%
Index 1 (Provider)	Stoxx	FTSE	MSCI	FTSE	HFRX	MSCI	FTSE
Index 2 (Provider)	MSCI	S&P	Dow Jones	CSFB/Tremont	FTSE	Dow Jones	CSFB/Tremont
Month of occurrence	Nov. 2002	Feb. 2001	April 2005	Oct. 2003	Nov. 2004	Jan. 2006	Sept. 2004

The data used are monthly returns data for the period 01/1999 to 12/2005 for the growth and value indices. For the hedge fund strategy indices, we use monthly returns from 07/2003 to 04/2006 for all strategies except CTA and Long/Short. For Long/Short, we use data from 01/2003 to 04/2006. For CTA, we use data from 07/2003 to 02/2006. These differences are due to data availability. For example, the monthly data for the S&P CTA index is last available for 02/2006.

The table reveals that equity style indices appear to be as heterogeneous as hedge fund strategy indices. The degree of heterogeneity is important in magnitude. For example, looking at the February 2001 returns for *value* stocks, an investor using the S&P index would have observed a return of -11.1% while an investor using the FTSE index, would have observed a return of -3.3%, a difference of 7.8 percentage points in terms of the monthly return.

From this evidence, we conclude that the problem of representativeness is not limited to hedge fund indices. Rather, even equity style indices which seem to be well established as underlyings for indexing products show a low degree of representativeness.

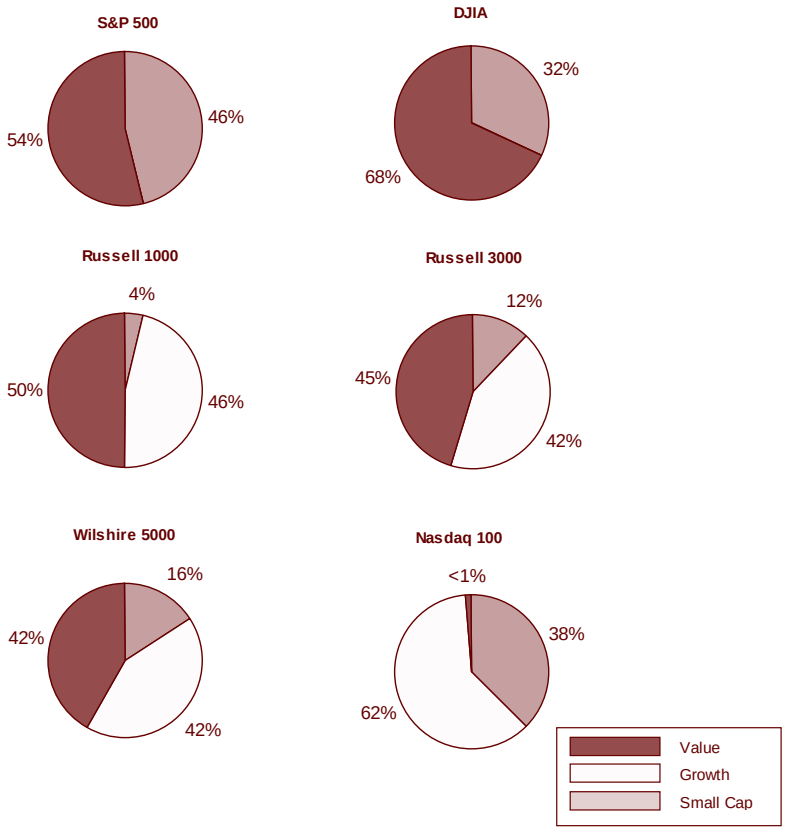
2.3. Problem of style composition heterogeneity between different providers

At this stage, it is appropriate to point out the difference between two types of hedge fund indices. The first type are hedge fund strategy indices that aim to be representative of a given hedge fund style or strategy. The second type are global hedge fund indices that, most often, are not representative of the entire hedge fund universe. As a matter of fact, these global indices either use an asset-weighted or an equal-weighted aggregation of all strategy indices, which leads to biases that depend on the weighting mechanism chosen.

