



**EDHEC
ALTERNATIVE
INDEXES**

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Edhec is one of the top five business schools in France owing to the high quality of its academic staff (90 permanent lecturers from France and abroad) and its privileged relationship with professionals that the school has been developing since its establishment in 1906. Edhec Business School has decided to draw on its extensive knowledge of the professional environment and has therefore concentrated its research on themes that satisfy the needs of professionals. Edhec implements an active research policy in the field of finance. The Edhec Risk and Asset Management Research Centre carries out numerous research programs in the areas of asset allocation and risk management in both the traditional and alternative investment universes.

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EXECUTIVE SUMMARY

Alternative investment currently represents nearly 700 billion dollars in managed assets. Institutional investors' increasing interest in alternative investment confirms the fact that it is rapidly becoming part of mainstream asset allocation decisions. At the end of 2002, 52% of the assets managed by alternative funds came from institutional sources (compared to only 19% in 1992). The massive inflow of capital (+60% in 2000 and +40% in 2001) has thus brought an end to the relatively confidential nature of alternative investment strategies, which can no longer reasonably be considered to be a marginal activity within the asset management industry. Major asset management houses expect that the long-term growth rate of assets under management by hedge funds should be around 15%.

There are however a number of obstacles to the industrialization of the alternative investment industry. Its adoption by institutional investors will only come about if a serious effort is made in terms of transparency and rationalization of the investment management process and, above all, performance evaluation.

Due to the scarcity of information, the logic of representativeness through market capitalization is difficult to apply to the alternative universe. As a result, finding a benchmark that is representative of a particular management universe is not a trivial problem.

The different indexes available on the market are constructed from different data, according to diverse selection criteria and methods of construction, and they evolve at differing paces. As a result of this heterogeneity, investors cannot rely on competing hedge fund indexes to obtain a "true and fair" view of hedge fund performance. Investors are therefore at a loss when selecting benchmarks.

As a response to the needs of investors, the Edhec Risk and Asset Management Research Center proposes an original solution by constructing an "index of indexes." The aim of the methodology used to construct this "index of indexes" is to construct a benchmark with degrees of representativity and stability that are significantly higher than those of the indexes available on the market. This methodology was first introduced in Amenc, Martellini (2003)¹.

The statistical process leading to the construction of the "index of indexes" (i.e., the Edhec Alternative Indexes) gives them interesting portfolio properties. These indexes improve the soundness of the strategic allocation process and they can be replicated more easily. Hence, the Edhec Alternative Indexes are ideal candidates to help investors to allocate a significant part of their portfolio to the alternative class.

List of Edhec Alternative Indexes and their Constituents as of January 2004

| Edhec Indexes | HFR | CSFB | EACM | Altvest | Hennessee | Van Hedge | CISDM | HF Net | Barclay | S&P |
|------------------------|-----|------|------|---------|-----------|-----------|-------|--------|---------|-----|
| Convertible Arbitrage | X | X | X | | X | | | X | X | |
| CTA Global | | X | | | | | X | X | X | X |
| Distressed Securities | X | X | X | X | X | X | | X | X | |
| Emerging Markets | X | X | | X | X | X | X | X | X | |
| Equity Market Neutral | X | X | | | X | X | X | X | X | |
| Event Driven | X | X | X | X | X | | X | X | X | X |
| Fixed Income Arbitrage | X | X | | | X | X | | X | X | |
| Funds of Funds | X | | | X | | X | X | X | X | |
| Global Macro | X | X | | X | X | X | X | X | X | |
| Long / Short Equity | X | X | | X | | | | X | X | |
| Merger Arbitrage | X | X | X | X | X | | | X | X | |
| Relative Value | X | | X | X | X | X | | X | | X |
| Short Selling | X | X | X | X | X | X | X | X | X | |

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¹ Amenc, N., and Martellini, L., 2003, The Brave New World of Hedge Fund Indexes, *Working Paper*, Edhec Risk and Asset Management Centre.



THE HETEROGENEITY AND BIASES OF ALTERNATIVE INDEXES

The full flexibility enjoyed by hedge fund managers in terms of products used and strategies implemented leads, as we might expect, to a high degree of diversity in terms of management styles. Just as in the traditional world, this diversity can also be found at the level of the index providers (henceforth referred to as competing indexes, cf. table below). It also appears clearly that different competing indexes are constructed from different data, according to diverse selection criteria and methods of construction and that they evolve at differing paces.

Such diversity poses serious problems to investors. To see why, we first consider the different biases that are characteristic of hedge funds and their impact on the performances of the different competing indexes available on the market.

Table 1: List of Hedge Fund Index providers as of December 2003

| Index Provider | Number of Indices | Launch Date | Beginning of Historical Data | Web Site |
|---|-------------------|---------------------------|-------------------------------|-----------------------------|
| Hennessee Group (Hennessee) | 24 | 1987* | 1987 | hennesseegroup.com |
| LJH Global Investments (LJH) | 16 | 1992 | 1989 | ljh.com |
| Van Hedge Fund Advisors International, Inc. (Van Hedge) | 16 | 1994** | 1988 | vanhedge.com |
| Hedge Fund Research, Inc. (HFR) | 37 | 1994 | 1990 | hedgefundresearch.com |
| CISDM / MAR (CISDM) | 19 | 1994 | 1990 | marhedge.com |
| HedgeFundNews.com / Bernheim Index (Bernheim) | 1 | 1995 | 1999 (with monthly frequency) | hedgefundnews.com/ |
| Evaluation Associates Capital Markets, Inc. (EACM) | 18 | 1996 | 1996 | eacmalternative.com |
| Hedgefund.net / Tuna Indices (HF Net) | 37 | 1998 | 1976-1995*** | hedgefund.net |
| HFIntelligence **** | ***** | 2002 / 2001 / 2001 / 2003 | 1998 | hedgefundintelligence.com |
| CSFB/Tremont Index LLC (CSFB) | 14 | nov-99 | 1994 | hedgeindex.com |
| Investorforce / Altvest (Altvest) | 14 | 2000 | 1993 | investorforce.com |
| Zurich Hedge Fund (Zurich) ***** | 5 | 2001 | 1998 | www1.zindex.com |
| Standard & Poor's (S&P) | 10 | 2002 | 1998 | spglobal.com |
| ABN AMRO / Eurekahedge (Eurekahedge) | 3 | may-02 | 2000 | eurekahedge.com |
| MSCI Hedge Fund Indices (MSCI) | More than 190 | july-02 | 2002 | msci.com |
| Blue Chip Hedge Fund Index (Blue X) | 1 | oct-02 | 2002 | bluex.org |
| Feri Alternative Assets GmbH (Feri) | 16 | dec-01 | 2002 | feri-alta.de |
| Edhec Alternative Indices (Edhec) | 13 | march-03 | 1997 | Edhec-risk.com |
| MondoHedgeIndex (MondoHedge) | 7 | march-03 | 2002 | mondohedgeindex.com |
| Talenthedge | 2 | oct-03 | 2003 | talenthedge.com |
| Barclay Group / Global HedgeSource Hedge Fund Indices (Barclay) | 18 | sept-03 | 1997 | barclaygrp.com/indices/ghs/ |

* In 1992 for the general public
 ** In 1995 for the general public
 *** Depends on the strategy
 **** HFIntelligence / Invest-, Europe-, Asia-Hedge, Absolute Return
 *****13 InvestHedge + 13 EuroHedge + 7 AsiaHedge + 12 Absolute Return
 ***** Note that Zurich has stopped maintaining its hedge fund indices since October 2003

Source: Vaissié (2004)²

The Biases of Hedge Fund Indexes

A fund's participation in a database is voluntary, which poses a real problem in terms of the reliability of the data published ("self reporting bias"). A fund can in fact decide, for one reason or another, to register in one or more databases. Since the funds that have refused to report to one or other of the databases are, by definition, unobservable, it is not possible to evaluate the impact of this bias. In addition, since some refuse to display their performance because of poor results and others because they have already reached their critical size, it is even difficult to know whether this bias has a positive or negative impact on the performances announced. The lack of transparency also poses a problem in terms of the reliability of data and exposes investors, in particular, to a risk of a change in the manager's management style (this is known as "style drift", cf. Lhabitant - 2001³). Hedge fund managers are under no obligation to publish the details of their positions, so it is very unlikely that they will hesitate to seize an investment opportunity, even if this means modifying their management style temporarily (without going as far as declaring it). It is once again difficult, or indeed impossible, to put a figure on the impact of this bias, due to the prevailing lack of transparency.

