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In Search of Alpha



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Investing in Hedge Funds

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Executive Summary

In Search of Alpha

- Most Alternative Investment Strategies (AIS) are designed to generate pure alpha by hedging the primary risk (eg, stock market and interest rate risk) that drive returns in the traditional asset classes. These strategies seek to exploit mispricings and inefficiencies in global capital markets by accepting idiosyncratic risk in return for generating high, risk-adjusted ratios of return with low correlation to traditional assets.
- Some AIS have returned Sharpe ratios of around 2.0 and are likely to do so in the future. Some absolute-return strategies yielded high returns, which were only weakly correlated with returns in other capital markets and weakly or negatively correlated among themselves. We believe that these correlation characteristics are unlikely to disappear as the risk factors of the AIS are of a different nature than traditional investment strategies. Returns from relative-value strategies have a correlation with global equities of around 0.2-0.3, whereas event-driven strategies are around 0.4-0.5. Opportunistic strategies normally have a higher correlation to equities.
- Some strategies perform better than others when equity markets fall. We believe that high downside protection is, to a large extent, predictable. Understanding the different investment philosophies is becoming increasingly important as more and more beta merchants camouflaged as hedge funds reach out for institutional dollars. In the case of a bear market, hedge funds without an edge in the discipline of exploiting market inefficiencies and without serious risk management capabilities are likely to tumble as did most copy-cat hedge funds in the early 1970s when markets reversed.
- In our opinion, if there is a single most important attribute of the hedge fund industry, it is heterogeneity. The various investment strategies are conceptually different. Traditional funds are normally long an asset class and unleveraged. Hedge funds can range from leveraged short to leveraged long. However, it is the middle section — the zero-beta strategies — which, in our view, deserve the most attention.
- We express the view that absolute return strategies which involve arbitrage and hedge market risk are more attractive to most investors due to low correlation to traditional markets and stable returns than, for example, macro funds. Our reservations for macro funds derive from the belief that the successful macro managers can be identified ex-post-, but not ex-ante. In 1969 it was difficult to foresee that a dollar given to a Mr Soros would grow to US\$300 within three decades.
- We believe that, in the quest for alpha, investing in hedge funds is irrefutably wise. Any investor who is not restricted to invest in hedge funds, in our view, should reach the same conclusion. Where risk, return and correlation to traditional asset classes matter, the advantages of investing in absolute-return strategies should outbalance the disadvantages by a wide margin.

Overview and Structure

Introduction

Alternative Investment Strategies are gaining in popularity among institutional and private investors alike. The two main types of alternative investments regarded as 'alternative' by the traditional capital markets are: (1) private equity; and (2) strategies, which focus on absolute returns and controlled market risk, ie, hedge funds. In this report on AIS we focus on investing in hedge funds. For over the 50 years it has existed, the hedge fund industry has remained opaque to the general investing public. Unfortunately, spectacular hedge fund activities, such as the attack of the pound sterling led by George Soros and the collapse of Long-Term Capital Management (LTCM), which prompted the intervention from federal regulators, have heightened public concern about the hedge fund industry.

The reality of hedge funds

In October 1998, we published *The Reality of Hedge Funds* as a response to the over-dramatised press coverage of the hedge funds industry after the collapse of LTCM, which prompted significant redemption of hedge funds. The document covered many aspects of the industry and discussed strategies and segmentation of hedge funds. The overall conclusion was that hedge funds can be attractive investment vehicles and were probably not as bad as they were portrayed at the time. We also discussed the efficiency gains in a portfolio if one adds alternative assets with high expected returns, low volatility and low correlation to traditional assets.

The future of hedge fund investing

This publication is intended as a follow-up, with the focus less on industry structure and asset allocation benefits to the investor, but on the future of hedge fund investing, ie, the sustainability of attractive risk/return and correlation characteristics. We used two tools to estimate future profitability: the conceptual assessment of the investment strategies and time-series analysis that goes further than measuring historical mean returns and standard deviations. We believe that the combination of an understanding of the investment philosophy of some absolute-return strategies, combined with an educated view of the historical return distributions, allows a solid prediction of future performance characteristics.

In search of alpha

Derivatives offer the investor efficient exposure to the capital markets. The widespread availability of derivatives allows the separation of alpha and beta. The main advantage of derivatives is that little or no cash is required to maintain desired capital market exposures. This creates an opportunity to allocate capital first to high-alpha strategies and limit the use of scarce capital to purchase capital market exposures where there is limited opportunity to generate alpha. We believe that in the future, it is possible that capital will be allocated to areas offering the highest alphas and capital market exposures will be managed with a derivatives overlay. Risk-adjusted returns should, therefore, be maximised as capital will not be used to purchase capital market exposures with low alpha potential. Two examples, which, in our opinion, will gain momentum are: (1) the core-satellite approach in which the core of the portfolio is managed passively and the remainder actively; and (2) the portable alpha concept where the capital market exposure is 'bought' with swaps and the capital is invested in skill-based strategies. We expect hedge funds to play an important role in the search for alpha.

Structure of Report

- One of the most important characteristics of hedge funds is their heterogeneity in terms of their strategies. After revisiting some industry characteristics, we distinguish between the different hedge fund strategies and elaborate their main characteristics on p20.
- On p51, we discuss some differences between mutual funds and hedge funds from an investor's perspective.
- To some investors hedge funds are a myth. We attempt to de-mystify some of the myths on p64.
- On p81, we summarise the advantages of investing in hedge funds and also elaborate on some of the disadvantages.
- For many investors, funds of funds are the best way to participate in hedge funds. We briefly discuss some advantages and disadvantages of investing this way on p94.
- Starting on p98, we focus on the performance of the previously discussed strategies. The goal is not only to analyse past risk/return and correlation characteristics but assess how and what might change in the future.
- We have covered the history of hedge funds in previous research and have included a summary to the appendix as reference. Many absolute return strategies are based on market inefficiencies. A brief discussion on the status of the 30-year old debate on whether markets are efficient is also included in the appendix. In addition, we include a description of the data used in this report in the appendix.

The author would like to thank Alan Scowcroft, Paddy Dear, William Kennedy, Rob Kirkwood, Keith Ackerman and Simon Phillips from UBS Warburg, Mike Welch and Daniel Edelman from UBS O'Connor, Bryan White and Lindsay McComb from Quadra for their invaluable contribution to this report. The author is solely responsible for any errors, omissions and ambiguities.

Hedge Funds – The Basics Revisited

Defining Hedge Funds

“During the French Revolution such speculators were known as agitateurs, and they were beheaded.”¹

Michel Sapin

There are nearly as many definitions of hedge funds as there are hedge funds. We think the following is the best description:

Definition

Hedge funds are private partnerships wherein the manager or general partner has a significant personal stake in the fund and is free to operate in a variety of markets and to utilise investments and strategies with variable long/short exposures and degrees of leverage.²

Beyond the basic characteristics embodied in this definition, hedge funds commonly share a variety of other structural traits. They are typically organised as limited partnerships or limited liability companies. They are often domiciled off shore, for tax and regulatory reasons. And, unlike traditional funds, they are not burdened by regulation.

Alternative Investment Strategies (AIS)

AIS comprise an asset class that seeks to generate absolute positive returns by exploiting market inefficiencies while minimising exposure and correlation to traditional stock and bond investments. Normally, private equity as well as hedge fund investing are referred to as AIS.

Skill-based strategies versus strategies capturing an asset class

As we elaborate later in this report, the reputation of hedge funds is not particularly good. The term ‘hedge fund’ suffers from a similar fate as ‘derivatives’ due to a mixture of myth, misrepresentation, negative press and high-profile casualties. Hedge fund strategies are occasionally also referred to as skill-based strategies or absolute return strategies which, from a marketing perspective, avoids the negative bias attached to the misleading term ‘hedge fund’. Skill-based strategies differ from traditional strategies. The former yields a particular return associated to the skill of a manager whereas the latter primarily captures the asset class premium. Skill-based strategies involve, from an investors perspective, the following three attributes:

- High expected risk-adjusted returns;
- Low correlation with traditional asset classes;
- A source of return not explained by the Capital Asset Pricing Model.

¹ Michel Sapin, former French Finance Minister, on speculative attacks on the Franc (from Bekier 1996)

² from Crerend 1995

Main Characteristics of the Hedge Fund Industry

Industry Size and Growth

US\$1tr assets under management as of 1998

Estimates of the size of the hedge fund industry are scarce and deviate substantially. The estimates for the number of funds ranges between 2,500 and 6,000 and assets under management between US\$200bn and US\$1tr. The President's Working Group estimates that the hedge funds universe as of mid-1998 was between 2,500 and 3,500 funds, managing between US\$200bn and US\$300bn in capital, with approximately US\$800bn to US\$1tr in total assets.¹

Still a niche industry

Compared with other US financial institutions, the estimated US\$1tr in assets under management remains relatively small. At the end of 1998, commercial banks had US\$4.1tr in total assets, mutual funds had assets of approximately US\$5tr, private pension funds had US\$4.3tr, state and local retirement funds had US\$2.3tr, and insurance companies had assets of US\$3.7tr.²

The CalPERS bombshell - legitimising hedge fund investing

The California Public Employees' Retirement System (CalPERS) dropped a bombshell on the hedge fund industry on 31 August 1999, when it released a statement saying it would invest as much as US\$11bn into 'hybrid investments', including hedge funds. While many other large and sophisticated institutional investors have been investing in the AIS sectors for years, the announcement by CalPERS further legitimised AIS investments for the broad base of institutions seeking viable alternatives to their reliance on ever-increasing stock prices. One year after the LTCM collapse, when it was nothing more than a fading memory, new hedge funds were hatching at the quickest pace ever seen. Net capital flows into the industry were picking up from 1998's retrenchment, placing the industry on the threshold of a long-term boom.

Some of the most conservative and sophisticated investors invest in hedge funds

While sophisticated individual investors (up to 75% of hedge fund assets, according to some estimates)³ have historically targeted hedge funds, in recent years the participation of institutional investors has risen. In the US, for example, institutional investors accounted for nearly 30% of new money flowing into hedge funds in the past few years. University foundations and endowments are among the most aggressive institutional investors. It is commonly known that the 'Ivy League' schools such as Harvard and Princeton have large allocations to hedge funds. On the corporate side, large conservative firms such as IBM or RJR Reynolds have been investing in hedge funds for years. Pension funds, under pressure to constantly look for new ways to diversify their holdings, are also starting to allocate capital to hedge funds. In addition, over-funded pension funds seek to preserve wealth by lowering risk.

¹ *Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management - The Report of The President's Working Group on Financial Markets*, April 1999.

² From Board of Governors of the Federal Reserve System, *Flow of Funds Accounts of the United States*, Fourth Quarter 1998.

³ See Hopkins (2000)

Supply driven expansion in the past versus...

Increased institutional participation portends a fundamental shift in the quality of hedge fund programmes. In the past, the establishment of hedge funds has been largely supply-driven. Successful investors, often the heads of proprietary trading desks, decided to forego their lucrative seven and eight figure Wall Street remuneration packages to establish boutique organisations as the primary vehicle for managing their own personal assets. Earning a return on their own assets (versus the collection of fees from outside investors) was the primary motivator for early hedge fund entrants. Entry costs were high as the dealer community set lofty standards for those to which it would lend money/stock and establish trading lines.

...today's demand driven growth

Increasing participation from institutions is beginning to shift the expansion from being supply driven to demand driven. This motivates a vast group of aspirants to enter the competition for these new US dollars and euros. At the same time, the barriers to entry have been torn down. There have been hedge funds launched by 20-year olds with little to no resources or investment experience.

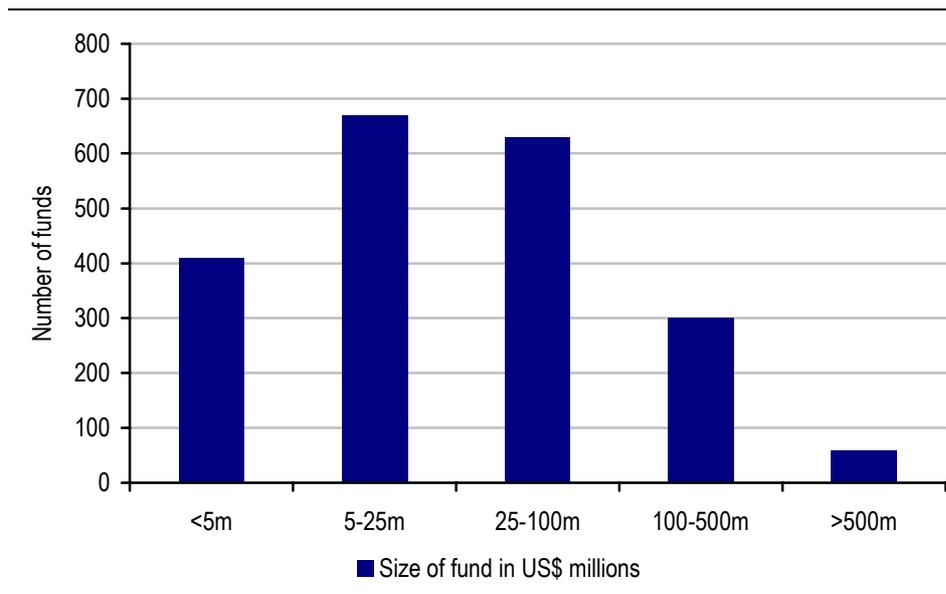
Growth in funds-of-funds industry

As a result, the differentiation between quality and sub-standard managers is becoming more pronounced. Quality hedge fund managers should benefit from a proliferation of ill-managed funds, while investors need to stay alert to this potential degradation in the quality of hedge fund management. This proliferation and the high costs associated with actively selecting hedge funds are among the main reasons for accelerated growth in the funds-of-funds-industry. We will take a closer look at funds-of-funds on p94.

The following two sections examine the distribution of dollars invested in hedge funds, by fund size and by fund investment style.

Distribution by Size

Chart 1: Size Distribution of Hedge Funds as of 31 December 1999



Source: Van Hedge Fund Advisors

Average fund size is falling

Chart 1 shows the distribution of hedge funds by size. As of 1999, around 83% of all funds under management were allocated to funds below US\$100m and around 52% to funds smaller than US\$25m. The average size of hedge funds is decreasing. Based on the 1,305 hedge funds in the MAR/Hedge database (not shown in graph), the average fund size in October 1999 was US\$93m compared with US\$135m a year earlier.

Distribution by Style**Table 1: Number of Funds and Assets Under Management by Style as of 1998**

(%)	Funds	Assets under management
Long/short equity	30.6	29.8
Managed futures	18.6	15.9
Funds-of-funds	14.1	NA*
Event-driven	11.9	16.6
Emerging markets	5.6	3.5
Fixed income arbitrage	5.1	7.7
Global macro	4.0	14.9
Equity market neutral	3.8	3.9
Convertible arbitrage	3.5	4.4
Equity trading	1.1	2.4
Dedicated short bias	0.5	0.4
Other	1.2	0.5

Source: Tremont (1999)

* As funds of funds invest in other funds the percentage of all hedge funds assets under management has not been given to avoid double counting

Equity long/short largest investment style

Long/short equity is the largest style with a market share of around 30%, based on the number of funds as well as assets under management. The funds of funds industry was around 12-14% of the total number of funds. We expect this percentage to increase, as for most investors a diversified exposure to hedge funds is more appropriate than carrying single-fund risk and picking single hedge funds is time consuming and costly. We will address the costs of picking hedge funds later in the document (p94).

Fewer macro funds

Note that only around 4% of funds are macro funds but they represent around 15% of the industry. The percentage of macro funds fell to around 22% by 1997 (Table 2) and 15% by 1998 (Table 1). We expect these percentages to be even lower today after large losses (Tiger) and retreats (Quantum). The following table compares allocation differences between 1990 and 1997.

Table 2: Assets Under Management Comparison Between 1990 and 1997

(%)	1990	1997	Change
Macro	50.6	22.4	-28.2
Equity Non-Hedge	14.1	15.8	1.7
Equity Hedge	9.8	14.8	5.0
Emerging markets	2.8	12.7	9.9
Event-Driven	4.5	7.9	3.4
Equity market-neutral	1.0	4.7	3.7
Sector	0.5	3.5	3.0
Distressed securities	1.7	2.5	0.8
Fixed income arbitrage	0.6	2.0	1.4
Convertible arbitrage	1.9	1.8	-0.1
Risk arbitrage	0.2	0.9	0.7
Short selling	2.7	0.2	-2.5
Other	9.6	10.8	1.2

Source: Nicholas (1999)

Note that Equity Non-Hedge and Equity Hedge is roughly what others define as long/short equity. The market share of long/short equity, therefore, is around 30%. This is consistent with data from Tremont (1999).

Use of Leverage

Leverage is an important issue to most investors when investing in hedge funds. Institutionally, leverage is defined in balance sheet terms as the ratio of total assets to equity capital (net worth). Alternatively, leverage can be defined in terms of risk, in which case it is a measure of economic risk relative to capital.

Different hedge fund strategies require different degrees of leverage

Vulnerable to liquidity shocks

Hedge funds vary greatly in their use of leverage. Nevertheless, compared with other trading institutions, hedge funds' use of leverage, combined with any structured or illiquid positions whose full value cannot be realised in a quick sale, can potentially make them somewhat fragile institutions that are vulnerable to liquidity shocks. While trading desks of investment banks may take positions similar to hedge funds, these organisations and their parent firms often have both liquidity sources and independent streams of income from other activities that can offset the riskiness of their positions.

The following table shows our own estimates of how different hedge fund managers are typically leveraged.

Table 3: Estimated Use of Balance Sheet Leverage

(%)	Balance-sheet leverage
Fixed income arbitrage	20-30
Convertible arbitrage	2-10
Risk arbitrage	2-5
Equity market-neutral	1-5
Equity Long/Short	1-2
Distressed securities	1-2
Emerging markets	1-1.5
Short selling	1-1.5

Source: UBS Warburg estimates

Around 72% of hedge funds use leverage

Based on a report from Van Money Manager Research around 72% of hedge funds used leverage as of December 1999. However, only around 20% have balance-sheet leverage ratios of more than 2:1. Fixed income arbitrageurs operate with the smallest margins and therefore gear up heavily to meet their return target. Hedge funds that operate in emerging markets, for example, use little leverage primarily because derivatives markets and securities lending is not developed.

Using leverage and using derivatives are often regarded as synonymous. This is a misconception, which we address later in the document (p88). Table 4 shows the use of derivatives by investment style.

Table 4: Use of Derivatives of Global Hedge Funds in 1995

(%)	No derivatives		Use of derivatives		
	Total	Hedging only	Yield enhancement only	Both	Total
Total Sample	28.1	48.8	1.4	21.7	71.9
Fund of Funds	6.3	53.4	0.0	40.2	93.7
Market Timing	13.8	55.2	6.9	24.1	86.2
Macro	20.5	38.6	0.0	40.9	79.5
Emerging Markets	21.6	64.9	0.0	13.5	78.4
Short Selling	23.3	46.7	0.0	30.0	76.7
Market Neutral - Arbitrage	23.5	55.1	1.0	21.4	76.5
Opportunistic	23.9	36.6	5.6	33.8	76.1
Special Situations	25.0	63.2	0.0	11.8	75.0
Market Neutral - Securities Hedging	33.3	43.3	0.0	23.3	66.7
Income	35.1	43.2	0.0	21.6	64.9
Value	37.6	50.5	2.6	9.3	62.4
Distressed Securities	42.9	37.1	0.0	20.0	57.1
Several Strategies	46.3	41.5	0.0	12.2	53.7
Aggressive Growth	47.4	40.9	0.6	11.1	52.6

Source: Van Money Manager Research

Incentive to hedge

Around 72% of hedge funds use derivatives primarily for hedging purposes. Unlike other money managers, the hedge fund manager's use of derivatives is not constrained by regulatory barriers. Furthermore, many hedge fund managers come from a risk management (as opposed to a fund management) background which implies knowledge of risk management instruments and experience in its markets. A further reason for the extensive use of derivatives is the fact that the hedge fund managers' own capital is at stake. Capital depreciation of the fund, therefore, has a greater impact on the managers' wealth. Hence, a hedge fund manager has a large incentive to hedge (ie, preserve wealth).

Some long-established macro funds find the fees on complex derivatives prohibitive. They find it cheaper to use conventional forwards and futures to take positions ahead of the market moves they foresee. Some newer macro funds pursue more specialised trading strategies using complex derivative securities. Relative-value funds are also inclined to use derivatives because the mis-priced securities they are seeking can be hidden within complex derivatives that combine several underlying assets.

High leverage is the exception rather than the rule

Hedge funds leverage the capital they invest by buying securities on margin and engaging in collateralised borrowing. Better known funds can buy structured derivative products without first putting up capital, but must make a succession of premium payments when the market in those securities trades up or down. In addition, some hedge funds negotiate secured credit lines with their banks, and some relative value funds may even obtain unsecured credit lines. Credit lines are expensive, however, and most managers use them mainly to finance calls for additional margin when the market moves against them. These practices may allow a few hedge funds to achieve very high leverage ratios.

Characteristics of the 'Average' Hedge Fund

The hedge fund industry is heterogeneous

There is no typical hedge fund. One of the industry's main characteristics is heterogeneity and not homogeneity. However, Table 5 lists some averages from the Van Hedge hedge fund universe. Table 6 on p13 lists some further characteristics.

Table 5: Global Hedge Fund Descriptive Statistics, as of Q4 99

	Mean	Median	Mode
Fund size (US\$m)	87	22	10
Fund age (years)	5.9	5.3	5.0
Minimum investment (US\$)	695,000	250,000	250,000
Number of entry dates	34	12	12
Number of exit dates	28	4	4
Lockup period *	84 days	0 day	NA
Advance notice *	35 days	30 days	NA
Management fee (%)	1.7	1.0	1.0
Performance related fee (%)	15.9	20.0	20.0
Manager's experience (years)			
in securities industry	17	15	10
in portfolio management	11	10	10

Source: Van Money Manager Research; Liang (1999).

* From Liang (1999) and as of July 1997

The mean measures the arithmetical average. The median measures the point on either side of which lies 50% of the distribution. A median is often preferred over the mean as a measure of central tendency because the arithmetic average can be misleading if extreme values are present. The mode is the number, which occurs most frequently

Table 6: Trends in Descriptive Statistics between 1995 and 1999

Characteristics	Yes 1995 (%)	Yes 1999 (%)
Manager is a US registered investment advisor	54	45
Fund has hurdle rate ¹	17	17
Fund has high water mark ²	64	75
Fund has audited financial statements or audited performance	97	98
Manager has US\$500,000 of own money in fund	78	75
Fund can handle 'hot issues' ³	25	53
Fund is diversified	57	57
Fund can short sell	76	84
Fund can use leverage	72	72
Fund uses derivatives for hedging only, or none	77	71

Source: Van Money Manager Research

We will highlight some of the characteristics in Table 6 when we compare hedge funds with mutual funds on p51. In the following section we discuss the

¹ Hurdle rate: The return above which a hedge fund manager begins taking incentive fees. For example, if a fund has a hurdle rate of 10%, and the fund returns 25% for the year, the fund will only take incentive fees on the 15% return above the hurdle rate.

² High water mark: The assurance that a fund only takes fees on profits unique to an individual investment. For example, a US\$1,000,000 investment is made in year one and the fund declines by 50%, leaving US\$500,000 in the fund. In year two, the fund returns 100%, bringing the investment value back to US\$1,000,000. If a fund has a high water mark, it will not take incentive fees on the return in year two, since the investment has never grown. The fund will only take incentive fees if the investment grows above the initial level of US\$1,000,000.

³ A newly issued stock that is in great demand and rises quickly in price. Special rules apply to the distribution of hot issues.

56% of institutions either currently invest (17%) or plan to invest (39%) institutional money in hedge funds in the future

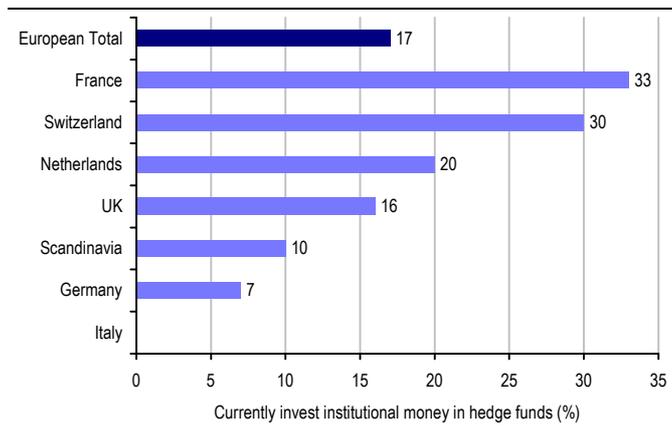
developments in Europe which many regard as a growth area for raising capital for absolute returns strategies.

The Situation in Europe

Ludgate¹ conducted a survey on the hedge fund industry in Europe from an investor’s perspective. The sample size was 100 major European institutional investors domiciled in UK, Germany, France, Switzerland, Italy, Netherlands, and Scandinavia. The number of sample institutions for each market was based on relative weighting of total assets under management in each market. All respondents were senior personnel involved in investment management, including 39 CIOs. Total assets of sample institutions represented over 60% of total assets under management by European institutions. The major findings were summarised as:

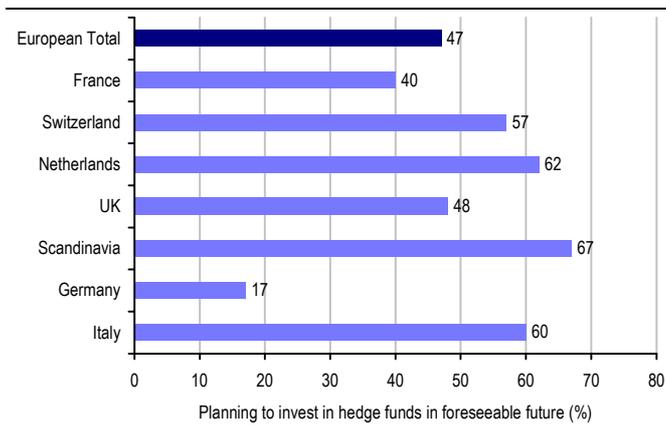
- 56% of institutions surveyed either currently invest (17%) or plan to invest (39%) institutional money into hedge funds in the foreseeable future;
- Current investment of institutional money in hedge funds was greatest in France (33% of investors) and Switzerland (30%) and lowest in Germany (7%) and Italy (0%);
- Biggest hedge fund growth markets were Scandinavia (67% of current non-investors) and the Netherlands (62%);
- 65% of all institutions surveyed thought that hedge funds would become an asset class in themselves.

Chart 2: Currently Invested in Hedge Funds



Source: Ludgate

Chart 3: Plan to Invest in Foreseeable Future



Source: Ludgate

Switzerland will have the largest and Germany the smallest institutional allocation to hedge funds

Adding current institutional money in hedge funds to the funds which plan to enter the industry would result in Switzerland (87%) having the largest allocation of institutional money, followed by the Netherlands (82%) and Scandinavia (77%).

¹ *The Future Role of Hedge Funds in European Institutional Asset Management*, by Ludgate Communications, March 2000.

The smallest allocation would be held by German (24%) and Italian investors (60%).

“We are not a casino!” – an investor

Based on this survey, investing in hedge funds is not something widely considered by German investors. One investor was quoted as saying:

“No, we don’t (currently invest in hedge funds)! It is completely obvious that hedge funds don’t work. We are not a casino.”

Note that the survey was conducted at the CIO level. Another investor was quoted arguing that investing in hedge funds is against their philosophy and that hedge funds still have a stigma attached to them.

An Indocam/Watson Wyatt survey¹, which reveals similar results as the Ludgate survey, took a sample consisting of continental European pension funds across nine markets, Belgium, Denmark, France, Germany, Ireland, the Netherlands, Portugal, Sweden and Switzerland. The survey contacted senior decision-makers at 284 continental European pension funds. Respondents were interviewed by telephone by experienced foreign language market researchers for an average time of about 25 minutes.

The Indocam/Watson Wyatt survey addressed AIS in general, whereas the Ludgate survey focused particularly on investing in hedge funds.

Table 7: Exposure to Alternative Investments by European Pension Funds

	Hedge funds (%)	Buyout & mezzanine* (%)	Venture capital (%)	Private Equity (%)	Sum (€m)	Market share (%)
Total	100	100	100	100	886	100
Belgium	0	0	0	0	0	0.0
Denmark	0	0	12.2	3	34	3.8
France	0	0	0	0	0	0.0
Germany	0	0	0	0	0	0.0
Ireland	0	0	0	3	10	1.1
Netherlands	0	0	15.3	0	30	3.4
Portugal	0	0	0	0	0	0.0
Sweden	0	0	0	1	2	0.2
Switzerland	100	100	72.4	94	810	91.4

Source: Indocam/Watson Wyatt

* Buyout funds and mezzanine financing: For buyouts and mezzanine financing, pension funds structure a combination of debt/equity investment in order to gain management control of a company or to initiate the transfer of ownership. In a leveraged buyout, a premium may be paid for the element of control, since it is critical for the purchaser to have the ability to restructure the target company's operations

¹ *Alternative Investment Review Relating To The Continental European Marketplace*, by Indocam and Watson Wyatt, May 2000.

European pension funds have a small allocation to AIS

Of the €886m in alternative investments analysed, private equity, hedge funds and CTAs and international venture capital were found to be the most popular. Nevertheless, within the context of the total investments made by all respondents, which totalled €452bn, the alternative investment exposure is extremely small.

Swiss pension funds have the largest allocation to AIS

Although 36 respondents invest in alternative asset classes, the predominant appetite accounting for over 90% of all mandates by value analysed was for Swiss respondents. Switzerland is believed to be one of the most important customer bases for non-traditional funds (Cottier 1996). Traditionally, many private banks in Geneva and Zurich have become sponsors and distributors of hedge funds through their vast private client base. Following a change in Swiss pension fund regulations, Swiss pension funds are allowed to take on more risk as long as they adhere to the 'Prudent Man Rule'¹

The European pension fund puzzle

The generally low allocation to hedge funds by non-Swiss pension funds in Europe is puzzling. Relative performance and benchmarks may enable traditional managers to look at their competitive position relative to their peer group. But, consistent long-term returns – independent of market movements – make a compelling reason for embracing the world of absolute return for all investors, including pension funds. Concepts such as the core-satellite and/or the portable alpha approach² to investing large amounts of money strongly favour hedge fund investing for the active mandate in these approaches.

A further interesting aspect of the Indocam/Watson Wyatt survey is the selection criteria for alternative investment managers. Table 8 shows the most important alternative investment manager selection criteria analysed geographically for those pension funds that are currently outsourcing these types of mandate. Table 8 only shows respondents from three countries for presentation purposes.

¹ In the US, for more than a century, the investment actions of fiduciaries have been subject to the test of the 'Prudent Man Rule' as interpreted by US courts. As enacted into legislation by most US states, the Prudent Man Rule holds that a fiduciary shall exercise the judgement and care, under the circumstances then prevailing, which men of prudence, character and intelligence exercise in the management of their own affairs, not in regard to speculation but in regard to the permanent disposition of their funds, considering the probable income as well as the probable safety of their capital.

² The core-satellite approach is an alternative to the 'all inclusive' balanced asset allocation approach. In a core-satellite strategy, a money manager will invest typically 70-80% of its assets in an index tracking fund. Specialist fund managers are hired around this 'passive core' as 'satellites' to invest in sectors where index-tracking techniques are difficult to apply, for example AIS, smaller companies or emerging markets.

With the portable alpha approach, the alpha of a manager or group of managers or strategy is transported to a target index. For example a pension fund allocates its fund to a bond manager who generates an alpha of 200bp yearly without an increase in credit risk. In addition it swaps total returns of an equity index with the risk free rate. The end result is the total index return plus 200bp. This approach can be used quite broadly. Alpha can be generated in many different areas and transported into virtually any index. The limiting factor is the availability of derivatives to carry out the alpha transfer. One of the disadvantages is the cost of the transfer. However, if the target index is an index with a liquid futures contract, the costs are usually less than 100bp per year.

Table 8: Alternative Investment Manager Selection Criteria

	Switzerland	Netherlands	Sweden	Average
Mandate suitability	3.7	3.5	3.8	3.67
Investment performance	3.6	3.6	3.6	3.60
Investment philosophy	3.6	3.6	3.5	3.57
Staff continuity	3.4	3.4	3.5	3.43
Investment professionals	3.0	3.5	3.4	3.30
Quality of client servicing	3.1	3.3	3.1	3.17
Financial strength	3.0	3.4	3.0	3.13
Quality of reporting	2.9	2.9	2.9	2.90
Quality of administration	2.9	3.1	2.6	2.87
Rapport at presentation	2.8	2.8	3.0	2.87
Culture	2.6	2.6	2.9	2.70
Brand comfort	2.8	2.6	2.4	2.60
Prior knowledge	2.5	2.5	2.6	2.53
Fees	2.5	2.2	2.6	2.43

Source: Indocam/Watson Wyatt.

Interviewees were asked to rate each criteria on a scale from one to four, with one representing the least important and four representing the most important

Mandate suitability is most important

Generally, the selection criteria do not differ substantially from those exhibited for more conventional asset mandates. There is a considerable amount of uniformity relating to what respondents regarded as the most important of alternative investment manager selection criteria. These criteria generally relate to the mandate suitability, calibre of investment professionals and continuity, investment performance and client servicing.

Fees do not seem to be an issue in selecting a manager

Once again, the least important of the alternative investment manager selection criteria were remarkably similar when analysed geographically. Respondents generally believed the 'softer' factors to be less important than selection criteria, namely brand comfort, culture of organisation, and prior knowledge of organisation. Additionally, fees were not deemed to be of particular importance for selection. Generally, the more operational of selection criteria, particularly quality of reporting and administration, were regarded as being of moderate importance by respondents.

Low correlation is most attractive feature

When asked for their rationale for investing in AIS, the respondents collectively chose average low correlation as the most important aspect followed by outperformance against equity, outperformance against fixed income and hedge against inflation.

According to Watson Wyatt and Indocam, of the 196 continental pension funds surveyed, some 30% outsourced to hedge funds or other alternative investment managers. Another 8% believe they will be doing so within three years. The following table shows future market appetite for AIS by 2003, based on the survey results.

Table 9: Future Market Appetite for AIS to 2003

	No. of funds	% of fund invested in alternative asset classes by 2003
Belgium	2	2-10
Denmark	6	1-5
France	1	1
Germany	2	1
Ireland	1	3
Netherlands	10	2-10
Portugal	1	5
Sweden	6	5-9
Switzerland	14	2-9

Source: Indocam/Watson Wyatt

Allocations to AIS are growing in Europe

Indocam/Watson Wyatt anticipate a rise of the allocation to alternative investments by respondents who already invest in AIS as well as those who are about to invest in these asset classes. The allocation from European pension funds could rise from less than €1bn to in excess of €12bn. As many Swiss respondents did not respond to the outlook for three years, this figure is probably understated.

The most considerable growth is expected to come from the Dutch, Swedish and Swiss pension funds. Elsewhere, there is expected to be some appetite, at least, expressed, which is consistent with the findings from the Ludgate survey.

No hedge funds, please, we're British¹

EuroHedge ran a story, examining why UK investors have a small allocation to hedge funds. It seems UK investors are following John Maynard Keynes' maxim that "worldly wisdom teaches us that it is better for reputation to fail conventionally than to succeed unconventionally." One of the deterrents is the fact that all investments, except UK equities and bonds, are excluded from the government's minimum funding requirement. Another stumbling block is that, unlike their European counterparts, UK funds do not like pooled investment vehicles because of poor past experiences. And mid-sized pension funds appoint their managers as custodians, which hinders the adoption of specialist strategies. Allocating returns from pooled vehicles to individual clients is an obstacle.

Fee structure is a concern in the UK

While fees are of limited concern to pension fund managers on the continent (as surveys suggest), fees are a big stumbling block in the UK, according to EuroHedge. To the trustees of the average UK fund, which pays about 30bp for management, hedge fund charges of 1% or 2% management and 20% performance appear astronomical. Unless they are convinced that the value added is worth the charges, trustees are even less likely to pay an extra layer of fees for a fund of funds.

Difficulties measuring total exposure to equity market

Another problem is that large UK pension funds aim for a target equity market exposure, and will likely be either under or overweight their guidelines if their hedge fund manager's beta is constantly changing – as it will, especially if the

¹ EuroHedge, 31 July 2000, www.hedgeworld.com

manager uses leverage. This, in turn, makes it difficult for pension funds to track 'active risk' against their benchmark. In addition, the allocation by sector is becoming more important.

**British abstinence is
changing for the better**

However, the fact that these problems are being discussed is evidence of changing attitudes. Pension consultants are warming to the concept of hedge funds – though with great caution, so as not to alienate clients.

This concludes our brief round up of the hedge fund industry. In the following section, we describe the different hedge fund strategies.

Hedge Fund Strategies

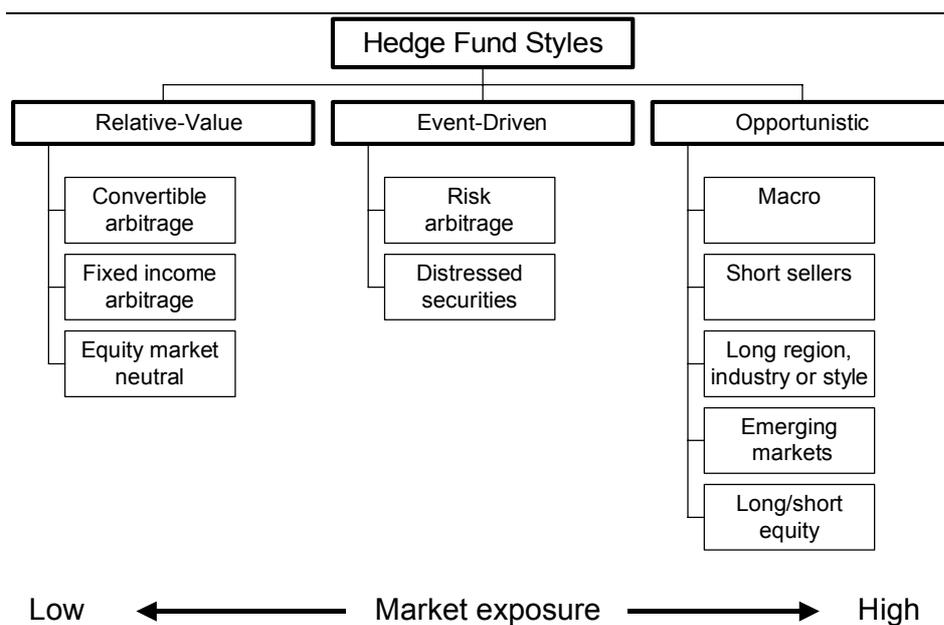
Defining Hedge Fund Styles

The beta of hedge funds can differ widely

We believe that one of the most important issues from an investor’s perspective in terms of investing in hedge funds is the knowledge about the different investment styles in the hedge fund industry. Equity investors are typically familiar with the fact that the equity market has different sectors and styles to invest in and that the different styles have different return, risk and correlation characteristics. The same is true for hedge funds. There is a vast amount of different strategies available. The style differences of hedge funds differ widely in one respect with styles and sectors in the equity arena. In equities, all sector and style indices have a beta (exposure) to the market of around one. The beta of the different hedge fund styles varies from minus a multiple of one (short seller using leverage) to a multiple of plus one (long-biased fund using leverage).

Chart 4 segments some hedge fund strategies into styles and sub-styles. The classification is subjective. As with equities, there are different style classification systems in the market. For this report we focused on exposure (and therefore correlation) to the general market of the different strategies.

Chart 4: Hedge Fund Style Classification



Source: UBS Warburg

Ambiguous classification

One of the main differences between hedge funds and other money managers is, as mentioned above, their heterogeneity and the fact that hedge funds are less regulated. This means categorising hedge funds is difficult and the above classification is therefore subjective, inconsistent with some hedge fund data vendors and incomplete. Any classification of hedge funds is an attempt at fitting something into a box. However, some hedge fund strategies do not fit into a box. There are many hedge funds, which do not fit into this classification and/or are hybrids of the above structure, ie, there are overlaps. However, for the purpose of

the description and performance analysis of the main styles (or skill-based strategies) the structure in Chart 4 is sufficient.

Correlation with equity market as main classifier

At the first level we distinguish between relative-value, event-driven and ‘the rest’ which we called ‘opportunistic’ in Chart 4. The main reason for this distinction is that relative-value had historically very little exposure/correlation to the overall market, whereas event-driven had little exposure/correlation and all other styles have variable degrees of exposure to the market.

Being long or flat the market is a big difference

We believe the main bone of contention in Chart 4 is probably the classification of long/short equity as opportunistic.¹ Long/short equity is the largest style in terms of number of managers pursuing the strategy. However, the managers in this group are not homogeneous. Some have long biases, others are market-neutral or short or vary over time. The managers in the long/short equity sub-style, who are close to market-neutral are effectively pursuing a relative-value strategy and therefore are closer to the ‘equity market neutral’ camp. However, we justify the classification of equity long/short style as opportunistic because most managers have historically made the bulk of their gains on the long side, and, partly as a consequence, maintain net long exposure.