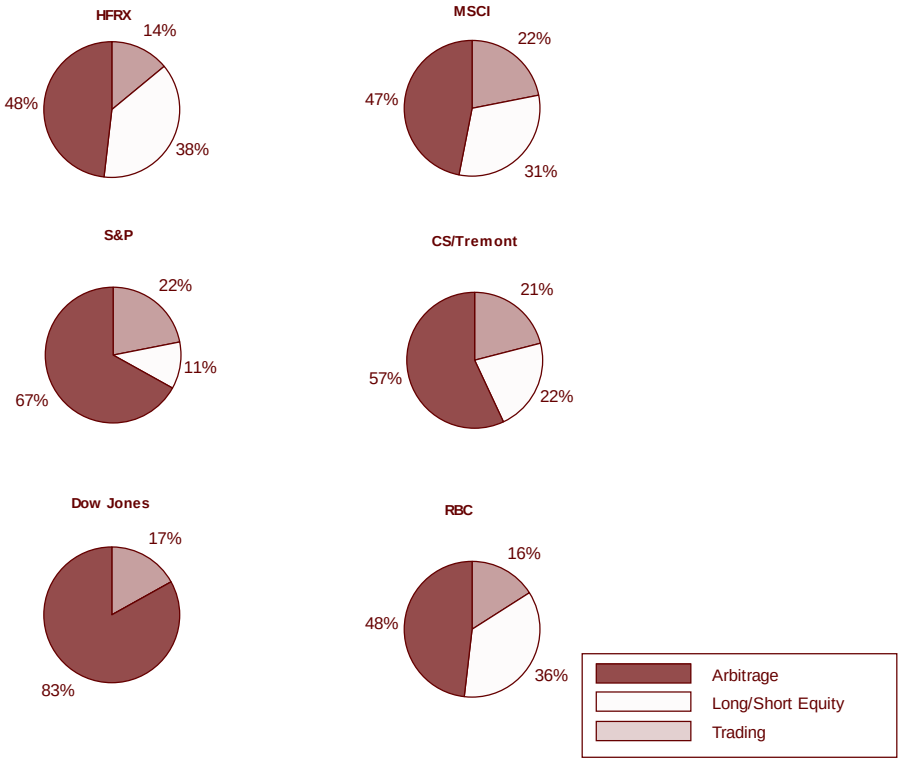
The considerable differences that global hedge fund indices show in terms of strategic allocation is pointed out as a major problem in the Lhabitant (2006) paper. The figure below shows the strategic allocation to investment styles of global hedge fund indices from the Lhabitant (2006) paper (graph 3 on p. 25), as well as that for US stock market indices. The style exposures have been calculated using Sharpe's return-based style analysis for the Dow Jones IA, S&P 500, Russell 1000, Russell 3000, Wilshire 5000, and Nasdaq 100 index. The style exposures are with respect to the returns of MSCI style indices for the U.S, i.e. MSCI *Growth*, *Value* and *Small Cap* indices, and have been calculated using monthly data over the period January 2004 to December 2006.

Figure 2: Strategic style allocation of broad stock market indices and global hedge fund indices

Broad Stock Market Indices



Global Hedge Fund Indices



It becomes evident that the heterogeneous style composition that is presented as a serious problem for hedge fund indices in the Lhabitant (2006) paper is also present in stock market indices. Thus, it can be stated that the stock market indices are heterogeneous concerning their style composition, with some indices displaying a strong *value* tilt (the Dow Jones Industrial Average), others showing a strong *growth* tilt (the NASDAQ 100 index), and some of them being rather balanced (i.e. the Russell and Wilshire indices).

2.4 Problem of style stability

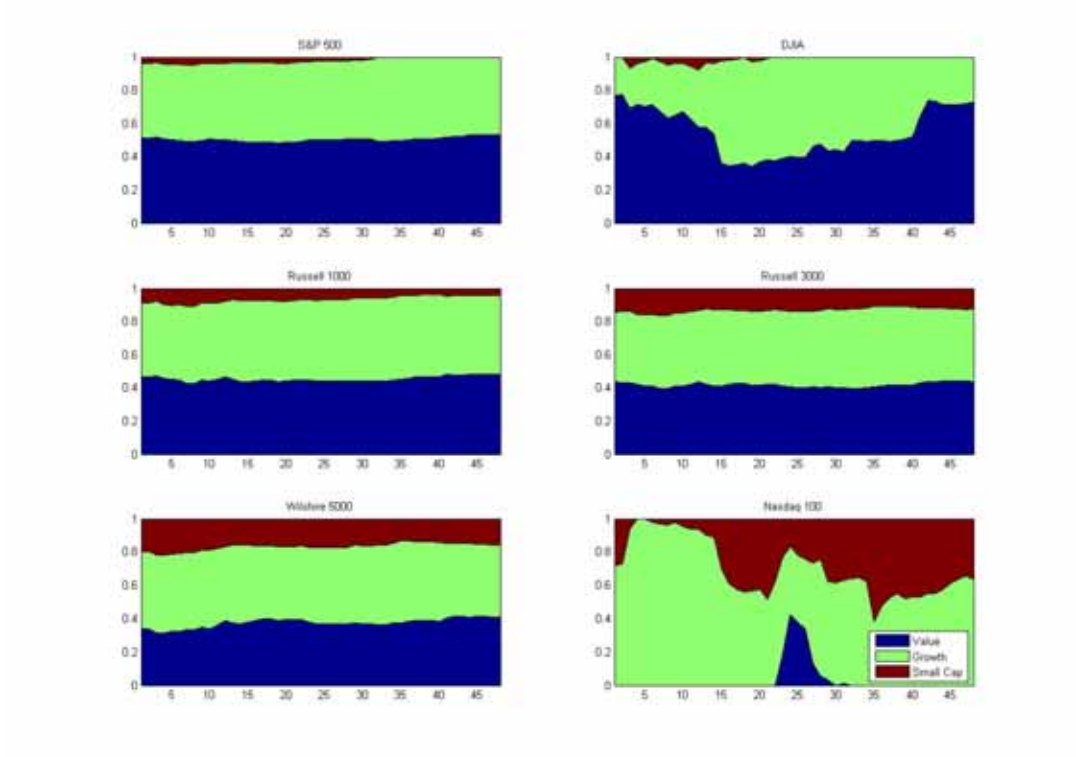
An additional problem concerning style composition is that investors typically seek stability in their exposures. Global hedge fund indices that mix the existing strategies expose investors to a given strategic allocation across styles. Beyond the fact that a given allocation between hedge fund strategies may not correspond to the optimal mix, given a specific investor's initial portfolio, the style composition has a tendency to vary over time. Therefore, investors are exposed to implicit allocation choices which they cannot control.