The voluntary nature of the act presupposes that only some of the funds will decide to register. Since hedge funds do not have the right to advertise, the fact that they are recorded in a database is important in terms of communication, which is why they may decide to register even if they do not intend to give out information on a regular basis. This makes it possible to smooth the results, a practice that is largely facilitated by the complexity and low level of liquidity of the products handled by the hedge funds (i.e. a "stale prices" or "managed prices" problem). Asness, Krail and Liew (2001)⁴, for instance, revealed an increase in the volatility of convertible arbitrage returns of 41.5% when one switches from monthly data to quarterly data.

² Vaissié, M., 2004, Are Hedge Funds Indices Created Equal?, *Alternative Investment Quarterly*, *Forthcoming*.

³ Lhabitant, F. S., 2001, Assessing Market Risk for Hedge Funds and Hedge Funds Portfolios, *Journal of Risk Finance*, Spring 2001, p.1-17.

⁴ Asness, C., Krail, R. and Liew J., 2001, Do Hedge Funds Hedge?, *Journal of Portfolio Management*, Fall 2001, Vol.28, N°1, p.6-19.



Depending on the date at which the database began, the quality of past information will vary (notably for funds that ceased their activity before the database began). This affects the performance of the index to a greater or lesser degree, depending on the number of funds that stop communicating their results each year (referred to as the attrition rate) and the average performance differential observed between those funds and the remaining funds. This is known as a "survivorship bias." Since the HFR and MAR databases began in 1994, it is likely that they will dispose of more accurate information than the CSFB database (which only begins in 2000) over the period 1994/2000, and that they will not be affected in the same way by survivorship bias. Fung and Hsieh (2002)⁵ valued the average impact of this bias at 3.0%. As a comparison, it should be noted that Malkiel (1995)⁶ estimated this bias to be 0.5% for mutual funds. The various databases are again affected in different ways by this bias. For example, the TASS database has a higher survivorship bias than the HFR database because it has a higher attrition rate, which in turn is due to different selection criteria for adding and removing funds.

The funds have selection criteria that can be very diverse, and the data provided will not be representative of the same management universe. This is referred to as "selection bias." For instance, HFR excludes managed futures from its databases while TASS and MAR take them into account. Most funds are present in one but not the other: of the 1,162 HFR funds and the 1,627 TASS funds, only 465 are common to both databases. 59% of the funds that are still in activity and 68% of the funds that no longer report to HFR are not part of the TASS database (cf. Liang - 2000)⁷. On top of this, indexes are rarely representative of their own database, as can be seen in the following table:

Table 2: Number of funds in the databases as of December 2003

| Index Providers | Database | Nr. of Funds in the Database | Nr. of Funds in the Indices |
|-----------------|---|------------------------------|-----------------------------|
| Van Hedge | Proprietary Database | 5 400 | 1 300 |
| Feri | Propr. Data. + Other Avail. Data. (Van Hedge, TASS, HF Net) | 5 000 | 41 |
| Hennessee | Proprietary Database | 3 500 | 690 |
| S&P | Proprietary Database + Other Available Databases | 3 500 | 40 |
| CSFB | TASS Database and Tremont Database | 3 300 | 431 |
| HFIntelligence | Proprietary Database | 3 202 | 2 652 |
| Altvest | Proprietary Database | 2 600 | All the funds |
| Barclay | Global HedgeSource | 2 450 | All the funds |
| HF Net | Proprietary Database | 2 300 | All the funds |
| HFR | Proprietary Database | 2 300 | 1 400 |
| CISDM | Proprietary Database | 2 300 | 1 600 |
| MSCI | Proprietary Database | 1 800 | 1 500 |
| Bernheim | U.S. Offshore Funds Directory | 900 | 18 |
| Zurich | ZCM + Other Available Databases | 900 | 60 |
| LJH | Proprietary Database | 800 | All the funds |
| Edhec | Main hedge fund indices available on the market | n.a. | n.a. |
| MondoHedge | Proprietary Database | 720 | 48 |
| Blue X | Proprietary Database | 350 - 400 | 30-40 |
| Eurekahedge | Proprietary Database | 365* | 110 |
| EACM | Proprietary Database | 100 | 100 |
| Talenthedge | Proprietary Database | Not communicated | 5 to 20 per index |

Source: Vaissié (2004)⁸

Of the 465 funds in common between the HFR and TASS databases, only 154 (or 33.1%) have been included in both databases at the same time. However, when a fund is added to a database, all or part of its historical data is recorded ex-post in the database. Since the databases are the sole means of communication for most funds, it is reasonable to believe that the funds will only decide to publish their results when they are at their highest levels, in order to attract as many investors as possible. It is therefore probable that the average performances displayed by the funds during their incubation period will be better than those of funds that have belonged to the database under consideration for a longer period. In this case we talk about "instant history bias." Fung and Hsieh (2002)⁵ valued the impact of this bias at 1.4 % per year. If the funds are not recorded at the same date in two different databases, it is probable that the two databases will not be exposed to instant history bias in the same way. This risk is heightened by the fact that only 47% of the performances recorded are strictly identical.

⁵ Fung, W., and Hsieh D. A., 2002, Benchmark of Hedge Fund Performance, Information Content and Measurement Biases, *Financial Analysts Journal*, Jan/Feb 2002, Vol.58, N°1, p.22-34.

⁶ Malkiel, B. 1995, Returns from Investing in Equity Mutual Funds 1971 to 1991, *Journal of Finance*, vol. 50, no. 2 (June): 549-572.

⁷ Liang, B., 2000, Hedge Funds: The Living and the Dead, *Journal of Financial and Quantitative Analysis*, September 2000, Vol.35, Issue 3, p.309-326.

Since the various indexes have different compositions, they will not be affected in the same way by the different biases to which we have referred. This could, in relevant cases, distort the analysis of their performance. The frequency with which an index is modified will also play an important role in the performances of the different indexes. The HFR indexes are equally-weighted and rebalanced on a monthly basis. As a result, they follow a contrarian strategy. The CSFB indexes, for their part, are value weighted and rebalanced quarterly and therefore follow a momentum type strategy. As Fung and Hsieh have shown, these differences alone explain a performance differential of 7.4% between the two databases in 1999! Here we can speak of a "rebalancing scheme bias."

The Performance Heterogeneity of Hedge Fund Indexes

Significant performance differences for the same style are commonly observed between the different competing indexes. This phenomenon is particularly noticeable in periods of crisis (between August 1998 and October 1998, cf. table below). The heterogeneity of the information supplied by the different index providers is actually spectacular. More than 20% separates the performances of the Zurich and EACM Long/Short Equity indexes in February 2000 (cf. Amenc and Martellini – 2003)¹. An analysis of the mean and median correlations between the performances of the different competing indexes confirms the lack of homogeneity. The mean correlation between competing indexes for the same type of strategy (Equity Market Neutral: 0.43, Long/Short Equity: 0.46) can be lower than 0.5. The increasing number of index providers and construction methods poses the problem of the heterogeneity of the data. It appears clearly that the competing hedge fund indexes do not today provide representativity and stability conditions that would allow investors a homogenous and relevant overview of alternative funds.

Table 3: Maximum Return Differences by Investment Style as of December 2003

| Investment Styles | Max differences (with dates and indexes) | |
|------------------------|--|---|
| Convertible Arbitrage | 7,55% | (Dec 01: EACM (-6.93%) / Hennessee (0.62%)) |
| CTA Global | 7,50% | (Dec 00: Barclay (6.00%) / S&P (13.50%)) |
| Distressed Securities | 7,75% | (Aug 98: CSFB (-12.45%) / Van Hedge (-4.70%)) |
| Emerging Markets | 19,45% | (Aug 98: CISDM (-26.65%) / Altvest (-7.20%)) |
| Equity Market Neutral | 5,00% | (Dec 99: Hennessee (0.20%) / Van hedge (5.20%)) |
| Event Driven | 5,37% | (Aug 98: CSFB (-11.77%) / S&P (-6.40%)) |
| Fixed Income Arbitrage | 10,09% | (Oct 98: HF Net (-9.89%) / Van Hedge (0.20%)) |
| Funds of Funds | 8,01% | (Dec 99: CISDM (2.41%) / Altvest (10.42%)) |
| Global Macro | 14,17% | (Oct 98: CSFB (-11.55%) / Altvest (2.62%)) |
| Long/Short Equity | 9,51% | (Feb 00: Altvest (3.50%) / CSFB (13.01%)) |
| Merger Arbitrage | 3,18% | (Jan 99: CSFB (-1.51%) / Altvest (1.67%)) |
| Relative Value | 10,50% | (Oct 98: S&P (-6.90%) / Van Hedge (3.60%)) |
| Short Selling | 21,20% | (Feb 00: Van Hedge (-24.30%) / EACM (-3.10%)) |

Source: Edhec Risk *From January 1998 through December 2003*

With the help of a simple heterogeneity indicator, we can attempt to evaluate the degree of heterogeneity of the different strategies. This indicator is denoted HI and is calculated as follows:

$$HI = 1 - \text{Average Correlation}$$

Therefore, a perfectly heterogeneous situation for the indexes is translated by HI=1.