In the following three chapters we highlight some of the main characteristics of the three styles and their sub-styles. A definition is given in the glossary on p173 for styles not covered here.

¹ For example, Schneeweis and Pescatore (1999) distinguish between five sectors (based on Evaluation Associates Capital Markets): relative value; event-driven; equity hedge; global asset allocators; and short selling. Long/short equity is a sub-sector of the relative value sector. It defines the equity hedge sector as long and short securities with varying degrees of exposure and leverage, such as domestic long equity (long undervalued US equities, short selling is used sparingly), domestic opportunistic equity (long and short US equities with ability to be net short overall), and global international (long undervalued global equities, short selling used opportunistically). We prefer our classification system because it allows us to distinguish strategies with zero beta from the long-biased strategies.

Relative-Value and Market Neutral Strategies

This class of investment strategy seeks to profit by capitalising on the mispricings of related securities or financial instruments. Generally, relative-value and market neutral strategies avoid taking a directional bias with regards to the price movement of a specific stock or market. We believe this makes this style most appealing for investors who are looking for high and stable returns accompanied by low correlation to the equity market.

Table 10: Summary Risk/Return Characteristics Based on Historical Performance

Sub-sector	Returns	Volatility	Downside risk	Sharpe Ratio	Correlation to equities	Exposure to market	Leverage	Investment Horizon
Convertibles arbitrage	Medium	Low	Low	Medium	Medium	Low	Medium	Medium
Fixed income arbitrage	Low	Low	Medium	Low	Low	Low	High	Medium
Equity market-neutral	Medium	Low	Low	High	Low	Low	Medium	Medium

Source: UBS Warburg

Exploiting inefficiencies for a living

Relative value and market-neutral strategies rely on identifying mispricings in financial markets. A spread is applied when an instrument (equity, convertible bond, equity market, etc.) deviates from its fair value and/or historical norm. Relative value strategies can be based on a formula, statistics or fundamental analysis. These strategies are engineered to profit if and when a particular instrument or spread returns to its theoretical or fair value.

Hedged as in 'hedge funds'

To concentrate on capturing these mispricings, these strategies often attempt to eliminate exposure to significant outside risks so that profits may be realised if and when the securities or instruments converge towards their theoretical or fair value. The ability to isolate a specific mispricing is possible because each strategy should typically include both long and short positions in related securities. In most cases, relative-value strategies will likely seek to hedge exposure to risks such as price movements of the underlying securities, market interest rates, foreign currencies and the movement of broad market indices.

High risk-adjusted returns could be derived from faulty methodology of accounting for risk

Disciples of the efficient market hypothesis (EMH) argue that the constant higher risk-adjusted returns of some hedge fund managers are derived from a faulty methodology with respect to accounting for risk. Mean and variance do not fully characterise the return distribution and understate true risk of skewed returns with fat tails. On pp98-150 we examine mean and variance characteristics as well as non-normality features of the return distribution of the various hedge fund strategies. We conclude that changing the methodology does not change the conclusion with respect to superior risk-adjusted returns.

Convertible arbitrageurs made money in the 1929 crash

Another argument brought against some relative value strategies is that opportunities are limited, ie, there is a capacity constraint. Hedge fund excess returns will diminish as soon as a discipline reaches a capacity limit. With respect to capacity constraints, we would like to quote a market comment from 1931:

"The last few years have been marked by steadily increasing arbitrage opportunities and arbitrage profits. Between 1927 and 1930 alone over

US\$5bn worth of equivalent securities¹ were placed on the market. In the same years the profits to the arbitrageurs totalled many millions of dollars. The year 1929 was perhaps the most profitable year in arbitrage history, but each year has yielded its quota of profits. Even the year 1930, which was marked by steadily declining prices, yielded excellent profits.”²

“As long as there continue to be people like you, we’ll make money”³

We believe this market comment highlights two aspects, or, conversely, two misconceptions of investing in hedge funds. These are:

- (1) Arbitrage is not a new concept. Mispriced derivatives and the exploitation of market inefficiencies by risk managers has been a feature of the industry for centuries;
- (2) Relative-value strategies can do well in falling markets too. One of the criticisms is that hedge fund investing is a child of the current bull market and therefore a bubble about to burst. This does not seem likely. The 1929/30 period was the worst in US stock market history and arbitrageurs made money. The reason is that panic results in market inefficiencies. When the majority of the market participants panic, alternative money managers, eventually, make money. We will quantify correlation in down-markets later in the document.

In this report we analyse three relative-value strategies, namely convertible arbitrage, fixed income arbitrage and equity market neutral strategies.

¹ Equivalent security is a predecessor term for convertibles

² From Weinstein (1931)

³ Myron Scholes: “As long as there continue to be people like you, we’ll make money.” See p66.

Convertibles Arbitrage

Exploiting market inefficiencies by hedging equity, duration and credit risks

Convertible arbitrage is the trading of related securities whose future relationship can be reasonably predicted. Convertible securities are usually either convertible bonds or convertible preferred shares, which are most often exchangeable into the common stock of the company issuing the convertible security. The managers in this category attempt to buy undervalued instruments that are convertible into equity and then hedge out the market risks. Fair value is based on the optionality in the convertible bond and the manager's assumption of the input variables, namely the future volatility of the stock.

According to Tremont (1999), convertible arbitrage represents 3.5% of all funds and 4.4% of all assets under management. Nicholas (1999) estimates the assets under management in convertible arbitrage at only 1.8%.

Table 11: Key Risk Factors

Risk	Position	Effect
Interest rates	Long convertible bond (long duration, long convexity)	Convertible bonds, like regular bonds, move inversely with changes in interest rates. To some extent the short equity position is a natural hedge against rising interest rates since equities generally also move inversely to interest rates. Arbitrageurs can use Treasury futures or interest rate swaps to manage interest rate risk.
Equity	Short stock (neutral delta, long vega, long gamma)	The delta of the convertible bond is normally hedged through selling stock short resulting in a delta neutral position. The strategy is long equity volatility (long vega) through the optionality in the convertible bond. The strategy is also, although less significant, long gamma: the position delta increases when the stock rises and vice versa. Vega and gamma risk is difficult to hedge (since strike and often maturity are unknown) and therefore are most often left unhedged. To some extent, convertible arbitrageurs sell economic disaster insurance because they usually are short the credit spread similar to fixed income arbitrageurs. In an economic disaster, credit spreads widen and investors short the spread lose money. Additionally, liquidity dries up, worsening the situation. The result is a few but high standard deviation negative returns. Today, convertible arbitrageurs hedge credit risk along with equity and duration risk.
Correlation	Long bond-equity correlation	The strategy is long correlation: if interest rates rise, losses on the long bond are reduced through gains on the short equity. If interest rates fall, losses on short equity are reduced through gains on the bond. This natural hedge does not work when correlation is low, for example when interest and stocks rise and bonds fall.
Credit	Long convertible, short equity	Being debt or preferred instruments, convertible bonds have an advantage to the common stock in case of distress or bankruptcy (exchangeables have different credit risk characteristics than plain vanilla convertibles). If the securities are debt, they have a termination value that must be paid at maturity, or bankruptcy may occur. If preferred, they have a liquidation value. There is less risk in holding the convertible because it has seniority in payment. Convertible arbitrageurs can use asset swaps to strip out the credit risk from convertible bonds.
Prospectus/legal risk	Long convertible	There have been cases where it has paid to read the prospectus in great detail, for example with respect to the treatment of dividends (Daimler's special dividend 1998). In addition there is regulatory risk (MOF ruling in 1998).
Liquidity	Short equity, long convertible bond	Convertible arbitrage is exposed to liquidity risk in form of potential short squeezes in equities or bid/ask spread in convertible bonds widening or borrowing cost of short equity increasing.

Source: UBS Warburg

Buying cheap volatility

Most managers view the discounted price of the convertible in terms of under-priced volatility, and use option-based models both to price the theoretical value of the instrument and to determine the appropriate delta hedge. The risk is that volatility will turn out lower-than-expected. Other managers analyse convertibles using cash flow-based models, seeking to establish positive carry positions designed to achieve a minimum level of return over their expected life.

Although convertible arbitrage is technical (its basis for putting on a trade is a mathematical formula) it involves experience and the skill of its managers.

Interviewed in Mar/Hedge in February 1997, Gustaf Bradshaw, at the time director of research of the BAI Funds, said:

“The art of the convertible arbitrageur ...lies in the calculation of the amount of underlying equity that should be sold short against the local convertible position. This ratio can be adjusted depending on a manager’s market view and so there is a large element of personal skill involved. This is an area where the skill and experience of the portfolio managers are vital because the computer systems are there to be overridden by the managers. Liquidity is one of the constraints in trading convertibles or warrants. You can often see great opportunities but no exit.”¹

Running the delta high

In theory, convertible arbitrage is a relative value strategy. The concept of the classic trade is to exploit a market inefficiency. However, convertible arbitrageurs can hedge imperfectly and be long delta to express a view on the underlying market or stock. To some, the high risk-adjusted returns of convertible arbitrage are partially attributable to most convertible arbitrages having a positive delta in the bull market of the 1990s.

Leverage is between two-10:1

The degree of leverage used in convertible arbitrage varies significantly with the composition of the long positions and the portfolio objectives, but generally ranges between two and 10x equity. Interest rate risk can be hedged by selling government bond futures. Typical strategies include:

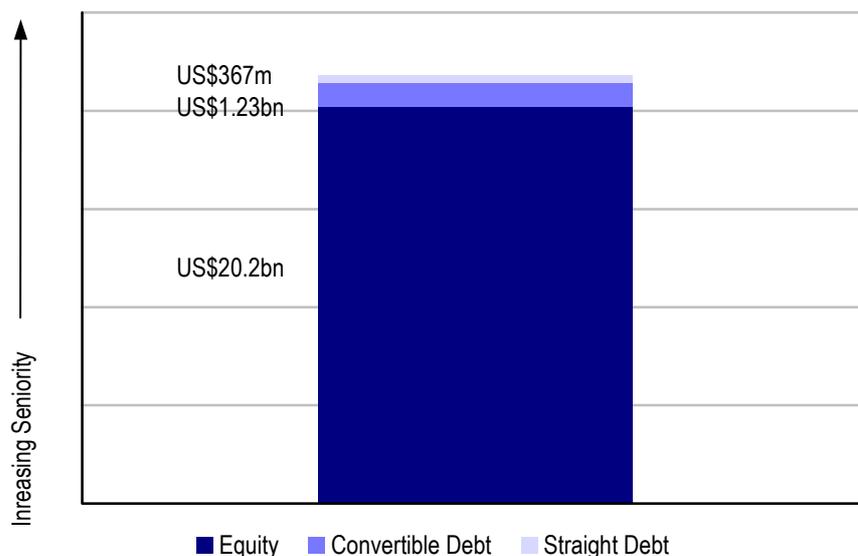
- Long convertible bond and short the underlying stock;
- Dispersion trade by being long volatility through the convertible bond positions and short index volatility through index options;
- Convertible stripping to eliminate credit risk;
- Arbitraging price inefficiencies of complicated convertible bonds and convertible preferred stocks with various callable, put-able, and conversion features (such as mandatory conversion, conversion factors based on future dividend payments, etc.);
- Buying distressed convertible bonds and hedging by selling short the underlying equity by hedging duration risk.

Cheap amazon.com convertible bond

An example of relative value disparity could be found in the capital structure of amazon.com. At the end of Q2 99, the Internet bookseller had, in addition to its equity capital, two tranches of long-term debt outstanding: a US\$530m stepped-coupon senior debt issue of 2008 and a US\$1.25bn convertible issue of 2009. After adjusting these securities’ prices to reflect market values at 30 June 1999, the following picture of the company’s capital structure emerged.

¹ From Chandler (1998), p49.

Chart 5: Capital Structure of Amazon.com (Marked-to-Market as of 30 June 1999)



Source: Quadra

Buy low – sell high

Despite no past earnings and no projected earnings for the fiscal year, equity holders believed the company to be extraordinarily valuable. The market capitalisation was US\$20.2bn at 30 June 1999.¹ The straight debt holders were somewhat less optimistic about amazon.com's prospects, as implied by the yield spread of these securities and their credit rating. The yield spread had averaged about 450bp over comparable Treasuries, implying a significant element of risk. With the junior (equity) security holders euphoric and the senior security holders suspicious about the prospects of the company, one might have expected the middle tranche of convertible security holders to be 'cautiously upbeat'. Surprisingly, they were the most pessimistic stakeholders of all. Assuming 100% implied volatility, the credit spread was over 1,500bp portending Amazon's imminent demise. Viewed differently, with a normalised credit spread of 600bp, the convertible was trading at a very low level of implied stock volatility. Either the convertible was too cheap or equity too expensively valued by the market. To exploit this inefficiency, convertible arbitrageurs sold expensive equity and bought the comparably cheap convertible bond.

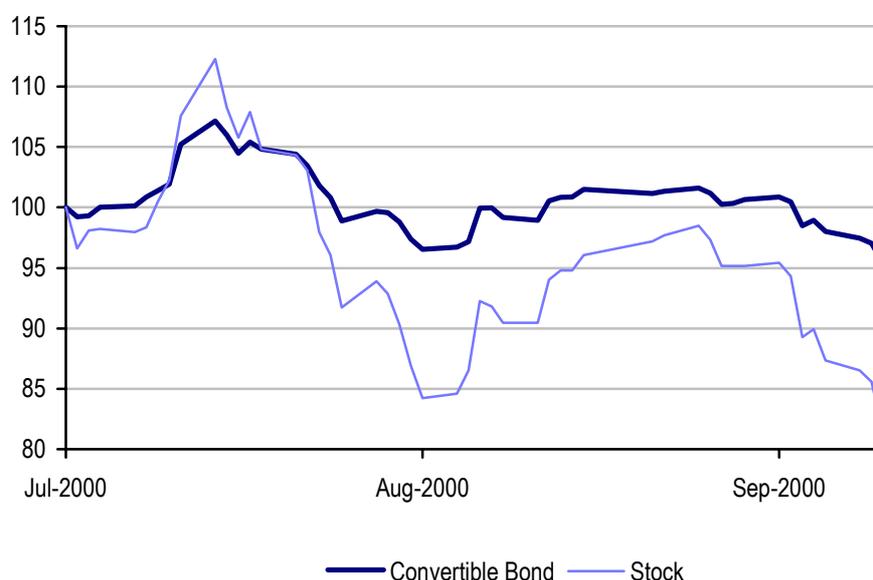
If the stock falls sharply the price of the convertible bond can become a function of the credit rating

Although the above example seemed to be a 'no-brainer' example of convertible arbitrage, investors who put on the trade without hedging the credit risk have lost money to date (September 2000). The convertible bond fell more or less in line with the stock. As Internet stocks fell in Q2 00, the markets' assessment of the credit rating of these stocks fell as well. The companies were said to be 'burning cash'. This resulted in the synthetic put of the convertible bond to lose value. In other words, the value of the convertible bond became more a function of the straight debt value (bond floor) and less a function of the conversion value. The recent path of the amazon.com arbitrage is therefore not only a good example of the mechanics of convertible arbitrage, it also highlights that convertibles can behave more as

¹ Which compares with US\$12.8bn one year later.

straight bonds after a dramatic fall of the share price, when the convertible bond becomes a function of credit risk as opposed to equity risk.

Chart 6: Infineon Share Price Versus Siemens/Infineon Exchangeable, 2005



Source: Bloomberg

Exchangeables have lower credit risk

A profitable example of convertible arbitrage is the purchase of the Siemens Exchangeable 2005 (exchangeable into Infineon stock) and the sale of Infineon stock. The attraction of exchangeables for spin-offs, such as Infineon by Siemens, is that the convertible bond carries the credit risk of the issuer (the blue-chip mother company), which in this case is Siemens, and allows the spin-off to finance itself more cheaply than if it issued a plain-vanilla convertible bond. We believe there will be an increase in issuance of exchangeable convertible bonds since it is an attractive financing instrument for companies unwinding cross-holdings or spinning off subsidiaries.

Fixed Income Arbitrage

Exploiting market inefficiencies in the fixed income market

Fixed income arbitrage managers seek to exploit pricing anomalies within and across global fixed income markets and their derivatives, using leverage to enhance returns. In most cases, fixed income arbitrageurs take offsetting long and short positions in similar fixed income securities that are mathematically, fundamentally or historically interrelated. The relationship can be temporarily distorted by market events, investor preferences, exogenous shocks to supply or demand, or structural features of the fixed income market. According to Tremont (1999), fixed income arbitrage represents 5.1% of all funds and 7.7% of all assets under management.

Table 12: Key Risk Factors

Risk	Position	Effect
Interest rates	Long and short (duration neutral)	By buying cheap fixed income instruments and selling short expensive securities, the fixed income arbitrageur usually hedges interest rate risk. The exposure to the yield curve is hedged by aiming for buying and selling instruments with similar duration. Yield curve arbitrage is exposed to the yield curve since the duration of the two positions is different.
Credit	Long and short default risk	The exposure to changes in credit risk depends on the strategy. The need to sell short limits arbitrageurs to markets where short selling is an option. Consequently, they tend to trade very liquid issues with high credit ratings that have low default risk and can easily be sold short.
Liquidity	Financing costs	Most strategies are contingent on low financing costs, ie, borrowing being cheap relative to lending. Strategies depend on advantageous financing. Often fixed income arbitrageurs are short liquidity. This means many trades involve a long position in a liquid instrument and the offsetting trade in a less liquid instrument.
Volatility	Short volatility	To some extent, fixed income arbitrageurs sell economic disaster insurance because they usually are short the credit spread. In an economic disaster, credit spreads widen and investors short the spread lose money. Additionally, liquidity dries up, worsening the situations. The result is few, but high standard deviation negative returns.
Legal/tax risk	Asset swaps	Asset swaps depend on stable relationship between low-risk bonds, such as Treasury or sovereign issues of a major developed nation, and the swaps. Changes in tax laws or a financial or political debacle in the issuing country can cause such relationships to change.

Source: UBS Warburg

Credit anomalies and advantageous financing

Often, opportunities for these relative value strategies are the result of temporary credit anomalies, and the returns are derived from capturing the credit anomaly and obtaining advantageous financing. These strategies can include:

- Arbitrage between physical securities and futures (basis trading);
- Arbitrage between similar bonds in the same capital structure;
- Arbitrage pricing inefficiencies of asset backed securities, swaptions, and other interest rate financial instruments;
- Arbitrage between on-the-run and off-the-run bonds (issuance-driven trade);
- Arbitrage between liquid mutual funds containing illiquid municipal bonds with treasury bonds;
- Yield curve arbitrage and yield curve spread trading;
- Stripping bonds with multiple callable features or swaps with complicated cash flows into their components in order to arbitrage these stripped components;

- Exploitation of inter-market anomalies (buying ‘TED’ spread by being long Treasury bill futures and short Eurodollar futures under the assumption that the spread will widen).

High degree of sophistication

Because the prices of fixed income instruments are based on yield curves, volatility curves, expected cash flows, credit ratings, and special bond and option features, fixed income arbitrageurs must use sophisticated analytical models to identify pricing disparities and to manage their positions. Given the complexity of the instruments and the high degree of sophistication of the arbitrageurs, the fixed income arbitrageurs rely on investors less sophisticated than themselves to over- and under-value securities by failing to value explicitly some feature on the instrument (for example, optionality) or the probability of a possible future occurrence (for example, political event) that will likely affect the valuation of the instrument. The alpha of a fixed income hedge fund, therefore, is primarily derived from the skill needed to model, structure, execute and manage fixed income instruments.

Small margin, high leverage

The spreads available tend to be very small, of the order of three to 20bp. Therefore, managers need to lever the position and expect to make money out of carry on the position and the spread reverting to its normal level. In order to generate returns sufficient to exceed the transaction costs, leverage may range from 20 to 30x NAV employed. Despite the high leverage, the volatility of returns achieved by fixed income arbitrageurs is usually very low due to the market-neutral stance of most funds in this discipline.

Not all fixed income arbitrage strategies are market-neutral

In general, fixed income arbitrageurs aim to deliver steady returns with low volatility, due to the fact that the directional risk is mitigated by hedging against interest rate movements, or by the use of spread trades. Managers differ in terms of the diligence with which interest rate risk, foreign exchange risk, inter-market spread risk, and credit risk is hedged.¹ Leverage depends on the types of positions in the portfolio. Simple, stable positions, such as basis trades, are leveraged much more highly than higher risk trades that have yield curve exposure. Some managers take directional credit spread risk, which results in a violation with our ‘relative value’ definition stated above. Some observers, due to large, unexpected losses in yield curve arbitrage in 1995, have also concluded that some trades with exposure to changes in the yield curve are not market-neutral (White 1996).

Basis trading as an example of fixed income arbitrage

Basis trading is the most basic fixed income arbitrage strategy. A basis trade involves the purchase of a government bond and the simultaneous sale of futures contracts on that bond. Bond futures have a delivery option, which allows several different bonds to be delivered to satisfy the futures contract. Because it is not certain which bond is expected to become the cheapest to deliver at maturity, this uncertainty, along with shifts in supply and demand for the underlying bonds, may create profit opportunities.

¹ Pension & Endowment Forum (2000), p23.

**Attractive opportunities
post-LTCM**

There were particularly attractive opportunities in this segment with the exodus of several proprietary trading desks and the downscaling of activities by other market participants such as LTCM. One situation in Brazilian fixed income instruments provides an interesting example of the inefficiencies in this area. The Brazilian sovereign market consists of many related securities, two of which are New Money Bonds and the Eligible Interest Bonds. Because New Money Bonds are somewhat less liquid than Eligible Interest Bonds they tend to react more slowly to changes in Brazilian fundamentals. During a rally in bonds in March 1999, for example, it was possible to purchase the lagging New Money Bonds at 55 and sell the Eligible Interest Bonds at 65, taking the 10-point credit differential, while picking up 125bp in yield. In either a bullish or bearish scenario, the trade was compelling: a deteriorating market would tend to cause the prices of both bonds to converge as a restructuring scenario unfolded; while (as it turned out) in a bullish market the money flows bid up the price of the New Money Bonds. Profits were taken as the prices converged to more normal levels.

Equity Market-Neutral

The goal is consistent returns with low volatility and low correlation

Equity market-neutral is designed to produce consistent returns with very low volatility and correlation in a variety of market environments. The investment strategy is designed to exploit equity market inefficiencies and usually involves being simultaneously long and short matched equity portfolios of the same size within a country. Market neutral portfolios are designed to be either beta or currency-neutral or both. Equity market-neutral is best defined as either statistical arbitrage or equity long/short with zero exposure to the market. According to Tremont (1999), equity market neutral represents 3.8% of all funds and 3.9% of all assets under management.

Number crunching can add value

Quantitative long/short funds apply statistical analysis to historical data (historical asset prices as well as 'fundamental' or accounting data) to identify profitable trading opportunities. The traditional discipline entails hypothesising the existence of a particular type of systematic opportunity for unusual returns, and then 'backtesting' the hypothesis. Backtesting essentially entails gathering the historical data and performing the calculations on it necessary to determine whether the opportunity would have been profitable had it been pursued in the past. Simple hypotheses are preferred to complex hypotheses; the intricate trading rules favoured by technicians and chartists are generally avoided. Normally, analysts hope to bolster their empirical findings with intuitive explanations for why the hypothesised opportunity should exist. Once a successful strategy is identified, it is normally implemented relatively mechanically. That is, the strategy is traded according to a limited set of clearly defined rules (the rules that were backtested), which are only rarely overridden by the subjective judgement of the manager. 'Quant' fund strategies are often closely related to work published by finance academics in peer-reviewed academic journals. In many cases, the fund managers come from academic backgrounds and, in some cases, created the academic research themselves. Quant fund managers are often very secretive, as their trading rules are potentially prone to theft. Mean reversion and earnings surprises have been the main drivers of this strategy.

Risk control is important

Users of quantitative strategies expect to identify small but statistically significant return opportunities, often across large numbers of stocks. Quantitative managers typically balance their longs and shorts carefully to eliminate all sources of risk except those that they expect will create returns. Since they are often trading long portfolio lists, they are able to reduce dramatically not only broad market risk, but also industry risk, and aggregate stock-specific risk. They appear less likely than fundamental managers to adopt substantial long or short biases.

Double alpha

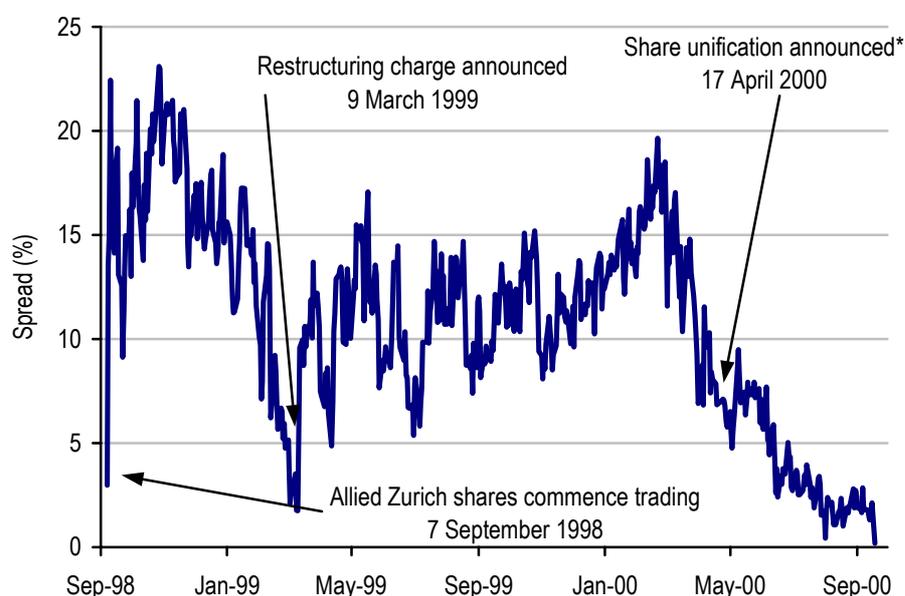
One of the great advantages of equity market-neutral strategies is the doubling of alpha. A long-only manager who is restricted from selling short only has the opportunity to generate alpha by buying or not buying stocks. A manager of an equity market-neutral fund, however, can generate alpha by buying stock as well as selling stock short. Some market observers argue that this 'double alpha' argument is faulty because an active long-only manager can over- and underweight securities, which means he is short relative to benchmark when underweight. We do not share this view because we believe there is a difference between selling short and being underweight against a benchmark. If a stock has a weight of 0.02% in the

benchmark index, the possible opportunity to underweight is limited to 0.02% of the portfolio. We would even go as far as portraying short selling as a risk management discipline of its own. We will address this issue on p76 where we attempt to de-mystify short selling.

A pair trade involves the purchase of one share category and the sale of another on the same stock

A typical example in this category would be a pair trade where one share category of the same economic entity is bought and the other is sold. One example of such a pair trade is the unification of shares of Zurich Financial Services of Switzerland, which announced a merger with the financial services arm of BAT Industries of the UK. This pair trade is typical for equity market-neutral managers because it does not involve market or sector risk. The two stocks are based on the same economic entity, which happen to deviate in price. Other typical pair trades involve trading voting rights, for example, buying TIM savings shares and selling the ordinary shares.

Chart 7: Zurich Allied/Allied Zurich Spread



Source: Datastream, UBS Warburg.

* Special dividend for each Allied Zurich share of 40p announced

The law of one price is the underlying theme of most equity market-neutral trades

For legal reasons two share categories were listed, Allied Zurich in the UK and Zurich Allied in Switzerland. Each Allied Zurich share was entitled to receive 0.023 Zurich Allied shares. On 17 April, Zurich Financial Services announced the unification of their two shares that was sweetened with a 40p dividend for shareholders in Allied Zurich. The spread narrowed to zero by September 2000. The fact that Zurich Allied and Allied Zurich were not traded at the same price was a violation of the law of one price since both shares together made up Zurich Financial Services.

This concludes our description of the three strategies in the relative value arena. In the following section, we discuss the characteristics of two event-driven strategies, risk arbitrage and distressed securities.

Event-Driven Strategies

“We are ready for an unforeseen event that may or may not occur.” Dan Quayle

Returns generated independently from moves in the stock market

This investment strategy class focuses on identifying and analysing securities that can benefit from the occurrence of extraordinary transactions. Event-driven strategies concentrate on companies that are, or may be, subject to restructuring, takeovers, mergers, liquidations, bankruptcies, or other special situations. The securities prices of the companies involved in these events are typically influenced more by the dynamics of the particular event than by the general appreciation or depreciation of the debt and equity markets. For example, the result and timing of factors such as legal decisions, negotiating dynamics, collateralisation requirements, or indexing issues play a key element in the success of any event-driven strategy. According to Tremont (1999), event-driven strategies represent 11.9% of all funds and 16.6% of all assets under management.

Table 13: Summary Risk/Return Characteristics Based on Historical Performance

Sub-sector	Returns	Volatility	Downside risk	Sharpe ratio	Correlation to equities	Exposure to market	Leverage	Investment horizon
Risk arbitrage	High	Medium	Medium	High	Medium	Medium	Medium	Medium
Distressed securities	Medium	Medium	Medium	Medium	Medium	Medium	Low	Long

Source: UBS Warburg

Research intensive strategies

Typically, these strategies rely on fundamental research that extends beyond the evaluation of the issues affecting a single company to include an assessment of the legal and structural issues surrounding the extraordinary event or transaction. In some cases, such as corporate reorganisations, the investment manager may actually take an active role in determining the event's outcome.

Opportunities for high risk-adjusted returns even in flat or negative markets

The goal of event-driven strategies is to profit when the price of a security changes to reflect more accurately the likelihood and potential impact of the occurrence, or non-occurrence, of the extraordinary event. Because event-driven strategies are positioned to take advantage of the valuation disparities produced by corporate events, they are less dependent on overall stock market gains than traditional equity investment approaches.

Event-driven strategies have higher systematic risk than relative value strategies

In times of financial crisis, the correlation between event-driven strategies and market activity can increase to uncomfortable levels. During the stock market crash in October 1987, for example, merger arbitrage positions fell in step with the general market, providing little protection in the short run against the dramatic market decline (Swensen 2000). As time passed, investors recognised that companies continued to meet contractual obligations, ultimately completing all merger deals previously announced. The return of confidence improved merger arbitrage results, providing handsome returns relative to the market.

Risk Arbitrage

Bet on a deal being accepted by regulators and shareholders

Risk arbitrage (also known as merger arbitrage) specialists invest simultaneously in long and short positions in both companies involved in a merger or acquisition. In stock swap mergers, risk arbitrageurs are typically long the stock of the company being acquired and short the stock of the acquiring company. In the case of a cash tender offer, the risk arbitrageur is seeking to capture the difference between the tender price and the price at which the target company's stock is trading.

Deal risk is usually uncorrelated with market risk

During negotiations, the target company's stock can typically trade at a discount to its value after the merger is completed because all mergers involve some risk that the transaction will not occur. Profits are made by capturing the spread between the current market price of the target company's stock and the price to which it will appreciate when the deal is completed or the cash tender price. The risk to the arbitrageur is that the deal fails. Risk arbitrage positions are considered to be uncorrelated to overall market direction with the principal risk being 'deal risk'.

We live in a probabilistic world

Former US secretary of the Treasury and Goldman Sachs partner, Robert Rubin brought fame to the profession in the 1980s. Throughout the industry, Rubin was known as one of the best in the field (Endlich 1999). His careful research and unemotional trading style were legendary. A quote from Rubin emphasises what risk arbitrage is all about:

*"If a deal goes through, what do you win? If it doesn't go through, what do you lose? It was a high-risk business, but I'll tell you, it did teach you to think of life in terms of probabilities instead of absolutes. You couldn't be in that business and not internalise that probabilistic approach of life. It was what you were doing all the time."*¹

Regulatory risk is key

Risk arbitrageurs differ according to the degree to which they are willing to take on deal risk. Where antitrust issues are involved, this risk is often related to regulatory decisions. In other cases, as was predominant in the late 1980s, financing risk was the major concern to arbitrageurs. Most managers only invest in announced transactions, whereas a few are likely to enter positions with higher deal risk and wider spreads based on rumour or speculation.

Table 14: Key Risk Factors

Risk	Position	Effect
Legal	Trust regulation	Risk arbitrage is primarily a bet on a deal being accepted by regulators and shareholders. If a deal is called off, the risk arbitrageur usually loses as the spread widens.
Equity	Short delta, long liquidity and long volatility	<p>One of the main performance variables is liquidity. Merger arbitrage returns depend on the overall volume of merger activity, which has historically been cyclical in nature.</p> <p>In general, strategy has exposure to deal risk and stock specific risk, whereas market risk is often hedged by investing in 10-20 deals. Stock specific risk has a large cap bias since large caps are easier to sell short.</p> <p>Most trades are transacted on a ratio-basis as opposed to a cash-neutral basis assuming the spread converges. This leaves the arbitrageur with a small short delta position as the cash outlay for long stock position is smaller than the proceeds from the short position.</p>

Source: UBS Warburg

¹ From Endlich (1999), p109.

Sub-sector in itself is heterogeneous

Most managers use some form of ‘risk of loss’ methodology to limit position size, but risk tolerance reflects each manager’s own risk/return objectives.¹ Some managers simply maintain highly diversified portfolios containing a substantial portion of the transaction universe, typically using leverage to enhance returns, whereas other managers maintain more concentrated portfolios (often unleveraged) and attempt to add value through the quality of their research and their ability to trade around the positions. Some managers are more rigorous than others at hedging market risk.

Risk arbitrage is not simply a binary event

Given the high profile of recent risk arbitrage deals and their profitability to the arbitrageur, many long-only managers joined this discipline. We believe that there is a certain risk of this herd behaviour backfiring. There is more to risk arbitrage than simply buying the stock of the company being acquired and selling the stock of the acquiring company. Risk arbitrage is not simply a binary event, will it work or fail? Risk arbitrage, as the name implies, is more the task of the risk manager than that of a portfolio manager. The deals are most often highly complex and the management of unwanted risk requires knowledge, experience and skill in all financial engineering and risk management disciplines. Below we list just a selection of the tasks, which are carried out by risk arbitrageurs entering a spread:

- Analysis of public information regarding the companies of the transaction and the markets in which they compete, including company documents, various industry and trade data sources, past Justice Department or Federal Trade Commission enforcement activities in the relevant product and geographic markets, and current antitrust agency enforcement policies;
- Estimation of probabilities as to the likelihood of a government antitrust investigation and enforcement action, the likely outcome of such an action, and whether a remedial order can be negotiated eliminating the necessity for litigation;
- Monitoring of litigation by the government and any private enforcement action and, in hostile transactions, analysis of the viability on antitrust and regulatory grounds of possible white knight candidates; analysis of the requirements and procedures of various federal and state regulatory approvals that may be required, depending upon the nature of the acquired company’s business operations;
- Control of deal risk with respect to the acquiror walking away, deal delay, possibility of material adverse conditions, shareholder approval, tax implications, and financing conditions; and
- In hostile transactions, analysis of the viability of various anti-takeover devices created by the target corporation in anticipation of or in the course of the unwanted takeover attempt and litigation arising from these defences.

¹ Pension & Endowment Forum (2000), p28.

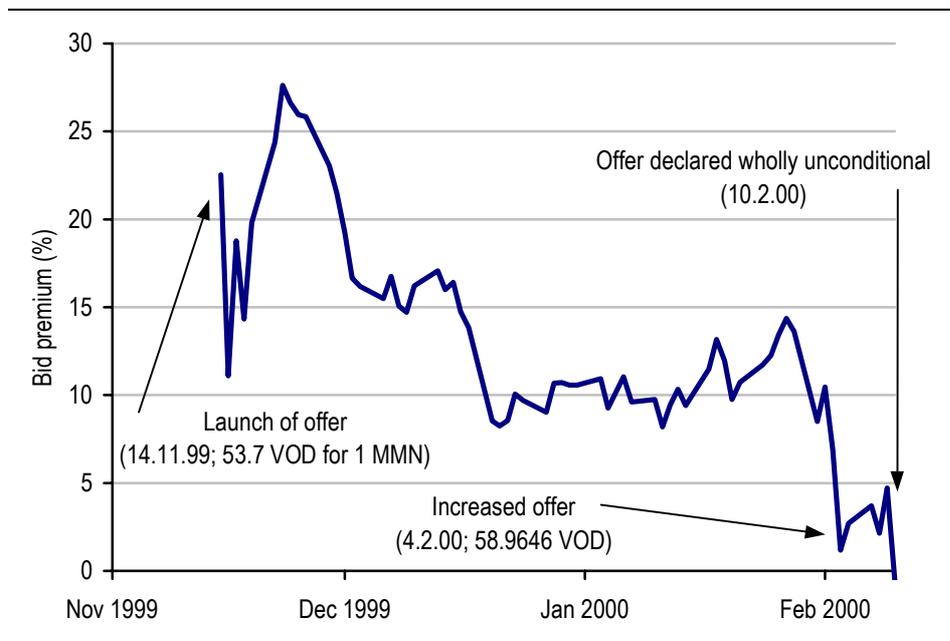
Risk arbitrage has a long tradition

Risk arbitrage is not new. As a matter of fact, risk arbitrage has a long tradition. Two prominent arbitrageurs, Gus Levy and Cy Lewis, were instrumental in establishing Goldman Sachs and Bear Sterns as prominent Wall Street firms. Gus Levy invented risk arbitrage in the 1940s and Ivan Boesky popularised it 40 years later (Endlich 1999). In fact, the senior post at Goldman Sachs has traditionally been filled by the head of the ‘arb desk’ including former US secretary of the Treasury Bob Rubin. Risk arbitrage was Goldman Sachs’s second most profitable department after mergers and acquisitions, it was regarded as a jewel in the firm’s crown. Risk arbitrage received negative press coverage in the late 1980s when some well known ‘M&A specialists’, such as Ivan Boesky and Martin Siegel, bought stock in companies before the merger announcements using inside information and Robert Freeman, chief of risk arbitrage, head of international equities, and trusted partner of Goldman Sachs, was forced to step down in ignominy.

Example

An illustrative and successful example of risk arbitrage activity is the completion of the acquisition of Mannesmann by Vodafone AirTouch.

Chart 8: Vodafone/Mannesmann Bid Spread



Source: Datastream, Bloomberg.

The deal was announced on Sunday 14 November 1999, when Vodafone AirTouch bid 53.7 of its own shares for each Mannesmann share. At the close of the following Monday, the bid premium was 22.5%. On 4 February, the Vodafone AirTouch board approved an increase bid of 58.9646 shares for each Mannesmann share. On 10 February, the deal was declared wholly unconditional. The bid premium eventually melted to zero, resulting in a large profit for hedge funds, which sold stock of the acquiror and simultaneously bought stock of the target company.

Distressed Securities

Distressed securities is about being long low investment grade credit

Distressed securities funds invest in the debt or equity of companies experiencing financial or operational difficulties or trade claims of companies that are in financial distress, typically in bankruptcy. These securities generally trade at substantial discounts to par value. Hedge fund managers can invest in a range of instruments from secured debt to common stock. The strategy exploits the fact that many investors are unable to hold below investment grade securities.

Origins go back to 1890s

Distressed securities have a long tradition. The origins of these event-driven strategies probably go back to the 1890s when the main railways stocks were folding. Investors bought the cheap stock, participated in the restructuring and issuance of new shares and sold the shares with a profit.

Table 15: Key Risk Factors

Risk	Position	Effect
Credit	Long default risk	The nature of the strategy is to be long low investment grade credit. A widening of credit spreads is bad for the strategy.
Interest rates	Long duration	A rise in interest rates reduces the value of the strategy, which to a large extent contains long duration instruments.
Equity	Long equity, short volatility	Event risk can be hedged by having long and short positions, but often the exposure and volatility of an instrument is accepted as a risk that should not be managed. In fixed income arbitrage, and to a lesser extent convertible arbitrage, investors invested in distressed securities are short a disaster put option. If disaster strikes, credit spreads widen, and distressed securities fund managers lose money.
Timing	Long patience	Strategies are usually long-term where the termination is not known in advance.

Source: UBS Warburg

Distressed securities are under-researched and distressed securities funds have a strong long-bias

Distressed securities often trade at large discounts since the sector is mainly a buyer's market (Cottier 1996). Most private and institutional investors want to get securities of distressed companies off their books because they are not prepared to bear the risks and because of other non-economic issues. Distressed companies are barely covered by analysts. Most banks do not get involved in the distressed securities business. Many distressed securities funds are long only.

Fundamental versus intrinsic value

Distressed securities specialists make investment returns on two kinds of mispricings. First, fundamental or intrinsic value, which is the actual value of the company that the bond interest represents. Second, relative-value, which is the value of bonds relative to the value of other securities of the same company (Nicholas 1999). When the market price of a company's security is lower than its fundamental value due to temporary financial difficulties, distressed securities specialists will take core positions in these securities and hold them through the restructuring process. They believe that the security will approach its fair value after the restructuring is complete.