While this is a serious problem from the investor's perspective, it should be noted that an alternative exists through the use of investable style indices that track the performance of a given hedge fund strategy. Such indices allow customised portfolios of hedge fund strategies that best suit an investor's needs to be built. In addition, the problem of style shifts also exists with broad stock market indices. In fact, when the investor may think that he holds a somewhat 'neutral' allocation, the actual allocation between styles may vary over time. In order to assess the magnitude of this problem, we compare the stability of style exposures of global hedge fund indices and compare it to stock market indices.

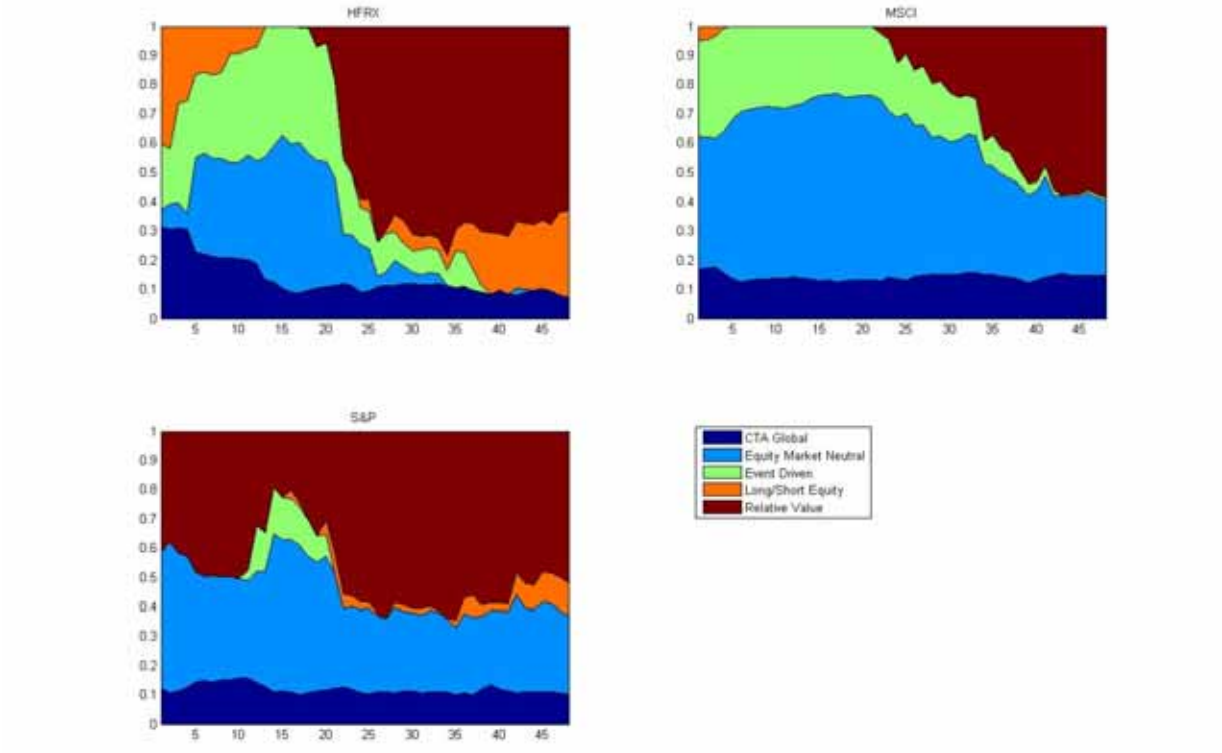
To this end, we perform a returns-based style analysis with monthly data, where we roll the data window in order to obtain the time-varying exposures. The time period is from January 2000 to December 2006. The initial calibration period is given by the first 36 months of the sample. Therefore, the time-varying exposures are observed *ex-post* in each of the 48 months in the period from January 2003 to December 2006. We perform this analysis on both the US stock market indices used above and the global hedge fund indices with available data for the corresponding period, namely the global investable HFR, MSCI and S&P hedge fund indices. The results are shown in the figure below.