Such an analysis reveals for example that the Equity Market Neutral, Fixed Income Arbitrage and Relative Value strategies are particularly heterogeneous. They exhibit respectively, for the test presented above, degrees of heterogeneity of 55.08%, 42.93% and 42.23%. Conversely, the Emerging Markets and CTA Global strategies respectively present degrees of heterogeneity of only 7.37% and 5.64%. These results confirm those obtained through the correlation analysis.



Table 4: Heterogeneity Index by Investment Style as of December 2003

| Investment Styles | HI |
|------------------------|--------|
| Convertible Arbitrage | 16,28% |
| CTA Global | 5,64% |
| Distressed Securities | 13,77% |
| Emerging Markets | 7,37% |
| Equity Market Neutral | 55,08% |
| Event Driven | 8,36% |
| Fixed Income Arbitrage | 42,93% |
| Funds of Funds | 8,50% |
| Global Macro | 28,96% |
| Long/Short Equity | 15,51% |
| Merger Arbitrage | 12,23% |
| Relative Value | 42,23% |
| Short Selling | 11,28% |

Source: Edhec Risk From January 1998 through December 2003

To document the heterogeneity of the different indexes, one may also highlight their contrasted exposures to a various risk factors. For example, HFR fixed-income arbitrage index is significantly more exposed to liquidity risk as proxied by changes in trading volume on the NYSE (correlation coefficient = -0.18) than the corresponding HF Net index (correlation coefficient = -0.01). In the same way, the correlation coefficient of the performances of the Van Hedge index with the returns of the S&P500 is 0.53, compared to 0.00 for the CSFB index! Finally, the exposure of the Van Hedge index to volatility risk is relatively high (-0.47), while that of the HFR index is significantly lower (0.14). It again appears clearly that different competing indexes are very heterogeneous. Taking the differentiated exposures to various risk factors into account, it would not be the same to take one or other of the competing indexes as a benchmark. So which one should be chosen?

Table 5: Sensivity to Broad-based Risk Factors - The Case of Fixed Income Arbitrage

| Fixed Income Arbitrage | Market Risk | Volatility Risk | Interest Rate Risk | Slope of the Yield Curve | Currency Risk | Commodity Risk | Credit Risk | Liquidity Risk |
|------------------------|-------------|-----------------|--------------------|--------------------------|---------------|----------------|-------------|----------------|
| CSFB | 0.00 | 0.12 | 0.15 | 0.23 | 0.42 | 0.05 | -0.38 | -0.10 |
| HFR | -0.16 | 0.14 | 0.25 | 0.19 | 0.57 | 0.07 | -0.24 | -0.18 |
| Van Hedge | 0.53 | -0.47 | 0.09 | 0.02 | -0.13 | 0.14 | -0.16 | -0.05 |
| Hennessee | 0.37 | -0.37 | 0.06 | 0.19 | 0.26 | 0.12 | -0.22 | -0.12 |
| HF Net | -0.10 | 0.20 | 0.22 | 0.20 | 0.42 | 0.03 | -0.37 | -0.01 |

Source: Amenc, Martellini (2003)¹ From January 1998 through December 2000

The data used to characterise the different sources of risk is as follows:

The market risk is measured by the evolution of the S&P 500 Price Index

The volatility risk is measured by the relative price variations of the VXO (i.e., ex VIX) contract, the underlying of which is the implicit volatility of the S&P 100

The interest rate risk is measured by the variations of the rate of return of the 3-month Treasury bill

The slope of the yield curve is obtained by calculating the difference between the rate of return of a bond with a 30-year maturity and that of a 3-month Treasury bill

The currency risk is measured by the evolution of the exchange rate of the US dollar compared to a basket of foreign currencies

The commodity risk is measured by the relative price variations of a barrel of crude oil

The credit risk is measured by the relative variations of the differential between the returns on bonds rated Baa and Aaa by Moody's

The liquidity risk is measured by the evolution of the volume of securities exchanged on the NYSE

Just as in the traditional world, none of the competing indexes are either collectively exhaustive or mutually exclusive. The lack of regulation and its corollary, a lack of transparency, accentuate the problem dramatically in the hedge fund universe. It is therefore necessary to construct style indexes that allow for a response to the needs of practitioners in terms of transparency and reliability. The Edhec Alternative Indexes presented in the following section have been constructed accordingly to meet those expectations.

EDHEC ALTERNATIVE INDEXES CONSTRUCTION AND MANAGEMENT PRINCIPLES

The logic of representativity through market capitalization is difficult to apply to the alternative universe. As a result, finding a benchmark that is representative of a particular management universe is not a trivial problem.

Principal Component Analysis

Given that it is impossible to come up with an objective judgment on what is the best existing index, a natural idea consists of using some combination of competing indexes to reach a better understanding of what the common information about a given investment style would be. One straightforward method for obtaining a composite index based on various competing indexes would involve computing an equally-weighted portfolio of all competing indexes. This would obviously provide investors with a convenient one-dimensional summary of the contrasted information contained in competing indexes. In particular, because competing hedge fund indexes are based on different sets of hedge funds, the resulting portfolio of indexes would be more exhaustive than any of the competing indexes it is extracted from. We can push the logic one step further and suggest using factor analysis techniques to extract the best possible one-dimensional summary of a set of competing indexes, and design what can be called “pure style” indexes. Our method is a natural generalization of the idea of taking a portfolio of competing indexes. The refinement involves relaxing the assumption of an equally-weighted portfolio.

We suggest using factor analysis techniques to generate a set of alternative indexes that can be thought of as the best possible one-dimensional summaries of information conveyed by competing indexes for a given style, in the sense of the largest fraction of the variance explained. Here, we are looking for the portfolio weights that make the combination of competing indexes capture the largest possible fraction of the information contained in the data from the various competing indexes. Technically speaking, this amounts to using the first component of a Principal Component Analysis (see Appendix 2 for more details on this method, which is henceforth referred to as PCA) of competing indexes as a candidate for a pure style index. Note that the first component typically captures a large proportion of cross-sectional variations because competing styles tend to be at least somewhat positively correlated.

The PCA of a time-series involves studying the correlation matrix of successive shocks. Its purpose is to explain the behavior of observed variables using a smaller set of unobserved implied variables. From a mathematical standpoint, it involves transforming a set of K correlated variables into a set of orthogonal variables, or implicit factors, which reproduces the original information present in the correlation structure. Each implicit factor is defined as a linear combination of original variables.

The Edhec Alternative Indexes are able to capture a very large fraction of the information. The average percentage of variance explained by the Edhec Alternative Indexes is 79.12% (and the median percentage of variance is 81.12%) across all sub-universes. The percentage of variance explained by the Edhec Alternative Indexes is, of course, all the more significant in that the correlation between the competing indexes is high. For example, emerging market style indexes have a percentage of variance explained that is greater than 90% from a population of 7 competing indexes. The mean correlation was almost 0.93 for emerging market indexes. In the same vein, the Edhec Event Driven and Merger Arbitrage Indexes capture more than 80% of the information originally available in a set of 8 and 4 competing indexes, respectively. The Edhec Fund of Funds Index also enjoys very low information loss as more than 91% of the information is captured by the one-dimensional summary. On the other hand, the percentage of information loss is higher in the case of equity market neutral (41.09% = 100% - 58.91% information loss) and fixed-income arbitrage (35% = 100% - 65% information loss). This is because these strategies were the ones for which the heterogeneity of information provided by competing index providers was the most extreme (see Amenc and Martellini (2003), for further explanation)¹.

Edhec Alternative Indexes generated as the first component in a factor analysis have an appealing built-in element of optimality, since there is no other linear combination of competing indexes that implies a lower information loss.

Edhec Alternative Indexes and their Constituents

In order to establish the list of Edhec Alternative Indexes we first eliminated alternative strategies for which fewer than 4 competitors were available. For statistical purposes it is essential to have at least 4 competing indexes for it to make sense to construct an index of indexes. We then eliminated strategies with a narrow focus (e.g., sectors - health care) to concentrate on popular strategies. As a result of that selection, we were left with a list of 13 investment styles with 4 to 9 index providers for each style (see table below).