Capital structure arbitrage

While a company is restructuring, the prices of its different financial instruments can become mispriced relative to one another. This is an opportunity for what is referred to as *intra-capitalisation* or *capital structure arbitrage*. The distressed securities specialists purchase the undervalued security and take short trading positions in the overpriced security to extract an arbitrage profit.

Usually low leverage and low volatility

The main risks of distressed securities investing lie in the correct valuation of securities, debt and collateral, as well as in the adequate assessment of the period during which the capital will be tied up (taking into account major lawsuits, etc.). Sometimes other asset classes are shorted in order to offset a part of the risks, and guarantees or collateral (such as brand names, receivables, inventories, real estate, equipment, patents, etc.) are used to hedge the risks. The diversification between securities, companies, and sectors is very important. Distressed funds have typically low leverage and low volatility. However, since positions are extremely difficult to value, investors have to bear mark-to-market risk. The volatility of the returns is therefore probably higher than published. The prices of distressed securities are particularly volatile during the bankruptcy process because useful information about the company becomes available during this period.

Long term in nature

Investments in distressed securities are most often illiquid. Long redemption periods, therefore, are the norm. Frequent liquidity windows of one year or more (for example quarterly) work against the nature of the strategy. A hedge fund manager will seek a long-term commitment from his investors. It is essential that the manager has a large pool of committed capital so that liquidity is not a problem. The length of any particular bankruptcy proceeding is notoriously hard to forecast and the outcome is always uncertain, both of which make the duration of distressed securities strategies unpredictable. In addition, managers who participate on creditor and equity committees must freeze their holdings until an arrangement is reached.

Active versus passive approach

There are basically two different approaches. Active distressed managers get involved in the restructuring and refinancing process through active participation in creditor committees. In some cases, an investor may even actively reorganise the company. The passive approach simply buys equity and debt of distressed companies at a discount and holds onto it until it appreciates. Both approaches are very labour-intensive and require a lot of analytical work. The US bankruptcy law is very detailed. Chapter 11 of the US Bankruptcy Code provides relief from creditor claims for companies in financial distress. Large tax loss carry forwards, strict disclosure rules, and clear debt restructuring rules help in reorganising distressed companies. The objective is to save distressed companies from total liquidation (Chapter 7). In Europe, however, bankruptcy is intended to end and not prolong the life of a company. US distressed securities markets are therefore much more liquid than their European counterparts, which is why few distressed funds are active outside the US. Typical trades are:

Typical trades

- Entering into core positions in the debt and equity of a distressed company, accompanied by active participation in the creditor committees in order to influence the restructuring and refinancing process;
- Passive long-term core positions in distressed equity and debt;
- Short-term trading in anticipation of a specific event such as the outcome of a court rule or important negotiations;
- Partial hedging of the stock market and interest rate exposure by shorting other stocks of the same industry or by shorting Treasury bonds.

- Arbitraging different issues of the same distressed company (eg, long mezzanine debt and short common stock);
- Vulture investing (derogatory term applied when a venture capitalist or a distressed securities investor gets an unfairly large equity stake);
- Providing buy-out capital: equity or debt for privatisations, spin-offs, acquisitions and takeovers (often by the firm's own management). Buy-out capital may be leveraged.

This concludes our description of event-driven strategies. In the following section we describe four strategies which we summarise as 'opportunistic strategies' namely macro funds, short sellers, long/short equity and emerging markets.

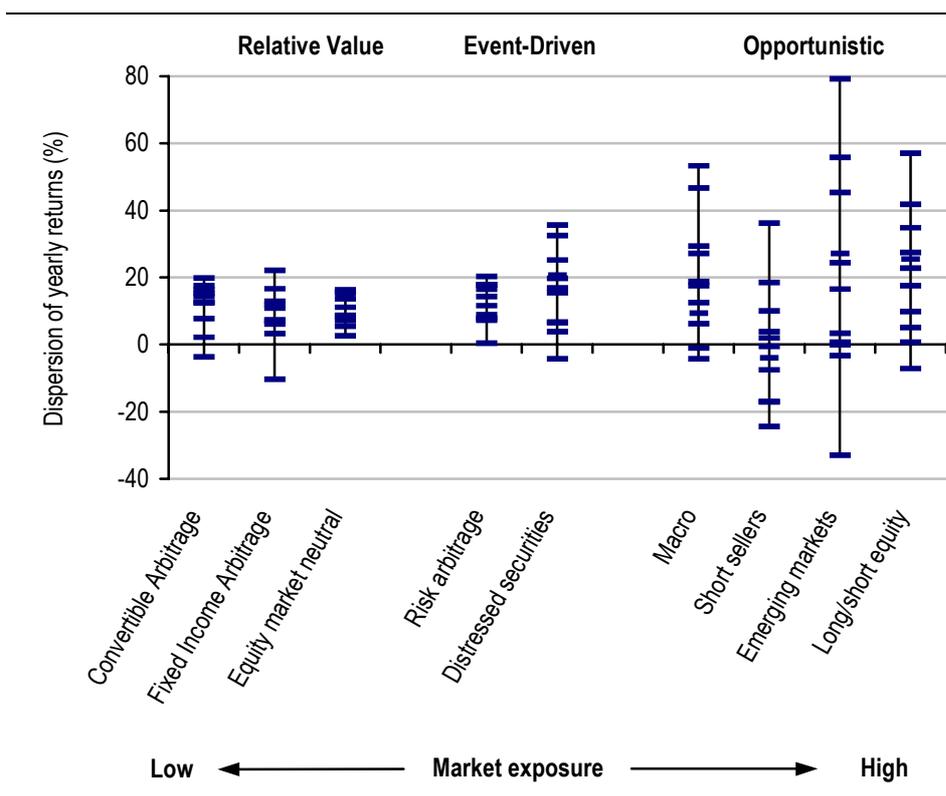
Opportunistic Strategies

“I don’t play the game by a particular set of rules; I look for changes in the rules of the game.”
 George Soros¹

Strategies which are not dependent on market returns are more easily forecasted

The main section of this report is a detailed analysis of hedge fund historical risk and return characteristics (starting p98). Despite having some reservations regarding to the quality of the hedge fund index return data, we analysed time series to assess how these characteristics could be defined in the future. For this reason, we classified the hedge fund universe in three main groups — relative-value and non-relative-value plus a hybrid of the two. The key determinant for our classification is exposure to the market. In our opinion, an investor that understands where risk and returns in convertible arbitrage are generated should have the tools to extrapolate the return, risk and correlation characteristics into the future. The predictability of performance characteristics increases as market exposure decreases, ie, increases if we go from right to left in Chart 9.

Chart 9: Dispersion of Yearly Total Returns of Different Hedge Fund Strategies



Source: HFR
 Every horizontal line represents an annual total return for the respective strategy. The graph covers the period from January 1990 to March 2000. A short vertical line implies little dispersion of returns and vice versa.

Other classification systems distinguish between directional and non-directional at the first level instead of relative-value, event-driven and opportunistic. With such a

¹ From Nicholas (1999), p172.

classification, risk arbitrage would be defined as non-directional, whereas distressed securities as directional. Chart 9 would justify such a classification system as the dispersion of returns of risk arbitrage are much lower than for distressed securities which have a strong directional bias.

Table 16: Summary Risk/Return Characteristics Based on Historical Performance

Sub-sector	Returns	Volatility	Downside risk	Sharpe ratio	Correlation to equities	Exposure to market	Leverage	Investment horizon
Macro	High	High	Medium	Medium	Medium	High	Medium	Short
Short sellers	Low	High	High	Low	Negative	High	Low	Medium
Long/short equity	High	High	High	Low	High	High	Low	Short
Emerging markets	High	High	High	Low	High	High	Low	Medium

Source: UBS Warburg

Higher volatility and lower risk-adjusted returns

The main difference between the four opportunistic strategies in Table 16 and the previously discussed relative value and event-driven strategies is volatility and the exposure to the market. The high volatility is primarily a function of beta, ie, a high exposure to the underlying asset class. As a result of higher volatility, risk-adjusted returns (as measured for example with the Sharpe ratio) are lower than with relative value and event-driven strategies.

Macro

Macro funds have the flexibility to move from opportunity to opportunity without restriction

Macro hedge funds, also known as 'Global macro funds', enjoy extraordinary flexibility regarding investment policy and investment strategies. They are (or were) the big players of the hedge fund industry and the ones most often in the headlines. They are (or have been) regarded as the new trading and investment gurus (Cottier 1996). Through their size and leverage, they are believed to influence and manipulate markets. Some macro hedge funds were accused of causing the fall in the pound sterling in 1992, resulting in its withdrawal from the European Monetary System. However, this allegation was brought into question by a study published by the International Monetary Fund.¹ Furthermore, it can be argued that since every move by one of the big macro players is amplified by many smaller copycats, they may not be entirely to blame for their large impact. For this reason, macro funds no longer disclose their positions, a move that has diminished the already low transparency of these funds.

Opportunistic strategies

Macro hedge funds pursue a base strategy such as equity long/short or futures trend-following to which large scale and highly leveraged directional bets in other markets are added a few times each year. They move from opportunity to opportunity, from trend to trend, from strategy to strategy. According to Tremont (1999), in 1998 4.0% of all funds are in this category, representing 14.9% of all assets under management.

The higher the market efficiency the fewer opportunities exist

Most often macro funds operate in very liquid and efficient markets such as fixed income, foreign exchange or equity index futures markets. We believe there is a trade-off between liquidity and opportunity. Liquidity is correlated with efficiency. The more efficient a market the higher the liquidity. High liquidity and high efficiency often means close to perfect information and competition. Perfect information and perfect competition means fewer opportunities to exploit inefficiencies. Macro funds, therefore, make their money by anticipating a price change early and not by exploiting market inefficiencies.

Macro managers exploit far-from-equilibrium conditions

Macro fund managers argue that most price fluctuations in financial markets fall within one standard deviation of the mean (Nicholas 1999). They consider this volatility to be the norm, which does not offer particularly good investment opportunities. However, when price fluctuations of particular instruments or markets push out more than two standard deviations from the mean into the tails of the bell curve, an extreme condition occurs that may only appear once every two or three decades. When market prices differ from the 'real' value of an asset, there exists an investment opportunity. The macro investor makes profits by exploiting such extreme price/value valuations and, occasionally, pushing them back to normal levels.

¹ It is beyond doubt that macro hedge funds had a significant short position in sterling in 1992 that impacted the market. It is, however, difficult to determine whether this position 'caused' the sterling devaluation, because it coincided with net capital outflows from the UK. The prologue to the 1992 ERM crisis was the 'conversion' play, estimated to be around US\$300bn by the IMF. Altogether, European central bank interventions amounted to roughly US\$100bn. The US\$11.7bn in hedge fund positions coincided with at least another US\$90bn of sales in European currencies. We explode the myth of hedge funds causing world-wide havoc on p78.

Stock picking versus risk management background

Tremont (1999) distinguished two kinds of macro managers, those who come from a long/short equity background and those who come from a derivative trading background:

- (1) Macro funds run by companies like Tiger Investment Management and Soros Fund Management were originally invested primarily in US equities. The success of these managers at stock picking resulted over time in substantial increases in assets under management. As the funds increased in size, it became increasingly difficult to take meaningful positions in smaller-capitalisation stocks. Consequently, the funds started gravitating towards more liquid securities and markets in which bigger bets could be placed;
- (2) Funds run by Moore Capital, Caxton, and Tudor Investment developed from a futures trading discipline which, by its very nature, was both global and macroeconomic in scope. The freeing up of the global currency markets and the development of non-US financial futures markets in the 1980s provided an increasing number of investment and trading opportunities not previously available to investment managers.

Mouse clicks and momentum

Anecdotal evidence suggests that the latter do better than the former in market stress situations as witnessed in March/April 2000. Julian Robertson wrote to investors in March 2000 to announce the closure of the Tiger funds. Investors are expected to get 75% back in cash and 5% in a basket of securities. The 20% balance will likely stay in five stocks, the returns on which should eventually be reimbursed to investors. In total he is returning US\$6.5bn to investors. Robertson said that, since August 1999, investors had withdrawn US\$7.7bn in funds. He blamed the irrational market for Tiger's poor performance, saying that "earnings and price considerations take a back seat to mouse clicks and momentum." Robertson described the strength of technology stocks as "a Ponzi pyramid destined for collapse." Robertson's spokesman said that he did not feel capable of figuring out investment in technology stocks and no longer wanted the burden of investing other people's money. Ironically, his letter reached investors in the week that the NASDAQ plunged and his views were being proved right. The Tiger funds were up 6% in March and US Air, the biggest of Robertson's remaining five holdings, has seen a 30% gain within two weeks as old economy stocks came back into fashion.

The death of the macro fund?

Tiger Management's large losses and George Soros' retreat are potentially a sign that the heyday of macro funds is over. At the end of April 2000, George Soros announced that he was cutting back on his Quantum fund. Quantum had US\$8.5bn in assets when Soros made the announcement that Stanley Druckenmiller, the manager of the fund, and his colleague Nicholas Roditi, who ran the US\$1.2bn Quota Fund, were leaving the group. The Quantum fund, which will be renamed Quantum Endowment Fund, plans to stop making large, so-called macro bets on the direction of currencies and interest rates and expects to target an annual return of 15% which is less than half of the annual average posted since the fund's start in 1969. One month later, the Quantum fund was said to have 90% in cash according to Bloomberg.

Opportunistic funds have a future despite setbacks in H1 00

Trades of the magnitude of George Soros' sterling trade in 1992 might or might not belong in the past. However, we believe the opportunistic hedge fund which has a mandate to invest in anything the general partners believe to yield a profit, will continue to raise funds in the future. Whether an investor prefers the stable, highly predictable returns of relative-value strategies or the unpredictable, widely dispersed and erratic returns generated by opportunistic funds, is a matter of idiosyncratic preference. We believe that an over-funded pension fund would be inclined to favour the former over the latter. However, we believe opportunistic hedge funds such as global macro or global asset allocation funds are not as dead as some claim them to be.

The next opportunistic investment style we discuss in this report is short selling. For a very brief moment in spring 2000, it looked like short sellers would experience a Renaissance. Jeffrey Vinik, who ran Fidelity Investments' flagship Magellan Fund before starting his own firm, returned 25% after fees in the March-April period through judicious use of short sales and stock-picking.¹ Although hedge funds with a pure short bias are rare, understanding the merits and dynamics of short selling is important with long/short equity funds, which are the largest category of the hedge fund universe.

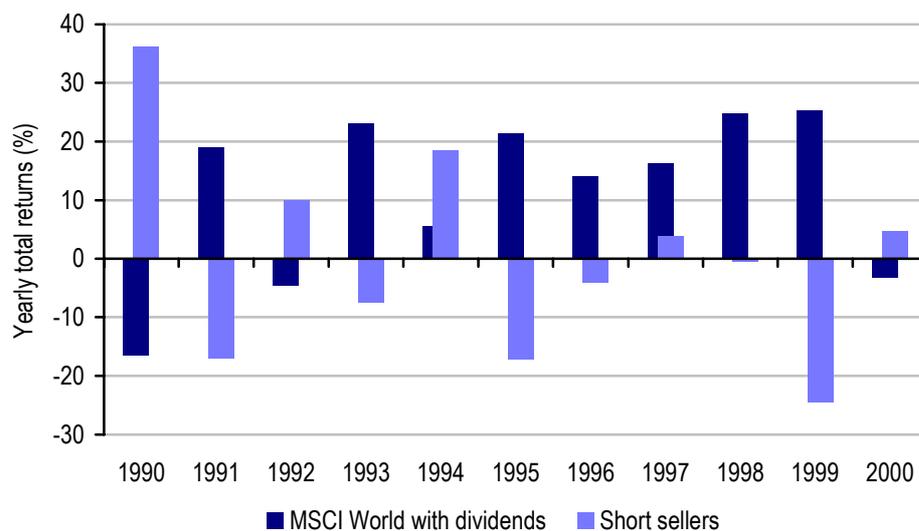
¹ Jeffrey Vinik's name became practically synonymous with bad stock market calls a few years ago. As a star manager of the largest mutual fund, Fidelity Magellan, Vinik reckoned that stocks had peaked in 1995. So he invested in bonds - and balefully watched one of the strongest stock market rallies of the decade from the sidelines. The results were not pretty: Returns slumped, and investors withdrew money. To make matters worse, at the end of 1995 he came under SEC scrutiny for saying positive things about stocks he was selling. He was exonerated; but when he left Fidelity in June 1996, many believe he departed with a cloud over his head. The hedge fund he started after he left Fidelity doubled investors' money in 1997. The US\$800m he raised when he started reached some US\$4bn four years later.

Short Sellers

Equity as well as fixed income element

The short selling discipline has an equity as well as fixed income component. Short sellers seek to profit from a decline in the value of stocks. In addition, the short seller earns interest on the cash proceeds from the short sale of stock. Tremont (1999) estimates that short sellers make up around 0.5% of all funds, representing 0.4% of all assets under management.

Chart 10: Short Sellers Versus MSCI World Index as of April 2000



Source: HFR, Datastream.

The current bull market has nearly driven short sellers into extinction

Given the extensive equity bull market, short selling strategies have not done particularly well in the recent past. Their performance is nearly a mirror image of equities in general. Chart 10 compares annualised returns of short sellers with the MSCI World index. We will focus on risk and return characteristics in more detail in the performance analysis section on p132.

Table 17: Key Risk Factors

Risk	Position	Effect
Equity	Short bias	Most often short delta, otherwise long/short fund. Usually short in large capitalisation stocks since larger capitalised stocks can be borrowed to be sold short more efficiently. Given the experience of the 1990s, one of the largest risks is momentum where overvalued stocks continue to outperform. A further risk is that the borrowed stock is re-called.
Credit	Short default risk	Collateral has usually little default risk. Short sellers are therefore short default risk since the strategy benefits if short equity positions default.
Interest rates	Short duration	If interest rates fall, the proceeds from the fixed income portion used as collateral as well as the rebate on the proceeds from the short sell are reduced.

Source: UBS Warburg

The short seller borrows the stock and earns interest on the proceeds from selling stock short

Short sellers borrow stock and sell it on the market with the intention of buying it back later at a lower price. By selling a stock short, the short seller creates a restricted cash asset (the proceeds from the sale) and a liability since the short seller must return the borrowed shares at some future date. Technically, a short sale does not require an investment, but it does require collateral. The proceeds from the short

sale are held as a restricted credit by the brokerage firm that holds the account and the short seller earns interest on it – the short interest rebate.

Security selection is a key driver

Security selection is the key driver of returns in the segment. A theme in 1999 that contributed to positive security selection on the short side was the exploitation of aggressive accounting by certain companies' management. These practices typically involve the acceleration of revenue recognition or the accounting of extraordinary items like mergers and acquisitions.

Example

Tyco International, in its recording of large reserves on acquisitions in 1999, is an example of aggressive accounting practice. By taking large reserves, Tyco avoided future depreciation/amortisation charges against profits and thereby showed increasing growth in earnings. While the company theoretically complied with GAAP, it was this methodology of aggressive accounting that had provided a source of short ideas.

Web of dysfunctional relationships

Securities and Exchange Commission Chairman Arthur Levitt broached the role of Wall Street analysts in regards to the issue of aggressive accounting. In a speech in October 1999, he noted a “web of dysfunctional relationships” between Wall Street and corporate America that encourages analysts to rely too heavily on company guidance for earnings estimates and pushes companies to tailor results for the Street's consensus estimates. He continued to argue, “...analysts all too often are falling off the tightrope on the side of protecting the business relationship at the cost of fair analysis.” Many hedge funds managers argue that while Wall Street research is of limited value on the long side, it is of even less value on the short side due in large part to the conflicts mentioned by Mr. Levitt. This leaves hedge fund managers in the short discipline to uncover profitable short opportunities through their own research and security selection.

Emerging Markets

Emerging market hedge funds are not regarded as a typical hedge fund strategy

Emerging market hedge funds focus on equity or fixed income investing in emerging markets as opposed to developed markets. This style is usually more volatile not only because emerging markets are more volatile than developed markets, but because most emerging markets allow for only limited short selling and do not offer a viable futures contract to control risk. The lack of opportunities to control risk suggests that hedge funds in emerging markets have a strong long bias. According to Tremont (1999), emerging markets represent 5.6% of all funds and 3.5% of all assets under management.

Table 18: Key Risk Factors

Risk	Position	Effect
Equity	Long bias	Usually long exposure to market risk. Stock specific risk usually diversified. Limited opportunity to sell short or use derivatives. One of the main differences between emerging markets and developed markets from a risk perspective is that correlation among stocks in an emerging market is much higher than in developed markets whereas the correlation among emerging markets themselves is lower than among developed markets. The country factor is the main variable.
Credit	Long default risk	Large exposure to the countries credit rating.
Currency	Neutral	Macro funds are famous for currency bets. Emerging market funds buy and sell undervalued financial instruments and hedge, when possible, residual risk such as currency. The focus is on exploiting inefficiencies as opposed to taking currency bets.
Liquidity	Long liquidity	Emerging market hedge funds are long inefficient markets and illiquid securities. They provide and enhance liquidity.

Source: UBS Warburg

Risk or opportunity?

A risk to the pessimist is an opportunity to the optimist. Investing in emerging markets therefore is full of risks or opportunities, depending on your viewpoint. The risks include the difficulty of getting information, poor accounting, lack of proper legal systems, unsophisticated local investors, political and economic turmoil, and companies with less experienced managers. The opportunities are due to yet-to-be-exploited inefficiencies or undetected, undervalued and under-researched securities.

The 1994 Mexican Peso Crisis

The 1994 Mexican Peso Crisis, when the Mexican Peso devalued by more than 40% in December 1994, is an interesting example of the difference between a traditional emerging market fund and an alternative emerging market fund.

Table 19: Hedge Fund versus Mutual Fund Returns During Peso Crisis

	MSCI Latin American Index (%)	Mutual Funds specialised in Latin America (%)	Hedge Funds specialised in Latin America* (%)
December 1994	-15.0	-17.4	-3.6
January 1995	-11.0	-14.0	-6.3

Source: Fung and Hsieh (2000)

* HFRI Emerging Markets Latin American Index

Emerging market hedge funds outperformed emerging market mutual funds

There were 18 hedge funds managing US\$1.8bn specialised in Latin America from the HFR database.¹ The average returns were -3.6% and -6.3% respectively. This compares with -15.0% and -11.0% respectively for the MSCI Latin American Index. In comparison, Lipper Inc. reported that there were 19 US equity mutual funds specialising in Latin America, with assets of US\$4.3bn. These funds returned on average -17.4% in December 1994 and -14.0% in January 1995. This was more or less in line with the benchmark index.

Hedge funds hedge the risks they do not want to be exposed to

One explanation for the speciality hedge funds outperforming the benchmark indices and mutual funds was that they had earlier hedged their Latin American positions. Another explanation is that the speciality hedge funds were primarily betting on Brady bonds (which are denominated in US Dollars and therefore have no currency risk), as their returns were more in line with those of Brady bonds than Latin American equities.

In our opinion, this highlights two characteristics of investing in hedge funds:

- (1) By investing in a speciality hedge fund, one is not necessarily buying the beta of the local asset class, in this case emerging markets. The hedge fund manager might seek investment opportunities elsewhere (Brady bonds) and hedge unwanted risks (currency swings). This means that returns can be uncorrelated with traditional funds;
- (2) It also means that transparency is lower. If the plan sponsor is not in constant dialogue with the hedge fund manager, transparency is low. Even if there is a dialogue, the hedge fund manager might not want to reveal his positions, especially not the short positions.

¹ From Fung and Hsieh (2000)

Long/Short Equity

Long/short equity is by far the largest discipline. According to Tremont (1999), this style represents around 30.6% of all funds and 29.8% of all assets under management.

Freedom to use leverage, sell short and hedge market risk

Nicolas (1999) classifies this category as 'equity hedge', and he further subdivides the discipline into equity hedge and equity non-hedge. In this report we classify all strategies with a long bias into the 'opportunistic' section and strategies which seek to eliminate market risk entirely into 'relative value'. The difference between long/short managers with long bias to traditional long-only managers is their freedom to use leverage, take short positions, and hedge long positions. Their main objective is to make money and not necessarily to beat an index. The focus of these funds can be regional, sector specific or style specific. Long/short equity funds tend to construct and hold portfolios that are significantly more concentrated than traditional fund managers.

Short sale hedges risk, enhances yield, and, potentially, generates alpha

Long/short strategies combine both long as well as short equity positions. The short positions have three purposes, which can vary over time or by manager. First, the short positions are intended to generate alpha. This is one of the main differences when compared with traditional long-only managers. Stock selection skill can result in doubling the alpha. A long/short equity manager can add value by buying winners as well as selling losers. Second, the short positions can serve the purpose of hedging market risk. Third, the manager earns interest on the short as he collects the short rebate.

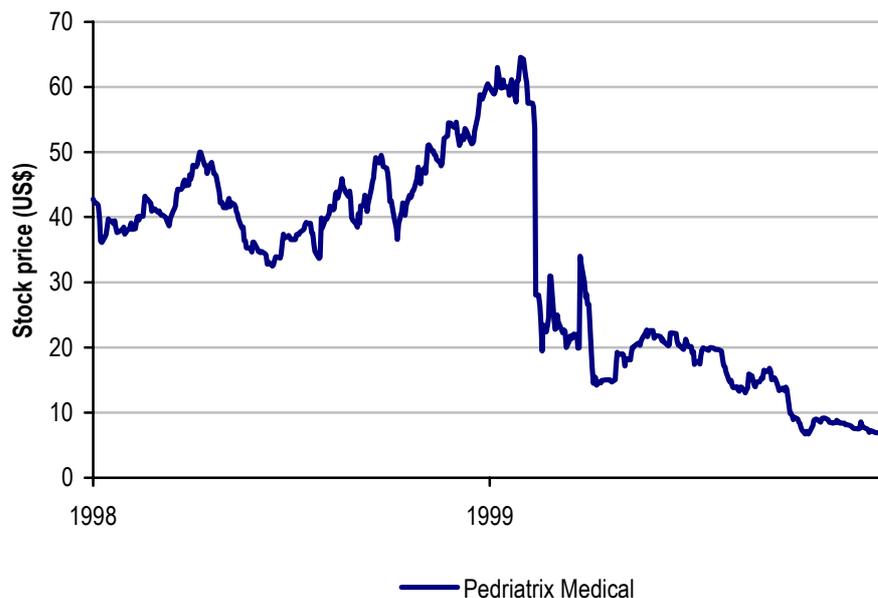
Position limits to control risk and liquidity

Many long/short equity managers use position limits to control stock specific risk and, more importantly, control liquidity. Some institutionalise daily P&L analysis similar to proprietary trading desks of investment banks. Selling short is not the opposite of going long.

Selling inflated earning expectations and aggressive accounting

The ability to sell short allows the hedge fund managers to capitalise on opportunities unavailable to most traditional managers. One example of a successful short stock position done by equity long/short managers was a short position on Pediatrix Medical Group Inc., a provider of physician management services to hospital-based neonatal intensive care units.

Chart 11: Pediatrix Medical Share Price Performance



Source: Datastream

Example

The company was *en vogue* on Wall Street in late 1998 and early 1999 due to the perceived high rate of growth in its revenues and profits. To some hedge fund managers, the stock was a potential short because the company's projected growth rate, attributed to the industry, far exceeded the rate at which babies were being born. Further research uncovered both 'aggressive' accounting practices and inappropriate charges to insurance carriers. Hedge fund managers sold the stock short outright. Eventually, the company announced that earnings would be far below analysts' expectations and officials said they were investigating the company for possible insurance fraud.

This concludes our brief description of hedge fund strategies. On pp98-150 we analyse risk, return and correlation characteristics of the strategies just described. On the next page we summarise the findings of our performance analysis.

Summary Performance Analysis

Historical Risk and Returns

Table 20 summarises the historical performance figures from nine different hedge fund strategies and compares them with the performance of equity and bond indices. The hedge fund figures are averages derived from different hedge fund data vendors and cover different time periods. The single style figures are outlined on pp99-150.

Summary

- Long/short equity hedge funds had the highest absolute returns.
- Equity market-neutral and convertible arbitrage were the least volatile.
- Risk arbitrage and equity market-neutral had the highest risk-adjusted returns based on Sharpe ratio and also the smallest 'worst one-year return'.
- Short sellers performed poorly in the period analysed.
- Emerging market hedge fund returns were high but achieved with great volatility.

Table 20: Average Historical Return and Risk Characteristics

	Annual return (%)	Volatility (%)	Sharpe ratio	Highest monthly loss (%)	Negative Months (%)	Worst One-year return (%)
S&P 500 (Total return)	18.3	13.7	0.97	-14.5	32	-3.1
MSCI World (Total return)	11.7	14.1	0.48	-13.3	36	-16.5
MSCI EAFE (Total return)	6.9	17.2	0.11	-13.9	40	-23.2
MSCI Europe (Total return)	13.5	14.7	0.58	-12.6	34	-12.1
JPM Global Bond Index (Total return)	7.4	5.8	0.41	-3.3	39	-6.2
Relative-value/market neutral						
Convertible Arbitrage	10.4	4.2	1.38	-3.7	15	-6.6
Fixed Income Arbitrage	6.0	5.1	0.22	-6.6	20	-11.1
Equity market neutral	11.2	2.8	2.43	-1.3	12	1.5
Event-driven						
Risk arbitrage	13.6	4.2	2.08	-5.7	9	1.4
Distressed securities	15.8	7.1	1.53	-8.9	19	-7.5
Opportunistic						
Macro	15.2	8.6	1.21	-6.4	32	-9.6
Short sellers	-3.2	20.2	-0.40	-15.9	53	-27.5
Emerging markets	14.3	16.8	0.55	-22.6	34	-42.5
Long/short equity	20.2	13.1	1.16	-12.4	30	-9.8

Sources: Datastream, HFR, MAR, Hennessee, CSFB/Tremont, UBS Warburg calculations
Based on monthly US\$ total returns net of fees between January 1990 and April 2000.

Challenging modern portfolio theory

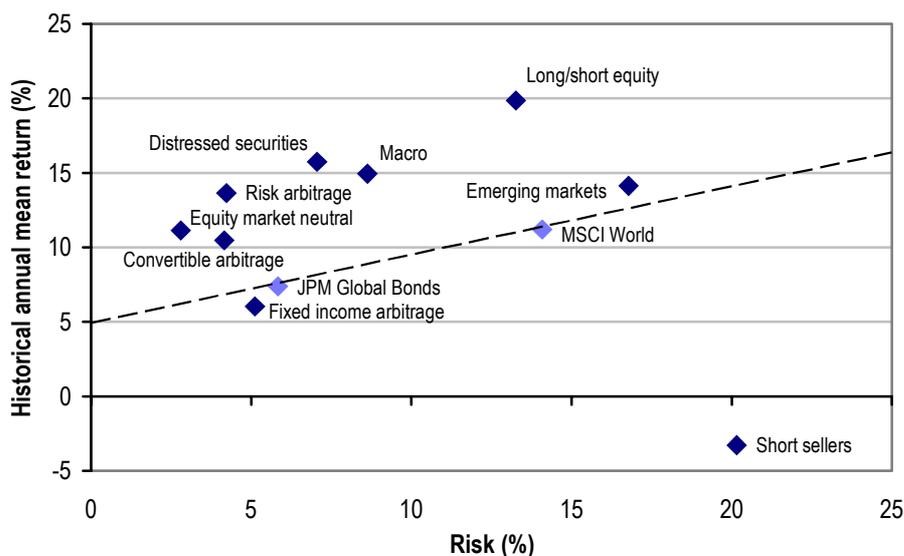
Chart 12 relates the average annual return and the volatility of the nine hedge fund strategies to global bonds and equities. The dotted line symbolises a global capital market line. In theory, an asset class substantially north of the line should not exist.

There are many different ways to gain insight into the risk/reward trade-off of a manager or investment strategy. All of the methods have their own strengths and weaknesses. However, we believe that evaluating an investment strategy relative to a capital market line is particularly useful since it contains much more information than a single ratio. The diagram makes it easy to identify the strategy that produced the highest return for an acceptable level of risk; the strategy that produced an acceptable return with the lowest risk; or the strategy that had the highest risk-adjusted excess return.

Analysis of return outliers and correlation are equally important

However, it does not display higher moment risk statistics nor does it indicate any correlation characteristics. We believe that the analysis of higher moment statistics and correlation attributes are at least as important when performance is analysed than are Sharpe ratios or the position relative to a capital market line. We think this is probably the main reason why this report can also function as doorstopper.

Chart 12: Average Annual Mean Returns Versus Volatility



Sources: Datastream, HFR, MAR, Hennessee, CSFB/Tremont, UBS Warburg calculations. Based on monthly US\$ total returns net of fees between January 1990 and April 2000.

Most hedge fund strategies have outperformed traditional asset classes on a risk-adjusted basis by a wide margin. Only short sellers and fixed income arbitrageurs, as investment groups, were below the capital market line.

Correlation

Correlation to Capital Markets and Among Hedge Fund Strategies

Table 21 summarises the correlation coefficients between some capital market indices and the hedge fund strategies analysed in this report.

Table 21: Summary Correlation Coefficients

	SPX	WRLD	EAFE	E	JPM	CA	FIA	EMN	RA	DS	M	S	EM	ELS
S&P 500 (Total return)		0.806	0.559	0.664	0.214	0.375	-0.112	0.238	0.467	0.384	0.456	-0.616	0.555	0.749
MSCI World (Total return)	0.806		0.938	0.855	0.345	0.338	-0.039	0.178	0.390	0.347	0.454	-0.572	0.600	0.654
MSCI EAFE (Total return)	0.559	0.938		0.835	0.369	0.265	0.022	0.116	0.291	0.285	0.384	-0.461	0.528	0.502
MSCI Europe (Total return)	0.664	0.855	0.835		0.354	0.302	0.052	0.183	0.340	0.385	0.424	-0.496	0.568	0.562
JPM Global Bonds	0.214	0.345	0.369	0.354		-0.004	-0.344	0.150	0.017	-0.172	0.071	-0.062	-0.061	0.036
Convertible Arbitrage	0.375	0.338	0.265	0.302	-0.004		0.100	0.182	0.487	0.603	0.448	-0.370	0.470	0.514
Fixed Income Arbitrage	-0.112	-0.039	0.022	0.052	-0.344	0.100		0.066	-0.078	0.385	0.111	-0.010	0.283	0.062
Equity market neutral	0.238	0.178	0.116	0.183	0.150	0.182	0.066		0.157	0.203	0.216	-0.142	0.109	0.265
Risk arbitrage	0.467	0.390	0.291	0.340	0.017	0.487	-0.078	0.157		0.534	0.292	-0.384	0.439	0.526
Distressed securities	0.384	0.347	0.285	0.385	-0.172	0.603	0.385	0.203	0.534		0.478	-0.462	0.648	0.639
Macro	0.456	0.454	0.384	0.424	0.071	0.448	0.111	0.216	0.292	0.478		-0.406	0.612	0.605
Short sellers	-0.616	-0.572	-0.461	-0.496	-0.062	-0.370	-0.010	-0.142	-0.384	-0.462	-0.406		-0.514	-0.847
Emerging markets	0.555	0.600	0.528	0.568	-0.061	0.470	0.283	0.109	0.439	0.648	0.612	-0.514		0.679
Long/short equity	0.749	0.654	0.502	0.562	0.036	0.514	0.062	0.265	0.526	0.639	0.605	-0.847	0.679	

Source: HFR, Datastream, UBS Warburg calculations.

Based on monthly US\$ total returns net of fees between January 1990 and April 2000.

- Short sellers have the lowest correlation to equity markets. Fixed income arbitrage and equity market-neutral also had low correlation to equities.
- Long/short equity has the highest correlation to the equity market indicating the long bias of the strategy discussed earlier.
- Short sellers have not only low correlation to equities in general but to most other hedge fund strategies as well.
- Fixed income arbitrage and equity market neutral had low correlation with other hedge fund strategies.
- Returns in risk arbitrage were negatively correlated with returns in fixed income arbitrage.

Mutual versus Hedge Funds

Difference Between Mutual and Hedge Funds

Overview

There are various differences between mutual funds and hedge funds. The difference is regulation with respect to short selling and leverage. Below, we list and comment on a selection of the main differences from an investor's point of view. Table 22 shows a bullet point summary of this discussion.

Table 22: Summary

Difference to mutual funds	Comment
Performance	Hedge funds outperform mutual funds.
Downside protection	Hedge funds do better in down quarters.
Performance measurement	Hedge funds are measured based on absolute performance, mutual funds are usually measured based on relative performance.
Source of return	Mutual funds capture the economic risk premium, while hedge funds add alpha.
Regulation	Hedge funds are less restricted than mutual funds.
Industry characteristics	The hedge fund industry is heterogeneous, mutual fund industry homogeneous.
Incentives	Hedge funds align incentive structure with investors' goals.
Market exposure	Relative value hedge fund strategies have little exposure to direction of market.
Risk management	Hedge funds focus on value at risk as opposed to tracking risk.
Short selling	Hedge funds can sell short where there are more opportunities to exploit inefficiencies.
Dead weight	Hedge funds can manage risk more efficiently.
Flexibility	Hedge fund managers are more flexible to exploit inefficiencies.
Advertising	Mutual funds are allowed to advertise, hedge funds are usually not.

Source: UBS Warburg

Performance

Hedge funds outperform mutual funds in most market conditions, but not all. The academic literature supports the notion that hedge funds offer more attractive risk-adjusted returns than mutual funds. McCarthy and Spurgin (1998), for example, find that over the time period analysed (1990-1997), hedge funds offered risk-adjusted returns greater than traditional stock and bond investments. However, results also demonstrate that there are considerable differences in the relative performance of these hedge fund indices. These differences are sizeable enough that investors must realise that the use of seemingly similar benchmark hedge fund indices may result in different asset allocation decisions.

Active funds underperform passive funds because active money management is more costly than passive money management. Bogle (1998), for example, compares the performance and risk characteristics of 741 mutual funds with peer groups and index funds that have similar average returns, and they have very different standard deviations. Within a style group, however, funds having different returns have nearly the same risk. Expense ratios, rather than risk, show cross-sectional variation in performance within a style group. Index funds appear to have significantly better risk-adjusted returns than the average funds within the same style, suggesting that low cost funds and index funds represent attractive investment opportunities for

**Mutual funds underperform
hedge funds...**

...as well as index funds

those seeking specific style representation. In Bogle (1991), the author reports that in the decade ending in 1979, about 47% of equity fund managers outperformed the S&P500, compared with 37% in the 1980s. Gruber (1996) finds that the average mutual fund underperforms passive market indices by about 65bp per year from 1985 to 1994. Results from a study by Daniel, Grinblatt, Titman, and Wermers (1997) in the *Journal of Finance* also indicate that performance based on selectivity and timing is not statistically greater than the difference between active and passive expenses.¹

Smart kids of Lake Wobegon

We believe it is fair to state that the amounts by which traditional fund managers as a group beat or are beaten by the market fall within the margin of statistical uncertainty. David F. Swensen, Yale's chief investment officer, puts it as follows:²

"In spite of the daunting obstacles to active management success, the overwhelming majority of market participants choose to play the loser's game. Like the residents of Lake Wobegon, who all believe their children to be above average, all investors believe their active strategies will produce superior results. The harsh reality of the negative-sum game dictates that in aggregate, active managers lose to the market by the amount it costs to play, in the form of management fees, trading commissions, and dealer spread. Wall Street's share of the pie defines the amount of performance drag experienced by the would-be market beaters."

Mutual funds do not always underperform

Mutual funds as a group most often underperform their benchmark, but not always. Ikenberry, Shockley and Womack (1998), for example, argue that provided they lack superior information/skills, active fund managers as a group should consistently underperform the S&P500 index over time, given search, trading, and investor servicing costs. However, data does not show such consistency. In some years, managers as a group have outperformed the S&P500, sometimes by a substantial amount. The authors concluded that size premium and the skewness of long-run stock returns are important determinants of this inconsistent performance.

¹ There is also evidence that mutual fund managers actually do add value. Wermers (2000) for example finds that funds hold stocks that outperform the market by 1.3% per year, but their net returns underperform by one percent. Of the 2.3% difference between these results, 0.7% is due to the underperformance of non-stock holdings, whereas 1.6% is due to expenses and transaction costs. Thus, funds pick stocks well enough to cover their costs. The author finds also that high-turnover funds beat the Vanguard Index 500 fund on a net return basis.

² Swensen (2000), p. 6. Note that David Swensen has achieved an annualised return of 16.2 percent and has transformed the management of Yale's endowment fund over the past fourteen years largely by focusing on nonconventional strategies which has propelled Yale's endowment fund into the top tier of institutional funds.