Figure 3: Dynamic style exposure of broad stock market indices and global hedge fund indices

Stock market indices



Global hedge fund indices



The results show that considerable variation in style weights is present in both stock market indices and hedge fund indices. While some of the stock market indices have rather stable exposures to the different styles, major indices like the Dow Jones Industrials and the NASDAQ 100 display dramatic variations in their style exposure. For example, the *value* exposure of the *Dow Jones Industrials* takes on values from 40% to 80%. Likewise the *growth* exposure of the NASDAQ varies between 40% and 100%. The style variations of global hedge fund indices are even more pronounced than those of the equity indices. Therefore, there are considerable differences between the HFRX, MSCI and S&P indices, with the latter being more stable over time.

While the style instability of global hedge fund indices is a serious problem for investors, it should be noted that the same type of problem is very pronounced for equity indices as well. In addition, the existence of style shifts is an argument in favour of investable style indices, rather than an argument against hedge fund indices in general.

2.5. Component weighting method

The definition of a weighting scheme is cited as a problem for hedge fund indices in the Lhabitant (2006) paper (see p. 13). It is pointed out that differences in the weights that are attributed to components can lead to important differences in index performance. It should be noted that the problem of choosing a weighting mechanism in index construction exists for any index based on any asset class. However, while standards exist for other asset classes - in particular, capitalisation weighting, which is the standard in equity index construction - hedge fund index providers are faced with a scarcity of information on assets under management which makes it difficult to implement capitalisation weighting.

However, it should be noted that even in the case of equity indices, different weighting schemes exist. First, while most indices use capitalisation weighting, additional criteria are often taken into account, such as sales/revenue and net income (see the “Guide to the Dow Jones Global Titan 50 Index”, January 2006). Second, capitalisation weighting has been subject to severe criticism (see e.g. Haugen and Baker (1991), Amenc, Goltz, and Le Sourd (2006), or Hsu (2006)), pointing out that the mechanics of capitalisation weighting lead to trend-following strategies that provide an inefficient risk-return trade-off. As an answer to such critiques, equity indices with different weighting schemes have emerged, such as “fundamental”-weighted (Arnott, Hsu and Moore (2005)), “diversity”-weighted (Fernholz, Garvy and Hannon (1998)) or equal-weighted indices.

Such different weighting methods lead to considerable differences in the performance of equity indices (see Arnott, Hsu and Moore (2005)), just as is the case with hedge fund indices. While it is somewhat understandable that the discussion of these issues is less pronounced in the equity universe, where market capitalisation weighting is the *de facto* standard, the significant impact of the chosen weighting method on the performance of indices however concerns any asset class and is not specific to hedge funds.

2.6. Selection bias (component selection)

The Lhabitant (2006) paper takes great care in spelling out the sources of selection bias of hedge fund indices (e.g. p. 12). Indeed, as the paper states, the majority of hedge fund index providers apply selection principles to the funds in their database in order to construct their indices. What is more, the problem is exacerbated for investable hedge fund indices, as is rightly pointed out in the Lhabitant (2006) paper (p. 22).

There are in principle two problems that providers of investable indices are facing. First, these providers have to exclude funds that are closed to new investment or have low liquidity or low investment capacity. Second, providers of investable indices have been tempted by *ex post* selection of outperforming funds, which naturally leads to good *pro forma* track records, but faces the same problems of robustness as in-sample optimisation, once the results are observed out of sample.

While the first problem seems to be specific to hedge fund indices, it should be noted that applying selection criteria to index components is also quite common in the area of stock market indices. Ranaldo and Häberle (2006) show that a considerable share of index-related investment management, which is usually considered to be passive investment management, can in fact hide a form of active management. The most well known indices are actually made up of a more restricted number of assets, which are selected using defined rules and are managed in a dynamic way. Likewise, criteria that require interpretation lead to discretionary decisions of index inclusion. S&P for example assess the “financial viability”, “adequate liquidity” and “reasonable price” of constituent companies (see the “S&P U.S. Indices Methodology”, March 2006, <http://www.standardandpoors.com>). The Dow Jones Titans indices are subject to discretionary adjustments of components by an index committee and the Dow Jones Industrial Average even has its components selected at the discretion of the editors of *The Wall Street Journal* (see Ranaldo and Häberle 2006, table 1). For the Dow Jones Industrial Average, apart from one requirement that components need to be US-based, no other pre-determined criteria are laid out for the selection process.