The second step involves selecting the indexes to be included in the Edhec Alternative Index for each strategy. The Edhec Alternative Indexes are required to enjoy completely transparent construction methodology and management principles. As a result, the selected indexes must be publicly available and have transparent style classification (i.e., well defined sub-universes) and construction methodologies, so that one can easily check the performances of the Edhec Alternative Indexes. Finally, the indexes must be based on a broad database (to ensure a minimum degree of representativity) and post their performances on time (see next section for more details).

We have identified the 10 index providers listed in the following table and included those that fulfilled the aforementioned requirements in the composition of the Edhec Alternative Index. Xs indicate that the index is included in the Edhec Alternative Index. It should be noted that these compositions are those established as of January 2004 and are subject to revision by the Edhec Alternative Index advisory board (see next section for more details).

It should be noted that the list of Edhec Alternative Indexes was also established to enable different levels of analysis. For example, broad style indexes such as the Edhec Relative Value Index or the Edhec Event Driven Index are perfect for analysis at a global level. On the other hand, the Edhec Convertible Arbitrage/Equity Market Neutral/Fixed Income Arbitrage Indexes or the Edhec Distressed Securities/Merger Arbitrage Indexes are ideal for more detailed analysis of those two broad categories.

Table 6 : List of Edhec Alternative Indexes and their Constituents as of January 2004

| Edhec Indexes | HFR | CSFB | EACM | Altvest | Hennessee | Van Hedge | CISDM | HF Net | Barclay | S&P |
|------------------------|-----|------|------|---------|-----------|-----------|-------|--------|---------|-----|
| Convertible Arbitrage | X | X | X | | X | | | X | X | |
| CTA Global | | X | | | | | X | X | X | X |
| Distressed Securities | X | X | X | X | X | X | | X | X | |
| Emerging Markets | X | X | | X | X | X | X | X | X | |
| Equity Market Neutral | X | X | | | X | X | X | X | X | |
| Event Driven | X | X | X | X | X | | X | X | X | X |
| Fixed Income Arbitrage | X | X | | | X | X | | X | X | |
| Funds of Funds | X | | | X | | X | X | X | X | |
| Global Macro | X | X | | X | X | X | X | X | X | |
| Long / Short Equity | X | X | | X | | | | X | X | |
| Merger Arbitrage | X | X | X | X | X | | | X | X | |
| Relative Value | X | | X | X | X | X | | X | | X |
| Short Selling | X | X | X | X | X | X | X | X | X | |

Information available at www.edhec-risk.com

Backfilling Process

The historical data period for the Edhec Alternative Indexes began officially in January 2003. However, in order to use a longer range of data, “backfilling” was carried out as follows:

As all the competing indexes did not have a sufficient length of historical data, we only selected those that have published monthly performances since January 1994. This allows us, taking into account the three years required for the calibration of the principal component analysis, to use monthly performances from January 1997 onwards. We therefore strictly observe the method described in Amenc and Martellini (2003)⁹ whilst at the same time limiting ourselves to the following indexes: Altvest, CSFB/Tremont, HF Net, HFR and MAR.

From January 2001 onwards, the Edhec Alternative Indexes are constructed using the same method, whilst this time incorporating four additional indexes in their composition: EACM, Hennessee, Van Hedge and Zurich.

Updating Process for Alternative Indexes

The principle for updating the performances of the Edhec Alternative Indexes from January 1997 to December 2002 is the following:

The composition of different Edhec Alternative Indexes is calculated every three months based on the historical performance data (three years) of the selected competing indexes. Each month these successive weightings are applied to the performance history of the indexes concerned. However, in order to ensure a certain level of homogeneity in the calculation of the performance history of the different Alternative Indexes, the performance history of the competing indexes published in December 2002 will be used to constitute the entire historical performance data of the Alternative Indexes. This will allow us to apply the same calculation rule to all the indexes, for all dates included between January 1997 and December 2002⁹.

The principle for updating the performance of the Edhec Alternative Indexes from January 2003 onwards is the following:

The weighting calculated through PCA at the beginning of each quarter will be applied to the performance of the different competing indexes, and the result obtained will be left as such, whether the competing indexes change their performance history or not¹⁰.

The updating of the Edhec Alternative Indexes, together with the risk and performance analysis for the M(onth), will be published on the www.edhec-risk.com web site on the third working day of M(onth) + 2. This time-scale will enable us to use, in normal operating conditions, the latest performance of the different competing indexes.

⁹ Given that the different competing indexes have fund selection criteria which vary little over time, it is likely that the funds integrated between January 1997 and December 2002 will have a similar profile to that of the funds which are already present in the database in question before this period. This is equally true for all the indexes and therefore the ex-post calculated weightings are identical to those which would have been calculated ex-ante, since the overall information contained in the different indexes remains unchanged.

¹⁰ Some of the different competing indexes integrate the historical performance of the funds, which they add to their database. The advantage of such a practice is to improve the representativity of the database ex-post, but this also presents a major disadvantage since it implies that the historical performance of the indexes concerned must be continuously modified. The construction of Edhec Alternative Indexes by PCA allows us, precisely, to respond ex-ante, and not ex-post, to the problem of representativity, which allows us to “freeze” the history.

If, for any particular reason, one of the competing indexes usually used to constitute the Edhec Alternative Index does not update its performance before the second working day of $M(\text{onth})+2$, we will be unable to calculate the new weighting of the pure style index in time for the third working day. In this case, we will use a one-off measure excluding the index concerned from the composition of the Edhec Alternative Index until the following rebalancing (i.e., at the beginning of the following quarter). If this situation arose in the middle of the quarter, we would then be obliged to undertake a one-off re-calculation of the new composition of the pure style index for the end of the current quarter, excluding the missing index.

Edhec Indexes' Preliminary Returns

Hedge Funds usually only disclose their performance a few weeks after month end. As a result, hedge fund indexes tend to publish their performance relatively late, which may leave practitioners at a loss. To compensate for this lack of timeliness, some index providers have decided to post preliminary returns on their website. In response to practitioners' needs, the Edhec Risk and Asset Management Research Centre will release the preliminary performance of its Alternative Indexes on the 17th calendar day of $M(\text{onth}) + 1$.

If all the indexes entering into the composition of the Edhec Alternative Index publish preliminary results:

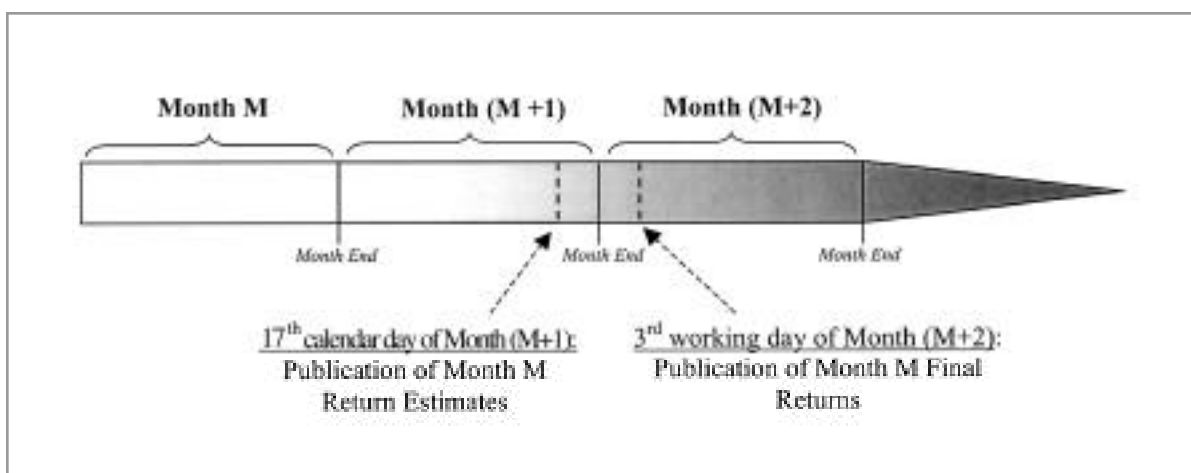
- > The preliminary return of the Edhec Alternative Index can be obtained simply by applying the current index weighting to the preliminary results of its constituents.

If one or several indexes entering into the composition of the Edhec Alternative Index do not publish preliminary results:

- > The weights of the "missing" indexes will be allocated proportionally to the other indexes, according to their initial weight. The preliminary results of the Edhec Alternative Index can then be obtained by applying the modified index weighting to the preliminary results.