Table 23: Hedge Fund Returns Compared with Mutual Fund and Index Returns

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	Mean -1999
MSCI World (Total return, \$)	24.0	17.2	-16.5	19.0	-4.7	23.1	5.6	21.3	14.0	16.2	24.8	25.3	-3.2	14.1
S&P 500 (Total return)	16.6	31.7	-3.1	30.5	7.7	9.8	1.5	37.6	22.9	33.4	28.6	19.9	0.2	19.7
Morningstar Average Equity Mutual Fund	14.9	25.5	-7.1	31.9	6.5	19.3	-2.3	25.0	17.5	17.0	10.1	29.5	NA	15.7
Van Global Hedge Fund	25.0	24.9	7.2	29.4	17.0	29.0	0.4	18.1	18.6	15.6	6.0	36.5	NA	19.0
HFRI Fund Weighted Composite Index	NA	NA	17.5	14.5	12.3	26.3	-3.5	11.1	14.4	16.2	-5.1	26.4	1.3	NA
CSFB/Tremont Hedge Fund Index	NA	NA	NA	NA	NA	NA	-4.4	21.7	22.2	25.9	-0.4	23.4	-0.7	NA

Source: Datastream, Van Money Manager Research, HFR and CSFB/Tremont.

Returns are total US\$ returns. Hedge fund returns are net returns.

Returns for 2000 until end of April 2000

The median outperformance of hedge funds relative to mutual funds was 1.9%

In the twelve years ending 1999, the average equity mutual fund outperformed hedge funds on five occasions, based on returns from Morningstar and Van Money Manager Research. In the years where mutual funds outperformed hedge funds, the average excess return was 3.1%. This compares with an average excess return of hedge funds over mutual funds of 7.9% in the years where the mutual funds underperformed the hedge funds. The relative performance of mutual funds relative to the benchmark index is more symmetrical than relative to hedge funds. In the three years where mutual funds outperformed the index, the average excess return was 6.8% where the underperformance to the index was 7.8% in the years where mutual funds did worse than the index. As we noted earlier, there is an important caveat with respect to generalising hedge fund returns.

Table 24: Comparison of the Best and Worst Performing Hedge Funds and Mutual Funds

	Hedge Funds (%)	Mutual Funds (%)
Top 10	62.20	51.50
Top 10%	46.30	27.20
Top 25%	36.30	20.30
Bottom 25%	6.40	5.60
Bottom 10%	0.70	4.00
Bottom 20	-4.40	-16.10

Source: Van Money Manager Research

Based on five-year net compound annual returns, Q1 95 to Q4 99

In addition to the average hedge fund outperforming the average mutual fund, the highest returning hedge funds significantly outperformed the highest returning mutual funds. This is, to some extent, attributable to leverage. However, the worst 20 hedge funds only lost 4.4%, whereas the worst mutual funds lost 16.1%, despite the former operating with leverage. This is an indication of the focus on absolute returns versus relative returns.

A Word on Survivorship Bias¹

Too good to be true

Hedge fund returns are said to be irrelevant since hedge fund return data suffers from survivorship bias. Reported hedge fund returns, therefore, are regarded as too good to be true.

Survivorship versus self-selection bias: good as well as poorly performing hedge funds exit database

Mutual fund return data suffers from a survivorship bias.² For hedge funds, it is unclear if survivorship bias inflates returns of hedge fund indices. Poor, as well as stellar performing hedge funds, exit the database. Poor hedge funds exit because of poor performance. Stellar hedge funds can close to new partners and, as a result of good performance, stop reporting returns to the data vendor. Hedge funds report their performance on a voluntary basis. This self-selection bias may partially offset the survivorship bias caused by the disappearance of poorly performing funds.

Exiting hedge funds can have above-average returns

A small, well-performing fund attracts assets. Unlike mutual funds, hedge fund strategies have limited capacity. This means that, over any given time period, performance may well decline when a fund's size gets too large. If it subsequently experiences poor performance, assets begin to flow out. In some cases, the fund can return to some equilibrium level of assets under management and the fund 'survives'. However, there will be other cases where assets shrink so much that it is no longer economical to cover the fund's fixed overhead and the manager closes it down and the fund 'exits'. This can occur even if the returns during the latter stage are above the surviving funds' average, but compare poorly to its peers in the same trading style. In other words, funds exiting the sample can easily have returns higher than the population average of the survivors.³

Hedge funds 'going private' may decide not to distribute return figures to third party data vendors

In addition, a successful hedge fund, which has reached its perceived capacity and has stopped accepting new investments, has no incentive to market the fund and distribute returns to third party data vendors. In other words, a successful hedge fund with above average returns might decide to close the fund for new money and chose not to report their performance.

Survivorship bias does not explain outperformance

Liang (1999) found survivorship bias in hedge fund return data from January 1992 through to December 1996. However, the author concluded that, on a risk-adjusted basis, the average hedge fund outperformed the average mutual fund and that the outperformance cannot be explained by survivorship bias.

¹ Survivorship bias occurs when data samples exclude markets or investment funds or individual securities that disappeared. The data sample of survivors describes an environment that overstates the real-world return and understates the real-world risk.

A classic example of survivorship bias is the paradigm that equities do well in the long run since market studies primarily focus only on returns for securities in the US. At the turn of the twentieth century, active stock markets existed in Russia, France, Germany, Japan, and Argentina, all of which have been interrupted for a variety of reasons, including political turmoil, war, nationalisation, and hyper-inflation.

² Grinblatt and Titman (1989); Brown, Goetzmann, Ibbotson, and Ross (1992); Malkiel (1995), and Elton, Gruber, and Blake (1996) found that survivorship biased upward mutual fund returns by between 0.5-1.4% a year.

³ See Fung and Hsieh (1997)

Downside Protection

Little correlation on the down-side

Mutual funds are not able to protect portfolios effectively against declining markets other than by going into cash or by shorting a limited amount of stock index futures. Hedge funds, on the other hand, are often able to protect against declining markets by utilising various hedging strategies. The strategies used vary tremendously depending on the investment style and type of hedge fund. But as a result of these hedging strategies, certain types of hedge funds are able to generate positive returns, even in declining markets.

Table 25: Performance of Hedge Funds and Mutual Funds in Down S&P500 Quarters

(%)	Q1 90	Q3 90	Q2 91	Q1 92	Q1 94	Q4 94	Q3 98	Q3 99	Sum
S&P500	-3.0	-13.7	-0.2	-2.5	-3.8	0.0	-9.9	-6.2	-39.3
VAN US Hedge Fund Index	2.2	-3.7	2.3	5.0	-0.8	-1.2	-6.1	2.1	-0.2
Morningstar Average Equity Mutual Fund	-2.8	-15.4	-0.9	-0.7	-3.2	-2.6	-15.0	-3.2	-43.8
Morningstar Average Taxable Bond Fund	-0.9	0.6	1.5	-1.1	-2.4	-0.2	2.0	0.3	-0.2

Source: Van Money Manager Research

Hedge fund returns are negatively correlated with market returns, even when markets fall

International diversification is often questioned because correlation between developed markets approaches one when markets fall due to a global crisis (oil shock, Gulf war, Asian crisis, etc.). In other words, the concept of diversification breaks down when it is most needed to preserve wealth. Table 25 speaks for itself. The table shows that as an asset group, hedge funds do not fall in line with the market. The low correlation of hedge funds with equities remains low, even when markets tumble. When the S&P falls, or is flat during a quarter, the average mutual funds fall as well. The sum of the negative quarters in the 1990s was -43.8% in the case of mutual funds, compared with -0.2% for the average hedge funds.

Car with no brakes

The main reason why traditional funds do poorer in downside markets is that they usually have to have a certain weight in equities according to their mandate and therefore are often compared with a car without brakes. The freedom of operation is limited with traditional money managers and more flexible with alternative managers. This is just one reason explaining why hedge funds do better in downside markets. Another reason is the fact that hedge fund managers have a large portion of their personal wealth at risk in their funds, ie, aligned with their investors. This increases the incentive to preserve wealth.

Performance Measurement

Relative versus active returns

Mutual funds are measured on relative performance. Their performance is compared to a relevant benchmark index or to comparable peer mutual funds in their style group. Most hedge funds focus on absolute returns. Hedge funds involved in arbitrage attempt to make profits under all circumstances, even when markets fall.

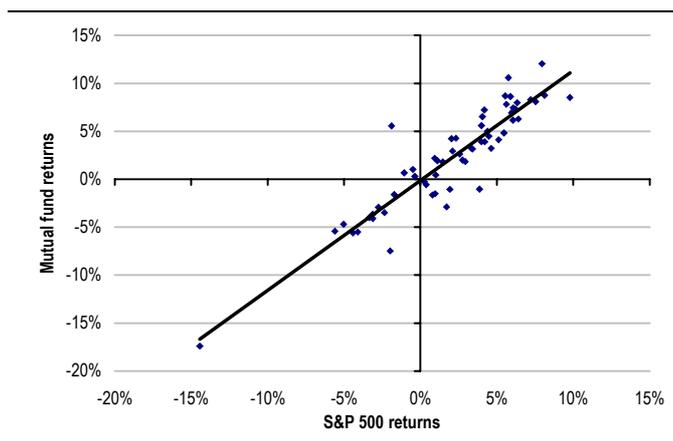
Source of Return

Returns from hedge funds are derived from skill – returns from traditional funds from earning the risk premium of the asset class

The primary source of return in asset class investing comes from earning the economic risk premium, whereas with most hedge funds it is derived from skill. Put differently, a long-only equity fund delivers the risk-free rate plus beta whereas a market-neutral fund delivers the risk-free rate plus alpha.

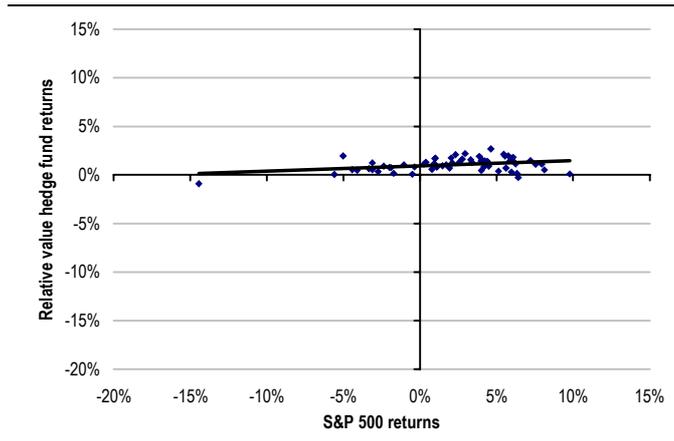
The following two graphs compare returns from a typical US equity mutual fund with returns from a typical US relative value fund.

Chart 13: Typical Equity Mutual Fund



Source: Quadra

Chart 14: Typical Relative Value Fund



Source: Quadra

Through long-only funds the investor gets exposure to beta

Chart 13 shows that the returns from the equity mutual fund are generated essentially by being long the underlying stock market. This is intuitive since this is what the managers are paid to do. A point can be made that plain vanilla exposure to a liquid and developed market can be more cheaply gained through indexation or swaps. Note that the intercept of the regression line is zero.

Through relative value funds the investors gets exposure to the manager's skill, excluding beta

Chart 14 compares returns of a typical relative value hedge fund manager with returns in the underlying stock market. The main difference to Chart 13 is that the returns are generated with almost no exposure to the market. In other words, the source of return is skill and not beta.

Regulation

Hedge funds are less restricted

Some refer to the continued high performance of hedge funds as *regulatory arbitrage*. Mutual funds are highly regulated, in many occasions restricting the use of short selling and/or derivatives. These regulations serve as handcuffs, making it more difficult to outperform the market or to protect the assets of the fund in a downturn. Hedge funds, on the other hand, are less regulated and therefore less restricted. They allow for short selling and other strategies designed to accelerate performance or reduce volatility. However, an informal restriction is generally imposed on all hedge fund managers by professional investors who understand the different strategies and typically invest in a particular fund because of the manager's expertise in a particular investment strategy. These investors require and expect the hedge fund to stay within its area of specialisation and competence. Hence, one of the defining characteristics of hedge funds is that they tend to be specialised funds,

operating within a given niche, speciality or industry that requires a particular expertise.

Making mutual funds out of hedge funds?

The chief executive of Fidelity Management and Research, Robert Pozen, said at an SEC-hosted conference that the lack of federal hedge fund regulation is a “total abdication” of regulatory responsibility.¹ He added that this is a “class issue”:

“Middle class investors are being harmed because many of the sharpest fund managers are forgoing mutual funds (which are open to any investor) to run hedge funds (which are open only to the rich).” Mr. Pozen’s solution?

“More SEC regulation of hedge funds and the requirement of symmetrical performance fees for hedge fund managers” – in other words, make hedge funds like mutual funds (Edwards 1999).

Damocles’ sword of the hedge fund industry

The regulatory environment with respect to hedge funds is probably one of the major threats to the hedge fund industry. Regulation is probably the most important factor when assessing the sustainability of the extremely attractive risk/return characteristics of some of the hedge fund strategies. It is a pending issue with most regulators.

Hedge funds are not exempt from all regulations

Hedge funds are not free from all regulation. Hedge funds are not exempt from regulations designed to monitor and safeguard the integrity of markets. The US Treasury, for example, requires traders to report large positions in selected foreign currencies and treasury securities. The SEC requires traders to report positions that exceed 5% of the shares of a publicly traded firm. The Federal Reserve has margin requirements for stock purchases that apply to all market participants. The CFTC requires traders with large futures positions to file daily reports. In addition, the CFTC and the futures exchanges set futures margins and position limits on futures contracts. These regulations apply to all market participants, including hedge funds.

Industry Characteristics

Hedge funds, as a group, are heterogeneous

Due to the fact that hedge funds are less regulated the industry is extremely heterogeneous, whereas the mutual fund industry is homogeneous in comparison. Heterogeneity means low correlation and results in diversification opportunities. Fund and Hsieh (1997) found that hedge fund returns were substantially different from those of mutual funds and standard asset classes. Mutual funds are essentially long the asset class, whereas hedge funds can more or less invest in anything. Some hedge funds have very strict pre-defined areas of activity, whereas others have full flexibility.

Hedge fund managers departing their field of expertise is a risk to the investor

Institutional investors tend to favour hedge funds that stick to their niche or area of expertise. There have been cases where hedge fund managers depart in areas where they have no edge, for example a fixed-income arbitrageur executing volatility or pair trades in the equity market. Institutional investors want to isolate the edge

¹ From Edwards (1999)

(skill) and diversify the different exposures. In this context, hedge fund managers departing from their field of expertise is a risk to the investor.

Incentives

Absolute performance-related incentives versus relative performance-related incentives

Mutual funds generally remunerate management based on a percentage of assets under management. Hedge funds always remunerate managers with performance-related incentive fees as well as a fixed fee. Not surprisingly, the incentive-based performance fees tend to attract the most talented investment managers to the hedge fund industry. A further distinction with respect to performance incentive is that hedge fund managers usually have a substantial portion of their net wealth invested alongside their investors' wealth.

Aligning goal of principal and agent

The wedge between principal goals and agent actions causes problems at the highest level of governance. Fund managers as individuals desire immediate gratification, leading to overemphasis of policies expected to pay off in a relatively short time frame. At the same time, fund fiduciaries hope to retain power by avoiding controversy, pursuing only conventional investment ideas. By operating in the institutional mainstream of short horizon, uncontroversial opportunities, committee members and staff ensure unspectacular results, while missing potentially rewarding longer-term contrarian plays (Swensen 2000). Aligning incentives between the manager and the investor reduces the principal/agent conflict and may lead to greater care in the management of funds. An investment manager level of commitment is meaningfully higher when a substantial portion of their liquid personal assets are invested in the strategy and when their remuneration is linked to investment performance.

High fee structure attracts most skilled money managers

The attractive incentives in the hedge funds industry are regarded as one of the main drivers of high returns of hedge funds since it attracts managers who have superior skill. Hedge fund managers may just be better than other active fund managers. It is not, after all, unreasonable to think that the attractive fee structure used by hedge funds may succeed in enticing money managers with the greatest skill to the hedge fund industry. The remarks cited earlier by Robert Pozen, who is head of the largest mutual fund complex, might be taken as evidence that this is in fact happening. Mr Pozen, after all, is certainly in a position to know whether he is losing his best fund managers.

Option-like incentives are a hot potato

Most hedge fund managers have high watermark and hurdle rates, which add optionality to the incentive structure. Option-like incentives are scarce in the mutual fund industry and pension fund management industry, but are prevalent in the real estate sector, the venture capital sector and the hedge fund sector. US mutual fund performance-based fees must satisfy the fulcrum rule. That is, gains and losses must have a symmetric effect, in the sense that the same amount of over- and underperformance relative to a benchmark must result in the same amount of positive and negative incentive fees for a mutual fund manager. Hedge fund managers are not subject to the fulcrum rule, or for that matter, any rules other than what the investors would bear. This embedded put option remains a highly debated issue on hedge fund managers' compensation.

Market Exposure

To be exposed to the market or not

The future performance of mutual funds is dependent on the direction of the equity markets. The name of the game is tracking risk. Equity mutual funds are all long beta, ie, primarily exposed to market risk. We believe that the future performance of some hedge fund strategies is predictable and not dependent on the direction of the equity markets.

Low correlation with traditional assets

Fung and Hsieh (1997) find that hedge fund returns have very low correlation with the returns of standard asset markets, such as short-term interest rates, US stocks, non-US stocks, emerging market stocks, US Government bonds, non-US Government bonds, gold (as a proxy for commodities), and the traded weighted US dollar (as a proxy for foreign currencies). This is very different from mutual funds, whose returns have high correlation with these standard asset markets. The authors also argue that the attrition rate in hedge funds is comparable to that in mutual funds. This means that the survivorship bias is unlikely to affect the result that hedge fund returns are uncorrelated with other asset classes.

Risk Management

Tracking risk versus value at risk

Risk control and capital preservation are among the main areas where the best hedge funds consistently excel. Many hedge funds grew out of a risk management environment and many hedge fund managers focus entirely on their edge by eliminating all other market risk. The risk management of most hedge funds is sophisticated, ie, similar to those of banks and insurers where daily P&L accounts are monitored and the economic leverage is related to invested capital.

Risk management of hedge funds better be superior to that of mutual funds

Given the leverage used by some hedge funds, the odds of large losses are much larger than with traditional investment vehicles. Risk management is therefore more important for investors, lenders and counterparties. Regulators are concerned with systemic risk. They seek to avert systemic threats to the financial system by limiting imprudent extensions of credit. These regulations include margin requirements, collateral requirements, and limits on the exposure of financial intermediaries to individual customers. All of them affect hedge funds' business with banks, brokers, and other intermediaries.

Short Selling

Greater inefficiencies on the short side

Hedge funds are usually not restricted to sell short. There are reasons to believe that greater inefficiencies may exist on the short side of the market than on the long side (Jacobs 1998). When short selling is restricted and investor opinion is diverse, market prices are no longer efficient, and the capital asset pricing model (CAPM) and arbitrage pricing theory (APT) do not hold. When investors have diverse opinions, some tend to be more pessimistic than others. Without complete freedom to sell short, the pessimism of these investors will not be fully represented in security prices, and some stocks will tend to be overpriced.

Restricting short sales can over-inflate securities and markets

Security overpricing may be supported by fads or bubbles. Overpricing may also be supported by corporate publicity, which tends to favour good news over bad. Good news tends to be publicised in a timely manner, whereas bad news is subject to delay, window dressing, and actual fraud.

Hedge funds can manage risk more efficiently

Dead Weight

White (1995) argues that hedge fund managers minimise ‘dead weight’. Dead weight in a portfolio results from securities owned into which the manager has no insight. For example, in a long equity account, the manager may maintain a market weighting in one sector in order to control tracking error within an acceptable range, even when the manager has no insight into the sector. The proportion of the portfolio, which is held to control residual volatility (volatility relative to the benchmark), is the proportion that will not add value.

Hedge funds carry less dead weight and therefore manage invested capital more efficiently

In a hedge fund, in general, only positions about which the manager has conviction will be held or sold short. Portfolio volatility and higher-moment and residual risks are controlled with risk management instruments or other hedging techniques, most of which require less capital than holding dead weight positions in the cash market. Consequently, a higher proportion of the hedge fund manager’s capital is invested in positions about which the manager has convictions. Hedge fund managers, therefore, should be able to provide higher alphas, since relative outperformance against a benchmark is not the primary objective.

FIFO

Flexibility

Hedge fund managers are more flexible to move between markets and exploit inefficiencies. Hedge fund managers are constantly scouring new or alternative markets for attractive investments, without the limitations often found in guidelines or policies by other fiduciaries. The probability that high risk-adjusted returns be realised is increased, because some hedge fund managers are opportunistic and move into inefficient markets earlier than traditional managers (White 1995). An example of a market with few participants and large inefficiencies was emerging markets debt and Brady bonds in 1993, and defaulted real estate mortgages in 1994. The absence of purchasers provided very good returns for the pioneers in these markets. This lack of inhibition generally leads them into the most attractive markets ahead of the typical institutional investor.

A Word on Feedback Trading

Although hedge funds have the flexibility to take short positions, they can also be the first to take long positions in currencies that have depreciated in the wake of a speculative attack, providing liquidity to illiquid markets and helping the currency establish a bottom. Clients’ expectations that hedge funds will make above normal returns — as they often do — will likely discourage managers from buying the same assets being purchased by other investors since these asset prices already reflect others’ moves.

Hedge funds’ greater flexibility makes them less inclined than other investors to buy and sell in the same direction as the market. Hedge funds are not bound by their prospectuses, as mutual funds often are, to invest new inflows of capital in the same manner as existing capital. When a market is falling, hedge funds can sit it out, while mutual funds may be required by their internal controls to liquidate positions, or they may have to pay off withdrawals by their investors. Hedge funds, except for those with very high amounts of leverage, are often able to wait for a market reversal, either because they may have credit lines to draw on to put up more margin or collateral, or because their investors are locked in for substantial periods.

The Myth of Hedge Funds

“As long as there continue to be people like you, we’ll make money.”

Myron Scholes¹

Negative press slows evolution of hedge funds

Hedge Fund Disasters

Hedge funds suffer from negative press. The headlines over the past three years have not always been favourable for the industry. We believe similarities can be drawn to the derivatives industry a few years ago. It took years until derivatives were regarded as what they were – instruments to efficiently manage risk. The main reason for derivatives taking a long route to full acceptance despite its economical logic was the negative bias induced by catchy (and negative) headlines and financial disasters where derivatives were involved. In our report *20th Century Volatility* we allocated a section to derivatives disasters and concluded that the so-called ‘derivatives disasters’ had much more to do with unskilled management of the market as well as business risk and fraud than with derivatives itself. Given the negatively biased press coverage of hedge funds and the large reported losses of macro hedge funds in H1 00, we believe the evolution of hedge funds will take a similar route to full acceptance as investment instruments to manage portfolio risk as did derivatives.

Louis Moore Bacon presented a very intuitive way of classifying hedge fund disasters at the 2000 Hedge Fund Symposium in April in London this year. More precisely, he presented five warning signs for investors to look out for when investing in hedge funds. These are:

- (1) Size
- (2) Leverage
- (3) Transparency
- (4) Funding
- (5) ‘Hubris’²

Size

There is a capacity constraint for every hedge fund style, most likely for every single hedge fund. Recent history has proven that once a fund reaches enormous proportions the alpha diminishes or, even worse, turns negative. Recent remarks of George Soros with respect to capacity were along these lines.

Bacon used Julian Robertson’s Tiger Funds as an example. In Bacon’s view a hedge fund should de-leverage or return capital to its partners once it reaches a certain size. A hedge fund manager should control size according to its capacity to implement its investment strategy. According to Bacon, Robertson kept on raising money despite respectable organic growth.

¹ Myron Scholes quoted in Shefrin (2000)

² *Oxford Dictionary*: ‘Presumption, orig. towards the gods; pride, excessive self-confidence’. *Roget’s Thesaurus*: ‘presumptuousness, insolence, rashness, confidence’.

'Illiquidity and leverage can be a toxic cocktail'

Larry Summers

Leverage

Leverage and liquidity are interconnected. Both, occasionally, turn the laws of economics upside down, because lower prices bring out less demand and more selling. George Soros, in *The Alchemy of Finance*, talks about 'reflexivity'. Blind adherence to economic orthodoxy, plus leverage, he says, lead to boom-bust mania.

'In a hedge fund, returns should be dependent on risk management, not just on stock-picking'

Ian Wace

Excess leverage is bad. Most examples of financial disasters involved an excess use of leverage. A sound risk management system relates open positions with liquidity. For example, a position is limited to three days of trading volumes. In other words, analysing a hedge fund's risk control systems and skill is extremely important. Much more important than with other money managers who are restricted and/or regulated by internal and/or external regulatory bodies. Managing hedge funds has much more to do with risk control and financial engineering than with picking stocks.

Beta merchants

According to Ian Wace (2000) from Marshall Wace Asset Management, the average correlation of the average European hedge fund to the market is 0.89 while the average net market exposure is 85%. He noted that since the returns are derived mainly from market moves, these funds are 'beta merchants, not hedge funds'. We share Wace's concerns and believe investing in hedge funds is about investment philosophies and strategies based on exploiting market inefficiencies by controlling risk and not based on the attempt to be smarter than the market.

Positions and methodology should be kept a secret to avoid copycats and front-running

Transparency

Transparency is the third warning sign. Full transparency of current positions is commercially unwise. This is true for hedge funds and proprietary trading desks as well as other money managers of large size. The reason why it is more important for hedge funds is because they involve short positions much more frequently than traditional funds. In many regions, traditional money managers are restricted from selling short.

Too much transparency is bad

Short positions require more sensitive treatment than long positions. Many equity hedge funds are involved in illiquid markets, as the inefficiencies are higher in illiquid markets than in liquid markets¹. The results of being squeezed out of a short position in an illiquid market can be disastrous to overall portfolio performance. One way of controlling this risk is by not unveiling one's positions to the market. Putting it more bluntly: a hedge fund manager who reveals his methodology and positions to the market has probably not got an edge worth protecting in the first place.

¹ See for example Grossman (1976) who argues that perfectly informationally efficient markets are an impossibility, for if markets are perfectly efficient, the return to gathering information is nil, in which case there would be little reason to trade and markets would eventually collapse. There must be sufficient 'inefficiencies' to compensate investors for the costs of trading and information gathering. Haugen and Jorion (1996) show that small-capitalisation stocks show higher returns in January than in other months of the year. This anomaly is well known, they argue, and should be eliminated through arbitrage. Yet it persists. The authors argue that it may mean that markets are slower to arbitrage away inefficiencies than previously thought. Chopra, Lakonishok and Ritter (1992) found that small companies and previous losers had an average return of 60-100bp over the three-day announcement period where large companies and winners have a zero average return over those days. This is consistent, they argue, with the concept of over-reaction.

**Front-running the
Hunt brothers**

Bacon used the examples of the Hunt brothers and their silver speculation. In 1979 and 1980 the brothers tried to corner the silver market and took managed accounts and charged spectacular fees. They were leveraged 20 to 1, with only 5% margin down. According to Bacon, traders on the trading floor (Bacon at the time was on the floor as well) apparently used to wait until the Hunt's broker entered the elevator that brought him into the trading pit. The runners alarmed the traders in the pit that the broker was on his way. The traders knew that he was going to buy silver so they bought silver beforehand, front-running Hunt's broker until the commodity was limit up. But when the day came to sell, the price collapsed.

**Hedge fund investing is of a
long-term nature**

Funding

The fourth of Bacon's warning signs is a mismatch between assets and liabilities, or the terms of funding. The capital invested in a hedge fund should be stable. Hedge funds are long-term investments. Hence, hedge funds have long redemption periods. If the capital base is not secure there is a chance that funds are withdrawn at exactly that moment when they are most needed. Note that many of LTCM's strategies would have worked if they could have held onto their assets for some months longer. Measures that indicate the stability of capital are the redemption periods or the portion of the fund, which belongs to the managers.

**Capital base should be
managed actively**

One example used by Bacon was Julian Robertson's Tiger Management. Apparently, Julian Robertson was constantly growing by accepting new funds. The funds grew fast without reducing leverage or returning capital to investors. In Bacon's opinion, a hedge fund should keep its capital base stable once it reaches an optimal size, either by closing the fund, returning accumulated gains to investors or reducing leverage.

**'Change is essential
to survival'
Louis Moore Bacon**

Hubris

The last point of Louis Bacon's warning signs is the sin of hubris, or arrogance and pride. According to Bacon, hubris can make a manager embrace leverage and size, and care about transparency and the stability of capital. Hubris can also make a manager reluctant to embrace change. Bacon quotes John Maynard Keynes: 'When circumstances change, I change my view. What do you do?'

**'As long as there continue
to be people like you, we'll
make money'
Myron Scholes**

With respect to hubris, consider the following exchange between Myron Scholes, LTCM partner and Nobel laureate, and Andrew Chow, vice president in charge of derivatives for potential investor Conseco Capital. Chow was quoted in the *Wall Street Journal* (16 November 1998) as saying to Scholes: 'I don't think there are many pure anomalies that can occur.' Scholes responded:

*"As long as there continue to be people like you, we'll make money."*¹

**As long as there continue to
be regulatory boundaries,
market inefficiencies are
likely to persist**

This excerpt highlights two aspects: first, it was not necessarily lack of self-confidence that brought down LTCM. Secondly, Myron Scholes highlights that traditional money managers to a large extent focus on relative returns whereas hedge funds focus on making money, ie, absolute returns. The focus on relative

¹ From Shefrin (2000).

returns together with internal as well as external regulatory boundaries has some negative side effects, including market inefficiencies. A topical example of inefficiency in the equity arena is additions and deletions of index constituents. Traditional money managers often 'have to' buy stock or subscribe to a large IPO regardless of their fundamental evaluation of the stock. Taking into account an increasing trend towards herd behaviour of traditional money managers opens a large range of opportunities for non-traditional, ie, alternative investment managers¹. In essence, Myron Scholes had a good point.

Bacon's Game Theory

'There are those who don't know – and those who don't know that they don't know.'
John K Galbraith

Bacon expressed the view that money management is like a game. There are no rules about the game except that it will change. But most importantly, one should avoid becoming the game. Bacon quoted John Kenneth Galbraith who once said, 'There are those who don't know – and those who don't know that they don't know.' Adopting the paraphrase, Bacon distinguished between three types of hedge fund managers:

- (1) There are those who know they are in the game.
- (2) There are those who don't know they are in the game.
- (3) There are those who don't know they are in the game and have become the game.

We believe the first group to be attractive to investors. For example, a former convertibles arbitrage desk of an investment bank leaves the bank, opens a hedge fund, has a sound track record, understands the market, has the discipline to focus on the edge, ie, avoid speculation, and has the skill and technology to manage risk. This should not make active manager selection obsolete. An investment bank background is no guarantee for future success.

In our opinion, the second group should be avoided. Often these hedge fund managers are long-only managers camouflaged as hedge funds. Fundamental research of the individual hedge fund enables the investor to distinguish between those who just were able to raise money from those who are in the game because they have an edge and experience in controlling risk. Analysis of investment philosophy and risk management systems should help distinguishing the first from the second group.

In Mr Bacon's opinion, the third category is the worst. One does not want to be invested in a fund that, in Bacon's terminology, 'becomes the game'. These funds are funds that have met all the five warning signs stated above. Bacon stated three examples of fund managers 'who became the game' and where investors lost

¹ Tracking error between a portfolio and its benchmark is a function of volatility and correlation. If volatility increases, the tracking error increases as a result. The rise of volatility over the past four years has resulted in active managers reducing their active bets, ie, moving closer to their benchmark. Hence the expression 'index huggers' (active managers who are not index fund managers but invest close to the index to avoid being caught on the wrong side of the market). Over the past 12-18 months there have been celebrated money managers (not to be named here) who stuck to their guns (value investing) and went out of business as a result. Hence, hugging an index is as much about financial risk as well as business risk. Market inefficiencies are the result.

money: the Hunt brothers, LTCM and Julian Robertson's Tiger Funds. LTCM, for example, had all of Bacon's warning signs:

Size

LTCM, with total assets of US\$129bn at end-1997, was significantly larger than any other reporting hedge fund family at the time¹. Only 11 reporting hedge fund families, including LTCM, had total assets exceeding US\$10bn at the end of 1997.

Leverage

The aim was 20-30bp on each position and an annual return for the fund of 30%, which is only achievable through high leverage. The notional amount of LTCM's total OTC derivatives position was US\$1.3trn at end-1997 and US\$1.5trn at end-1998.

Transparency

LTCM's fate got considerably worse once the market knew its positions and how it was going to trade to unwind positions. The fall-out from the liquidation was far greater than it might have been.

Funding

LTCM margined all its capital.

Hubris

According to Bacon it was the 'height of hubris' that after the debacle it claimed that market conditions had been a 'one off', or the 'perfect storm'. But it failed to realise that it had been the 'perfect storm'. It had become the game.

¹ *Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management - The Report of The President's Working Group on Financial Markets, April 1999.*

Demystifying Hedge Funds

“Hedge fund managers can be tough to like, but it is difficult not to admire the great confidence and faith that they have in themselves, demonstrated by the willingness to risk their future on their skills.”
William Crerend (1998)

To some extent we demystified hedge funds in our report *The Reality of Hedge Funds* in October 1998. However, the demystification at that time was in response to LTCM. Nearly two years post the LTCM experience, a clearer view of hedge funds allows a more detailed analysis. In the following section we highlight some myths regarding hedge funds and more importantly regarding the investment in hedge funds.

Summary

Table 26 summarises our demystifying process. We categorised the myths into general myths, myths with respect to risk of the hedge funds industry, myths with respect to hedge fund strategies and myths with respect to economic logic (or common sense).

Table 26: Demystifying Hedge Funds

Myth	Fact
The hedge fund industry is dead as recent remarks by Soros and losses at Tiger show	We do not subscribe to the view that the destiny of two macro managers is no indication for a heterogeneous industry overall. We do not believe hedge fund investing has come to an early halt. However, perhaps the beginnings of hedge fund investing has come to an end.
Investing in hedge funds is unethical	We believe a case can be made that ignoring the risk/return and correlation benefits of hedge fund investing is unethical.
Hedge funds are only for wealthy private investors	This belongs to the past. Today even retail investors can buy exposure to fund of hedge funds on listed exchanges.
Hedge funds are an investment product from the 1990s	Hedge funds have been around since the 1940s.
Hedge funds are risky	Different hedge fund strategies have widely different risk characteristics. Idiosyncratic risk can be diversified.
Hedge funds generate strong returns in all market conditions	Different hedge fund strategies are exposed to different risk factors, such as market risk, M&A activity, credit spreads, volatility, liquidity, etc.
The lesson of LTCM is not to invest in hedge funds	The fall of LTCM highlights that investors should hedge idiosyncratic risk, ie, diversify.
The failure of a single hedge fund is cause for concern	In a free market place, some companies succeed, others do not. Occasionally, large companies fail. This risk can be hedged through diversification.
All leverage is bad	Most firms finance their operations to some extent through debt.
Hedge funds are always hedged hence the name ‘hedged’ funds	Not all hedge funds are hedged. However, some funds are always hedged against market risk.
Selling short is the opposite of buying long	Selling short is not the reverse of going long. Selling short is a risk management task and requires a different skill set and experience.
Hedge funds are unique in their investment strategies	Insurance companies, endowments, and other institutional investors have invested in alternative investments for years.
Hedge funds do not invest, they just trade	The range of hedge funds varies from extremely short-term (trading) to extremely long-term (distressed securities).

Myth	Fact
Hedge funds offer no economic value	Without hedge funds, financial markets could have fewer risk management choices and higher cost of capital.
The failure of LTCM was the failure of the market	The market did not fail. A rare and unfortunate combination of human failure and unattained return appetite caused the disaster.
Hedge funds cause worldwide crisis	There is little to no evidence that hedge funds are the cause for any worldwide crisis
We can and must control the financial marketplace	This is a bad idea. A collapse is the function of compounded mistakes that are only identified in hindsight. Growth requires investment in risky ventures.

Source: UBS Warburg

General Myths¹

Myth: The Hedge Fund Industry is Dead As Recent Remarks by Soros and Losses at Tiger Show

Macro funds are not what they used to be

The hedge fund industry is not dead. However, the heydays of macro managers might have come to a temporary or terminal halt. The losses at Tiger or the retreat of hedge fund icon George Soros are an indication for the macro hedge fund industry, in particular, but not for the overall hedge fund industry.

Louis Moore Bacon remains a true believer in the virtues of macro investing. In one of his recent letters to investors, he expounded on the opportunities in the sector.

“If macro means ‘interest rates’, I will point out that we have had one of the largest 12-month movements in interest rates on record in the last year. If macro means ‘currency’ the extent of the movement of the yen and the deutsche mark is normal for the first nine months of the year. If macro means ‘commodities’, then a doubling of oil prices in six months seems rather eventful. If macro means ‘stock indices’, well there’s no need to chronicle those movements. I can assure you, despite the lack of performance on my part and some others in the industry, there have been great opportunities... At the end of the day, the overall viability of the ...[macro] funds continues to rest on my abilities to call the markets and manage risk.”²

Myth: Investing in Hedge Funds is Unethical

Speculation is unethical

Hedge funds are often viewed as a high risk asset class and investing in hedge funds is associated with speculation. According to the myth, investing in hedge funds is speculative and therefore unethical. We would like to turn the argument around and postulate that for a fiduciary not considering investing in AIS in a portfolio context in general or absolute-return strategies in particular, is, if anything, unethical. The empirical evidence from absolute return managers exploiting inefficiencies and producing high risk-adjusted returns is overwhelming and academia is in the

¹ The myths marked * are adopted from Schneeweis (1998) or Schneeweis (1998b). See also Friedland (1998a).

² From Institutional Investor (2000)

Are Prudent Expert Rule and Code of Ethics consistent with hedge fund investing?

process of justifying the market inefficiencies, ie, migrating to a very weak form of market efficiency¹.

Views and definitions of ethics vary across countries and cultures. Any view, therefore, is subjective and has a strong home bias. The following view is based on the Prudent Expert Rule from ERISA (Employee Retirement Income Security Act) and the Code of Ethics from AIMR (Association of Investment Management and Research)². Under ERISA, fiduciaries must discharge their duties with respect to the plan³:

- Solely in the interest of plan participants and beneficiaries.
- For the exclusive purpose of providing benefits to participants and their beneficiaries and defraying reasonable plan expenses.
- With the care, skill, prudence, and diligence under the circumstances then prevailing that a prudent person acting in like capacity and familiar with such matters would use in the conduct of an enterprise of a like character and with like aims (the Prudent Expert Rule).
- By diversifying the investments of the plan so as to minimise the risk of large losses, unless doing so is clearly not prudent under the circumstances.
- In accordance with the governing plan documents, as long as they are consistent with ERISA.

Ignorance could be viewed as an unethical attitude

Assuming ERISA's Prudent Expert Rule is some indication of how a fiduciary should act and AIMR's Code of Ethics is a reference for ethical conduct of an individual financial professional, we believe that investing in hedge funds cannot be unethical. Going one step further, we believe one can argue that, if anything, ignoring absolute return strategies and the benefits of its inclusion to a portfolio might be unethical. The fourth of ERISA's points listed above states that a fiduciary should diversify and reduce risk of large losses. In a portfolio context, risk is reduced by increasing the allocation to less risky assets or introducing assets with low or negative correlation to the core of the portfolio. The strategies by relative-value managers exploiting inefficiencies have proven to be conceptually sound as well as empirically of high risk-adjusted returns and low correlation to traditional assets. In addition, once risk to single hedge funds is diversified, large losses hardly occur especially when compared with traditional investments that are essentially long the asset class outright.

¹ Whether markets are efficient, or semi-efficient or not efficient at all is an old debate and is beyond the scope of this report. We briefly mention the debate in the Appendix on p156.

² The AIMR is a global, non-profit organisation of more than 41,000 investment professionals from more than 90 countries worldwide. Through its headquarters in the United States and 94 affiliated societies and chapters throughout the world, AIMR provides knowledge to investment professionals while promoting a high level of standards, ethics, and professionalism within the investment industry. According to the AIMR (1999) Code of Ethics members shall: 1. Act with integrity, competence, dignity, and in an ethical manner when dealing with the public, clients, prospects, employers, employees, and fellow members. 2. Practise and encourage others to practise in a professional and ethical manner that will reflect credit on members and their profession. 3. Strive to maintain and improve their competence and the competence of others in the profession. 4. Use reasonable care and exercise independent professional judgement.

³ From AIMR (1999).

Conflicts of interest

The relationship between institutional funds and the agents engaged to manage the portfolio assets has been always provided a fertile breeding ground for conflicts of interest. Institutions seek high risk-adjusted returns, while outside investment advisors pursue substantial, stable flows of fee income. Conflicts arise since the most attractive investment opportunities fail to provide returns in a steady, predictable fashion. To create more secure cash flows, investment firms frequently gather excessive amounts of assets, follow benchmark-hugging strategies, and dilute management efforts across a broad range of product offerings. While fiduciaries attempt to reduce conflicts with investment advisors by crafting appropriate compensation arrangements, interest of fund managers diverge from interests of capital providers even with the most carefully considered deal structures (Swensen 2000).