In addition, some of the “fundamental” weighted indices introduced in section 2.5 above actually conduct stock selection in addition to changing the weighting scheme that is applied to components. U.S. stock market indices that conduct such selection of components according to fundamental criteria are the Intellidex indices published by the American Stock Exchange (see <http://www.amex.com>) and the Wisdom Tree indices (see <http://www.wisdomtree.com/>).

What is more, a large number of indices that are provided directly by stock exchanges, which are supposed to fully reflect the respective stock market, do not always contain all stocks, since inclusion in the index is a commercial argument of the stock exchange vis-à-vis the issuers. Any index that involves discretionary decisions by an index committee is susceptible to inherent selection biases and this problem is consequently not at all specific to hedge funds.

2.7. Problem of component transparency

The Lhabitant (2006) paper underlines that replication of hedge fund indices is a difficult task, given that these indices are not transparent with respect to the list of components (see p. 17). However, it should be stressed that even for stock market indices, full transparency is not always granted. For example, the full composition of MSCI Equity indices is not available free of charge to investors. Also, some of the listed index providers do not freely disclose components and component weights to the public. This problem exists generally in the case of indices that are constructed from proprietary databases. As the examples above show, full transparency of indices is not a question that is specific to hedge funds.

In addition, the absence of detailed information on components does not necessarily mean that investors are left without information that is relevant for risk management purposes. In fact, it has been argued that information on risk factor exposure could be more relevant than detailed information on components. One has to bear in mind that transparency is not an objective *per se*, it is simply a means. Indeed, it is no use seeking absolute transparency. What investors really need is enough information to assess the risk and return profile of an investment opportunity with a reasonable degree of certainty. A survey of investors and fund managers (Amenc, Malaise and Vaissié (2005)) showed that investors and managers agreed on the relevance of returns-based performance indicators such as risk exposure and risk-adjusted performance that provide significant quantitative information and enable quality reports to be constructed for final investors, without disclosing single positions, since the major indicators are calculated on the basis of past returns. For hedge fund indices, detailed reporting of performance and risk measures based on past returns may constitute a viable alternative to detailed information on index components.

2.8. Problem of diversification I: number of components

A problem that is often invoked when discussing sufficient diversification of hedge fund indices is the low number of components that these indices have, especially concerning the investable indices. It should be noted that the Lhabitant (2006) paper argues that in principle, only 10 to 15 funds should be sufficient to construct diversified hedge fund indices. In order to analyse once again whether the low number of components is uniquely a problem for hedge fund indices, we compare the number of index components of some investable hedge fund indices to that of a selection of equity indices.

Table 3: Number of index components: Investable hedge fund indices vs. stock market indices

This table shows a list of available hedge fund indices that are investable, as well as the number of components in each index. The information is taken from Goltz, Martellini and Vaissié (2007, table 3). The HFRX index is not listed as the number of components is not disclosed. The table also shows some selected stock market indices along with the number of components.

Investable Hedge Fund Index	Nbr of funds in the index	Stock Market Index	Nbr of stocks in the index
Dow Jones	40	Dow Jones IA	30
FTSE	40	CAC40	40
CSFB/Tremont	60	Eurostoxx 50	50
MSCI	120	FTSE	100

It can be seen that the number of components of investable hedge fund indices is actually in the range of the major stock market indices. Of course, the stock market indices included in table 3 are the narrower indices, and quite often, broader indices exist for the respective geographic region. However, as shown in Amenc, Goltz, and Le Sourd (2006), the narrow indices are actually the leading ones in Europe in terms of market share. Therefore, most investors in traditional index funds, exchange-traded funds or stock index futures are actually exposed to such narrow indices which may not fully represent the entire stock market.

2.9. Problem of diversification II: properties of components and optimal allocation

An important issue to note is that sufficient diversification does not merely depend on the absolute number of components, but also on the properties of these components, as well as on how these components are combined in a portfolio. Learned and Lhabitant (2002) show that there is a risk of “diversification overkill”; in fact, the authors show that by increasing the number of hedge funds in a portfolio, the correlation with the general stock market increases. This indicates that such “over-diversification” reintroduces dependence on the stock market and thus reduces the risk-reduction benefits of mixing such portfolios with traditional asset classes. The authors argue that 5 to 10 hedge funds are sufficient in order to reap the benefits of diversification without falling into the trap of “over-diversification.”

However, the properties of the funds used have to be taken into account instead of their number. The table below, borrowed from Amenc and Goltz (2006), shows that hedge funds show less co-movement than the components of broad stock market indices. Hence, one can conclude that even with a low number of funds, significant diversification can be achieved.