It should be noted that preliminary returns are only meant to be used as an initial estimation of the indexes' performance. The final returns of the Edhec Alternative Indexes will be published on the website on the 3rd working day of $M(\text{onth}) + 2$, once all the indexes entering into their composition have published their final results. Only these returns will constitute the official historic performance of the Edhec Alternative Indexes.

Edhec Index Publication Dates



Edhec Index Advisory Board

The Edhec Index Advisory Board determines the inclusion or exclusion of an index in the calculation of the Edhec Alternative Indexes. The criteria upon which the committee bases its decisions are as follows:

- > The available history
- > The clarity of its construction method
- > Its representativity in terms of being a reference index for managers and/or investors as well as whether it takes existing funds into account
- > The completeness of the provider's indexes
- > The stability of the composition
- > The regularity with which the data/index is published

This committee is composed of 9 specialist professionals and recognized researchers in the domain of alternative investment.

THE PROPERTIES OF THE EDHEC ALTERNATIVE INDEXES

We have tested the qualities of the Edhec Alternative Indexes. We first assess the degree of representativity of the Edhec Alternative Indexes to show the extent to which they are able to capture the substance of the alternative investment strategies. We then assess the impact of short-term market or economic trends on their composition.

The Representativity Dimension

To test the representativity qualities of the Edhec Alternative Indexes, we have proceeded in the following manner: we have constituted an equally-weighted portfolio for each of the strategies from a proprietary database made up of 7,422 funds (of which 2,317 are not recorded in any database). The portfolios therefore contain more than 600 funds on average, and as a result were considered to be relatively representative of their management universe. We then calculated the correlation coefficient of those portfolios with the Edhec Alternative Indexes over the period from January 1998 through December 2000. The higher the coefficient, the more representative the index is. We then compared this correlation coefficient with the average correlation coefficient obtained by the indexes entering into the composition of the Edhec Alternative Indexes. We can see from the following table that the Edhec Alternative Indexes are systematically more representative than the average of the competing indexes. This confirms that the PCA method allows the representativity dimension to be improved significantly.

Table 7: The Representativity Dimension

| Investment Styles | Edhec Indexes | Competing Indexes |
|--|---------------|-------------------|
| Convertible Arbitrage | 0,84 | 0,77 |
| Distressed Securities | 0,94 | 0,88 |
| Emerging Markets | 0,98 | 0,95 |
| Equity Market Neutral | 0,41 | 0,35 |
| Event Driven | 0,96 | 0,93 |
| Fixed Income Arbitrage | 0,81 | 0,63 |
| Funds of Funds | 0,93 | 0,88 |
| Global Macro | 0,77 | 0,61 |
| Long Short Equity | 0,98 | 0,67 |
| Merger Arbitrage | 0,86 | 0,83 |
| Relative Value | 0,89 | 0,75 |
| Short Selling | 0,73 | 0,71 |
| Average Correlation Coefficient | 0,84 | 0,75 |

From January 1998 through December 2000

The PCA approach ensures that the Edhec Alternative Indexes capture the largest possible fraction of the information contained in the data from the various competing indexes. The first consequence, as can be seen in table 7, is a maximization of the representativity dimension. The second, significant, consequence is that the Edhec Alternative Indexes are, by construction, systematically less biased than the indexes they contain. Since the competing indexes are affected differently by the biases mentioned in section I, searching for the linear combination of competing indexes that implies a maximization of the variance explained, leads to a minimization of the bias. This characteristic is of great interest from a performance evaluation perspective.



The Stability of the Edhec Alternative Indexes

We then assess the impact of short-term market or economic trends on the composition of Edhec Alternative Indexes. The first test consists of calculating the average weighting evolution caused by the quarterly index rebalancing. For example, if the Edhec Style Index is composed of 40% of Index 1 and 60% of Index 2 in Q1 and 50% of Index 1 and 50% of Index 2 in Q2, we consider a weighting evolution of $1/2 * Abs(40\% - 50\%) + 1/2 * Abs(60\% - 50\%)$, i.e. 10%. We then calculated the average weighting evolution over the period January 2001 through December 2002. This test shows that the index composition is very stable over time (see table below for detailed results), which confirms that the construction methodology enables Edhec Alternative Indexes to capture the substance of the investment strategy and not statistical artifacts.

Table 8: Stability of the Composition of the Edhec Alternative Indexes

| <u>Edhec Style Indexes</u> | <u>Average weighting change</u> |
|----------------------------|---------------------------------|
| Convertible Arbitrage | 0.24% |
| Emerging Markets | 0.07% |
| Equity Market Neutral | 1.18% |
| Event Driven | 0.17% |
| Fixed Income Arbitrage | 2.03% |
| Global Macro | 0.61% |
| Long/Short | 0.57% |
| Merger Arbitrage | 0.05% |
| Relative Value | 0.34% |
| Short Selling | 0.07% |
| Distressed Securities | 0.27% |
| Funds of Funds | 0.08% |

From January 2001 through December 2002

The high level of stability of Edhec Alternative Indexes is of great interest for asset management firms who invest (or are willing to invest) in hedge funds. The practical advantages are numerous. First (but not least) is the fact that the Edhec Alternative Indexes are easier to replicate.

USE OF THE EDHEC INDEXES FOR PORTFOLIO MANAGEMENT

The higher degree of representativity and stability of the Edhec Alternative Indexes give them not only superiority in terms of statistical properties but also in terms of portfolio properties.

The Trackability of the Edhec Alternative Indexes

To demonstrate the advantages of the Edhec Alternative Indexes in terms of trackability, we have constructed portfolios made up of single funds that replicate the Edhec Alternative Indexes. We then did the same thing with the HFR and CSFB Indexes. Portfolio replication involves a tracking error minimization problem (see the following formula):

$$\min_w TE = (R_{PF} - R_B)$$

where R_{PF} is the return of the replicating portfolio and R_B the return of the benchmark. W refers to the composition of the replicating portfolio.

The single funds used for this experiment were drawn randomly (without replacement) from the HF Net Database. The replicating portfolios were composed on average of twenty-five funds (which is a good compromise between industry practice – 20 to 40 funds - and academic evidence – 5 to 10 funds¹¹) with at least 4 years of historic performances. We excluded the Short Selling strategy since we did not dispose of 20 funds with at least 4 years of existence. As a result, we calculated the “in sample” tracking error for January 1999 through September 2002 for the 7 strategies common to Edhec, HFR and CSFB (the choice of the HFR and CSFB indexes is motivated by the fact that they are often quoted by practitioners).

The results confirm the superiority of Edhec Alternative Indexes, since we obtain a lower “in sample” tracking error in 6 out of 7 strategies. The tracking error is systematically lower than 2.5% and in 4 out of 7 cases it is lower than 1.0%. This is all the more interesting in that the tracking error obtained with Edhec Alternative Indexes appears to be sound (lower than 2.5% in 5 out of 7 cases). The low difference observed between the “in-sample” and “out-of-sample” tracking errors indicates that the tracking error is stable over time. In some cases the “out-of-sample” tracking error is even lower than the “in-sample” tracking error obtained with the competing indexes.

Table 9: Trackability of Edhec Alternative Indexes

| | Edhec | | CSFB | HFR |
|------------------------|------------------|----------------------|------------------|------------------|
| | <i>In sample</i> | <i>Out of sample</i> | <i>In sample</i> | <i>In sample</i> |
| Convertible Arbitrage | 0.73% | 1.05% | 2.23% | 0.74% |
| Emerging Markets | 2.34% | 3.39% | 4.61% | 3.19% |
| Event Driven | 0.95% | 1.36% | 2.40% | 1.03% |
| Fixed Income Arbitrage | 1.11% | 1.25% | 0.83% | 2.70% |
| Global Macro | 0.12% | 2.23% | 0.17% | 0.13% |
| Long/Short Equity | 1.90% | 3.25% | 4.02% | 2.07% |
| Market Neutral | 0.73% | 0.86% | 1.03% | 2.28% |

From January 1999 through September 2002

¹¹ Learned, M. and Lhabitant, F.S., 2002, Hedge Fund Diversification: How much is enough?, *Journal of Alternative Investments*, Winter 2002, Vol.5, Issue 3, p.23-49

Edhec Alternative Indexes in the Strategic Allocation Process

Since Edhec Alternative Indexes are easy to replicate, we have tested the benefits of including them in the strategic allocation of a typical institutional investor. For that purpose we have tested the stability of the minimum variance portfolio. We consider that this portfolio is made up of stocks (proxied by the S&P 500), bonds (proxied by the Lehman Global Bond Index) and alternative investments (proxied by the Edhec Alternative Indexes, or the competing indexes). We impose the following constraints: an asset class cannot represent more than 60% of the portfolio's holdings and hedge funds must represent between 10% and 30% of the portfolio's holdings. It has been shown in several research papers¹² that a significant proportion of a portfolio must be dedicated to the alternative class for it to impact the portfolio's risk/return characteristics. The latter constraint is set in this respect.