Today, nearly all investors have access to exposure of hedge funds

Myth: Hedge Funds Are Only For Wealthy Private Investors

In recent history hedge funds exposure was only offered to qualifying individuals who must meet high net worth and/or income requirements and institutional investors such as banks, insurance companies, qualifying pension plans, endowments and foundations. This has changed. Today nearly any investor can buy into exposure of hedge funds¹. In some countries hedge funds instruments are even offered on exchanges in the form of fund of funds, ie, where risk to a single hedge fund is diversified and daily liquidity is provided.

Hedge funds are not a product from the 1990s

Myth: Hedge Funds Are An Investment Product from the 1990s*

While the number and size of hedge funds has grown in recent years, hedge funds have existed since the 1940s. It was not until the 1980s that they experienced rapid growth. This growth was due in part to the increase in the number of new financial vehicles as well as changes in technology that permitted sophisticated investment strategies to be designed and implemented without the infrastructure of a large investment house. See also comments on the history of hedge funds in the Appendix on p153.

Risk to single hedge fund can be diversified

Myths with Respect to Risk

Myth: Hedge Funds Are Risky

This is the one single myth that we believe is actually true. Hedge funds are risky – as are technology stocks. However, most investors do not hold single stock portfolios. They diversify stock-specific risk by investing in a range of stocks with different characteristics. To most investors, it is regarded as unwise not to diversify stock specific risk. It should be similarly unwise not to diversify risk to a single hedge fund.

Low correlation as diversifier

Schneeweis and Purgin (1998) and many others have shown that hedge funds offer an attractive opportunity to diversify an investor's portfolio of stocks and bonds. This is true even if the returns earned by hedge funds in the future are merely on par with that of stocks and bonds. There is no need to see risk-adjusted returns as high as they have been to justify diversification benefits into hedge funds.

¹ The regulatory environment varies across countries for private as well as institutional investors.

**Systematic versus
idiosyncratic risk**

In addition, there are different styles of hedge funds. Different styles result in different risk characteristics. Some are riskier than others. Consider for example a fund exploiting mispricings between DAX index and DAX futures. Whenever futures are too expensive the hedge funds manager will sell futures and buy the underlying basket of shares. This can be done at a mouse click or a couple of minutes depending on whether the manager wants to buy at the offer or between bid and ask. In other words, the manager is exposed to very little market risk. He constantly will be delta neutral. His returns will likely be positive, very stable and in most instances uncorrelated with the DAX index itself (especially in a falling market). In addition, a bias to absolute returns may be less risky than a focus on relative returns that does not fully recognise the risks inherent in the index itself.

**Different strategies are
exposed differently to
equity bear markets**

Myth: Hedge Funds Generate Strong Returns in All Market Conditions

One cannot generalise across all hedge fund styles. Some hedge funds do better than others during bear markets. However, hedge funds are often regarded as a child of the current bull market. There is limited data on hedge funds available before the bull market started in 1982. We believe that, should the bull market end, some hedge funds will do well while others will, probably, go out of business. A hedge fund in convertible arbitrage, for example, which sticks to its edge, ie, buying the convertible and selling the stock, should do well even if markets decline because the market risk is hedged. However, long-only managers, camouflaged as hedge funds due to the more attractive fee structure should, most likely, perform poorly depending on their leverage employed to their market exposure.

**Relative-value managers
should have a greater
probability of surviving a
bear market**

The hedge funds from the 1960s did extremely poorly during the bear market of the 1970s. Many managers went out of business. Essentially because they were long, leveraged and totally exposed to the market. However, the degree of sophistication of hedge funds employing relative investment strategies has increased since the 1960s.

**Diversifying idiosyncratic
risk seems to be a
good idea**

Myth: The Lesson of LTCM Is Not to Invest in Hedge Funds

There are many lessons to be learned from LTCM: (1) diversify, (2) high return investments are also potential low return investments, and (3) trading in illiquid secondary markets is potentially disastrous in extreme market conditions. These are lessons that are true for all investments and have nothing to do with the fact that LTCM was a hedge fund.

**Entrepreneurs should take
idiosyncratic risk where
investors should not**

A hedge fund is a business. Businesses, unfortunately, occasionally fail and go bankrupt for various reasons. This is one of the main reasons why investors diversify across businesses. Although we believe that a disaster such as LTCM is unlikely, some hedge funds are likely go bankrupt in the future, ie, potentially could destroy wealth under management. However, we believe entrepreneurs should have exposure to idiosyncratic risk whereas investors should be exposed to systematic risk. In other words, we recommend investors to hold portfolios of hedge funds as opposed to a hand full of hedge funds.

Table 27: Major Hedge Fund Losses

Case	Strategy	Date	Loss (US\$m)	What went wrong?	Risk
Askin Capital Management	Fixed income arbitrage (mortgage-backed securities)	1994	420	Hedge did not work. Liquidity squeeze. Could not meet margin calls. Did not inform investors.	Market/business
Argonaut Capital Management	Macro	1994	110	Market losses. Departure of general partner.	Market/business
Vairocana Limited	Fixed income arbitrage	1994	700	Change of strategy from duration-neutral to directional plays on falling interest rates. Could not calculate proper NAV figures. Investors lost confidence.	Market/business
Fenchurch Capital Management	Fixed income arbitrage	1995	NA	Change of strategy from US bond basis trading and US yield curve arbitrage to European bonds and equities despite being unacquainted with markets.	Business
Global Systems Fund (Victor Niederhoffer)	Macro	1997	NA	Market losses. Short puts in market correction. Margin calls.	Market/business
LTCM	Fixed income arbitrage	1998	3600	Market losses. Excess leverage. Margin calls. Fund was underfunded (or over-leveraged)	Market/business
Manhattan Investment Fund	Long/short equity	1999	300	Manager sent fictitious statements for three years to the fund's auditor overstating the funds net assets. Fund was short internet stocks and published returns for 1997 and 1998 of 12% and 14 respectively!	Business (fraud)
Tiger Management	Macro	2000	NA	Undiversified exposure to value stocks in TMT frenzy resulting in large redemptions and losses.	Market/business
Soros Fund	Macro	2000	NA	Departure of key staff. Lack of opportunities relative to fund size.	Market/business
Ballyunion Capital Partners	Long/short equity	2000	7	Reporting of false performance figures. Wrong information on web.	Business (fraud)

Sources: Cottier (1996), UBS Warburg

Table 27 shows a list of some of the more recent casualties. We believe there are only a few cases, if any, where markets are to be blamed. The losses or defaults are a function of organisational malpractice, ie, business risk. It is business risk, if:

- Key staff leave the firm and the firms' edge walks out of the door.
- A fund is inappropriately funded with respect to its market risk.
- The hedge does not work.
- A hedge fund manager departs field of expertise without telling investors.
- A hedge fund manager selling Internet stocks and reports high positive returns while stocks skyrocket and nobody harbours suspicions.
- Even fraud is not atypical for the hedge fund industry, but is a risk of corporate life (otherwise firms could allocate funds spent for legal advice in productive projects).

LTCM employed the brightest academicians and most skilled arbitrageurs of Wall Street

There are many ironies surrounding the collapse of LTCM. One is that the brightest academics in finance together with the most skilled arbitrageurs caused one of the largest disasters in financial history.

LTCM was more a risk wholesaler than a hedge fund

To the investor, diversification is the name of the game

Banks have a leverage of 15 to 1, which compares with 2 to 1 for most hedge funds

A true hedge fund is an investment vehicle whose key priority is to minimise investment risk in an attempt to deliver profits under all circumstances

Another interesting aspect is that LTCM is the one single hedge fund that is most commonly known. In our opinion, the irony is that LTCM was a very atypical hedge fund. Its trading strategies were more in line with those of a capital market intermediary. When investors or issuers needed to change their positions or risk exposures, they would go to an investment bank or dealer to buy or sell securities or structured products. In turn, the dealer would utilise the capital markets to cover this exposure. LTCM was often on the other end of these transactions, in some sense wholesaling risk to the intermediary who was working directly with clients. LTCM viewed its main competitors as the trading desks at large Wall Street firms rather than traditional hedge funds.

Myth: The Failure of a Single Hedge Fund Is Cause for Concern*

Many hedge funds failed before LTCM, and many could fail in the future. Some failed quietly, returning some investor capital after liquidating positions. Others, like LTCM, failed in a more spectacular fashion. The failure of a single firm or investment product is always of concern to the investors as well as those who invest in similar ventures. However, modern investment theory points out that no person should have a sizeable portion of their wealth invested in any one investment product. In short, unless one has a perfect forecast of the future, diversification is laudable concept with dealing with uncertainty. The stock market has survived the bankruptcy of many companies. This does not mean that stocks are bad investments. It does not even mean that the investors in a company that loses money ex post initially made the wrong choice. The most notable aspect of the LTCM is not in its near collapse, but in the fact that many highly sophisticated investors held a single large portion of their wealth in the single fund, which is completely contrary to modern investment principals.

Myth: All leverage Is Bad*

Leverage is derived from raising capital externally, ie, not through shareholders or partners, and is common in most corporate structures. One must remember that leverage itself is not something to be avoided. Banks, for example, are levered about 15 to 1. Residential real estate is typically levered 5 to 1 (a 20% down payment is common, with 80% borrowed). From the sample universe of a recent Van Money Manager Research report around 72% used leverage. However, only around 20% use leverage above 2 to 1.

Myths with Respect to Investment Strategy

Myth: Hedge Funds Are Always Hedged Hence the Name 'Hedge' Funds

Some funds that are called hedge funds do not actually hedge market risk. Because the term is applied to a wide range of alternative funds, it also encompasses funds that may use high-risk strategies without hedging against market risk. For example, a global macro strategy may speculate on changes in countries' economic policies that impact interest rates, which impact all financial instruments, while using high degrees of leverage. The returns can be high, but so can the losses, as the leveraged directional investments (which are not hedged) tend to make the largest impact on performance.

Focus on consistent and stable returns...

Many hedge funds, however, do seek to hedge against risk in one way or another, making consistency and stability of return, rather than magnitude, their key priority. Event-driven strategies, for example, such as investing in distressed or special situations reduce risk by being uncorrelated to the markets. They may buy interest-paying bonds or trade claims of companies undergoing reorganisation, bankruptcy, or some other corporate restructuring – counting on events specific to a company, rather than more random macro trends, to affect their investment.

...with low risk of financial loss

Thus, some hedge funds are generally able to deliver consistent returns with lower risk of loss. Long/short equity funds, while dependent on the direction of markets, hedge out some of this market risk through short positions that provide profits in a market downturn to offset losses made by the long positions. Equity market neutral funds that invest equally in long and short equity portfolios, generally in the same styles of the market, are not correlated to market movements.

Short selling skill can add value

Myth: Selling Short Is the Opposite of Buying Long

Mutual funds are normally restricted from selling short. The regulatory environment, however, is only one issue with respect to short selling. Selling short is not the opposite of going long. Most equity investors have a long-only mentality and are less familiar with hedging, managing risk and the dynamics of short positions.

Dynamics of selling short

Short positions behave differently than long positions. The portfolio consequences of adverse price movements require greater diversification of short positions. If a stock moves against a short seller by increasing in price, the position increases in size. To take advantage of the now more attractively priced short-sale opportunity, the short seller faces the uncomfortable prospect of further increasing the position. Starting with a modest allocation to a particular short idea allows an increase in position size without creating an uncomfortable concentration in a single stock. Contrast the dynamics of a losing short position with the behaviour of a losing long position. As the long position's price declines, it becomes a smaller portion of the portfolio, reducing its impact on returns and facilitating new purchases at the newly discounted, relatively more attractive price levels.

Risk of short squeeze

There also is a technical difference between buying and selling short. To execute a short sell, the investor has to borrow securities to deliver to the buyer on the other side of the trade. If the lender recalls the shares, the short seller has to cover, ie, buy back and deliver the stock. When the market for borrowing a particular security becomes tight, short sellers face a short squeeze. Security borrowers tend to have the most trouble with small, less liquid companies, which are exactly the type of security most likely to present interesting short-sale opportunities.

Unlike long-only funds, hedge fund strategies are heterogeneous

Myth: Hedge Funds Are Unique in Their Investment Strategies*

Some hedge funds can be viewed as the privatisation of the trading floor of investment banks. New technology has permitted investment professionals to leave investment banks and trade externally what for years was conducted only internally. The strategies are not new. Insurance companies, endowments, and other institutional investors have invested in alternative investments such as private debt, private equity and derivative strategies for years. What is new is that when these

Some hedge funds are long-term investors

large, diversified investors took losses in a particular product, it often was hidden by their gains in other areas. For a single hedge fund, the lack of product diversification heightens its risk, but does not necessarily increase the risk of its investors, who should be well diversified across a number of hedge funds and a number of asset classes.

Myth: Hedge Funds Do Not Invest, They Just Trade*

Ackermann (1998) has shown that one of the principal economic benefits provided by hedge funds is their ability to provide capital to relatively illiquid investment markets. Investment in liquid assets can be accomplished easily through mutual funds, which are highly regulated and offer the ability to redeem assets instantly. Hedge funds can require investors to lock up capital for many years, which allows them to make investments that are highly illiquid. It is surprising and perhaps ironic that many of the same people who have been critical of short-term trading and favour long-term investing are now critical of hedge funds, which exist primarily to invest in less liquid, long-term investments or to permit other investors, such as banks, to redeem themselves out of investment positions they no longer wish to hold.

Financial markets with participants executing heterogeneous strategies reduces cost of capital

Myths with Respect to Economic Logic

Myth: Hedge Funds Offer No Economic Value*

Hedge funds invest in a wide variety of investment arenas including private equity, private debt, merger and acquisitions, and emerging markets. Without their participation, many worthwhile projects could not find the necessary financing. In addition, hedge funds trade in financial products, offering liquidity to other investors in these assets. The primary use of derivative products is to offer a mechanism for firms to reduce or manage their own risk. Financial innovations such as mortgage-backed bonds provided a means for individuals and institutions to raise capital more efficiently. Recent innovations are much more exotic but have the same objective – allow one to effectively raise capital and manage risk. In many cases, hedge funds are a primary purchaser of these new securities, both in the primary market and the secondary market. Without hedge funds, financial markets could have fewer risk management choices and, for some projects, a higher cost of capital.

Unattainable human return appetite

Myth: The Failure of LTCM Was the Failure of the Market*

Financial markets are not people. LTCM was a combination of many human failures. Most of the reasons behind the failure may be laid directly on the traders at LTCM who took highly leveraged positions while failing to divulge to creditors the extent of this leverage. But the credit officers at the banks are equally culpable for their willingness to extend even more credit without adequate information about the potential risks. A future problem to be solved is how to manage the individual human appetite (however unattainable) for return without risk combined with banks desire for return with limited risk and with societies need for risk capital which requires the existence of financial institutions and traders as financial intermediaries.

There is little to no evidence that hedge funds are the cause for any worldwide crisis

Myth: Hedge Funds Cause Worldwide Crisis

Numerous academic research studies have shown that hedge funds were not the cause of the Asian crisis or other major world economic collapses¹. We believe it is true that in today's financial markets, capital reacts quickly to information. As a result, when countries or firms fail to live up to their promises – over-build, over-buy, over-monetise – funds flee and the market reacts quickly. While such capital flight may have its own associated problems, the alternative to free flows is almost always worse. If investors are afraid of an inability to retrieve capital, it simply should never go there in the first place.

Fung and Hsieh (2000) analysed the role of hedge funds during some macro turbulence in the 1990s, of which many were attributed to action by hedge funds resulting negatively bias in the industry's reputation. The authors concluded:

- (1) Hedge fund activities were prominent and probably exerted market impact during several episodes;
- (2) There was no evidence that hedge funds used positive feedback trading in any of these episodes;
- (3) Hedge funds did not act as a single group;
- (4) There was no evidence that hedge funds deliberately herded other investors to doing the same thing.

Cause and effect are often confused

The evidence indicates that, by themselves, hedge funds were not likely to have caused the market turmoil analysed in the paper. Rather, the evidence indicates that some highly leveraged trades, practised by hedge funds as well as other market participants, can lead to market disruptions when they are unwound subsequently. The unwinding of the leveraged 'carry trades' led to the 1994 Mexican Peso Crisis, in which hedge funds had no discernible role. The unwinding of the leveraged 'carry trades' also resulted in the 1992 ERM Crisis and the 1997 Asian Currency Crisis, in which hedge funds had a significant role alongside other, much larger, market participants. However, hedge funds were not the cause for the unwinding of the carry trades.

The following table lists some financial disasters where hedge funds were blamed to have caused the havoc and the true cause.

¹ See for example Brown, Goetzmann, and Park (2000). Authors tested the hypothesis whether hedge funds in the currency markets caused the crash in the Malaysian Ringgit as suggested by the Malaysian prime minister Mohamad Mahathir. While not alone in holding currency fund operators like George Soros responsible for the currency crisis, Mohamad Mahathir was clearly the most outspoken. The authors empirical analysis of the dynamics of hedge funds and Asian currencies suggested little evidence that hedge fund managers as a group caused the crash. In particular, it is difficult to believe, the authors conclude, that George Soros was responsible for a 'bear raid' on the ringgit when the performance of three of his funds was less than stellar. If anything, it appears that the top ten hedge funds were buying into the ringgit as it fell in the late summer and early fall of 1997. The authors draw the same conclusion for other Asian currencies.

Table 28: Cause and Effect of Financial Disasters Where Hedge Funds Were Blamed

Effect	Cause
The 1992 ERM Crisis	<p>It is beyond doubt that macro hedge funds had a significant short position in sterling in 1992 that impacted the market. It is, however, difficult to determine whether this position 'caused' the sterling devaluation, because it coincided with net capital outflows from the UK. The prologue to the 1992 ERM crisis was the 'conversion' play, estimated to be around US\$300bn by the IMF. Altogether, European Central Bank interventions amounted to roughly US\$100bn. The US\$11.7bn in hedge fund positions coincided with at least another US\$90bn of sales in European currencies.</p> <p>Fung and Hsieh find neither herding nor positive feedback trading.</p>
The 1994 Mexican Peso Crisis	<p>General capital outflow of US\$5.1bn from the Mexican debt market in Q4 1994 followed by US\$11.5bn in the next nine months. The IMF concluded that Mexican residents, not foreign investors, played the leading role in the 1994 crisis.</p>
The 1997 Asian Currency Crisis	<p>Macro hedge funds had sizeable gains in July 1997, when the Thai baht devalued 23%. Stanley Druckermiller, who headed the daily operations of the Quantum Fund, confirmed the existence of short positions in the Thai baht and Malaysian ringgit in a <i>Wall Street Journal</i> interview. The position sizes were not disclosed. The popular press assumed that the short position was large and profitable. It turned out that the monthly returns of large macro hedge funds were more correlated with the US equity market than with Asian currencies.</p> <p>The Asian crisis was much reminiscent of the ERM Crisis of 1992. Substantial amounts of 'carry trades' were involved in the build-up of both crises. These carry trades allowed Thai corporations and banks to borrow in foreign currencies, which had a lower interest rate than the domestic currency. As long as the domestic currency did not depreciate, the foreign currency loans represented a cheap source of funding. In the end, the carry trade led to an unsustainable equilibrium. By fixing the exchange rate, the Thai Central Bank was indirectly paying a risk premium to foreign investors to support domestic funding needs. However, when these foreign 'lenders' are themselves highly leveraged institutions such as proprietary desks from investment banks (and occasionally leveraged domestic corporations), the resultant equilibrium is at best tenuous.</p> <p>In July 1997, for whatever reason, some foreign lenders decided to unwind their carry trades in Thailand. They sold baht and bought dollars in the spot market, putting tremendous pressure on the baht.</p> <p>Fung and Hsieh draw the same conclusions as the IMF: 1. Hedge funds positions were relatively modest at the beginning of the crisis. 2. Hedge funds did not utilise positive feedback trading to destabilise the Asian markets. If anything, they displayed some contrarian trading in being long the Indonesian rupiah while it was still falling. 3. Hedge funds cannot be blamed for herding other investors to doing the same trade. The underlying economic fundamentals were ripe for an 'accident' to happen.</p>

Source: Fung and Hsieh (2000), Eichengreen and Mathieson (1999)

Singapore – unlike its neighbours – welcomes hedge funds

In a surprise reversal of the long-honoured tradition of vilifying hedge funds as perpetrators of global market calamities, the Monetary Authority of Singapore in January 1999 announced its intent to attract hedge funds. In a statement reported by *Bloomberg News* (4 January 1999), Ms Teo Swee Lian stated: 'There are proprietary trading departments of perfectly respectable banks that punt the market. They are more damaging than hedge funds. Do we say 'no' to the banks then?' The recognition of similarities between proprietary trading desks and hedge funds by regulators is positive. This recognition will likely reduce the risk that arbitrary and

capricious legislation is expected to be enacted to restrict the activities of hedge funds.

Myth: We Can And Must Control the Financial Marketplace

**Any business activity
requires investment in
risky ventures¹**

It is always possible, in hindsight, to see the mistakes that compound on mistakes that lead eventually to collapse. It is often easy, ex post, to see where a simple rule or regulation may have prevented a catastrophe. Improved credit analysis and risk analysis is always a goal, but one can never, and should never, prevent all possible losses. If we never extend credit to a firm or investment strategy that may fail, a large number of worthwhile projects or products would go unfunded. Growth requires investment in risky ventures. Risky ventures imply the possibility of loss. In the long run, a diversified portfolio is expected to offer a return commensurate with the risk.

**Hedge funds are not
trend-followers**

In 1994, Soros was invited to deliver testimony to the US Congress on the stability of the financial markets, particularly with regard to hedge fund and derivative activity (Chandler 1998). Soros believed that the banking committee was right to be concerned about the stability of markets, saying: 'Financial markets do have the potential to become unstable and require constant and vigilant supervision to prevent serious dislocations.' However, he felt that hedge funds did not cause the instability, preferring to blame institutional investors, who measured their performance relative to their peer group and not by an absolute yardstick. 'This makes them trend-followers by definition.'

¹ We assumed here that corruption is not a business activity. However, even corruption bears risks.

Advantages and Disadvantages of Hedge Fund Investing

Advantages

The main advantages from an investor's point of view are high risk-adjusted returns and diversification benefits, which are not achievable with traditional assets. A survey by *Institutional Investor* asking US, UK and Swiss institutional investors to rank their reasons for investing in hedge funds in 1994 resulted in the following:

Table 29: Reasons for Investing in Hedge Funds

1	Superior performance
2	Diversification/hedging
3	Access to modern techniques and markets
4	Little regulation/high flexibility

Source: Bekier (1996)
Ranked by importance

Sustainable Good Performance

Too good to be true

The past performance of most hedge fund categories is stunning. Some investors argue that past performance is 'too good to be true', implying hedge funds are paranormal or mystery. We hope this report sheds some light on the past performance and sustainability of such high risk-adjusted returns. CAPM does not explain the hedge fund phenomena nor does imperfect hedge fund return data. One of the assumptions underlying our performance analysis and conclusions is the belief that the hedge fund data we use is not inferior to mutual fund data. We believe that survivorship bias and self-selection bias, to some extent, balance each other out. This view is not shared by all hedge fund specialists.

How sustainable is the attractive past performance of hedge funds?

Hedge funds as a group have delivered high returns with low risk and low correlation in the past. We believe that these good historic performance characteristics are to a large extent sustainable – especially of hedge funds in the relative-value and event-driven segment. However, there are some systemic risk factors and capacity constraints.

Regulatory risk

One of the main risk factors that could affect all hedge funds is change in the regulatory front. As we have noted earlier, the high flexibility of hedge fund managers is certainly a factor that contributes to the attractive performance characteristics. However, a second case similar to LTCM would most certainly be negative for the whole industry. It is doubtful whether a second case of such proportions would develop so smoothly (for those not invested in LTCM) and it is questionable that the industry would recover so quickly as it did after LTCM. The pressure on regulators could increase many-fold.

Capacity constraints

We do not believe there is a consensus opinion on capacity constraints endangering the sustainability of high risk-adjusted returns of absolute return strategies. With some relative-value strategies there is a natural capacity constraint determined by the amount of opportunities in the market and the amount of capital chasing the deals. On the other hand, we observe that investment banks are lowering their risk

to proprietary trading to increase the quality of earnings (ie, reduce the volatility associated with earnings from trading). This means there are more deals available to be exploited by hedge funds which themselves are often ex-trading franchises from investment banks scaling down their risk to trading activity.

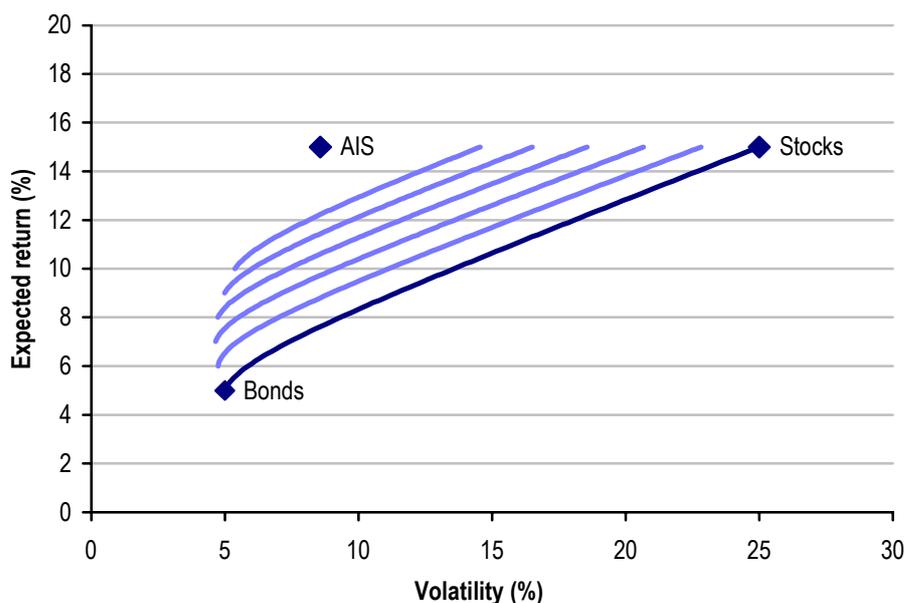
Low Correlation

Diversification effect

Correlations between alternative and traditional assets are typically low. This is in fact one of the most important advantages of non-traditional products. For an investor it is important to know how his prospective non-traditional investment correlates to the rest of his portfolio. A high volatility hedge fund with a low correlation to his overall portfolio might in fact be a less risky investment than a low risk but high correlating hedge fund. Correlations, however, are not necessarily stable over time. They often rise in certain market situations when many funds start investing in the same opportunities.

The following graph shows how adding alternative to traditional asset classes increases the efficiency of a portfolio. The five light blue lines show the efficient frontier with 10% to 50% allocations to AIS.

Chart 15: Efficiency Gains in Mean-Optimal Framework



Source: UBS Warburg
 Implied Sharpe ratios: equity = 0.6 (expected return 15%, 25% volatility); bonds = 1 (5%/ 5%); AIS = 1.75 (15%/8.6%).
 Correlation assumptions: 0.35 equity versus bonds and each 0.2 between AIS and bonds and equities.

Caveat emptor

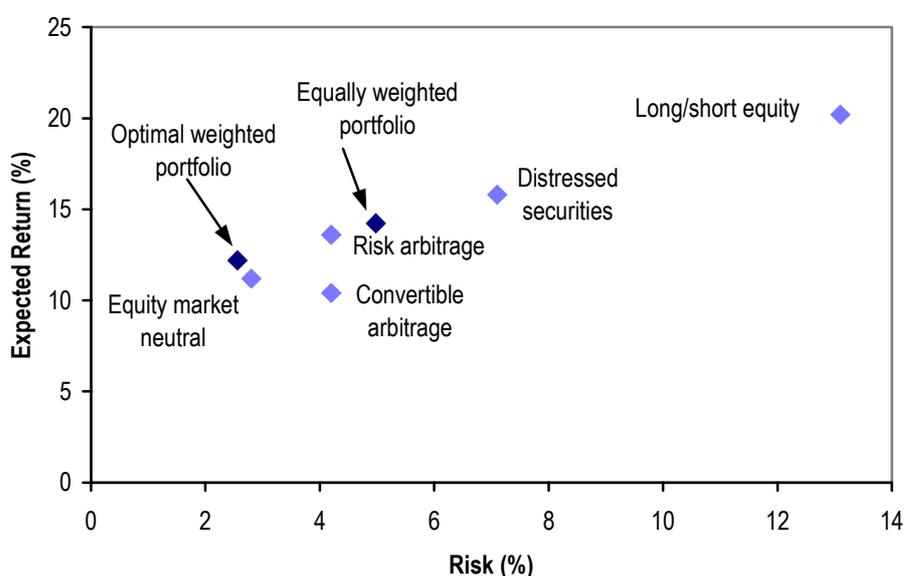
There is a caveat to this sort of analysis: We apply risk/return characteristics in a mean-optimised fashion as suggested by modern portfolio theory. However, hedge fund returns are derived from skill exploiting market inefficiencies whereas in a CAPM framework there is no such thing as ‘skill.’ Markets are assumed to be efficient. Increasing one’s return, therefore, is only possible by increasing risk.

Low correlation among AIS

Not only are alternative assets weakly correlated with traditional assets they are weakly correlated among each other. The past few years have been characterised by both high volatility and high correlation among developed traditional capital markets. For an investor investing in AIS, this means that combining different (uncorrelated) AIS in the portfolio can further reduce portfolio risk.

The following graph shows two portfolios derived from combinations of five different hedge fund strategies. We have used the risk and return figures displayed in Table 20 on p51 and correlation figures shown in Table 21 on p53. The first portfolio is equally weighted, whereas the second portfolio is optimised for high risk-adjusted return.

Chart 16: Expected Risk and Return for Different Hedge Funds Combinations



Source: UBS Warburg

Sharpe-ratio maximised portfolio: 62% Equity market neutral, 35% risk arbitrage, 3% distressed securities with zero weight in convertible arbitrage and long/short equity

An optimal portfolio has a large weight in relative-value strategies

The optimised portfolio resulted in a portfolio with a strong weight in equity market neutral due to its historically high Sharpe ratio of 2.2 and its low correlation with other strategies. The optimiser resulted in a Sharpe ratio of 2.9 (expected return of 13.6% with risk of 3.7%). Note that if no boundaries are set, no opportunistic strategies enter the model portfolio. If we set upper and lower boundaries for the optimiser of minimal weight of 10% and maximal weight of 30%, then an optimal portfolio would have weights of each 30% in equity market neutral and risk arbitrage, 20% convertible arbitrage and each a 10% weight in distressed securities and long/short equity. The expected return of such an optimised portfolio would be c13.1% with annual volatility of c3.7% resulting in a Sharpe ratio of c2.2.

Disadvantages

A survey by *Institutional Investor* asking US, UK and Swiss institutional investors to rank reasons why not to invest in hedge funds in 1994 resulted in the following:

Table 30: Reasons For Not Investing in Hedge Funds

1	Risk
2	Not fit with strategy
3	Lack of understanding/transparency
4	Not allowed
5	Use of leverage
6	Cost
7	Lack of regulation/Liquidity

Source: Bekier (1996)
Ranked by importance

'Risk' is important

Risk was the key concern of investors, followed by a perceived lack of fit with their investment strategy and concerns regarding the transparency of what the funds were really doing.

Bekier (1996) assumed that the cost factor was underestimated by the survey. This also would be our own assessment. However, with respect to cost, the survey is consistent with the Indocam/Watson Wyatt survey (Table 8 on p17).

In this section, we will discuss some disadvantages of investing in hedge funds:

- Excessive fees.
- Excessive leverage.
- Lack of transparency.
- Low liquidity.
- Capacity constraints.

The list does not include risk, which is the major concern according to Bekier (1996). We hope that pp98-150 are discussion enough about the risk characteristics of various hedge fund strategies.

Excessive Fees

A discussion of the various agency issues in regard to performance-based compensation in general and hedge fund fees in particular would blast the scope of this report. Unfortunately, therefore, we will only be able to scratch the surface and intend to discuss the matter in more detail in a succeeding report.

Excessive fee hypothesis

According to the Indocam/Watson Wyatt survey (Table 8 on p17) fees are not an issue when investing in hedge funds. Fees rank last by the investors surveyed. To us this seems counter-intuitive as well as inconsistent with our experience in the field. It seems to us that for existing hedge fund investors, fees are a small issue whereas it is a big issue for potential investors, currently evaluating future commitments to the hedge fund industry. Some investors, or more precisely potential investors,

regard the fee structure of hedge funds as excessive. We believe that there are two counter-arguments that can challenge the view that hedge fund fees are excessive:

- (1) Net returns matter.
- (2) Fees are small relative to alpha.

(1) Net Returns Matter

Utility is derived from net risk-adjusted returns

A point could be made that net returns matter more than gross returns. Utility is derived from net returns not from gross returns. What matters even more are net risk-adjusted returns. Risk-adjusted performance compensation could be a possible solution to some of the pending fee related issues¹. Two points seem important with regard to fees:

- **Alignment** of investors' risk and return preferences with manager's incentives. Where an investor is risk averse, the standard fee does not align the manager's incentives with investor preferences since the standard fee rewards higher returns with no reference to volatility or risk.
- **Asymmetry**: the fee is positive only and can create an option-like transfer of expected value from the investor to the manager. The asymmetry may provide an incentive for the manager to add to the risk of the fund by applying or increasing leverage to the underlying positions. This asymmetry is similar to risk control issues of investment banks where traders have an incentive to increase risk – large personal upside with little downside risk. This asymmetry is often referred to as a free call option².

(2) Fees Are Small Relative to Alpha

A further counter-argument to the excessive fee hypothesis is that hedge fund fees might be high in absolute terms but low relative to alpha.

Which of the following managers, A or B, has the more attractive fee structure?

- A, on average, generates a pre-fee alpha of 100bp and requires a fee of 1% of assets under management.
- B, on average, generates a pre-fee alpha of 10%, requires a flat fee of 1% of assets under management plus 20% of alpha with high water mark.

AIS manager get paid for alpha as opposed to beta

We would like to point out that it is neither absurd nor excessive when an active manager gets paid for alpha. Mutual funds, on average, generate an alpha of zero on a net basis. In other words, there is empirical evidence³ suggesting that if an active manager on average is able to generate alpha it is usually only on a gross basis. In

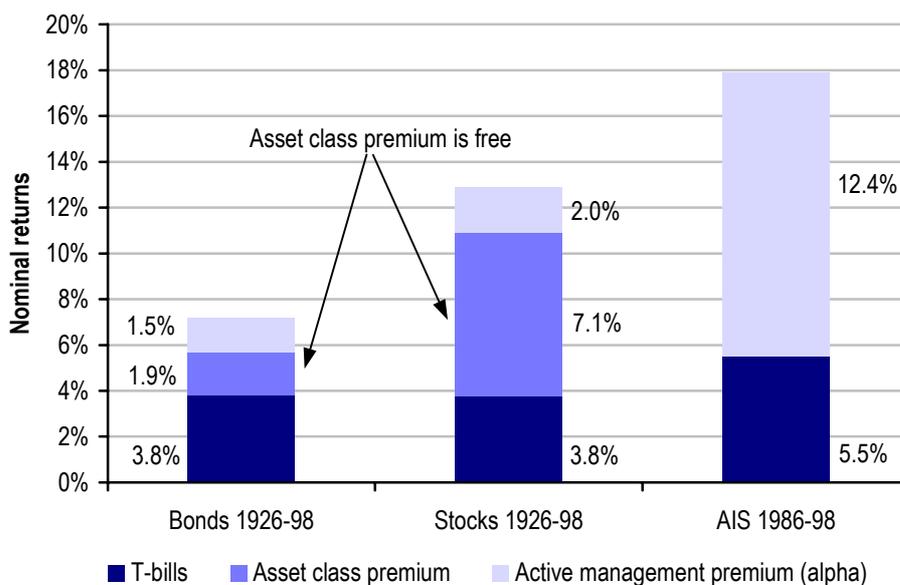
¹ For a discussion on the subject see Coleman (2000).

² Cottier (1996) suggests that this call option could be an incentive for a manager to take more risk to increase profits and potentially, 'making him rich'. We would argue that this might be true for the 20-year old 'manager' raising funds for his 'trading strategy' but not for the experienced ex-head-of-trading who invests his eight-figure fortune in his own fund. He already is 'rich'. He does not join the game for the fees, but for the capital gains. These, obviously, are the more attractive constellations.

³ See p54 on the discussion of the empirical evidence.

other words, on a net basis active management in large developed markets does not generate alpha. Put another way, the fee an investor actually pays for active management is 100% of alpha. This compares with only 20% of alpha for manager B. In other words, manager A charges for beta whereas the large portion of manager B's fees are based on alpha. This is interesting and relevant because nowadays – with high liquidity in risk management instruments such as swaps and futures – beta in a developed market can be 'bought' at very low cost.

Chart 17: Elements of Returns for Traditional and Alternative Investment Strategies



Source: Ibbotson Associates and Quadra Capital Management LP

T-bill rates are from Ibbotson Associates for the periods indicated. Asset class premium is based on Ibbotson data from 1926-98. Active management premium is representative data from Quadra Capital Management LP

The risk-free rate is the compensation to the owner of capital for deferring its use – the time value of money. The asset class premium represents the incremental return over the risk-free rate earned by an investor passively investing in an asset class. This premium compensates the investor for the risk of holding that type of asset. For traditional strategies, the significant source of excess return (return above the risk-free rate) is earned by accepting the asset class risk and thereby earning the asset class premium. As we will show in the performance analysis section of this report (p98), some hedge fund managers in the relative-value universe have zero beta. Excess return from these managers is attributable to the active management premium, that is, the risk and reward of actively managing a portfolio.

High water mark and...

A further fact often overlooked is that hedge funds regularly have high water mark and a hurdle rate. A high water mark assures that a fund only takes performance-related fees on the value added to the investor. If a fund moves from 100 to 80 it has to move back to 100 before performance fees can be charged. This increases the fiduciary's incentive not to destroy the wealth in mandate. On the other hand, a manager with high water mark who experienced a large loss has an incentive to return capital to investors if he believes it would take too long to regain the losses. Goetzmann, Ingersoll, and Ross (1998) note that the high water mark feature can represent a large transfer of expected value from investor to manager. The transfer

occurs because the manager is motivated to take risk when he is below the high water mark so as to maximise the likelihood of exceeding the mark and earning a performance fee. Such a motivation to take extra risk is costly to the investor. The authors conclude that hedge funds 'may be priced about right' where investors are rational and expect a large positive risk-adjusted return in compensation for higher fees. Liang (1999) found that hedge funds with high watermarks provide significantly better returns than funds without them.

... hurdle rate

The hurdle rate is a further mechanism, which aligns the hedge fund manager's incentives with those of the investors. A hurdle rate is a pre-defined rate of return, which has to be achieved before the incentive fee kicks in. However, most hedge funds do not have a hurdle rate. Based on research by Liang (1999), unlike the high watermark, a hurdle rate is not critical for fund performance. Note that the hurdle rate and the high watermark serve different purposes. The hurdle rate is used for collecting incentive fees, whereas the purpose of a high watermark is to assure that past losses are recovered.

Conclusion

We believe that there is a strong case against the excessive fee hypothesis. First, net returns should matter and not the difference between gross and net returns. Second, alternative investment strategies base their fees on the value added and not the risk premium of the asset class. However, lucrative fee structures are an incentive for managers to become fee-oriented as opposed to result-oriented. This emphasises the importance and costs of due diligence of actively selecting hedge funds. Funds of hedge funds is an alternative which transfers the selection of hedge funds to industry specialists which have the knowledge, skill and experience to avoid the hedge funds with an investor-unfriendly fee structure.

Outlook

A case could be made that when institutional investors moved into alternative investments, they could push hedge funds to lower their fees. With trillions of dollars in assets, there was the perception that institutional investors had the power to combat high fees. So far, the opposite seems to be taking shape.

Hedge fund managers are not only sticking to their traditional 1% management and 20% performance fees but many of the more-popular funds are raising their fees by a few percentage points due to high demand from institutional clients. The justification for raising fees is the additional risks of managing a larger fund in a relatively illiquid market. In other words, capacity constraints could, in the future, result in lower net returns for the investor because of a higher fee structure. Until 1996, the research on correlation between fund size and fund performance has been inconclusive (see Table 34 on p92).

Skill usually does not come cheap

To some extent, institutional investors have been able to bargain down fees when dealing with new entrants in the hedge fund arena. This trend could mean that the more persistent institutional investors will end up with the least talented managers. We doubt that the most talented in the hedge fund industry will under-sell their services and skill.

Excessive Leverage

There is also an ‘excessive leverage’ hypothesis postulating that exposure to hedge funds is not attractive because the use of high leverage. To some extent this is a viable concern. Most financial disasters in human history in one way or another are associated with excess leverage or, more precisely, the misuse of leverage. However, we again try to falsify the hypothesis:

- (1) Leverage of hedge funds is relatively low.
- (2) The risk to single hedge funds can be eliminated through diversification.
- (3) There is a misunderstanding with respect to what leverage is.
- (4) The LTCM effect.