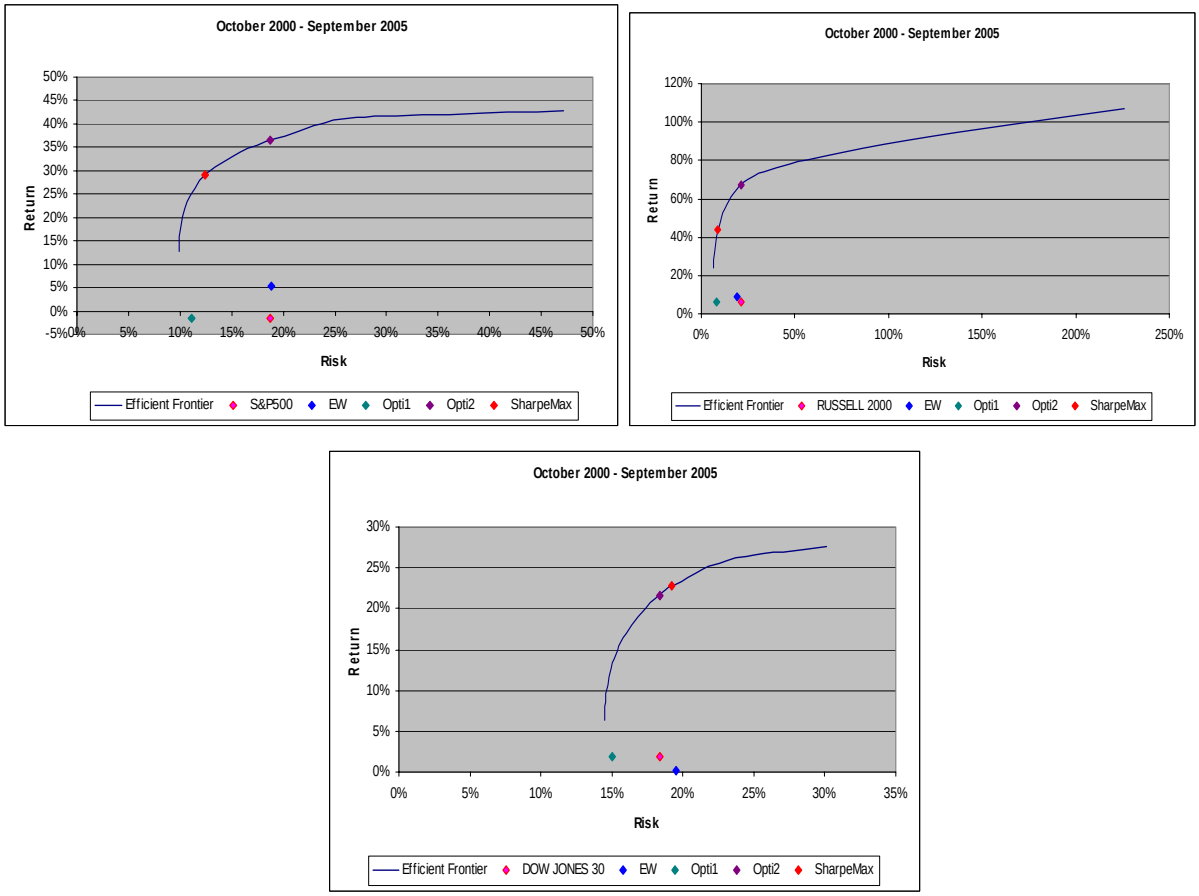
Table 4: Co-movement between index components: hedge funds vs. stocks

	CISDM Funds	Stoxx 600 Index Components
Average Correlation	0.17	0.25
Variance explained by PC1	0.24	0.29

The data used are monthly returns data for the period 01/1999 to 12/2005 for the hedge funds from the CISDM database and for components of the Stoxx 600 index for European stocks.

While it can be seen from table 4 that the diversification potential among index components seems to be more pronounced for hedge funds than for stock market indices, the ultimate goal of an investor is to hold an efficient portfolio. Existing market capitalisation-weighted indices typically fail to provide investors with such a portfolio, as shown recently in Goltz, Amenc and Le Sourd (2006). The figure below taken from Goltz, Amenc and Le Sourd (2006) compares the relative efficiency of stock market indices by comparing their situation on the mean-variance plane with the actual efficient frontier for portfolios containing the index components. They also indicate the equally weighted portfolio and the index in the mean-variance plane. By visually comparing the index with the mean variance efficient frontier, one has an idea of the efficiency of the index. The conclusion on the efficiency of the index will therefore depend on how close the index lies to the mean variance frontier. In order to compare the market index to portfolios obtained through an allocation between the index components, they also plot another three portfolios in the mean variance plane. These are: i) the portfolio with minimum risk given that it has the same return as the index; ii) the portfolio with the maximum return given that it has the same risk as the index and iii) the portfolio with the maximum Sharpe ratio. Comparing the distance of the index with respect to these three portfolios allows for an assessment of the gain an investor can obtain in terms of the risk/return trade-off by deviating from the index using the same stocks.