The minimum variance portfolio corresponds to the portfolio that offers the lowest variance on the efficient frontier¹³. The construction of this portfolio involves a variance minimization problem:

$$\min_x \text{var} (R_{PF}) = \sum_{i=1}^n \sum_{j=1}^n x_i x_j \text{cov} (R_i, R_j)$$

where R_{PF} is the return of the portfolio, R_i the return of the i^{th} asset and x_i the weight of the i^{th} asset.

The test aims to assess the stability of the strategic allocation (i.e., minimum variance portfolio). We used a three-year calibration period (from January 1998 to December 2000) to compute the first minimum variance portfolio. We then rolled over a 6-month calibration period to construct the second minimum variance portfolio, and so on. The last step was to calculate the average portfolio turnover implied by the semi-annual rebalancing. We performed this test with the Edhec Alternative Indexes, as well as with the HFR and CSFB Indexes, for all the strategies common to the three providers.

Once again, the Edhec Alternative Indexes turn out to be more efficient than the competing indexes, since they make the strategic asset allocation more robust, regardless of the investment style (see table below for more details). The turnover is systematically lower with the Edhec Alternative Indexes than with the CSFB or HFR Indexes.

Table 10: Average Minimum Variance Portfolio Turnover

| | Edhec | CSFB | HFR |
|------------------------|-------|-------|-------|
| Convertible Arbitrage | 0% | 0% | 0% |
| Emerging Markets | 6.10% | 7.17% | 7.34% |
| Equity Market Neutral | 0% | 0% | 0% |
| Event Driven | 0% | 0% | 0% |
| Fixed Income Arbitrage | 0% | 0% | 0% |
| Global Macro | 0% | 3.70% | 0% |
| Long/Short Equity | 0% | 3.35% | 0% |
| Short Selling | 0.80% | 1.83% | 1.36% |

From January 2001 through December 2002

¹² Amin, G., Kat H., 2002, Stocks, Bonds and Hedge Funds, *Journal of Portfolio Management*, Summer 2003, Vol.29, Issue 4, p.113-119.

¹³ Amenc, N., Martellini, L., 2002, Portfolio Optimization and Hedge Fund Style Allocation Decisions, *Journal of Alternative Investments*, Fall 2002, Vol.5, N°2, p.7-20.

APPENDICES



APPENDIX 1

DEFINITION OF HEDGE FUND STYLES

| | |
|-------------------------------|--|
| Convertible Arbitrage | Investment in convertible bonds. The strategy is to buy the convertible bond and sell short the common stock of the same company. |
| CTA Global | CTA Global funds invest in listed financial and commodity markets as well as in currency markets all over the world. They can follow systematic or discretionary strategies and are referred as to Commodity Trading Advisors. |
| Distressed Securities | Involves buying back, at a low price, the securities of companies that are experiencing financial difficulties. The securities targeted may cover a wide range, from senior secured debt (lowest risk) to common stock (highest risk). |
| Emerging Markets | Investment in equities or bonds from emerging markets. |
| Event Driven | Investment strategy that exploits price movements related to the anticipation of events affecting the life of the company (merger, acquisition, bankruptcy, etc.). |
| Fixed Income Arbitrage | The investment return is based on exploiting price anomalies related to interest rate instruments. |
| Funds of Funds | Consists of investing in several funds that may or may not follow the same strategy. |
| Global Macro | Investment strategy with a strong leverage effect on market events or developments. |
| Long Short Equity | Involves investing mainly in equities and derivative instruments. The manager systematically uses short selling, but takes care to maintain a permanent overall net position that is either long or neutral. |
| Equity Market Neutral | Exploits inefficiencies in the market through balanced buying of undervalued securities and selling of overvalued securities enabling either a beta or a dollar neutral approach to be obtained. |
| Merger Arbitrage | Merger Arbitrage funds invest in companies involved in a Merger or Acquisition process. They typically go long the targeted company and sell short the stock of the acquiring company. |
| Relative Value | The objective of this type of strategy is to take advantage of the relative price differentials between related instruments. |
| Short Selling | Maintains a net or simple short exposure relative to the market. |

APPENDIX 2

PRINCIPAL COMPONENT ANALYSIS

The PCA of a time-series involves studying the correlation matrix of successive shocks. Its purpose is to explain the behavior of observed variables using a smaller set of unobserved implied variables. From a mathematical standpoint, it involves transforming a set of K correlated variables into a set of orthogonal variables, or implicit factors, which reproduces the original information present in the correlation structure. Each implicit factor is defined as a linear combination of original variables. Define R as the following matrix:

$$R = (R_{tk})_{\substack{1 \ t \ T \\ 1 \ k \ n}}$$

We have n variables, i.e., monthly returns for n different competing indices, and T observations of these variables.

$$R_{tk} = \sum_{i=1}^n \sqrt{U_{ik}} U_{ik} V_{ti} \quad (1)$$

where

$(U) = (U_{ik})_{1 \ i, k \ n}$ is the matrix of the n eigenvectors of $R'R$.

$(U^T) = (U_{ki})_{1 \ k, i \ n}$ is U transposed.

$(V) = (V_{ti})_{\substack{1 \ t \ T \\ 1 \ i \ n}}$ is the matrix of the n eigenvectors RR'

Note that these n eigenvectors are orthonormal. λ_i is the eigenvalue (ordered by degree of magnitude) corresponding to the eigenvector U_i . Denoting $S_{ik} = \sqrt{\lambda_i} U_{ik}$ the principal component sensitivity of the kth variable to the ith factor, and $V_{ti}=F_{ti}$, one can equivalently write equation (1)

$$R_{tk} = \sum_{i=1}^n S_{ik} F_{ti}$$

where the n factors F_{ti} are a set of orthogonal variables. 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

$$R_{tk} = \sum_{i=1}^I \sqrt{\lambda_i} U_{ik} V_{ti} + \epsilon_{tk} = \sum_{i=1}^I S_{ik} F_{ti} + \epsilon_{tk} \quad (2)$$

where some structure is imposed by assuming that the residuals ϵ_{tk} are uncorrelated one to another.

The percentage of variance explained by the first I factors is given by $\frac{\sum_{i=1}^I \lambda_i}{\sum_{i=1}^n \lambda_i}$.

By taking I=1 in equation (2) this method can be used to generate "the best one-dimensional" summary of a set of competing indices. Furthermore, a simple normalization allows one to obtain an index which can be regarded as a portfolio of competing indices, so that an actual decomposition in terms of actual funds in the index can easily be obtained as long as information is available in each competing index composition.

$$R_{tk} = \sum_{i=1}^K \frac{S_{ik}}{\sum_{k'=1}^K S_{ik'}} F_{ti}$$

APPENDIX 3

PERFORMANCE OF THE EDHEC ALTERNATIVE INDEXES

It should be noted that the Edhec Alternative Indexes are meant to be representative and stable and do not aim to post superior risk-adjusted performance. Adding value remains the task of the fund manager who is in charge of selecting funds and/or changing the portfolio's tactical allocation.

Nevertheless, it is interesting to give a snapshot of the Edhec Alternative Indexes' risk and performance characteristics. For comparison purposes we will do the same for the competing indexes that enter into their composition¹⁴. We will also compare the Edhec Alternative Indexes' risk and return characteristics to the average risk and return characteristics of the competing indexes (referred to as Competing Indexes in table 14). The risk dimension will be characterized by the annual volatility of the indexes' returns (i.e. annual standard deviation) and by its Value-at-Risk¹⁵. The Sharpe Ratio¹⁶ and the Sortino Ratio¹⁷ were used to assess the indexes' risk-adjusted performances.

Maximizing the representativity of the Edhec Alternative Indexes (i.e. the index of indexes) consists roughly of reducing the noise of the index portfolio's variance co-variance matrix. This leads implicitly to a reduction in volatility. Consequently, the Edhec Alternative Indexes are not only more representative and stable but they also tend to have lower volatility. The same remark holds for the VAR, which indicates that the Edhec Alternative Indexes are also less exposed to extreme risks. This last property is of great interest for institutional investors who are keen to limit extreme losses.

¹⁴ Only those indexes that fulfilled our requirements (see section II for more details) were included in the composition of the Edhec Alternative Indexes. As a result, other indexes that are not mentioned in tables 12 & 13 may be available on the market.