(1) Leverage of Hedge Funds Is Relatively Low

According to Van Research around 72% of analysed hedge funds used leverage. We estimate that only around 35% use balance sheet leverage in excess of 2-to-1. The Report of The President’s Working Group on Financial Markets from April 1999 also acknowledges that a ‘significant majority’ of hedge funds have balance-sheet leverage ratios of less than 2-to-1¹. In comparison, the balance sheets of banks are leveraged around 10-15-to-1. Residential real estate is typically levered 5-to-1 (a 20% down payment is common, with 80% borrowed). In other words, leverage in the hedge fund industry is comparably low.

(2) Exposure to Leverage Can Be Reduced Through Diversification

Some practitioners recommend one should view hedge funds like a call option: downside is limited to principal whereas unlimited upside through leveraged participation in the underlying of whatever the hedge fund is dealing in. We do not subscribe to this view as it does not distinguish between the various strategies and implies high risk. Some relative-value strategies are very low risk since beta is kept at zero and leverage is used to hedge as opposed to increase exposure.

(3) Misunderstanding of Leverage

When investors borrow funds to increase the amount that they have invested in a particular position, they use leverage. Investors use leverage when they believe that the return from the position will exceed the cost of the borrowed funds. Sometimes, managers use leverage to enable them to put on new positions without having to take off other positions prematurely. Managers who target very small price discrepancies or spreads will often use leverage to magnify the returns from these discrepancies. Leveraging can magnify the risk of the strategy as well as creating risk by giving the lender power over the disposition of the investment portfolio. This may occur in the form of increased margin requirements or adverse market shifts, forcing a partial or complete liquidation of the portfolio.

Average leverage is low when compared with other financial institutions

A call option on hedge funds?

What is leverage?

¹ *Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management – The Report of The President’s Working Group on Financial Markets, April 1999.*

Definition of leverage

Institutionally, leverage is defined in balance-sheet terms as the ratio of total assets to equity capital (net worth). Alternatively, leverage can be defined in terms of risk, in which case it is a measure of economic risk relative to capital.

No regulatory constraints

Hedge funds obtain economic leverage in various ways, such as through the use of repurchase agreements, short positions, and derivatives contracts. At times, the choice of investment is influenced by the availability of leverage. Beyond a trading institution’s risk appetite, both balance-sheet and economic leverage may be constrained in some cases by initial margin and collateral at the transaction level, and also by trading and credit limits imposed by trading counter-parties. For some types of financial institutions, regulatory capital requirements may constrain leverage, although this limitation does not apply to hedge funds. Hedge funds are limited in their use of leverage only by the willingness of their creditors and counter-parties to provide such leverage.

Table 31: Balance Sheet A

10-year US Treasury bonds	500	Collateralised financing (repurchase agreement)	500
Cash	100	Equity	100
Total assets	600	Total liabilities	600

Source: HBS (1999)

Table 32: Balance Sheet B

10-year US Treasury bonds	500	Collateralised financing (repurchase agreement)	500
Collateralised lending (reverse repo agreement)	500	Short Treasury bonds	500
Cash	100	Equity	100
Total assets	1,100	Total liabilities	1,100

Source: HBS (1999)

Balance-sheet leverage is not an adequate measure for risk

The hedge fund that’s schematic balance sheet is shown in Table 31 is leveraged 6:1. If, instead of purchasing the Treasury bonds financed at a floating rate (the repo rate), the fund enters into a swap to receive fixed and pay floating on a notional of 500, which is an economically equivalent position in terms of interest rate exposure. The fund would have only cash and equity on its balance sheet and its leverage would be 1:1. Finally, if the fund were to enter into an additional but offsetting position in which it sells short a comparable maturity Treasury bond that it borrows through a reverse repo transaction, its balance sheet would be as shown in Table 32. The leverage increases to 11:1, even though the offsetting short position in Treasury bonds vastly reduces the risk of the portfolio. In other words, balance-sheet leverage by itself is not an adequate measure of risk. For any given leverage ratio, the fragility of a portfolio depends on the market, credit, and liquidity risk in the portfolio. In addition, a high capital requirement based on balance-sheet concepts alone might induce fund managers to shift their risk-taking activities to more speculative trading strategies as they seek to meet rate-of-return targets on the required capital¹. It could also induce managers to move off-balance-sheet risk-taking strategies such as through the use of derivatives.

The Report of The President’s Working Group on Financial Markets from April 1999 recognises that placing direct constraints on leverage presents certain difficulties. Given investors’ diverse exposures to risk, and differences in their links to other market participants, requiring a uniform degree of balance-sheet leverage for all investors does not seem reasonable.

¹ ‘Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management – The Report of The President’s Working Group on Financial Markets’, April 1999.

Value-at-risk relative to net worth is an alternative measure of leverage

An alternative measure to balance-sheet leverage is the ratio of potential gains and losses relative to net worth, such as value-at-risk relative to net worth. An advantage of such a statistical measure is its ability to produce a more meaningful description of leverage in terms of risk. A disadvantage is the potential pitfalls in measuring value-at-risk, such as through faulty or incomplete modelling assumptions or narrow time horizons. These issues suggest that enforcing a meaningful regulatory capital requirement or leverage ratio for a wide and diverse range of investment funds would be a difficult undertaking.

Credit-risk management as an alternative tool for influencing excessive leverage

The President's Working Group also highlights credit-risk management as an alternative tool for indirectly influencing excessive leverage. Credit-risk management can help to constrain the leverage employed by significant market participants, including hedge funds, thereby reducing systemic risk. The diversity of the credit risk and liquidity profiles of borrowers had led creditors to use a variety of tools to control credit risk. The President's Working Group suggested that public policy initiatives relating to hedge funds should build upon those practices that have worked well, and should encourage their use and improvements in their implementation.

(4) LTCM Effect

Exception to the rule

Hedge funds leverage the capital they invest by buying securities on margin and engaging in collateralised borrowing. Better-known funds can buy structured derivative products without putting up capital initially, but must make a succession of premium payments when the market in those securities trades up or down. In addition, some hedge funds negotiate secured credit lines with their banks, and some relative-value funds may even obtain unsecured credit lines. Credit lines are expensive, however, and most managers use them mainly to finance calls for additional margin when the market moves against them. These practices may allow a few hedge funds, like LTCM (prior to its reorganisation), to achieve very high leverage ratios. This practice is exceptional.

Betting the bank

At the end of August 1997, the fund had a balance-sheet leverage of 19:1, which was at the lower end of the historical range of 19:1 to 31:1 since it had reached global scale in 1995 (HBS 1999). However, in August 1997 the gross notional size of the fund's off-balance sheet positions was approximately US\$1trn. This figure, handed around broadly by the popular press, was misleading. It simply summed the absolute values of the notional amounts of the contractual agreements and futures, even when their risks were offsetting.

Lack of Transparency

Transparency is a double-edged sword

Full transparency of current positions is commercially unwise. This is true for hedge funds and proprietary trading desks as well as other money managers of large size. The reason why it is more important for hedge funds is because hedge funds involve short positions much more frequently than, for example, pension funds and mutual funds.

Confidentiality

Hedge fund investors are in a similar relationship to the hedge funds as are stockholders to the company. The shareholder does not have full access to all the information of the company, such as future projects or contracts with suppliers. The same applies for hedge fund investors with respect to the hedge fund. The hedge fund manager will hold back confidential information, especially current positions. A hedge fund manager will disguise his positions to the market, as do car manufacturers disguise their new models during test drives. A possible solution to the transparency issue is that the hedge fund manager discloses his positions with a time lag. This would enable investors to assess the risk they were exposed to in detail. Such an ex-post risk assessment would, in our view, be better than no evaluation at all.

Higher degree of institutional money leads to higher transparency

We believe there is a trend for the better. In the future institutional money will play a more important role in the hedge fund industry, which means requirements will be higher. Even John Meriwether, whose secretive LTCM blew up in 1998, told potential investors last year that he and his partners will share more information with clients in his new fund, JWM Partners.

Allocations to AIS in general or hedge funds in particular are long-term investments

Low liquidity, ie, high redemption periods, are often brought up as an argument against investing in hedge funds. This is understandable for a treasurer managing the company's cash and requiring a high degree of liquidity. It is less intuitive, however, why a high-duration pension fund has a problem with high redemption periods. Generally speaking, hedge fund investment is more suitable for long-term investors.

Most inefficiencies are found in illiquid markets

Some investors might find comfort in the fact that most hedge fund managers have a large portion of their net wealth tied to the fund, ie, the same high redemption periods as the investor. A more pragmatic argument for low liquidity is the fact that hedge funds exploit inefficiencies and therefore are by definition in markets that are less liquid than the bluest of blue chips. In other words, exploiting inefficiencies by its nature involves some degree of illiquidity.

The longer the redemption period, the higher the return

Many hedge funds pursuing strategies such as investing in distressed securities and emerging markets or mortgage-backed securities arbitrage are holding a large part of their assets in rather illiquid positions. These strategies would be difficult to play if investors had the possibility to withdraw funds at any time without notice. In general, scarce subscription and redemption possibilities result in lower cash reserves held and less administrative work due to fewer deposits and withdrawals. The performance should increase as less liquidity is offered to the investors. The following analysis uses the frequency of redemptions as a proxy for liquidity, the assumption being that subscription and redemption frequency are similar.

Table 33: Impact of Redemption Frequency on Performance (January 1990 to June 1996)

Redemption period	Annual return (%)	Volatility (%)	Sharpe ratio	Maximum number of funds	Minimum number of funds
Daily	13.0	5.9	1.35	19	5
Weekly	11.4	6.6	0.97	30	9
Monthly	14.2	5.0	1.85	155	17
Quarterly	19.6	5.9	2.46	97	12
Semi-annually	22.0	13.1	1.30	11	3
Annually	25.4	11.2	1.82	16	4

Source: Cottier (1996) based on TASS database.

The lower the liquidity, the better the performance

The advantages of long redemption periods manifest in performance statistics. Cottier (1996) found that the possibility that low redemption frequency has a positive effect on performance is in fact very strong. Note that the volatility increases for funds providing only semi-annual and annual redemptions.

Capacity Constraints

The size factor

Size is often seen as a risk rather than a performance enhancing factor, particularly when assets grow too rapidly (Cottier 1996). Niches become too small, it becomes difficult and costly to move quickly in and out of positions and to execute trades. In addition, the top trader of a large fund is distracted by administrative duties and personnel management instead of being able to devote himself entirely to trading. There are also arguments in favour of size, such as administrative and legal economies of scale, lower brokerage commissions, more research spending, and possible influence and manipulation of markets. Furthermore, there may be a survival bias. Large funds have often existed for many years; they had to survive in many market situations, leading to more managerial experience.

Table 34: Impact of Size on Performance (July 1994 to June 1996)

Assets under management (US\$m)	Annual return (%)	Volatility (%)	Sharpe ratio
1 – 5	10.7	4.8	1.18
5 – 10	15.4	7.4	1.41
10 – 20	14.4	5.3	1.79
20 – 50	12.1	3.7	1.91
50 – 100	15.6	4.3	2.45
100 – 500	13.2	4.6	1.78
>=500	20.9	8.1	1.95

Source: Cottier (1996)

Cottier (1996) found no evidence that the amount of assets under management has an effect on performance. This finding contradicts to some extent the results of a similar study conducted by VAN, which compared the performance of funds with above-average asset growth to the performance of a global hedge fund index. Cottier's work is, however, consistent with analogous research for mutual funds.

Summary

Investing in hedge funds has some disadvantages. However, we do not believe that high fees per se is a disadvantage against investing in hedge funds. We believe that the fees have to be put in the context of the value added. Leverage is in our opinion also not a disadvantage because most hedge funds have low leverage and exposure to hedge funds with high leverage can be diversified through holding different strategies and different hedge funds. The lack of transparency is a disadvantage. However, the trend is for more transparency as institutional money plays a larger role. We do not buy into capacity constraints being a disadvantage for hedge funds. On one hand, most hedge funds close the fund if they believe they reached a capacity limit or return equity to partners. On the other hand, there is no empirical evidence that size has a negative impact on performance. The lack of liquidity, which is occasionally quoted as a disadvantage, is actually an advantage. Empirical evidence suggests that there is a positive relationship between high redemption periods and performance.

Fund of Funds

Overview

Fund of funds is a means of investing in different funds mainly for diversification purposes. Fund of funds is not the main focus of this report. Below we briefly address some aspects of investing in funds of funds.

Definition

A fund of funds is a fund that mixes and matches the most successful hedge funds and other pooled investment vehicles, spreading investments among many different funds or investment vehicles. A fund of funds simplifies the process of choosing hedge funds, blending together funds to meet a range of investor risk/return objectives while generally spreading out the risks among a variety of funds. This blending of different strategies and asset classes aims to deliver a more consistent return (than any of the individual funds).

Searching for attractive hedge funds can be costly

Some fund of funds operators, being in the business, are able to locate high-return hedge funds that the individual investor could not find alone. The aggregate returns of some are high enough that, even after their extra layer of fees, returns are still attractive.

Advantages

Risk Control and Return Predictability

Risk control

Returns, risk and volatility can be somewhat controlled by the mix of underlying funds. Capital preservation is generally an important consideration. Volatility depends on the mix and ratio of strategies employed.

Predictability of returns

In any investment strategy, the predictability of future results is strongly correlated with the volatility of past returns of each strategy. Future performance of strategies with high volatility is far less predictable than future performance of strategies experiencing low or moderate volatility. Participants in the mutual fund industry, where the volatility of past results is high (because results are dependant on the direction of the stock market), know how impossible it is to predict future performance. However, within the hedge fund industry many of the hedging strategies are able to produce consistent returns that are highly predictable. As a result, focused funds of funds, utilising some of these low-volatility strategies, are often able to produce highly predictable returns, not correlated to market direction.

Efficient Exposure

The costs of hedge fund research

Because of the tremendous operating latitude available to many hedge fund managers, their funds have inherent risks that do not exist to the same extent in, say, mutual funds. Therefore, to lower risk, we recommend that investors who do not buy into a fund of funds create their own portfolio of hedge funds by investing in at least 20 single funds – if they feel they have adequate knowledge of portfolio construction. Research on hedge funds is much more difficult than stock research. With stock research, most of the relevant information is available. The hedge fund industry is opaque. The information is hardly available or costly.

Estimate of Costs of Hedge Fund Research

Below we estimate the cost to an investor attempting to pick 20 hedge funds. The first costs would be in information technology. Since off-the-shelf software is of limited use, a system has to be developed. Assuming it takes one man one year to develop (assuming 2,200 hours per year) and one hour costs, say, US\$200, the total cost for the system would amount to around US\$480,000. A reasonable maintenance costs for hardware would double this figure. Information costs would be around US\$250,000 a year. In other words, the costs have reached seven digits before one single fund was analysed and picked. The following table gives some estimate of how much it would cost to analyse 200 funds, of which 20 are selected.

Table 35: Costs of Picking 20 Hedge Funds

	Hours per manager	Total hours	Total cost* (US\$)
Collect and file documents	2	400	80,000
Analyse documents	10	2000	400,000
Talk to 100 managers on phone	1	100	20,000
Visit 50 managers	4	200	40,000
Total cost		2,700	540,000

Source: UBS Warburg estimates. * US\$200 per hour all-in cost

Due diligence is important, laborious, important, costly, and important

Analysing hedge funds is laborious. Once the information is collected, which in itself is difficult, due diligence begins. What are the annual net returns of the fund? How consistent are the returns, year by year? Are audited returns available? What kind of reputation does the principal have and what kind of objective references (investors, not friends) can the manager provide? How much of the managers' money is at risk in fund? Are any investor complaints on file with state or federal authorities? Does investing style make sense? Has the fund performed well in relative as well as absolute terms?

All in all, the investor entering the hedge fund arena spends between US\$1.5-US\$2m for the allocation to the first 20 hedge funds. Assume the fund of fund manager charges 2% of funds under management and the costs are US\$2m to set up a portfolio of 20 hedge funds. Breakeven for the manager would amount to US\$100m. In other words, if the allocation is lower than US\$100m, the investor would be better off picking the fund of funds.

However, in the analysis above we have missed three important points:

- (1) The hedge fund universe does not consist of 200 hedge funds. There are around 3,000-5,000 hedge funds available. Certainly, many of them are closed or do not meet certain basic criteria. However, picking hedge funds from a 200 universe is similar to building a diversified equity portfolio with Belgian stocks only;
- (2) More importantly: not only is the information difficult to find, also the human resources with the knowledge and experience to analyse the investment philosophy and quality of business franchise and management are difficult to

hire. Picking hedge funds involves at least as much qualitative analysis as it does require quantitative analysis. This means that to pick the most attractive funds one must be an insider. One has to know the industry and the managers within the industry. Without this insight, attractive funds will be closed to new investment before one had the opportunity to pick up the phone and require information;

- (3) Some of the more experienced managers raise money by reputation, ie, are not involved in a fund raising tour among institutional investors. This increases the search cost of picking good hedge funds.

The Breadth of Selection Universe Is Important

A further argument for investing in fund of funds is the breadth of the hedge fund universe. The breadth to which an active manager selecting hedge funds has access to is an important variable of the information ratio of active management. The information ratio is defined as:

$$IR = IC\sqrt{BR}$$

where

IR = the information ratio

IC = the information coefficient, or skill: the correlation between forecasted and realised active returns

BR = the breadth, or scope: the number of independent bets the manager can make a year¹.

The ex ante information ratio depends on a manager's skill and (the square root of) breadth or scope. We believe that picking hedge fund managers is difficult and opting for a fund of funds structure is therefore in most cases more pragmatic as well as efficient. Not only is it difficult to identify skill (IC) on an ex ante basis it is also costly to acquire breadth (BR) of the market place. The lack of one or both factors favours investing in fund of funds – for both private as well as institutional investors.

Disadvantages

Double Fee Structure

With fund of funds, fees are charged twice. The funds collect fees from the fund manager and the fund manager collects fees from the distributor or investor. The double fee structure is occasionally seen as a negative aspect of investing in hedge funds.

We have some reservations with this view because it does not relate fees to the value added. If a fund of funds structure allows a more efficient and superior allocation to hedge funds, the double fee structure should not be a negative. Picking

Lack of skill and/or market breadth favours investing in fund of funds

Paying the farmer as well as the milk man

¹ From Kahn (1998) quoted in Thomas (2000).

hedge funds is costly. Unlike the mutual fund industry, the hedge fund industry is still opaque which increases the costs of fund selection.

Lack of Transparency

Black-box syndrome

Some investors find it annoying to not know what they are investing in when investing in a hedge fund since transparency is lower compared with traditional managers. Transparency is even smaller when investing in fund of funds because, quite often, the names of the funds are not disclosed.

Low name recognition

Again, we attempt to challenge this notion: How many hedge funds does the reader know by name? Hedge funds are not like stocks with respect to brand recognition. Every investor, or every person for that matter, has knowledge of companies because they affect our daily life. Hedge funds do not. The industry itself is opaque to most investors. Even an investor who can name 10 different hedge funds still only 'knows' a fraction of the industry. Fund of funds managers specialise and operate in a field where knowledge is only attainable at high cost.

Lack of transparency

Lack of transparency is a disadvantage of investing in hedge funds in general and fund of funds in particular. There is a certain commercial logic behind not revealing ones positions to the market and competitors. Where transparency is a disadvantage, we believe it is outweighed by the vast amount of advantages.

Performance Analysis

Introduction

Past performance is not a guarantee for future performance

Probably every disclaimer by a financial wholesaler or intermediary contains some sort of warning that past performance is no guarantee for future performance – hedging the firm against the abstinence of common sense. The following anecdote best describes this issue with past performance of hedge funds. At a 1995 seminar on hedge fund selection, a European institutional investor stood up¹:

“History and statistics are worth nothing! You just can’t tell how a hedge fund will perform, from its past performance!”

A later conversation with this individual revealed that his institutional hedge fund portfolio had been invested heavily in macro funds. This touches two aspects of performance analysis of hedge fund returns: diversification and outliers. The investor was not diversified since many styles had positive returns in 1994. Furthermore, macro funds, as a group, have been extremely successful during the 1990s, with 1994 being an exception (outlier).

To a certain degree some hedge fund risk/return and correlation characteristics are predictable

This said, there is no guarantee that future hedge fund performance will be equal to past risk/return characteristics. However, one main aspect of this report is the predictability or sustainability of hedge fund performance. The previous section illustrated the concept behind various hedge fund strategies. The following section is designed to understand the main risk/return as well as correlation characteristics in the past. The understanding of a strategy’s concept plus knowledge of how the strategy performed in the past will allow us to make educated estimates of how these strategies will perform in the future. We believe that, over time, some of the hedge fund return and risk characteristics should remain fairly stable.

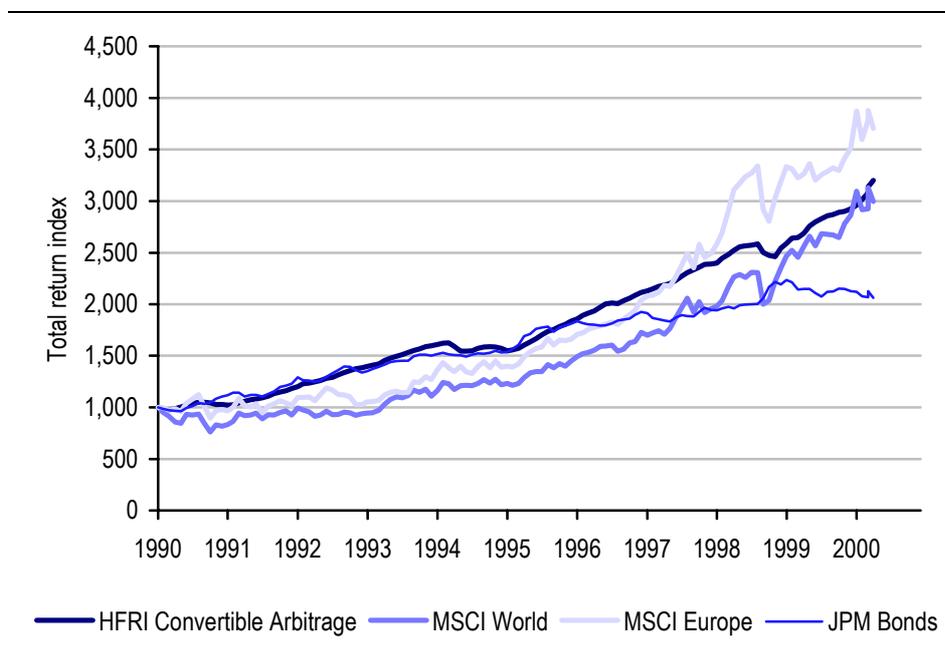
On pages 98-150 we examine the performance of hedge funds strategies. All returns shown were on a US\$ and total return basis net of fees². A description of the data is in the Appendix. Our focus was on standard risk and return performance characteristics (Sharpe ratio), higher moment risk factors (outliers in the return distribution) and downside correlation.

¹ From VAN Hedge Fund Advisors (1999).

² Except returns from Hennessy, which are gross of fees.

Relative-value and Market Neutral Convertible Arbitrage

Chart 18: Convertible Arbitrage



Source: HFR and Datastream

- The HFRI Convertible Arbitrage index has performed in line with the MSCI World over the past 10.5 years. However, volatility was much lower. The index underperformed MSCI Europe and the S&P 500 index.
- The smoothness of the wealth creation is worth pointing out. The wealth profile was flat on two occasions and slightly negative on one occasion. In 1990 convertible arbitrage added little value due to global recession and in 1994 due to US interest rate rises. The fall in autumn 1998 was due to widening of most arbitrage spreads and redemptions from the industry due to LTCM.

Table 36: Convertible Arbitrage Risk and Return Characteristics

	# of monthly returns*	Annual return (%)	Volatility (%)	Sharpe ratio**	Worst 1-month return (%)	Negative months (%)	Worst 1-year return (%)
S&P 500 (Total return)	124	18.3	13.7	0.97	-14.5	32	-3.1
MSCI World (Total return)	124	11.7	14.1	0.48	-13.3	36	-16.5
MSCI Europe (Total return)	124	13.5	14.7	0.58	-12.6	34	-12.1
HFRI Convertible Arbitrage Index	124	11.9	3.5	1.96	-3.2	13	-3.8
Hennessee HF Index - Conv Arb	88	10.1	3.7	1.36	-3.3	14	-7.1
CSFB/Tremont Convertible Arbitrage	76	9.3	5.2	0.83	-4.7	18	-9.0

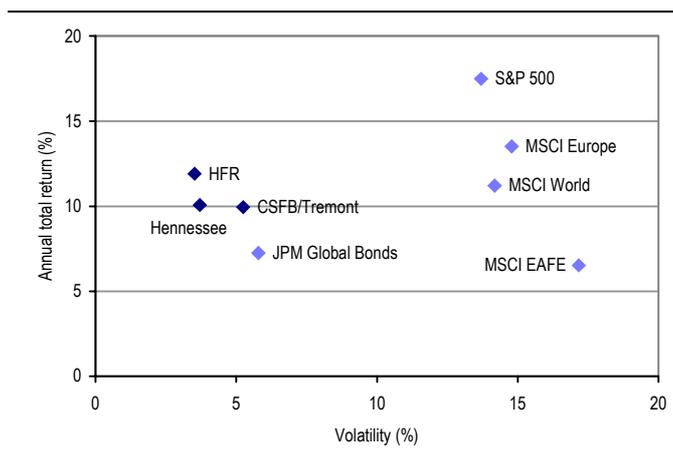
Source: HFR, Hennessee, CSFB/Tremont, Datastream, UBS Warburg calculations

* ending April 2000; ** based on risk free rate of 5%

- Annual returns were around 11% achieved with a volatility of around 3.5%. The high year of the HFRI Convertible Arbitrage Index was in 1995 at 19.9%, and the low year was 1994 at -3.7%. As of July 2000, the strategy performed by 12.4%.
- Convertible arbitrage has one of the lowest volatility averages of all strategies analysed in this report. Annual volatility was around 3-4%. Only equity-market-neutral strategies had a lower volatility.
- Convertible arbitrage was among the top three strategies based on the worst monthly loss and number of negative months as a percentage of the total. It is mid-range in terms of high Sharpe ratio, worst one-year cumulative return and low correlation to equity markets.

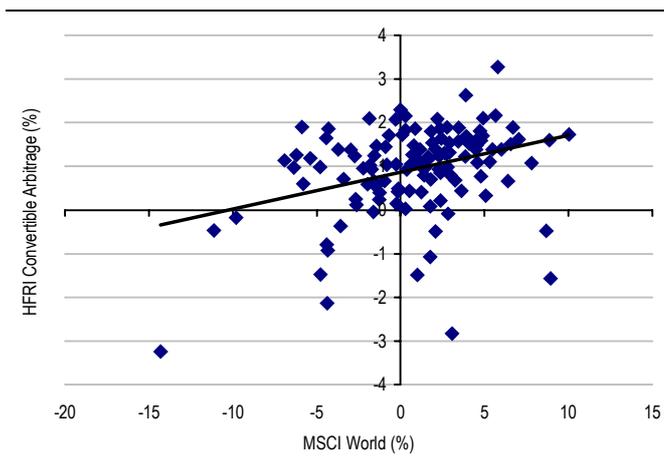
The first of the following two graphs shows the returns of various hedge fund indices with some equity and bond indices. The second graph compares monthly total MSCI World returns with HFRI Convertible Arbitrage Index returns.

Chart 19: Return Versus Risk



Source: HFR, Hennessee, CSFB/Tremont, Datastream

Chart 20: MSCI World Versus Convertible Arbitrage Returns



Source: HFR and Datastream

- Chart 19 illustrates the attractiveness of convertible arbitrage. The returns are positive and consistent across different data vendors and time periods. The volatility is lower than the volatility in bonds and the returns average around 11%, which is higher than long-term equity returns.
- Chart 20 shows that the returns are derived from convertible arbitrage and not by taking on equity market risk. The intercept (alpha) of the HFRI Convertible Arbitrage index to the MSCI World is 0.86. The slope (beta) measuring the exposure to the equity market is very low, around 0.08.
- Convertible arbitrage strategies can yield positive returns in equity bull markets despite their short stock positions. In Q4 99, for example, convertible arbitrage had positive returns despite world equity markets rising 17% during the quarter. Losses in short equity positions were balanced by an increase in equity volatility and because certain pockets, like investing in new issues and positive

developments in a ‘busted’ or low credit quality convertible, provided a source of returns.

The following table shows some further statistics of convertible arbitrage.

Table 37: Statistical Analysis of Convertible Arbitrage Returns

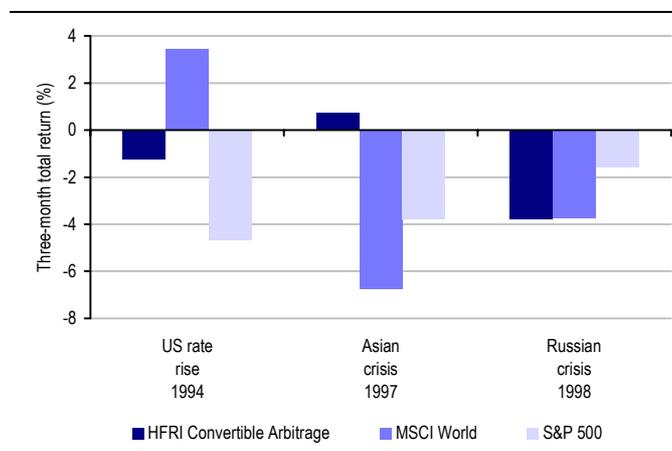
	Alpha to MSCI World	Beta to MSCI World	Skew	Excess kurtosis	Correlation MSCI World	Correlation JPM Global Bonds
HFRI Convertible Arbitrage Index	0.86	0.08	-1.52	3.54	0.330	-0.004
Hennessee HF Index - Conv Arb	0.68	0.09	-1.23	3.17	0.308	-0.058
CSFB/Tremont Convertible Arbitrage	0.71	0.06	-1.66	4.08	0.146	-0.252
EACM Relative-value - Convertible Hedge	0.82	0.04	-1.56	4.46	0.183	-0.457

Source: HFR, Hennessee, CSFB/Tremont, Evaluation Associates, Datastream, UBS Warburg calculations

- All convertible arbitrage indices have positive alpha and extremely low beta against the MSCI World. The low beta indicates that returns are generated without getting exposed to the equity market as a whole. In other words, the source of returns in convertible arbitrage is not derived from capturing the equity risk premium such as in long equity funds. The returns are derived to a large extent from exploiting market inefficiencies.
- The distribution of returns is slightly negatively skewed (to the left with a long tail to the left) and leptokurtic (narrow distribution with outliers). Chart 23 on p104 will show that the negative outliers are small. Overall, we regard the non-normality of the return distribution of convertible arbitrage as minor.
- Correlation to equities was around 0.30 over a longer period of time and around 0.16 in recent history. The correlation coefficients are statistically significant.
- The correlation with bonds is negative, but statistically not significant. Intuitively we would have assumed a positive and statistically significant correlation to bonds, ie, a negative correlation to changes in interest rates. Convertible arbitrageurs are normally simultaneously long the convertible securities and short the underlying securities of the same issuer, thereby working the spread between the two types of securities. Returns result from the difference between cash flows collected through coupon payments and short interest rebates and cash paid out to cover dividend payments on the short equity positions. Returns also result from the convergence of valuations between the two securities. Positions are designed to generate profits from the fixed income security as well as the short sale of stock, while protecting principal from market moves. The worst case scenario, therefore, is rising interest rates (losses on the bonds) and rising equity markets (losses on the short equity position), widening credit spreads (losses on the bonds) and falling stock implied volatility. The fact that correlation to bonds is not significant is an indication that the convertible arbitrageurs tend to hedge duration risk.

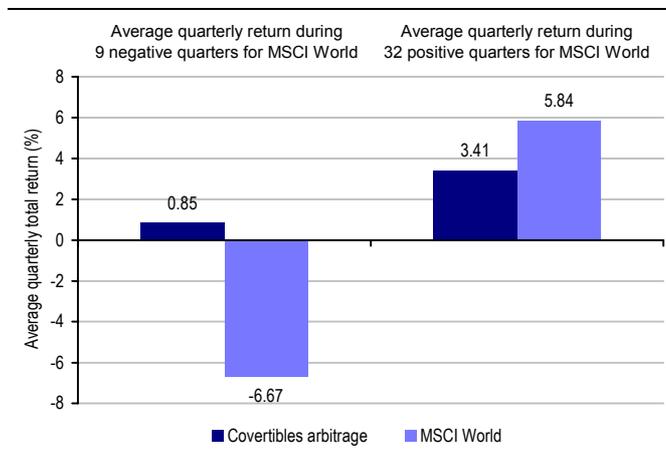
The following two graphs show the performance of convertible arbitrage in different market environments and average quarterly returns in down-markets versus average quarterly returns in friendly markets.

Chart 21: Scenario Analysis



Source: HFR and Datastream
 US rate rise: Q1 94; Asian crisis: 1/8/97-31/10/97; Russian crisis: 1/8/98-31/10/98

Chart 22: Average Negative Versus Average Positive Returns



Source: HFR and Datastream

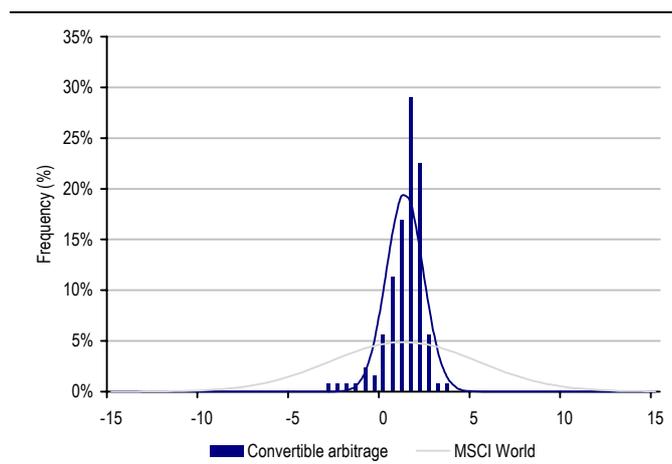
- 1994 was the worst year based on the HFRI Convertible Arbitrage Index, which was down by 3.7% during 1994. The year was characterised by rising US interest rates. Convertible arbitrage behaved orderly during the Asian crisis in 1997. All hedge fund strategies except short sellers suffered during the Russian crisis in 1998 due to the collapse of LTCM. However, convertible arbitrage, equity market neutral and risk arbitrage suffered least.
- Theoretically, falling interest rates is good for convertible arbitrageurs because of the long position in the convertible, which reacts inversely to moves in interest rates due to its bond characteristics. However, declining interest rates in 1992, 1993 and 1995 encouraged many companies to call convertible issues and lower their cost of capital, thus adding to the hedging difficulties as investors prematurely lost their conversion premiums and accrued interest. The sudden rise in interest rates in 1994 caused additional problems as investment floors dropped dramatically.
- When the Dow dropped 554 points on 27 October 1997 and when similar volatility occurred later in the quarter in Japan, convertible arbitrage strategies performed well as the stock positions dropped more swiftly than the related convertible bonds. Thus, the managers earned more on their short stock positions than losses incurred on the long convertible positions. However, there were a few exceptions who lost money with Japanese resettables due to the lack of opportunity to sell short or the instruments did not behave in the market as the pricing models suggested they would.
- Q4 98 sent equity-linked markets in Japan into a tailspin due to the introduction of new short-selling rules. The uproar's inception was founded in the Ministry of Finance's (MOF) initiative to curb 'rumour mongering' and other speculative attacks on Japanese stocks. The MOF promulgated securities legislation

modelled after the US regulation on short-selling (the ‘uptick’ rule). Unfortunately, they created mass confusion among custodians, stock lenders and stock borrowers by not clearly stating under what conditions and to whom the rule’s draconian penalties would apply. Large-scale and immediate retrenchment of stock lending activity resulted from the MOF’s obfuscation of the new rules. Many convertible and warrant hedgers were forced to liquidate positions at distressed prices for fear of being caught naked-long without the offsetting short hedge. Ultimately, the MOF issued clarification of the rules the day they became effective averting further deterioration in the market. Nonetheless, some losses were incurred. This example illustrates the exposure of the strategy to regulatory issues.

- Convertible arbitrage also experienced difficulties during the LTCM collapse in autumn 1998. In the US, the flight to quality and liquidity led investors to shun smaller and lower credit quality convertible issues leading to price deterioration and a significant widening in bid-ask spreads. Liquidations by hedge funds and proprietary trading desks in an already liquidity hampered market further exacerbated the tone of the market.
- 1999 was a difficult year for the convertible arbitrage industry, as the year was characterised by rising interest rates, mostly rising equity markets and falling stock volatility (except for the last quarter). US convertibles, which tend to be of lower credit quality, suffered when the Federal Reserve started to raise interest rates. There was even less activity than normal during summer from proprietary trading desks that did not want to take positions ahead of the enormous supply scheduled to the market in autumn. Potential illiquidity surrounding Y2K also discouraged participants. The main reason for the year ending profitably was the fact that issuance was extremely cheap making the arbitrage profitable despite rising rates and equities and falling volatilities.
- We regard the outperformance of convertible bond arbitrage in equity bear markets as worth pointing out (Chart 22 on p102). Since January 1990 there were nine quarters in which MSCI World reported a negative return. During these quarters convertible arbitrage showed an average return of 0.85% that compares with –6.67 in the case of the MSCI World. During the 32 quarters where MSCI World ended in positive territory, convertible arbitrage performed by 3.4% per quarter against 5.84 for the MSCI World.
- The above examples illustrate that convertible arbitrage can perform well in bear markets, primarily due to short stock position in the arbitrage. In other words, exposure to convertible arbitrage is attractive to bearish or neutral investors in search of instruments with positive expected return but low correlation to equities.

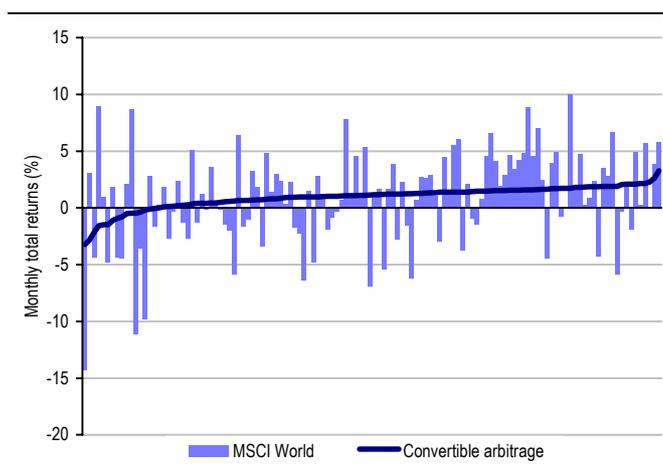
The left graph of the following pair shows how returns have been distributed in the past and compares the historic return distribution with a normal distribution of convertible arbitrage and a normal distribution of historical MSCI World returns both based on historic mean return and standard deviation of returns. For the graph on the right, we have sorted the convertible arbitrage returns and compared them with the corresponding market returns. This allows us to see in which market environment the extreme positive and negative returns were achieved.

Chart 23: Return Distribution



Source: HFR, Datastream, UBS Warburg calculations

Chart 24: Correlation



Source: HFR and Datastream

- Chart 23 shows how narrowly around the mean the monthly returns were distributed, especially compared with the market. The outliers are minor. Six returns were below the 95% range and one above. None of the returns were outside the 99% range.
- Chart 24 shows that negative convertible arbitrage returns were not concentrated during equity market declines. The chart shows that convertible arbitrage returns tend to have low variability compared to equity returns and that there is little relation between the two sets of returns.

Conclusion

We regard convertible arbitrage as an attractive hedge fund strategy. Stable returns of around 11% were achieved with very low volatility and low correlation to equities. The returns are achieved with little exposure to the equity market. Convertible arbitrages are not necessarily negative in equity market downturns. Downside risk is limited. No significant correlation to bonds suggests limited duration risk. We do not believe that these characteristics will change materially going forward.

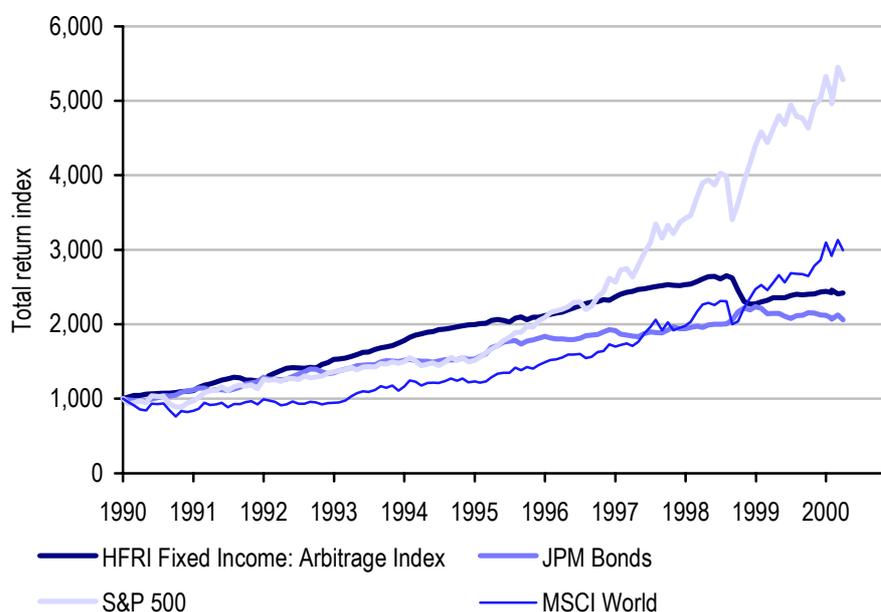
However, there are capacity constraints to convertible arbitrage. One of the main drivers of recent returns in convertible arbitrage are derived from IPOs. Convertible arbitrageurs play a dominant role in the issuance of paper. Future performance is, therefore, to some extent dependent on future issuance. A further constraint is the ability to borrow stock and sell short.