Figure 4: Optimisation of S&P 500, Russell 2000 and Dow Jones 30 for the period of October 2000 to September 2005



Among the three indices shown here – the S&P 500, Russell 2000 and Dow Jones 30 – the index which is the farthest from the mean variance frontier is the S&P 500. It becomes evident from these results that the broad market indices are dominated in terms of efficiency, not only by an optimal portfolio but also by a naive portfolio that consists of equally weighted component stocks. It appears that it was possible to construct a portfolio made up of the market index constituents with the same return as the index but with a lower risk (Opti 1), or with the same risk as the index but a higher return (Opti 2). In fact, the inefficiency of broad market indices is closely linked to their construction methodology, which uses market capitalisation weights and thus leads to i) a trend-following strategy by increasing the weights of stocks that perform well and ii) a high concentration in a few heavyweight stocks and thus insufficient diversification.

As a conclusion, it seems surprising that so much attention is focussed on a possibly insufficient diversification of hedge fund indices, while completely inefficient stock market indices are widely accepted as benchmarks and/or investment supports.

2.10. Problem of defunct funds

We believe that raising the issue of database biases stems from confusion over the distinction between investable and non-investable indices. The problem of database biases is certainly important when considering the information from non-investable hedge fund indices. These indices are based on large databases of hedge fund returns and the reported performance of such indices is indeed subject to the biases mentioned above. However, such indices do not give rise to actual investment products tracking them, as it is not feasible to actually invest in the large number of funds that the index contains (due to operational limits of the index provider as well as due to the fact that the funds may be closed for new investment). Such indices are used instead to represent the broad hedge fund universe or in order to benchmark hedge fund performance. Therefore, the only indices that could potentially be used in the context of UCITS are investable hedge fund indices. Such investable hedge fund indices typically rely on a small number of funds in order to allow for investability. The actual track record of such investable indices corresponds to the true returns that have been generated for investors by holding the index, and in that sense, are free of any biases. For example, a fund will be accounted for upon entering the index, with no possibility of "backfilling". Likewise, defunct funds are necessarily excluded from investable hedge fund indices as of the occurrence of the event that causes the fund to be defunct. Excluding defunct funds from the track record obviously distorts performance but this is not much of an issue as it does not occur with investable hedge fund indices.

It should be noted that misrepresentation of funds in the hedge fund databases (funds that are defunct or omitted for other reasons or included through backfilling by the database provider) leads to representativeness problems with the databases and with non-investable indices based on those databases. Investable indices on the other hand, are largely free of such biases, since they have a more modest proposal, namely representing the investable (and observable) part of the hedge fund universe rather than the (unobserved) entire hedge fund universe.

In addition, emphasis should be put on the fact that the omission of assets is a generic problem with any index: one may as well blame stock market indices for the fact that they do not include stocks that have been delisted or stocks that are to be listed in the future.

The following table illustrates how stock market indices deal with removal issues.

Table 5: Removal criteria for popular stock market indices

Index	Stoxx 50	S&P 500
Removal Criteria	Bankrupt companies have the option to be removed immediately from the index if their illiquidity is due to (1) not being traded for ten consecutive days, (2) being suspended from trading, or (3) ongoing bankruptcy proceedings. Changes are announced immediately, implemented two days later, and become effective the trading day after implementation	The S&P 500 Committee will review companies on the S&P 500 that liquidate, as shares decrease. Liquidity concerns can be used as a reason to eliminate poor performing companies.

(Source : Credit Suisse Tremont 2006)

It becomes apparent that even leading stock market indices keep the possibility of excluding “poor performing” or defunct companies. While it is of great interest to require high standards from index providers in dealing with such data issues, it is not understandable that hedge fund indices should be treated any differently from other indices concerning requirements spelled out by the regulator.

Conclusion

While we agree with the Lhabitant (2006) paper that hedge fund indices have numerous problems, we point out in this paper that:

i) there are solutions that allow truly representative investable hedge fund indices to be constructed;

and most importantly

ii) these problems are not specific to hedge funds.

Therefore, it is perhaps surprising that the Lhabitant (2006) paper argues that hedge fund indices should currently not be allowed as eligible for UCITS. This document shows that indices for other asset classes, and most notably stock market indices, face the same type of limitations and problems that hedge fund indices face. It is unclear on what basis hedge fund indices should be subject to discrimination compared to indices for other asset classes.