¹⁵ We calculated historical Value at Risk with a 95% confidence level (i.e. $\alpha=5\%$): $VAR = W (\mu - z^* \sigma)$ where μ is the average return, σ the standard deviation and z the critical value for probability (1- α). W refers to the current value of the portfolio.

¹⁶ The Sharpe Ratios were calculated with a risk-free rate of 3%. $Sharpe\ Ratio = (\mu - R_f) / \sigma$, where μ is the average return, σ the standard deviation and R_f the risk-free rate.

¹⁷ The Sortino Ratios were calculated with a Minimum Accepted Return equal to the risk-free rate (i.e. $MAR=3\%$). $Sortino\ Ratio = (\mu - R_f) / \sigma_{MAR}$, where μ is the average return, σ_{MAR} the semi standard deviation and R_f the risk-free rate.

Table 11: Risk Overview

| | Edhec | | HFR | | CSFB | | EACM | | Altvest | | | |
|------------------------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|--|--|
| | Volatility | VAR* | Volatility | VAR* | Volatility | VAR* | Volatility | VAR* | Volatility | VAR* | | |
| Convertible Arbitrage | 3,46% | 18,33% | 6,30% | 20,50% | 4,03% | 20,24% | 6,30% | 20,50% | | | | |
| CTA Global | 9,07% | 22,55% | | | 12,44% | 27,44% | | | | | | |
| Distressed Securities | 4,91% | 21,50% | 5,40% | 21,49% | 5,30% | 21,28% | 4,50% | 18,92% | 6,00% | 23,67% | | |
| Emerging Markets | 11,52% | 35,16% | 14,34% | 40,62% | 13,44% | 36,88% | | | 7,23% | 25,78% | | |
| Equity Market Neutral | 1,93% | 12,26% | 3,44% | 11,77% | 2,10% | 13,73% | | | | | | |
| Event Driven | 4,98% | 19,45% | 6,62% | 22,73% | 4,31% | 18,48% | 3,84% | 17,33% | 4,33% | 18,30% | | |
| Fixed Income Arbitrage | 2,08% | 11,51% | 2,77% | 11,28% | 2,47% | 11,80% | | | | | | |
| Funds of Funds | 5,91% | 19,54% | 5,71% | 17,98% | | | | | 10,08% | 29,62% | | |
| Global Macro | 5,70% | 19,26% | 6,82% | 21,85% | 7,88% | 26,05% | | | 8,29% | 24,16% | | |
| Long Short Equity | 7,72% | 22,69% | 10,64% | 29,97% | 11,64% | 30,04% | | | 4,29% | 18,36% | | |
| Merger Arbitrage | 3,32% | 14,15% | 3,21% | 13,14% | 4,26% | 14,45% | 3,96% | 13,38% | 3,48% | 15,61% | | |
| Relative Value | 3,33% | 15,73% | 2,26% | 13,62% | | | 2,63% | 12,44% | 2,45% | 15,07% | | |
| Short Selling | 22,46% | 39,62% | 26,43% | 49,07% | 17,55% | 24,87% | 18,47% | 36,90% | 8,32% | 29,36% | | |

| | Hennessee | | Van Hedge | | CISDM | | HF Net | | Barclay | | S&P | |
|------------------------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|------------|--------|
| | Volatility | VAR* | Volatility | VAR* | Volatility | VAR* | Volatility | VAR* | Volatility | VAR* | Volatility | VAR* |
| Convertible Arbitrage | 3,99% | 17,59% | | | | | 3,21% | 18,26% | 3,23% | 17,83% | | |
| CTA Global | | | | 8,24% | 21,37% | 9,50% | 26,36% | 8,25% | 19,26% | 16,77% | 39,50% | |
| Distressed Securities | 5,66% | 21,37% | 5,45% | 21,33% | | | 5,42% | 24,30% | 5,43% | 22,85% | | |
| Emerging Markets | 11,71% | 33,02% | 18,25% | 49,35% | 10,46% | 32,72% | 11,87% | 40,36% | 14,66% | 43,46% | | |
| Equity Market Neutral | 2,63% | 7,49% | 3,42% | 17,12% | 1,27% | 11,37% | 3,04% | 15,92% | 3,32% | 13,01% | | |
| Event Driven | 5,37% | 21,18% | | | 3,22% | 14,97% | 6,31% | 22,17% | 6,01% | 22,22% | 4,03% | 16,85% |
| Fixed Income Arbitrage | 3,21% | 12,18% | 3,33% | 14,08% | | | 2,24% | 13,86% | 2,37% | 13,49% | | |
| Funds of Funds | | | 7,82% | 24,16% | 3,51% | 13,43% | 4,81% | 17,86% | 4,96% | 18,20% | | |
| Global Macro | 6,82% | 16,58% | 11,45% | 26,49% | 4,03% | 14,12% | 5,40% | 22,30% | 5,91% | 21,75% | | |
| Long Short Equity | | | | | | | 9,43% | 31,59% | 9,28% | 29,95% | | |
| Merger Arbitrage | 3,65% | 14,69% | | | | | 3,28% | 15,74% | 3,23% | 14,33% | | |
| Relative Value | 9,21% | 26,56% | 11,71% | 34,35% | | | 2,13% | 14,55% | | | 2,71% | 13,92% |
| Short Selling | 16,50% | 32,09% | 24,23% | 43,74% | 18,87% | 33,64% | | | 21,13% | 43,34% | | |

* computed at a 95% confidence level Analysis period: from January 1999 through December 2003

Table 12: Risk Adjusted Performance

| | Edhec | | HFR | | CSFB | | EACM | | Altvest | | | |
|------------------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--|--|
| | Sharpe Ratio | Sortino Ratio | Sharpe Ratio | Sortino Ratio | Sharpe Ratio | Sortino Ratio | Sharpe Ratio | Sortino Ratio | Sharpe Ratio | Sortino Ratio | | |
| Convertible Arbitrage | 2,79 | 7,01 | 1,14 | 1,59 | 2,64 | 5,57 | 1,14 | 1,59 | | | | |
| CTA Global | 0,52 | 0,85 | | | 0,32 | 0,52 | | | | | | |
| Distressed Securities | 2,13 | 5,57 | 1,78 | 4,26 | 1,81 | 3,19 | 1,90 | 4,54 | 1,81 | 4,04 | | |
| Emerging Markets | 1,15 | 2,23 | 0,98 | 1,83 | 0,88 | 1,66 | | | 1,51 | 3,09 | | |
| Equity Market Neutral | 3,16 | 22,16 | 0,91 | 1,87 | 3,46 | 20,55 | | | | | | |
| Event Driven | 1,67 | 3,12 | 1,34 | 2,35 | 1,96 | 3,59 | 2,10 | 4,08 | 1,89 | 3,92 | | |
| Fixed Income Arbitrage | 2,46 | 5,70 | 1,35 | 2,55 | 1,92 | 3,16 | | | | | | |
| Funds of Funds | 1,16 | 2,79 | 0,98 | 2,15 | | | | | 1,00 | 2,45 | | |
| Global Macro | 1,21 | 2,93 | 1,12 | 2,33 | 1,29 | 2,35 | | | 0,91 | 1,90 | | |
| Long Short Equity | 0,91 | 1,74 | 0,89 | 1,83 | 0,68 | 1,39 | | | 1,94 | 4,02 | | |
| Merger Arbitrage | 1,72 | 2,91 | 1,52 | 2,49 | 1,05 | 1,75 | 0,98 | 1,42 | 1,98 | 3,80 | | |
| Relative Value | 2,18 | 4,22 | 3,06 | 13,32 | | | 1,95 | 3,57 | 3,29 | 12,07 | | |
| Short Selling | -0,01 | -0,01 | 0,10 | 0,15 | -0,39 | -0,53 | 0,20 | 0,32 | 1,53 | 4,08 | | |