Outlook

From a convertibles issuance perspective, the 1990s can be described as boom years. Convertible bonds became an asset class of their own. To some investors, convertibles are the best of both worlds: convertible bonds pay income plus provide upside to equity. Bond investors bought convertible bonds because of the 'equity-kicker' in a low interest rates environment. Equity investors used convertible bonds to add some downside protection to ever-rising stock markets. Corporates like the 'cheap' financing through low coupon, locking in low interest rates and reducing the costs of debt. Given the pending corporate restructuring in Europe and Asia we expect supply and demand of convertible bonds to increase hand in hand. With this increase, the opportunities for convertible arbitrageurs increase as well.

Fixed Income Arbitrage

Chart 25: Fixed Income Arbitrage



Source: HFR and Datastream

- Based on HFR indices, the fixed income arbitrage hedge fund style has not done extremely well. Since 1990, it has only marginally outperformed the JPM Global Bonds Index with a similar degree of volatility.
- Performance analysis would look more attractive if we excluded H2 98. From January 1990 to June 1998, the HFRI Fixed Income Arbitrage indexed yielded 11.9% a year, which compares with only 8.5% for the JPM Global Bonds Index. The best year was 1992 when the HFRI Fixed Income Arbitrage Index gained 22.1%. The worst year was 1995 where the hedge fund index increased by ‘only’ 6.1%. Until the end of July 2000 the index was up by 3.3%.

Table 38: Fixed Income Arbitrage Risk and Return Characteristics

	# of monthly returns*	Annual return (%)	Volatility (%)	Sharpe ratio**	Worst 1-month return (%)	Negative months (%)	Worst 1-year return (%)
S&P 500 (Total return)	124	18.3	13.7	0.97	-14.5	32	-3.1
MSCI World (Total return)	124	11.7	14.1	0.48	-13.3	36	-16.5
JPM Global Bond Index (Total return)	124	7.4	5.8	0.41	-3.3	39	-6.2
HFRI Fixed Income: Arbitrage Index	124	8.9	5.0	0.79	-6.45	19	-10.6
CSFB/Tremont Fixed Income Arbitrage	76	6.5	4.6	0.32	-6.96	22	-10.1

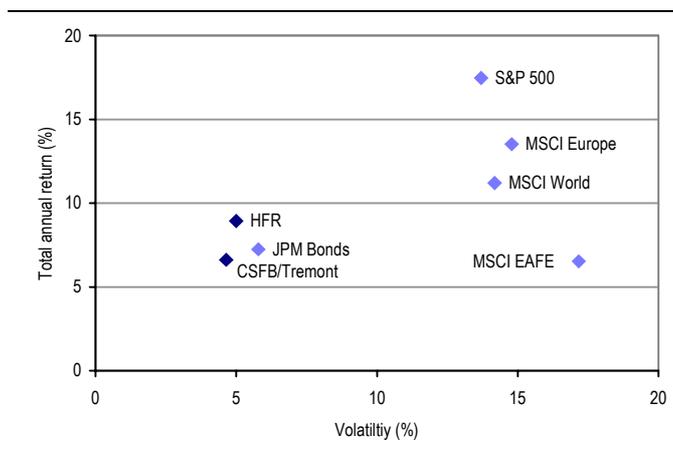
Source: HFR, CSFB/Tremont, Evaluation Associates, Datastream, UBS Warburg calculations

* based on risk free rate of 5%

- The HFRI Fixed Income Arbitrage index has yielded a return of 8.9% with a volatility of 5% from 1990 to April 2000. Returns were slightly higher than bonds and volatility slightly lower. In other words, fixed income arbitrage did slightly better than a long-only bonds strategy. The higher risk-adjusted returns of the hedge fund strategy was confirmed when we compared the CSFB/Tremont relative-value bond hedge index with the corresponding bond returns for the same time period.

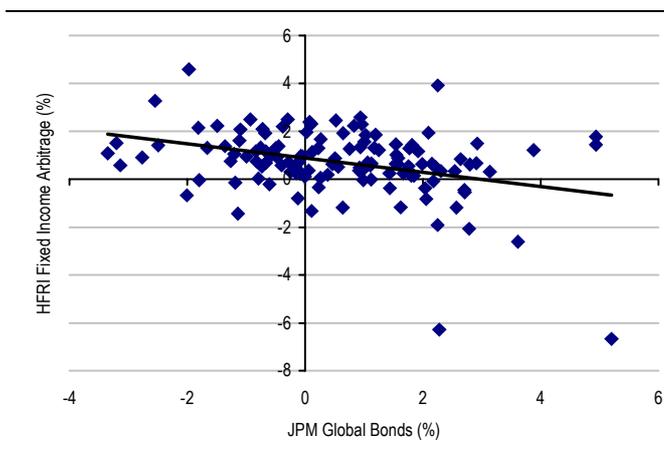
The first of the following two graphs shows the returns of various hedge fund indices with some equity and bond indices. The second graph compares monthly total JPM Global Bond returns with the HFRI Fixed Income Arbitrage index.

Chart 26: Return Versus Risk



Source: HFR, CSFB/Tremont, Datastream

Chart 27: JPM Bonds Versus Fixed Income Arbitrage Returns



Source: HFR and Datastream

- Fixed income arbitrage had the second lowest returns from all eleven strategies analysed in this report. Only short sellers did worse. When the 33 different strategies of the HFR universe are analysed, fixed income arbitrage was ranked 30 in terms of returns and 25 in terms of Sharpe ratio¹. We therefore believe fixed income is a viable alternative to an allocation to bonds but not necessarily an attractive alternative to equity. An investment in fixed-income arbitrage could be viewed as similar to an investment in bonds without the duration risk.
- Chart 27 shows that the returns are derived from fixed income arbitrage and not by taking on interest rate risk. As a matter of fact, fixed income arbitrage is about exploiting market inefficiencies between related interest rate instruments and hedging away interest rate risk. The intercept (alpha) of the HFRI Fixed Income Arbitrage index to the JPM Global Bonds index was 0.89. The slope (beta) measuring the exposure to the bond market is negative and relatively low, in this case, around -0.30.

The following table shows some further statistics of fixed income arbitrage. Note that we compare the fixed income arbitrage indices with the JPM Global Bond Index.

¹ See Appendix for detailed risk and return characteristics of the different databases used in this report.

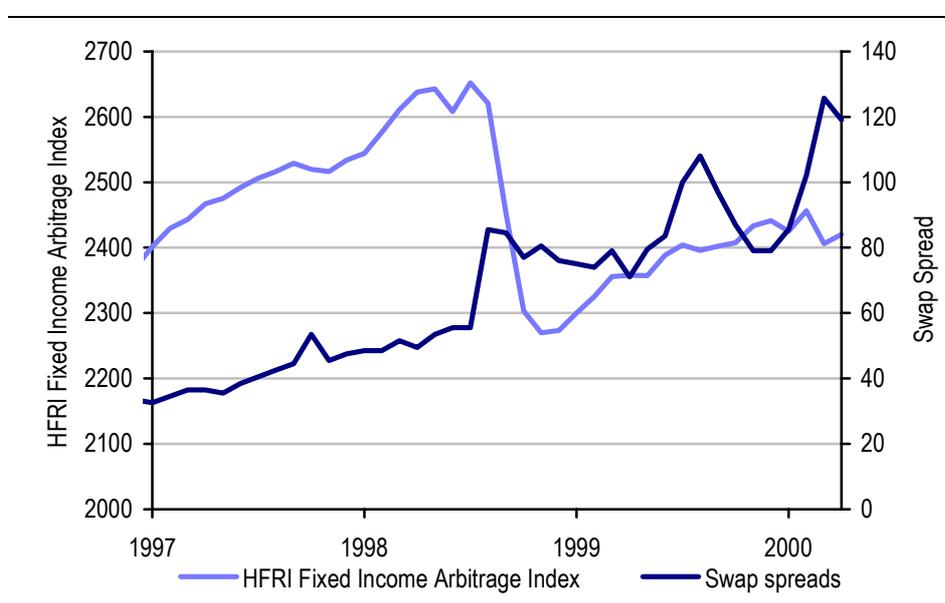
Table 39: Statistical Analysis of Fixed Income Arbitrage Returns

	Alpha to JPM Bonds	Beta to JPM Bonds	Skew	Excess Kurtosis	Correlation MSCI World	Correlation JPM Global Bonds
HFRI Fixed Income: Arbitrage Index	0.89	-0.30	-1.92	9.07	-0.043	-0.345
CSFB/Tremont Fixed Income Arbitrage	0.64	-0.26	-3.28	15.19	0.064	-0.319

Source: HFR, CSFB/Tremont, Datastream, UBS Warburg calculations

- The distribution of returns is slightly negatively skewed (to the left with a long tail to the left) and extremely leptokurtic (narrow distribution with outliers). Chart 31 on p109 shows that the negative outliers are relatively small in absolute terms but represent a strong deviation from normality of returns.

Chart 28: Fixed Income Arbitrage Versus Swap Spreads



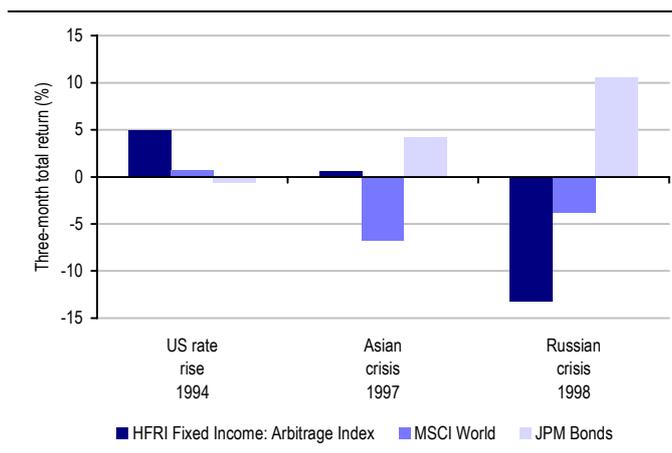
Source: HFR and Bloomberg.

- The two outliers occurred in September and October 1998 – a period that will probably not go down in history as the happiest of times for fixed income arbitrageurs (widening of credit spreads). Fixed income arbitrageurs are often long an instrument that is liquid and of high credit quality and short a less liquid instrument of lower credit quality. If credit spreads widen, the arbitrageur can potentially, if credit is unhedged, suffer a loss. From an investors’ perspective, fixed income arbitrageurs are short a disaster insurance policy because they usually are short the credit spread similar. In an economic disaster, credit spreads widen and investors short the spread lose money. Additionally, liquidity dries up, worsening the situations. The result is few, but high standard deviation negative returns. In other words, as with any other short put option position, the investors receives the premium in calm markets but loses money in market turmoil, as the put option moves in-the-money. For long-term investors, like insurance companies, selling put options (insurance policies) can be attractive.

- Excluding these two outliers from 1998 results in a reduction of skew and an excess kurtosis to nearly zero. Chart 28 shows the rise in swap spreads due to the Russian default and the subsequent fall in fixed income arbitrage returns. An increase in swap spreads arises when there is a flight-to-quality situation. Such situations occur when a large number of investors seek the safety and stability of government securities to escape from turmoil in international stock and bond markets. The resultant buying of government securities generally causes the credit spread to widen.
- The correlation between fixed income arbitrage and global equities is around zero but not statistically significant. The correlation with global bonds is around -0.4 . This negative correlation to bonds implies positive correlation to changes in interest rates: If interest rates rise, bonds fall and fixed income arbitrage returns rise.

The following two graphs show the performance of the HFRI Fixed Income Arbitrage Index in different market environments and average quarterly returns in down-markets versus average quarterly returns in friendly markets.

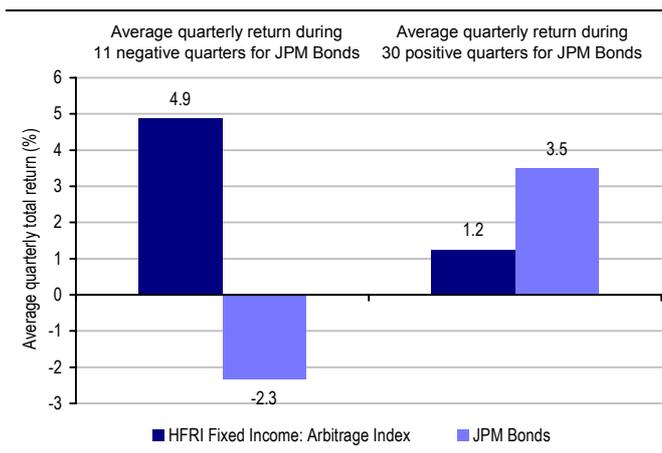
Chart 29: Scenario Analysis



Source: HFR and Datastream

US rate rise: Q1 94; Asian crisis: 1 August to 31 October 1997; Russian crisis: 1 August to 31 October 1998.

Chart 30: Average Negative Versus Average Positive Returns



Source: HFR and Datastream

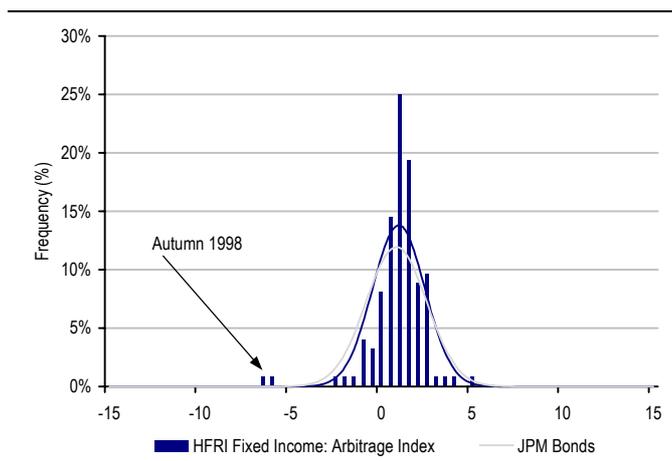
- Chart 29 shows again where the outliers come from. From all strategies analysed in this report fixed income arbitrage had the second worst performance in autumn 1998. Only emerging markets performed worse.
- In October 1998, the bond markets went into a tailspin because a vast network of participants had essentially closed their trading doors, freezing the otherwise highly liquid and tightly traded bond markets. In a flight to quality and liquidity, all assets have been severely and negatively re-priced. This included swaps, investment grade corporate bonds, high yield bonds, mortgage-backed securities, municipal bonds and emerging-market bonds. The violence and velocity of these movements have been of historic proportions.
- Fixed Income Arbitrage has been subject to negative press and regulatory scrutiny in the wake of LTCM 1998 catastrophe. Many investors departed from

the strategy. Investors who acknowledged that the well-documented problems were not a result of an inherently flawed strategy, but were instead attributable to manager specific factors such as over-leverage, investments outside of core competency, and too large of a balance sheet were rewarded in 1999. The HFRI Fixed Income Arbitrage Index increased by 7.4% in the year after LTCM despite swap spreads widening beyond the post-LTCM level.

- Chart 30 shows in which market environments fixed income arbitrageurs make money. In the quarters where global bonds fell by an average of 2.3% fixed income arbitrage yielded 4.9%. In the quarters where global bonds increased by an average of 3.5%, fixed income arbitrage yielded only 1.2%.

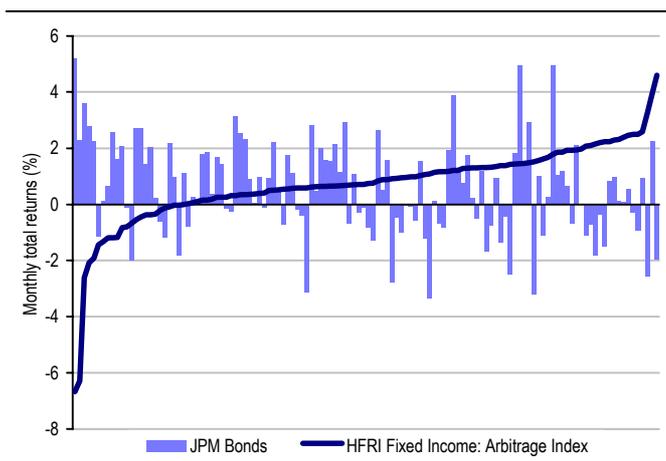
The left graph of the following pair shows how returns have been distributed in the past and compares the historic return distribution with a normal distribution of fixed income arbitrage and a normal distribution of historical JPM Global Bond returns both based on historic mean return and standard deviation of returns. For the graph on the right, we have sorted the fixed income arbitrage returns and compared them to the corresponding market returns. This allows us to see in which market environment the extreme positive and negative returns were achieved.

Chart 31: Return Distribution



Source: HFR, Datastream, UBS Warburg calculations

Chart 32: Correlation



Source: HFR, Datastream

- Chart 31 highlights the deviation of the historic return distribution from normality. There were four returns below the 95% range and none above this range. Two returns were below the 99% range. The experience in September and October 1998, where the HFRI Fixed Income Arbitrage Index lost 6.5% and 6.1% respectively, was a six standard deviation event for this discipline. To put this into perspective, the largest monthly loss prior to autumn 1998 was only 2.6%.

- Fung and Hsieh (1999) provide three explanations why fixed income arbitrage provides equity-like returns with bond-like volatility¹:
 - (1) Fixed income arbitrage funds are capturing true mispricings.
 - (2) They are acting as market makers providing liquidity.
 - (3) They sell economic disaster insurance – where the low historical return volatility is consistent with a period over which the gathering of insurance premium has yet to be tested by a disaster payout.

The third point can explain the outliers since insurers are essentially ‘short volatility.’ They perform best in calm markets and worst in volatile markets.

- Chart 32 shows that large negative returns in fixed income arbitrage are concentrated when bonds rise, ie, when interest rates fall. The most extreme positive returns from fixed income arbitrage occur both in rising and falling bond markets.

Conclusion

The reputation of fixed income arbitrage as a relative-value strategy has suffered because of the LTCM debacle. However, LTCM is likely to go down in financial history as a mismanaged company where leverage was excessive. Most trades would have been profitable if funding had been managed appropriately and carried to the end.

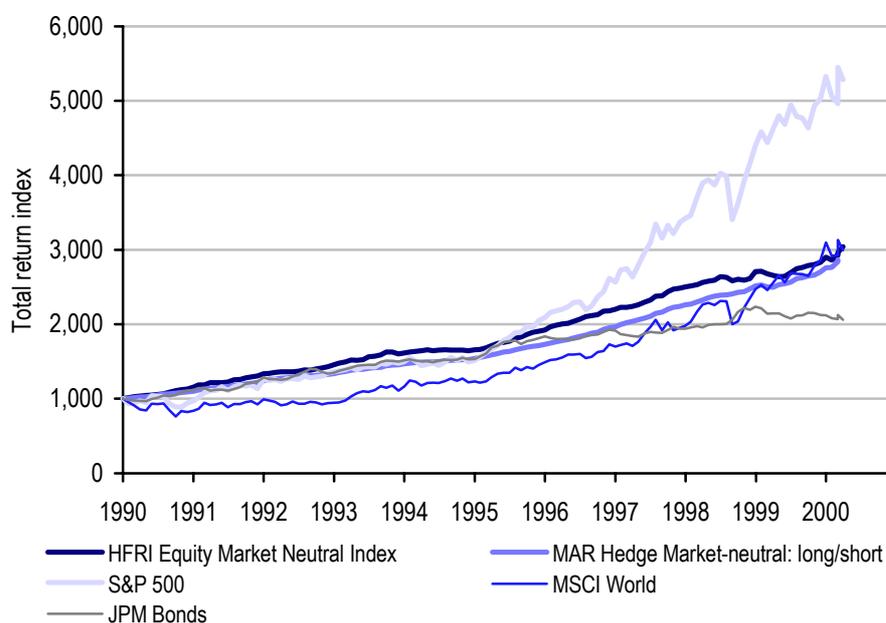
Outlook

We think this year could again test the risk management systems of fixed income arbitrageurs who have already experienced an inversion of the US yield curve and the chance of a reduced supply of 30-year bonds. However, in general, we believe that inefficiencies in fixed income markets will continue to exist. The skill and the determination (read funding) for these inefficiencies to be exploited will not disappear because of LTCM. Fixed income arbitrage represents a sound alternative to allocating funds in bonds. This is especially the case in an environment of rising interest rates and inflation uncertainty since fixed income arbitrage shows negative correlation with bond markets. When bonds did poorly in the past (interest rates rise), returns in fixed income arbitrage were higher.

¹ Note that prior to LTCM, fixed income arbitrage had equity-like returns with bond-like volatility (around 12% a year). Chart 26 on page 106 shows the period that includes autumn 1998.

Equity Market Neutral

Chart 33: Equity Market Neutral



Source: HFR, MAR and Datastream

- Both equity market neutral indices performed in line with MSCI World with less volatility. The indices were flat in 1994 and showed some degree of volatility in 1998.
- As with other relative-value strategies the smoothness of the wealth creation is worth pointing out.

Table 40: Equity Market Neutral Risk and Return Characteristics

	# of monthly returns*	Annual Return (%)	Volatility (%)	Sharpe ratio**	Worst 1-month return (%)	Negative months (%)	Worst 1-year return (%)
S&P 500 (Total return)	124	18.3	13.7	0.97	-14.5	32	-3.1
MSCI World (Total return)	124	11.7	14.1	0.48	-13.3	36	-16.5
MSCI Europe (Total return)	124	13.5	14.7	0.58	-12.6	34	-12.1
HFRI Equity Market Neutral Index	124	11.4	3.2	2.00	-1.67	15	1.6
MAR Hedge Market-neutral: long/short	123	10.8	1.7	3.44	-1.03	2	4.9
CSFB/Tremont Equity Market Neutral	76	11.5	3.5	1.84	-1.15	18	-2.0

Source: HFR, MAR, CSFB/Tremont, Datastream, UBS Warburg calculations

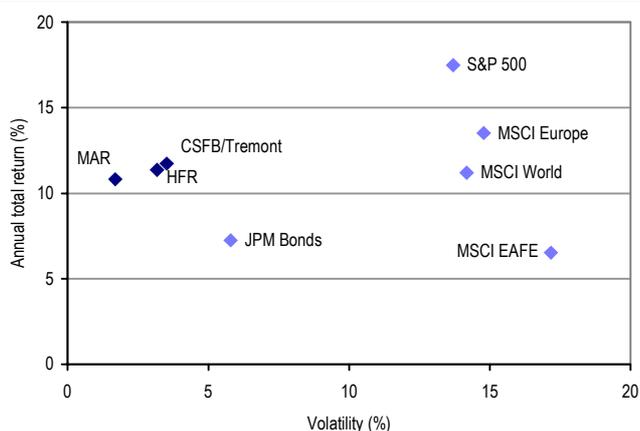
* ending April 2000 (except MAR: ending March 2000); ** based on risk free rate of 5%

- Returns in equity market neutral have been around 11% in the past. Equity market neutral had the lowest volatility of around 2.8%, highest Sharpe ratio of around 2.4, highest ‘worst month’ and ‘worst year’ of around -1.3% and -1.5%

respectively. Given these characteristics, we regard equity market neutral as the most attractive strategy despite its medium-range historic returns.

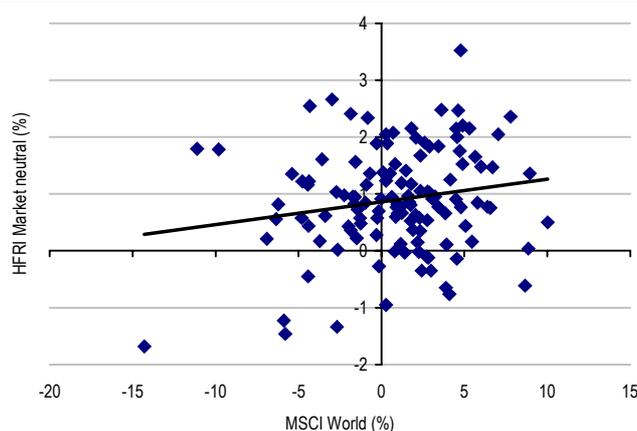
The first of the following two graphs shows the return of various hedge fund indices with some equity and bond indices. The second graph compares monthly total MSCI World returns with the HFRI Market Neutral index returns.

Chart 34: Return Versus Risk



Source: HFR, MAR, CSFB/Tremont, Datastream, UBS Warburg calculations

Chart 35: MSCI World Versus Equity Market Neutral Returns

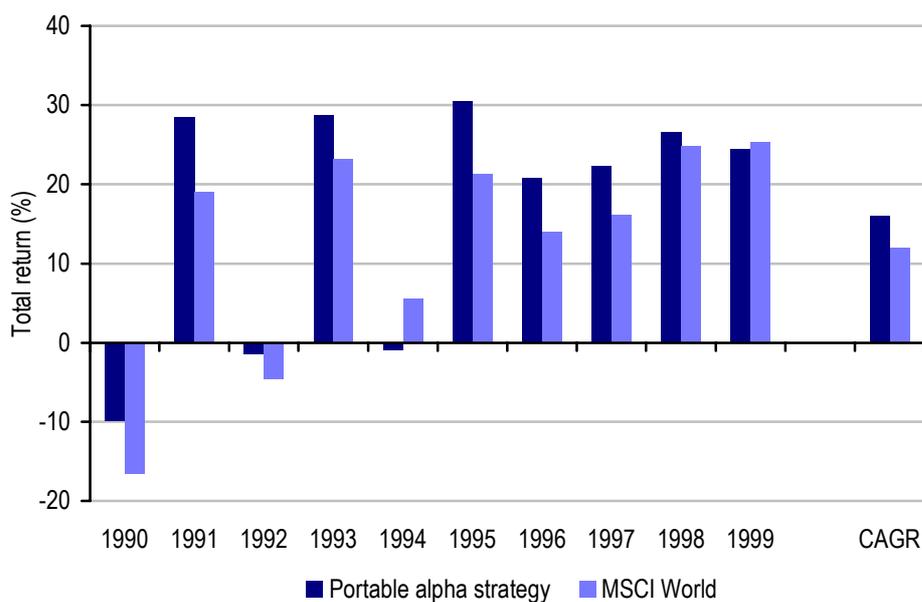


Source: HFR and Datastream

- Equity market neutral is the purest form of alpha generation in the equity arena. The average 11% return shown in Chart 34 is nearly pure alpha. In our view there is hardly any market risk, as shown in Chart 35. Note that these returns are net of fees.
- In other words, an investor who in the beginning of 1990 decided to swap the risk free rate with, for example, the MSCI World index total return and invested the principal in a fund of equity market neutral funds would have paid, say 200bp for the equity index returns and have ended up with an annual return of around 16% (12% from the equity index, plus 11% from the fund of equity market neutral funds, minus 200bp cost from the swap transaction, minus the risk free rate)¹. The following chart shows the breakdown of such a strategy by year. Had the strategy been done with MSCI World index, the total annual return would have been around 22.0%, which compares with around 18% for the MSCI World Total Return Index.

¹ Calculations simplified.

Chart 36: Transporting Equity Market Neutral Alphas to MSCI World Total Returns



Source: HFR, Datastream, UBS Warburg calculations

- The strategy would have outperformed MSCI World in all years except 1994 and 1999.
- We believe that the concept of portable alpha (or alpha transport) is ideally suitable in connection with hedge fund investing once risk to single hedge funds is diversified. Chart 36 shows the annual returns of such a strategy compared with MSCI World total returns. The (hypothetical) manager running such a strategy would have outperformed index funds most the time and the majority of active managed funds nearly all of the time.

The following table shows some further statistics of equity market neutral strategies.

Table 41: Statistical Analysis of Equity Market Neutral Returns

	Alpha to MSCI World	Beta to MSCI World	Skew	Excess kurtosis	Correlation MSCI World	Correlation JPM Global Bonds
HFRI Equity Market Neutral Index	0.86	0.04	-0.18	0.41	0.174	0.150
MAR Hedge Market-neutral: long/short	0.83	0.03	0.30	2.62	0.254	0.206
CSFB/Tremont Equity Market Neutral	0.77	0.12	-0.03	-0.28	0.450	0.022

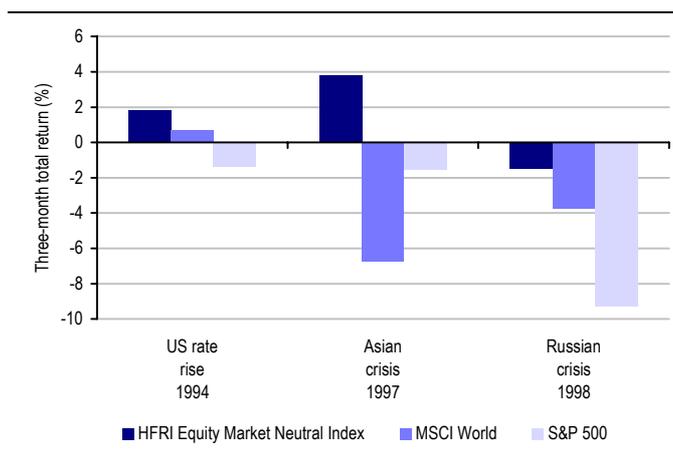
Source: HFR, MAR, CSFB/Tremont, Datastream, UBS Warburg calculations

- As already mentioned, the alpha of the strategy is positive and the exposure to the market negligible. Apart from short sellers and fixed income arbitrage, equity market neutral has the lowest exposure to the equity market among the strategies analysed in this report.

- The return distribution is fairly normal, ie, returns seem neither skewed nor kurtotic.
- Correlation with equities is low, ie, around 0.2 and statistically significant at the 95% level. Correlation with global bonds is positive but not significant.

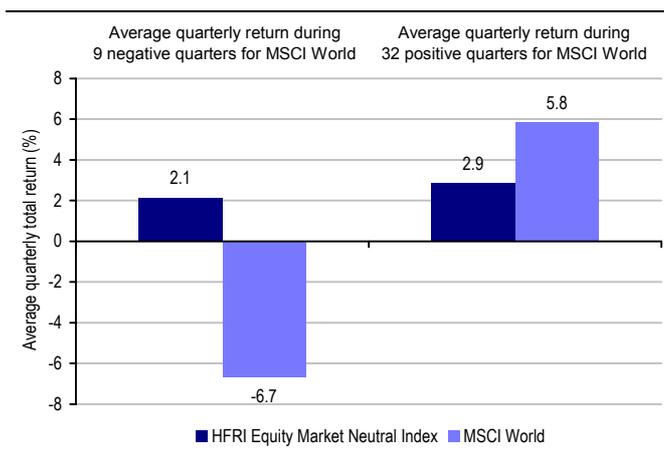
The following two graphs show the performance of the HFRI Equity Market Neutral index in different market environments and average quarterly returns in down-markets versus average quarterly returns in friendly markets.

Chart 37: Scenario Analysis



Source: HFR and Datastream
 US rate rise: Q1 94; Asian crisis: 1 August to 31 October 1997;
 Russian crisis: 1 August to 31 October 1998

Chart 38: Average Negative Versus Average Positive Returns



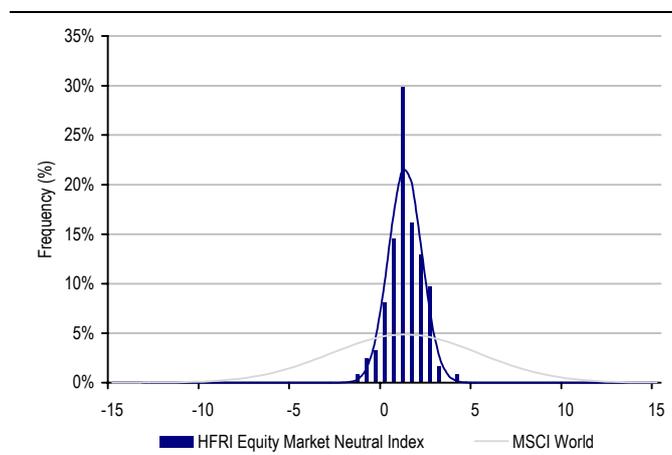
Source: HFR and Datastream

- The HFRI Equity Market Neutral index was up both during the US rate rise of 1994 as well as the Asian crisis in 1997. Since the Russian crisis coincided with the default of LTCM and the associated early redemptions, fear of early redemptions, and the (forced) reduction of leverage in difficult market conditions, even equity market neutral funds reported, on average, small losses.
- Since January 1990, there were nine quarters where MSCI World reported a negative return. During these quarters, relative-value equity market neutral showed an average return of 2.1%, which compares with -6.7% in the case of the MSCI World. During the 32 quarters where MSCI World ended in positive territory, the relative-value arbitrage index gained 2.9% per quarter against 5.8% for the MSCI World. In other words, quarterly returns are between 2-3% regardless of equities going up or down.
- These two comparisons, as well as the analysis done on other relative-value strategies, highlight the robustness of the relative-value sector in general and its ability to perform well in down-markets in particular.

The left graph of the following pair shows how returns have been distributed in the past and compares the historic return distribution with a normal distribution of equity market neutral and a normal distribution of historical MSCI World returns, both based on historic mean return and standard deviation of returns. For the graph on the right, we have sorted the equity market neutral returns and compared them

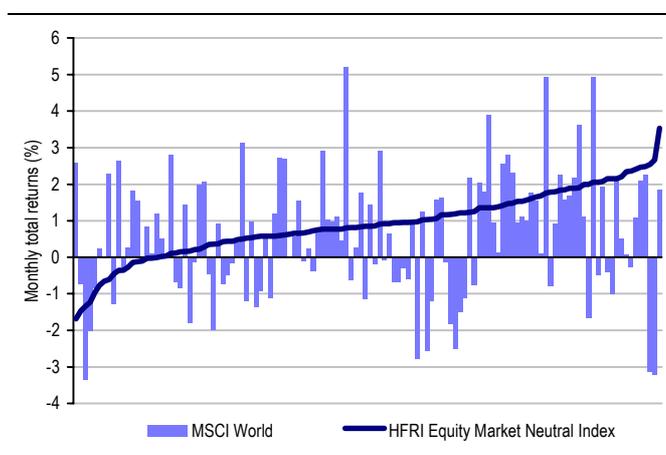
with the corresponding market returns. This allows us to see in which market environment the extreme positive and negative returns were achieved.

Chart 39: Return Distribution



Source: HFR, Datastream, UBS Warburg calculations

Chart 40: Correlation



Source: HFR and Datastream

- Chart 39 shows how narrowly around the mean the monthly returns were distributed, especially compared with the market. There are no outliers of significance. Five returns were below the 95% range and one return above. Note that only 18 of the 124 monthly returns were below zero. This compares with 40 for the S&P 500, 45 for the MSCI World and only two for the MAR Hedge Market-neutral long/short index.
- Chart 40 illustrates graphically what statistics already have revealed, ie, low correlation with equities and that negative equity market neutral returns were not concentrated during equity market declines.

Conclusion and outlook

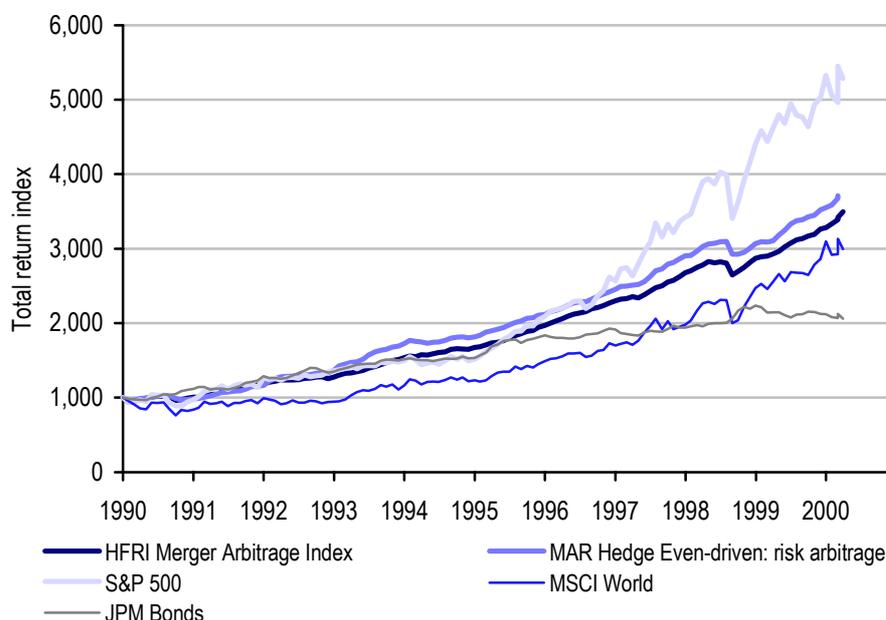
We regard equity market neutral as one of the most attractive strategies. The sector has proven that it's an alpha-generator par excellence and not a beta-merchant at all. Our analysis leads us to believe that the risk/return as well as the correlation characteristics of equity market neutral strategies are fairly stable and therefore, to some degree, can be extrapolated into the future. Capacity constraints are limited. We believe that as long as there will be violations to the law of one price there will be market participants making money on the conversion.

This concludes our analysis of relative-value strategies. The following section takes a closer look at two event-driven strategies, ie, risk arbitrage and distressed securities.

Event-Driven Strategies

Risk Arbitrage

Chart 41: Risk Arbitrage



Source: HFR, MAR and Datastream

- The HFRI Merger Arbitrage Index has outperformed nearly all equity indices over the past 10 years. This was the case when sentiment was friendly for equities.
- Risk arbitrage is another example of sustainable, smooth, stable, positive returns.

Table 42: Risk Arbitrage Risk and Return Characteristics

	# of monthly returns*	Annual Return (%)	Volatility (%)	Sharpe ratio**	Worst 1-month return (%)	Negative months (%)	Worst 1-year return (%)
S&P 500 (Total return)	124	18.3	13.7	0.97	-14.5	32	-3.1
MSCI World (Total return)	124	11.7	14.1	0.48	-13.3	36	-16.5
MSCI Europe (Total return)	124	13.5	14.7	0.58	-12.6	34	-12.1
HFRI Merger Arbitrage Index	124	12.9	4.6	1.70	-6.46	10	0.4
MAR Hedge Event-driven: risk arbitrage	123	13.6	4.6	1.89	-5.61	9	-1.7
Hennessee HF Index - Merger Arb	88	14.3	3.5	2.66	-4.97	9	5.6

Source: HFR, MAR, Hennessee, Datastream, UBS Warburg calculations

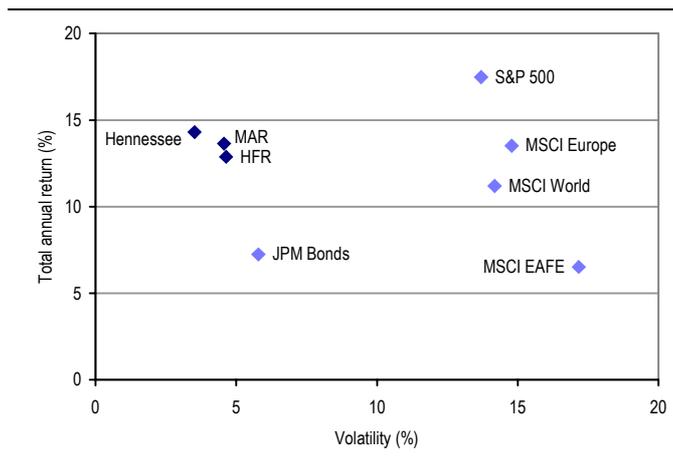
* ending April 2000 (except MAR: ending March 2000); ** based on risk free rate of 5%

- Absolute returns in risk arbitrage have been around 13-14% in the past with volatility of less than 5% resulting in a relatively high Sharpe ratio of c1.8.

- The worst monthly losses are higher than, for example, equity market neutral. However, the worst annual return is around zero in the long run and around 5% in recent history. The number of negative months is extremely low at around 10%.

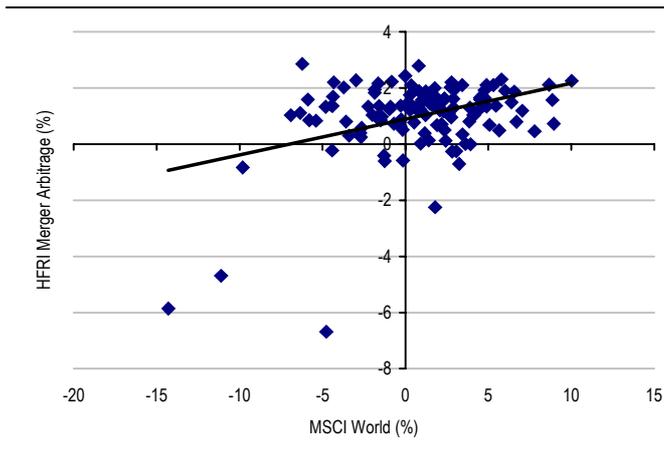
The first of the following two graphs show the return of the various hedge fund indices with some equity and bond indices. The second graph compares monthly total MSCI World returns with the HFRI Merger Arbitrage Index.