Furthermore, we have pointed out that one should distinguish between investable and non-investable indices and between strategy and global hedge fund indices. In particular, we have pointed out that numerous problems identified in the Lhabitant (2006) paper were in fact related to non-investable indices. Investable indices avoid certain database problems and can be constructed to be representative, provided that an appropriate construction methodology is used. Concerning global hedge fund indices, it is obvious that such indices obtained by aggregation of several strategies, cannot claim to be truly representative of the entire hedge fund universe, while representativeness can be achieved for a given hedge fund strategy. Therefore, we claim that investable hedge fund strategy indices are a useful tool in asset allocation and performance analysis.

Stemming from a lack of official recognition, hedge fund indices currently do not have the status of a major reference for most hedge fund or fund of hedge fund managers. Instead, most of these managers use the risk-free rate, as represented by the rate of return of short-term treasury bills or money market instruments, as a reference. This practice constitutes the worst of all choices, given that it assumes that hedge funds are completely free of systematic risk exposures. Such a practice leads therefore to performance measures that lack any pertinence and lead investors into the error of omitting to balance returns for the associated risk exposure. It is interesting to note that the author of the Lhabitant (2006) paper has himself underlined the role of quality hedge fund indices, that - in combination with performance analysis tools such as style analysis - “let investors make an informed decision about the role hedge funds can play in their portfolio” (see Lhabitant (2003)). Establishing hedge fund indices as truly recognised references therefore appears to be an

important step towards proper information for investors on the level of risk in hedge fund products.

Rather than denying official recognition of any hedge fund index, a more promising approach would be to accept hedge fund indices in principle and to require a number of quality criteria, including:

- Transparency of the method
- A methodology that guarantees a high degree of representativeness as well as precise classification of components (such as factor analysis)
- Minimum liquidity of the indices
- Investability of index components
- Prohibition of practices such as backfilling
- Information on risk factor exposure.

Such an alternative of ensuring the respect of certain quality criteria for eligible indices seems to be more convincing than to either reject hedge fund indices on the basis of their shortcomings or to make all hedge fund indices eligible without considering the specific quality of each index. Wide use of high quality hedge fund indices for investment and risk analysis would mark an important step towards proper information for investors on the level of risk in hedge fund products.

References

Amenc, N., P. Malaise and M. Vaissié, 2005, "EDHEC Funds of Hedge Funds Reporting Survey", *EDHEC Publication.*

Amenc, N., and F. Goltz, 2006, "A Reply to the CESR Recommendations on the Eligibility of Hedge Fund Indices for Investments of UCITS", *EDHEC Position Paper* .

Amenc, N., F. Goltz, and V. Le Sourd, 2006, "Assessing the Quality of Stock Market Indices", *EDHEC Publication.*

Arnott, R.D., J. Hsu, and P. Moore, 2005, "Fundamental Indexation", *Financial Analysts Journal* 60 (2), 83-99.

Committee of European Securities Regulators, 2006, CESR's Issues Paper: "Can hedge fund indices be classified as financial indices for the purpose of UCITS?", Ref: CESR/06-530, October 2006.

Credit Suisse Tremont, 2006, Response to CESR's Issues Paper, working paper.

Fernholz, R., R. Garvy, and J. Hannon, 1998, "Diversity-Weighted Indexing", *Journal of Portfolio Management*, 24(2), 74-82.

Goltz, F., L. Martellini, and M. Vaissié, 2007, "Hedge Fund Indices: Reconciling Investability and Representativity", *European Financial Managemen*t, scheduled for publication March 2007.

Haugen, R.A., and N.L. Baker, 1991, "The Efficient Market Inefficiency of Capitalization-Weighted Stock Portfolios", *Journal of Portfolio Management.*

Hsu, Jason, 2006, "Cap-Weighted Portfolios are Sub-Optimal Portfolios", *Journal of Investment Management*, 4(3), 1-10.

Lhabitant, F.S, and M. Learned, 2002, "Hedge Fund Diversification: How Much is Enough?". The Journal of Alternative Investments, winter, vol. 5 (3).

Lhabitant, F.S., 2004, "Evaluating Hedge Fund Investments: The Role of Pure Style Indices", in *Intelligent Hedge Fund Investing, Successfully Avoiding Pitfalls through Better Risk Evaluation,* B. Schachter (ed), Risk Books.

Lhabitant, F.S, 2006, Hedge Fund Indices for Retail Investors: UCITS Eligible or not Eligible? *AMF working paper no. 2.*

Ranaldo, A., and R. Häberle, 2006, Wolf in Sheep's Clothing: the Active Investment Strategies behind Index Performance, *working paper, UBS AG.*

Strongin, S., M. Petsch and G. Sharenow, 2000, Beating Benchmarks, *Journal of Portfolio Management*, 26(4).

Publication Director:
Hubert Reynier h.reynier@amf-france.org
33 (0) 1 53 45 6365

Chief Editor:
Fabrice Pansard f.pansard@amf-france.org
33 (0) 1 53 45 6357

Secretariat:
Muriel Visage m.visage@amf-france.org
33 (0) 1 53 45 6335