| | Hennessee | | Van Hedge | | CISDM | | HF Net | | Barclay | | S&P | |
|------------------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|--------------|---------------|
| | Sharpe Ratio | Sortino Ratio | Sharpe Ratio | Sortino Ratio | Sharpe Ratio | Sortino Ratio | Sharpe Ratio | Sortino Ratio | Sharpe Ratio | Sortino Ratio | Sharpe Ratio | Sortino Ratio |
| Convertible Arbitrage | 2,02 | 4,04 | | | | | 3,12 | 9,06 | 2,95 | 8,58 | | |
| CTA Global | | | | | 0,59 | 0,99 | 0,82 | 1,53 | 0,33 | 0,52 | 0,54 | 0,90 |
| Distressed Securities | 1,61 | 3,22 | 1,72 | 4,64 | | | 2,29 | 6,28 | 2,02 | 4,64 | | |
| Emerging Markets | 0,92 | 1,87 | 0,90 | 1,75 | 1,20 | 2,40 | 1,51 | 3,17 | 1,12 | 2,21 | | |
| Equity Market Neutral | 0,07 | 0,09 | 2,49 | 13,49 | 4,93 | 51,43 | 2,62 | 15,40 | 1,38 | 3,15 | | |
| Event Driven | 1,74 | 3,54 | | | 2,08 | 4,70 | 1,40 | 2,64 | 1,56 | 3,09 | 1,79 | 2,95 |
| Fixed Income Arbitrage | 1,22 | 2,41 | 1,69 | 4,01 | | | 3,20 | 12,37 | 2,79 | 8,67 | | |
| Funds of Funds | | | 1,07 | 2,33 | 1,33 | 2,76 | 1,45 | 4,07 | 1,42 | 4,06 | | |
| Global Macro | 0,35 | 0,63 | 0,41 | 0,69 | 1,12 | 2,66 | 1,94 | 5,37 | 1,53 | 4,34 | | |
| Long Short Equity | | | | | | | 1,39 | 3,85 | 1,27 | 3,46 | | |
| Merger Arbitrage | 1,57 | 2,63 | | | | | 2,24 | 4,84 | 1,86 | 3,28 | | |
| Relative Value | 0,92 | 1,60 | 1,04 | 1,95 | | | 3,78 | 16,01 | | | 2,39 | 8,77 |
| Short Selling | 0,12 | 0,19 | 0,04 | 0,06 | -0,02 | -0,02 | | | 0,27 | 0,39 | | |

* computed at a 95% confidence level Analysis period: from January 1999 through December 2003

Table 13: Edhec Alternative Indexes versus the average of competing indexes¹⁸

| | Convertible Arbitrage | | CTA Global | | Distressed Securities | | Emerging Markets | | Equity Market Neutral | |
|---------------------------|-----------------------|-------------------|-------------|-------------------|-----------------------|-------------------|------------------|-------------------|-----------------------|-------------------|
| | Edhec Index | Competing Indexes | Edhec Index | Competing Indexes | Edhec Index | Competing Indexes | Edhec Index | Competing Indexes | Edhec Index | Competing Indexes |
| Average Annual Return | 12,66% | 11,99% | 7,67% | 8,68% | 13,45% | 13,05% | 16,26% | 16,87% | 9,10% | 8,55% |
| Min Monthly Return | -1,59% | -2,72% | -5,43% | -6,63% | -2,09% | -2,72% | -5,41% | -6,17% | -0,13% | -0,75% |
| Max Monthly Return | 3,44% | 3,63% | 6,82% | 8,45% | 4,21% | 4,95% | 12,30% | 13,48% | 2,53% | 3,07% |
| % of winning months | 86,67% | 86,11% | 56,67% | 57,33% | 76,67% | 76,04% | 73,33% | 69,79% | 95,00% | 84,72% |
| % of losing months | 13,33% | 13,89% | 43,33% | 42,67% | 23,33% | 23,96% | 26,67% | 30,21% | 5,00% | 15,28% |
| Skewness | -0,34 | -0,59 | 0,10 | 0,15 | 0,07 | -0,02 | 0,32 | 0,44 | 0,99 | 0,69 |
| Exc. Kurtosis | 0,35 | 1,98 | -0,21 | -0,10 | -0,42 | 0,51 | 0,87 | 1,19 | 0,99 | 1,57 |
| Annual Std Deviation | 3,46% | 3,94% | 9,07% | 11,04% | 4,91% | 5,39% | 11,52% | 12,74% | 1,93% | 2,65% |
| Annual Semi Std Deviation | 1,38% | 1,95% | 5,47% | 6,59% | 1,87% | 2,38% | 5,95% | 6,48% | 0,28% | 0,87% |
| VAR 95% | 18,33% | 18,46% | 22,55% | 26,79% | 21,50% | 21,90% | 35,16% | 37,77% | 12,26% | 12,90% |
| Sharpe Ratio | 2,79 | 2,47 | 0,52 | 0,52 | 2,13 | 1,87 | 1,15 | 1,13 | 3,16 | 2,41 |
| Sortino Ratio | 7,01 | 6,12 | 0,85 | 0,89 | 5,57 | 4,35 | 2,23 | 2,25 | 22,16 | 17,14 |

| | Event Driven | | Fixed Income Arbitrage | | Funds of Funds | | Global Macro | | Long/Short Equity | |
|---------------------------|--------------|-------------------|------------------------|-------------------|----------------|-------------------|--------------|-------------------|-------------------|-------------------|
| | Edhec Index | Competing Indexes | Edhec Index | Competing Indexes | Edhec Index | Competing Indexes | Edhec Index | Competing Indexes | Edhec Index | Competing Indexes |
| Average Annual Return | 11,29% | 11,33% | 8,11% | 8,30% | 9,84% | 10,13% | 9,91% | 10,06% | 10,04% | 13,13% |
| Min Monthly Return | -3,00% | -3,06% | -0,92% | -1,36% | -2,69% | -3,32% | -3,04% | -4,17% | -3,89% | -4,15% |
| Max Monthly Return | 4,29% | 4,52% | 2,08% | 2,93% | 6,66% | 7,11% | 6,12% | 7,20% | 7,45% | 10,05% |
| % of winning months | 80,00% | 81,48% | 86,67% | 85,28% | 71,67% | 73,33% | 68,33% | 68,54% | 66,67% | 69,33% |
| % of losing months | 20,00% | 18,52% | 13,33% | 14,72% | 28,33% | 26,67% | 31,67% | 31,46% | 33,33% | 30,67% |
| Skewness | -0,49 | -0,42 | -0,26 | 0,06 | 1,26 | 1,19 | 0,87 | 0,70 | 0,48 | 0,90 |
| Exc. Kurtosis | 0,94 | 1,66 | 0,70 | 1,97 | 2,99 | 3,48 | 1,35 | 1,88 | 0,93 | 2,66 |
| Annual Std Deviation | 4,98% | 4,89% | 2,08% | 2,73% | 5,91% | 6,15% | 5,70% | 7,07% | 7,72% | 9,05% |
| Annual Semi Std Deviation | 2,66% | 2,56% | 0,90% | 1,22% | 2,45% | 2,58% | 2,36% | 3,50% | 4,04% | 3,96% |
| VAR 95% | 19,45% | 19,36% | 11,51% | 12,78% | 19,54% | 20,21% | 19,26% | 21,66% | 22,69% | 27,98% |
| Sharpe Ratio | 1,67 | 1,76 | 2,46 | 2,03 | 1,16 | 1,21 | 1,21 | 1,08 | 0,91 | 1,24 |
| Sortino Ratio | 3,12 | 3,43 | 5,70 | 5,53 | 2,79 | 2,97 | 2,93 | 2,53 | 1,74 | 2,91 |

| | Merger Arbitrage | | Relative Value | | Short Selling | |
|---------------------------|------------------|-------------------|----------------|-------------------|---------------|-------------------|
| | Edhec Index | Competing Indexes | Edhec Index | Competing Indexes | Edhec Index | Competing Indexes |
| Average Annual Return | 8,71% | 8,60% | 10,26% | 10,89% | 2,79% | 4,76% |
| Min Monthly Return | -2,67% | -2,78% | -2,21% | -2,10% | -13,40% | -16,58% |
| Max Monthly Return | 2,39% | 2,90% | 3,33% | 4,43% | 16,57% | 17,30% |
| % of winning months | 85,00% | 82,86% | 85,00% | 82,38% | 51,67% | 51,25% |
| % of losing months | 15,00% | 17,14% | 15,00% | 17,62% | 48,33% | 48,75% |
| Skewness | -1,09 | -0,88 | -0,77 | 0,17 | -0,01 | 0,01 |
| Exc. Kurtosis | 2,46 | 2,26 | 1,91 | 0,65 | -0,24 | 0,66 |
| Annual Std Deviation | 3,32% | 3,58% | 3,33% | 4,73% | 22,46% | 22,00% |
| Annual Semi Std Deviation | 1,97% | 2,08% | 1,72% | 2,20% | 15,82% | 15,11% |
| VAR 95% | 14,15% | 14,48% | 15,73% | 18,64% | 39,62% | 40,84% |
| Sharpe Ratio | 1,72 | 1,60 | 2,18 | 2,35 | -0,01 | 0,08 |
| Sortino Ratio | 2,91 | 2,89 | 4,22 | 8,18 | -0,01 | 0,13 |

Analysis period: from January 1999 through December 2003



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