Chart 42: Return Versus Risk



Source: HFR, MAR, Datastream, UBS Warburg calculations

Chart 43: MSCI World Versus Risk Arbitrage Returns



Source: HFR and Datastream

- Chart 42 puts the attractive risk return characteristics described above into perspective. Risk arbitrage had very high returns with volatility lower than global bonds. However, Chart 43 reveals some outliers in down markets.

The following table shows some further statistics of risk arbitrage.

Table 43: Statistical Analysis of Risk Arbitrage Returns

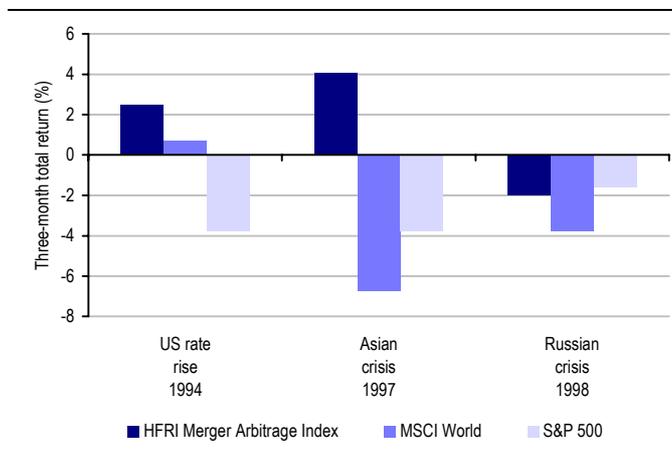
	Alpha to MSCI World	Beta to MSCI World	Skew	Kurtosis	Correlation MSCI World	Correlation JPM Global Bonds
HFRI Merger Arbitrage Index	0.88	0.13	-3.38	15.44	0.376	0.017
MAR Hedge Event-driven: risk arbitrage	0.95	0.13	-1.69	7.96	0.376	-0.078
Hennessee HF Index - Merger Arb	0.91	0.14	-2.66	15.66	0.443	-0.086

Source: HFR, MAR, Datastream, UBS Warburg calculations

- The exposure to the market is higher than in equity market neutral, but still very low at around 0.13.
- The distribution of returns were negatively skewed and strongly leptokurtic, indicating the presence of outliers.
- The correlation to the equity market was around 0.4 and statistically significant at the 99% level. Correlation to bonds was not significant.

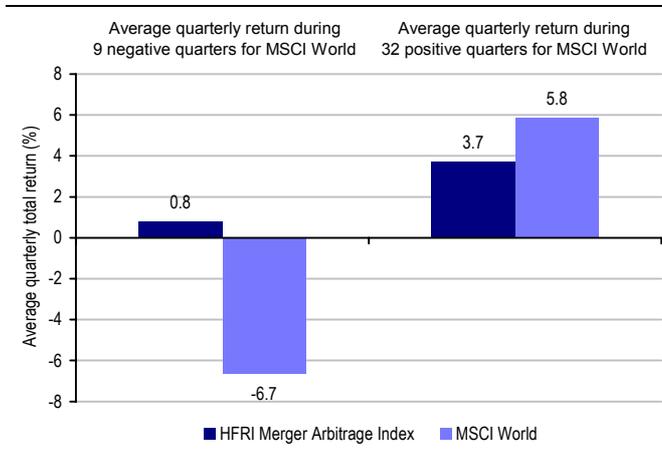
The following two graphs show the performance of the HFRI Merger Arbitrage index in different market environments and average quarterly returns in down-markets versus average quarterly returns in friendly markets.

Chart 44: Scenario Analysis



Source: HFR and Datastream
 US rate rise: Q1 94; Asian crisis: 1 August to 31 October 1997;
 Russian crisis: 1 August to 31 October 1998

Chart 45: Average Negative Versus Average Positive Returns



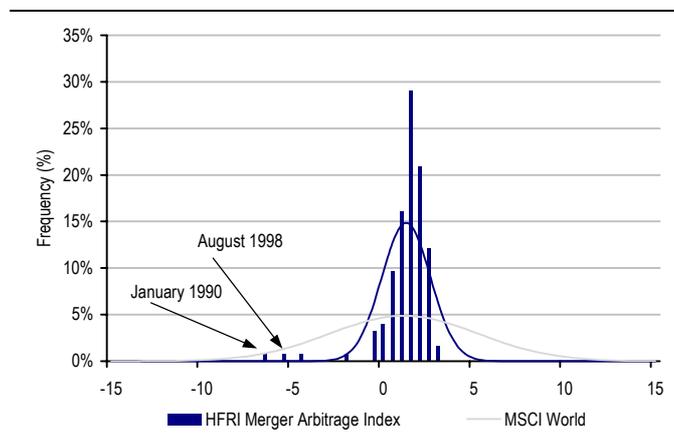
Source: HFR and Datastream

- Either the US rate rise in 1994 or the Asian crisis in 1997 did not negatively affect risk arbitrage. Normally, increases in downside volatility has no impact on the long-term profitability of risk arbitrageurs as the spreads, eventually, converge despite the markets' volatility. However, short-term volatility can have an impact on the spread of longer-duration deals. A market disruption can diminish the risk appetite for longer-duration deals of several months to completion. The spread of the deals which are expected to complete within a couple of weeks are normally not affected by short-term volatility.
- The reason for the negative outliers in risk arbitrage is more micro than macro. There are only a limited number of transactions available to this category and most managers employing this strategy have similar trades put on, ie, long the stock of a company being acquired in a merger, leveraged buyout, or takeover and simultaneously short in the stock of the acquiring company. The opportunities are limited to deals where the acquiring company is a large, listed and liquid traded stock where it is possible to borrow stock for shorting.
- Risk arbitrage offers some degree of protection, although less than some relative-value strategies discussed above. To some extent, risk arbitrage is short equity market delta because a trade is normally transacted on a deal-ratio basis as opposed to a cash-neutral basis. Since January 1990, there were nine quarters where MSCI World reported a negative return. During these quarters, relative-value arbitrage showed an average return of 0.8% which compares to -6.7% in the case of the MSCI World. During the 32 quarters where MSCI World ended in positive territory, the relative-value arbitrage index gained 3.7% per quarter against 5.8% for the MSCI World.

The left graph of the following pair shows how returns have been distributed in the past and compares the historic return distribution with a normal distribution of risk

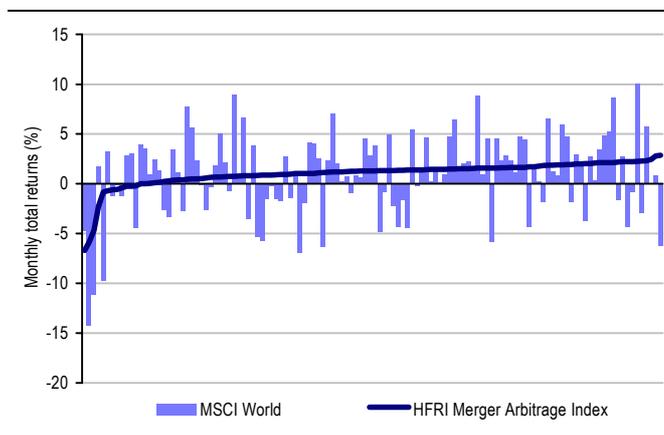
arbitrage and a normal distribution of historical MSCI World returns, both based on historic mean return and standard deviation of returns. For the graph on the right, we have sorted the risk arbitrage returns and compared them to the corresponding market returns. This allows us to see in which market environment the extreme positive and negative returns were achieved.

Chart 46: Return Distribution



Source: HFR, Datastream, UBS Warburg calculations

Chart 47: Correlation

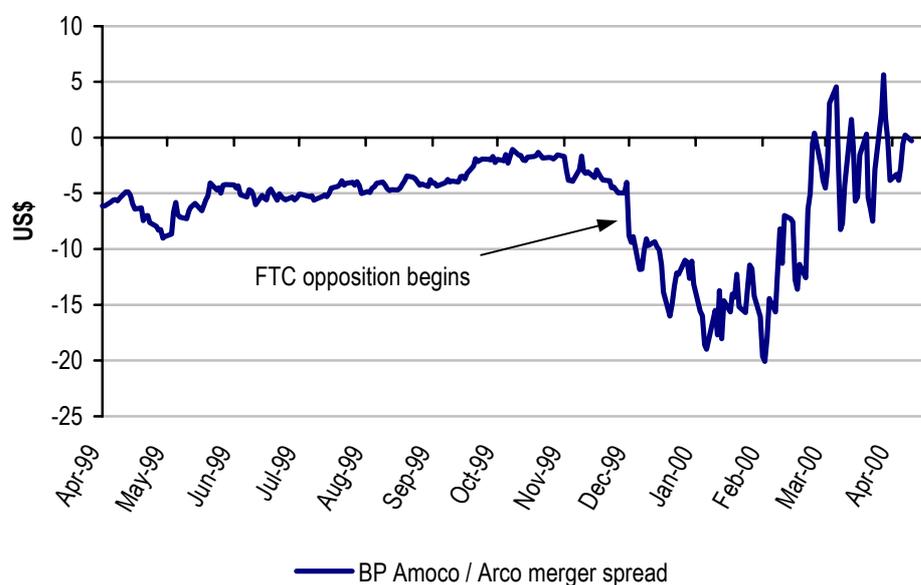


Source: HFR and Datastream

- Chart 46 shows the leptokurtic features of the distribution very well. The historic return distribution has been narrow with more outliers than normality would suggest. Note that the outliers are on the downside and not on the upside. Four returns were outside the two-standard deviation range. This is what we would expect because if a deal goes through, the risk arbitrageur earns the gap between the two merging stocks which, in a semi-efficient market, is not huge, ie, around 10-30%. However, if a deal goes wrong, for example when a deal is cancelled, the arbitrageur is left with a long stock position that collapses and a short position that rallies and where there is a potential short-squeeze since everyone in the market knows that there are many risk arbitrageurs in the market who are forced to unwind their positions. In other words, there are limited outliers on the upside, but outliers on the downside are in the nature of the strategy. We therefore expect the return distribution characteristics to remain similar going forward.
- Chart 47 shows that most negative risk arbitrage returns occurred in down-markets, whereas the extreme positive returns are not dependent on the direction of the market.
- Risk arbitrage occasionally faces some challenges with respect to anti-trust issues. The Federal Trade Commission (FTC), one of the US agencies charged with enforcing antitrust regulations, continues to ‘rethink’ existing merger-review standards. This changing attitude stems from the FTC’s view that a number of mergers that relied on negotiated divestitures have failed to protect competition. Thus, the FTC has taken the stance that they will simply opine on whether the proposed merger would inhibit competition and thereby refrain from participating in more protracted settlement negotiations. When the FTC has communicated this position, a number of deals have experienced difficulties as

evidenced by the break of Royal Ahold/Pathmark, the delayed approval of Exxon/Mobil and the derailment of Abbott Labs/Alza.

Chart 48: BP Amoco/Arco Merger Spread



Source: Datastream, FactSet, Bloomberg, Quadra
Announced 1 April 1999 and completed 18 April 2000.

- In the case of the BP Amoco/Arco acquisition, the FTC was effectively forced to take legal action if they persisted to oppose the merger. As illustrated in Chart 48, the FTC's opposition and potential legal challenge to the BP Amoco/Arco merger had shaken investors' confidence in the deal, causing the spread to widen dramatically. Likewise, other merger deals with regulatory concerns have experienced similar effects.

Conclusion

We regard risk arbitrage as an attractive hedge fund strategy despite higher correlation to equity returns and limited downside protection features. The risks to merger arbitrage are, to a large extent, of a legal/regulatory nature, which is uncorrelated to returns in capital markets. Future profitability of risk arbitrage is determined by the amount of capital involved and to some extent is constraint by the number of opportunities and the ability to sell short.

Outlook

We expect future corporate activity to remain strong, fuelled by continued consolidation in several global styles and a rapid expansion of M&A activity in Europe and Asia, facilitated by booming equity markets and high valuations. The M&A value as a percent of market capitalisation is still well below that of the 1980s. In particular, we expect the number and size of European and cross-border deals to increase significantly, driven by the single currency, disappearing commercial barriers among the EU nations and globalisation. The changes in the law, government regulation and business practices in Europe and Asia could substantially change the investment landscape in these regions. For risk arbitrageurs, 'change' equals 'opportunity'. We expect the overall growth in value in M&A globally to outpace the growth of risk arbitrage capital. This should result in sustaining attractive spreads and risk-adjusted return potential going forward.

The late 1990s has already seen the beginnings of change in Europe manifested in the rise in size and number of cross-border corporate transactions. Despite the EU's sluggishness in forging uniform merger rules, it now appears imminent that the EU will adopt British-style take-over regulations¹. Such rules would still have to be enacted at the national level, however, EU adoption coupled with market forces such as the Mannesmann/Vodafone transaction should pressure national governments to reform their laws. Additional impetus for change in Europe stems from Germany's tax reform approved by the Upper House on 14 July 2000. Tax efficient portfolio re-allocations from 2002 are expected to pave the way for in-market and cross-border mergers in the old economy sectors, and the realisation of cost synergies through rationalisation and economies of scale. Simultaneously, it will probably facilitate balance sheet optimisation of financials and the re-allocation of funds towards more profitable investment areas.

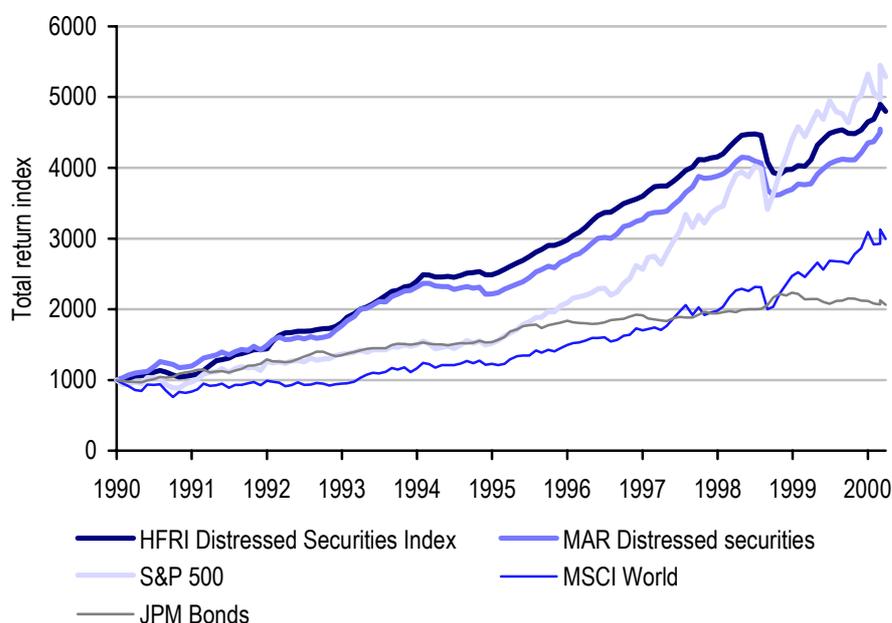
Through less concrete measures, Japan has also officially sanctioned the unwinding of the cross-holdings that have long been a feature of the *keiretsu* system. We are seeing the revitalisation of the moribund equity-linked market as corporations issue exchangeable securities to monetise their cross-holdings. The elimination of cross-holdings would have the secondary effect of spurring corporate take-over activity as the barriers to corporate mergers are lowered. While Europe is farther along in the process, the harmonisation of take-over rules and elimination of tax barriers will likely provide a strong catalyst for change.

With this increasing merger-and-acquisition activity, including the trend of consolidation presently taking place in Europe and Asia, and a growing number of investors looking for reprieve from volatile equity markets, merger arbitrage is a hedge fund strategy likely to grow in importance in portfolios seeking absolute returns and diversification opportunities.

¹ The EC Council of Ministers has agreed a common position on takeovers in June 2000. The directive still needs to be approved by the European Parliament but this is unlikely to present further difficulties.

Distressed Securities

Chart 49: Distressed Securities



Source: HFR, MAR and Datastream

- Distressed securities, as the graph above implies, has been a star performer. It nearly has beaten the mother of all indices, the S&P 500 (total return) index. However, in a world where risk is defined as standard deviation of returns, distressed securities has outperformed equity in the long run. We regard the sustainability of high returns one of the most attractive characteristics of this discipline.

Table 44: Distressed Securities Risk and Return Characteristics

	# of monthly returns*	Annual return (%)	Volatility (%)	Sharpe ratio**	Worst 1-month return (%)	Negative months (%)	Worst 1-year return (%)
S&P 500 (Total return)	124	18.3	13.7	0.97	-14.5	32	-3.1
MSCI World (Total return)	124	11.7	14.1	0.48	-13.3	36	-16.5
MSCI Europe (Total return)	124	13.5	14.7	0.58	-12.6	34	-12.1
HFRI Distressed Securities Index	124	16.4	6.6	1.73	-8.5	16	-6.4
MAR Hedge Event-driven: Distressed securities	123	15.9	7.6	1.44	-9.2	22	-7.6
Hennessee HF Index - Distressed	88	15.0	7.1	1.40	-8.9	18	-8.6

Source: HFR, MAR, Hennessee, Datastream, UBS Warburg calculations

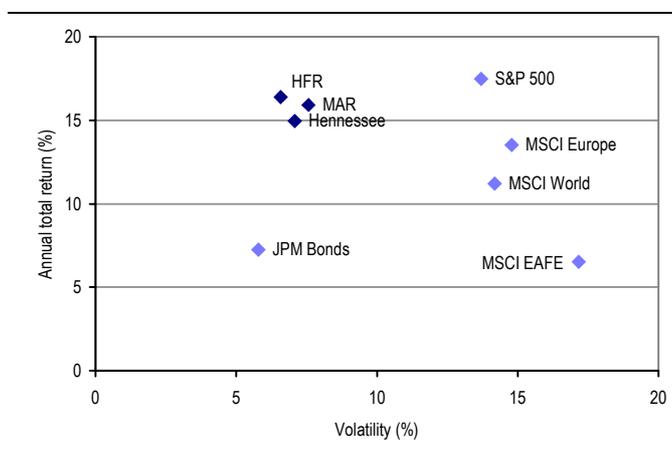
* ending April 2000 (except MAR: ending March 2000); ** based on risk free rate of 5%

- Distressed securities is one of the most profitable hedge fund strategies, resulting in returns to the investor of around 16% a year. This year, the HFRI Distressed Securities Index has increased by 6.8% as of the end of July 2000.

- Volatility is slightly higher than with relative-value strategies or with bonds but substantially lower than with equities. The dispersion of returns has also been higher with distressed securities than with other event-driven strategies such as risk arbitrage. Unlike risk arbitrage, distressed securities have a long bias. The annualised standard deviation has been around 7%. This results in a Sharpe ratio of approximately 1.5.
- Around 20% of the returns were below zero. Distressed securities provide much less downside protection than some relative-value strategies discussed previously. However, the discipline is less erratic on the downside than equities.

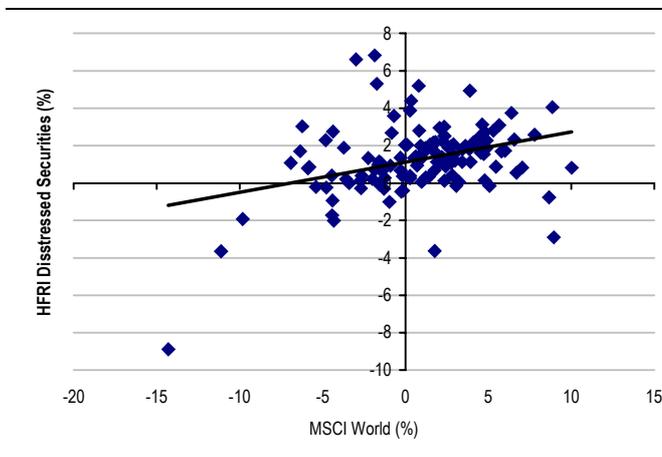
The first of the following two graphs shows the returns of various hedge fund indices with some equity and bond indices. The second graph compares monthly total MSCI World returns with the HFRI Distressed Securities Index.

Chart 50: Return Versus Risk



Source: HFR, MAR, Hennessee, Datastream, UBS Warburg calculations

Chart 51: MSCI World Versus Distressed Securities Returns



Source: HFR and Datastream

- The three distressed securities indices are from three different sources covering two different periods. The fact that they result in nearly the same risk/return profile is an indication that the characteristics are robust and could be stable going forward¹. However, there are some viable reservations regarding the quality of the data for distressed securities. Given the nature of the strategy, managers often hold illiquid positions for which there is no market which makes calculating net asset values at the end of a month rather challenging.
- Chart 51 points to some negative outliers that occur in both positive as well as negative markets.

The following table shows some further statistics of distressed securities.

¹ Note that there is a strong overlap between the different databases. Surely some hedge funds are in all databases.

Table 45: Statistical Analysis of Distressed Securities Returns

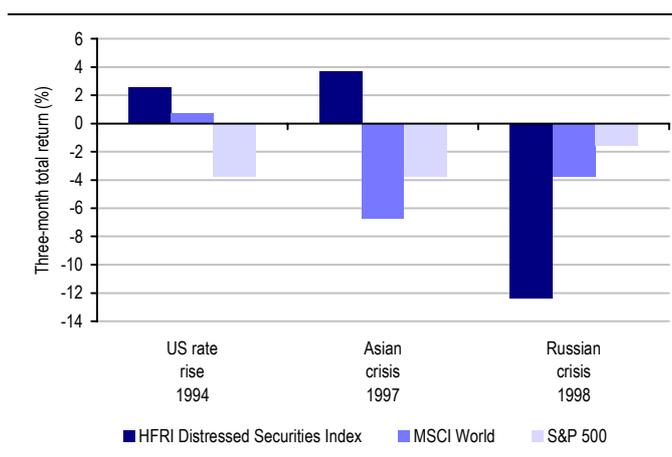
	Alpha to MSCI World	Beta to MSCI World	Skew	Excess Kurtosis	Correlation MSCI World	Correlation JPM Global Bonds
HFRI Distressed Securities Index	1.15	0.15	-1.08	7.38	0.326	-0.174
MAR Hedge Event-driven: Distressed securities	1.02	0.23	-1.16	4.55	0.419	-0.045
Hennessee HF Index - Distressed	0.85	0.24	-1.18	9.34	0.427	-0.173

Source: HFR, MAR, Datastream, UBS Warburg calculations

- The intercept between returns from distressed securities and MSCI World is relatively high, indicating that there are returns not explained by CAPM.
- The beta to the MSCI is around 0.2, which is slightly higher than with some relative-value strategies discussed above.
- Historical returns were slightly negatively skewed (to the left with a long tail to the left) and leptokurtic (narrow distribution with outliers).
- Correlation to equities was around 0.4, the same as for risk arbitrage, the other event-driven strategy discussed in this report. The correlation is statistically significant at the 99% level. The correlation to bonds is not statistically significant. Note that relative-value strategies in equities have a correlation with the market of around 0.25-0.30 whereas event-driven strategies have a correlation coefficient of around 0.40.

The following two graphs show the performance of the HFRI Distressed Securities Index in different market environments and average quarterly returns in down-markets versus average quarterly returns in friendly markets.

Chart 52: Scenario Analysis

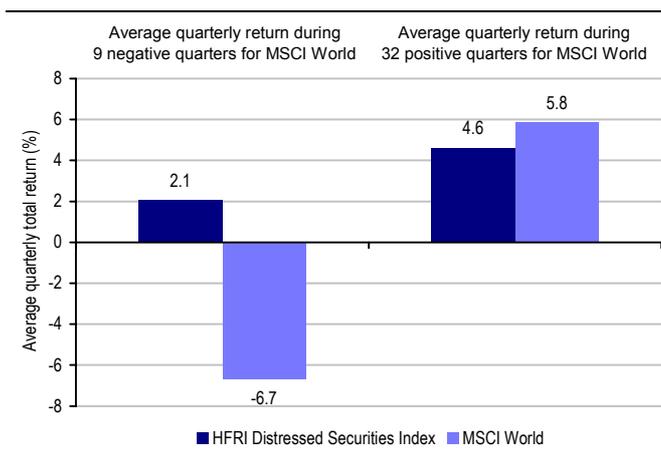


Source: HFR and Datastream.

US rate rise: Q1 94; Asian crisis: 1 August to 31 October 1997;

Russian crisis: 1 August to 31 October 1998

Chart 53: Average Negative Versus Average Positive Returns

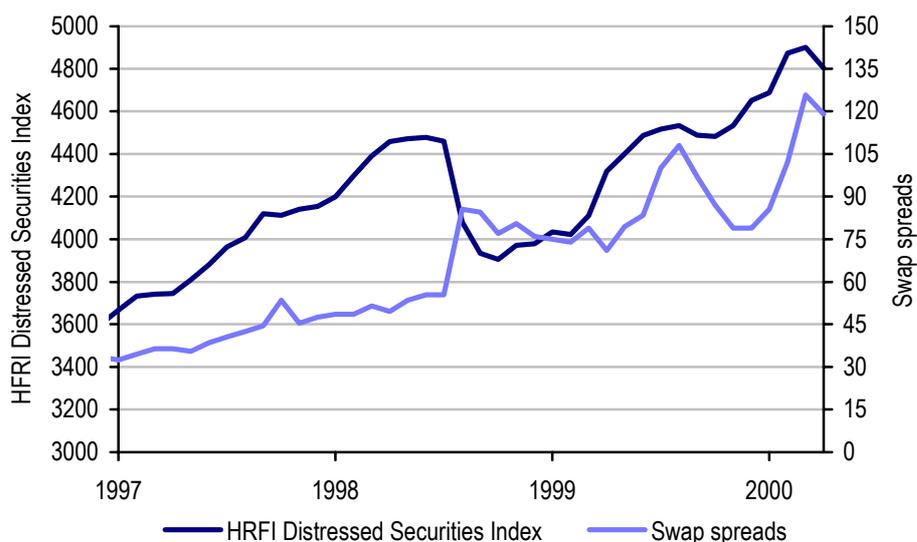


Source: HFR and Datastream

- Intuitively, we would not expect distressed securities to lose money during a global crisis since the positions in distressed securities are more micro than macro. Distressed securities showed nearly the same returns as risk arbitrage

during the US rate rise in 1994 and the Asian crisis in 1997. However, the strategy was one of the worst performers during the Russian crisis (or credit crisis) in 1998. Only emerging markets and fixed income arbitrage suffered larger losses during autumn 1998. The nature of the strategy is to be long low investment grade credit. A widening of credit spreads is bad for the strategy as the following graph illustrates. 1998 was the worst year since 1990 where the HFRI Distressed Securities Index lost 4.2%.

Chart 54: Distressed Securities Versus Swap Spreads



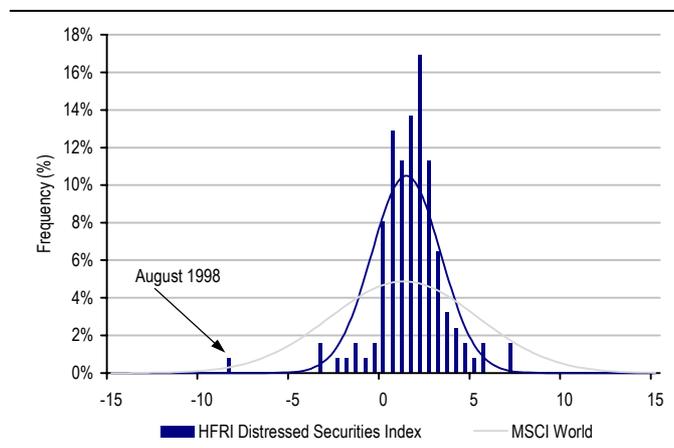
Source: HFR, Bloomberg

- Distressed securities strategies perform poorly in recessions. 1990 and 1994 saw returns of 6.4% and 3.8% respectively. However, the recessions led to a number of well established companies running into financial difficulties, which meant that there were good opportunities in this segment in the years that followed recession years. In the years 1991 and 1995, distressed securities yielded returns of 35.7% and 19.7% respectively.
- The 1999 calendar year witnessed 144 publicly traded US companies with total assets of US\$58.6bn filing for Chapter 11 bankruptcy. This was the greatest number of defaults in any year since 1986 and the greatest asset total in any year since 1992, when US\$64.2bn went into Chapter 11. Calendar returns of the HFRI Distressed Securities index in 1992 and 1999 were 25.2% and 16.9% respectively.
- In average down-quarters distressed securities yields a positive absolute return as Chart 53 shows. However, the strategy does better in equity-friendly markets. As fixed income arbitrage and, to a lesser extent, convertible arbitrage, investors invested in distressed securities are short a disaster put option. If disaster strikes, credit spreads widen, and distressed securities fund managers lose money.

The left graph of the following pair shows how returns have been distributed in the past and compares the historic return distribution with a normal distribution of distressed securities and a normal distribution of historical MSCI World returns

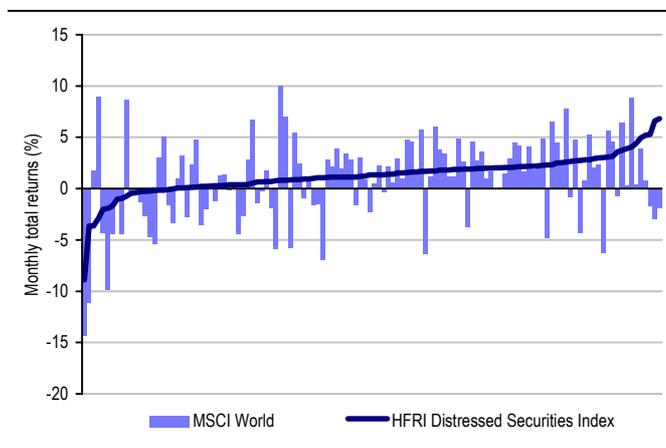
both based on historic mean return and standard deviation of returns. For the graph on the right, we have sorted the distressed securities returns and compared them with the corresponding market returns. This allows us to see in which market environment the extreme positive and negative returns were achieved.

Chart 55: Return Distribution



Source: HFR, Datastream, UBS Warburg calculations

Chart 56: Correlation



Source: HFR and Datastream

- Chart 55 shows the positive kurtosis (narrow distribution with outliers) of the historical return distribution when compared with the normal distribution. Note that 20 from the 124 monthly returns were below zero which compares with 40 in the S&P 500 total return index and 45 in the case of the MSCI World total return index. There were eight observations outside the 95% range, four on the upside and four on the left-hand side of the mean return. We believe the nature of the strategy dictates the presence of outliers going forward since, to some extent, investors in distressed securities are short a disaster put option.
- Negative returns from distressed securities were moderately concentrated in down markets. Note that the highest returns were achieved in down-markets too.

Conclusion

Based on risk considerations, distressed securities represent the average hedge fund discipline: not the most conservative and not the most aggressive strategy. For the long-term investors distressed securities are attractive because of high returns with medium risk and the sustainability and predictability of this relationship.

Outlook

As long as companies blow up, we expect managers of distressed securities to make money. The strategy is a good example of regulatory arbitrage. Most investors must sell securities of troubled companies. Policy restrictions and regulatory constraints do not allow them to own securities with very low credit ratings. As a result, a pricing discount occurs that reflects both these structural anomalies as well as uncertainty about the outcome of the event. For the attractive risk/return combinations in distressed securities to disappear, in our opinion, investment policies and financial regulation would have to change dramatically.

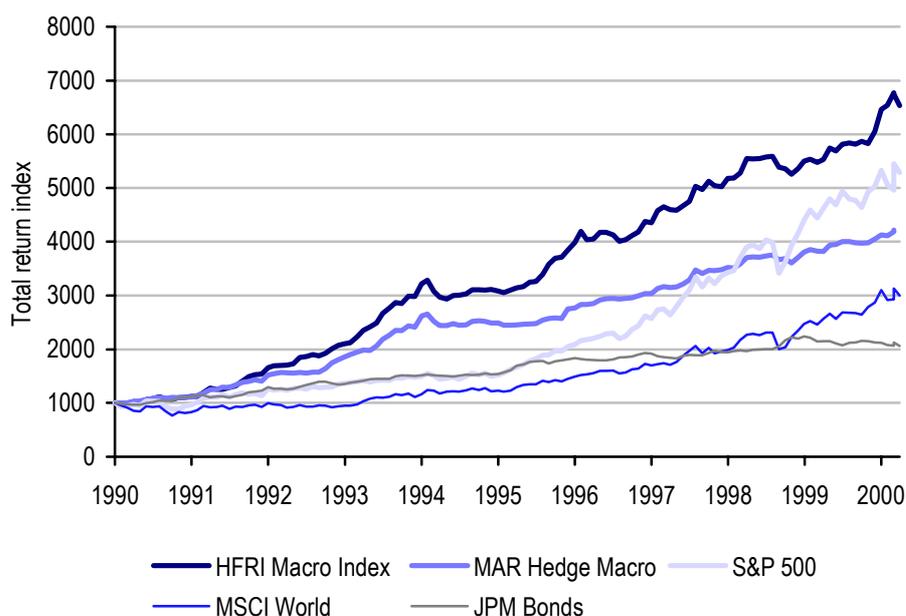
This concludes our performance analysis for event-driven strategies. In the following section, we take a closer look at some strategies we branded ‘opportunistic’.

Opportunistic Absolute-Return Strategies

In some hedge fund universes, ‘opportunistic’ is defined as a sub-category with short-term investment horizon. Note that in this report we use the term to classify hedge funds which are not relative-value (ie, market neutral) or event-driven. Except short sellers, hedge funds in this category are long or have a long bias.

Macro

Chart 57: Macro



Source: HFR, MAR and Datastream.

- Macro funds, as a group, have performed well in the past. However, after recent events, the sustainability of these returns are of interest. We suspect that macro investing is simply a leveraged bet on the market.

Table 46: Macro Risk and Return Characteristics

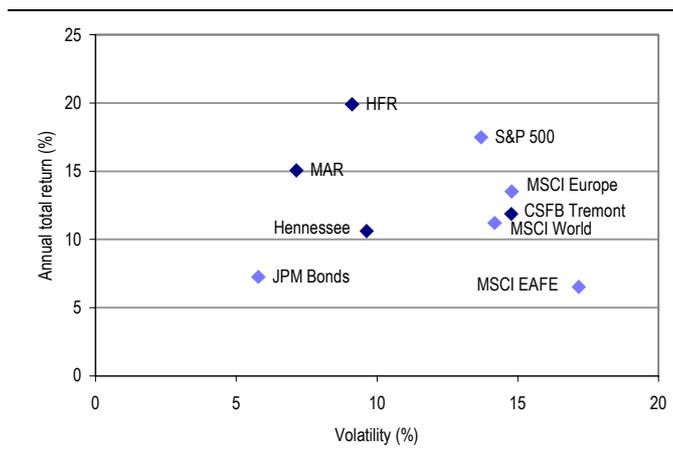
	# of monthly returns*	Annual return (%)	Volatility (%)	Sharpe ratio**	Worst 1-month return (%)	Negative months (%)	Worst 1-year return (%)
S&P 500 (Total return)	124	18.3	13.7	0.97	-14.5	32	-3.1
MSCI World (Total return)	124	11.7	14.1	0.48	-13.3	36	-16.5
MSCI Europe (Total return)	124	13.5	14.7	0.58	-12.6	34	-12.1
HFRI Macro Index	124	19.9	9.1	1.64	-6.40	29	-7.1
MAR Hedge Macro	123	15.1	7.1	1.41	-5.36	28	-7.9
Hennessee HF Index - Macro	88	10.6	9.6	0.58	-7.52	40	-13.8
CSFB/Tremont Global Macro	76	12.8	14.8	0.53	-11.55	39	-22.2

Source: HFR, MAR, Hennessee, CSFB/Tremont, Datastream, UBS Warburg calculations
 * ending April 2000 (except MAR: ending March 2000); ** based on risk free rate of 5%

- There are large differences between the different hedge fund databases we used for this report. One return characteristic seems to be that the longer the data series used, the better the performance is, both absolute and on a risk-adjusted basis.
- Risk-adjusted returns seem high when measured over the past ten years. However, the Sharpe ratio derived from the CSFB/Tremont macro index indicates that the heyday of macro funds are over, ie, the index performed in line with MSCI World total return index. The CSFB/Tremont macro index starts in 1994. The annual returns from HFR, MAR and Hennessee for the period of January 1994 to April 2000 (MAR until March) fall to 11.8%, 7.9% and 6.9% respectively. The Sharpe ratios fall to 0.78, 0.44 and 0.20. In other words, macro funds have become less attractive to investors over time. Currently, we do not see the catalyst for this trend to reverse. The HFRI Macro Index fell by 1% from January to July 2000, despite opportunities in form of interest rates rises in the US, the Euro in free-fall, and the rising oil prices.

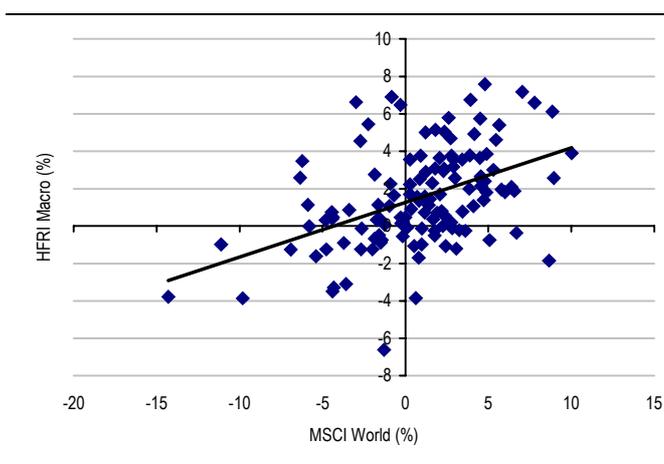
The first of the following two graphs shows the returns of various hedge fund indices with some equity and bond indices. The second graph compares monthly total MSCI World returns with the HFRI Macro index.

Chart 58: Return Versus Risk



Source: HFR, MAR, Hennessee, Datastream, UBSW calculations.

Chart 59: MSCI World Versus Macro Returns



Source: HFR and Datastream.

- Chart 58 reveals that macro funds are difficult reviewed as a group. The group in itself is strongly heterogeneous. The dispersion among single fund returns is extraordinary. In addition, as we have pointed out, hedge fund data in general is not perfect. It seems that macro fund data from different data vendors is heavily biased towards selection and mean returns and historical standard deviations strongly period dependent.
- Chart 59 shows the negative outliers occurring in down markets. This suggests that downside correlation to other asset markets is high.

The following table shows some further statistics on macro returns.

Table 47: Statistical Analysis of Macro Returns

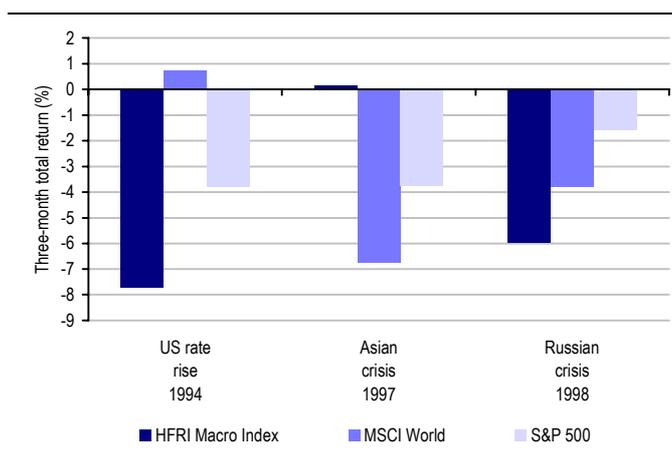
	Alpha to MSCI World	Beta to MSCI World	Skew	Excess kurtosis	Correlation MSCI World	Correlation JPM Global Bonds
HFRI Macro Index	1.26	0.29	0.05	0.17	0.451	0.071
MAR Hedge Macro	0.99	0.19	0.69	2.02	0.369	-0.017
Hennessee HF Index - Macro	0.31	0.41	-0.18	0.88	0.533	-0.025
CSFB/Tremont Global Macro	0.52	0.34	-0.09	0.60	0.297	-0.209

Source: HFR, MAR, Hennessee, CSFB/Tremont, Datastream, UBSW calculations.

- The statistics vary across data vendors and across different time periods. Alpha is higher and beta is lower when longer periods are analysed. This is a conformation of statements made earlier with respect to diminishing investment opportunities in this discipline.
- The distribution of historical returns is hardly skewed and only shows a minimal degree of positive excess kurtosis.
- The correlation to equities ranges from 0.3 to 0.55.

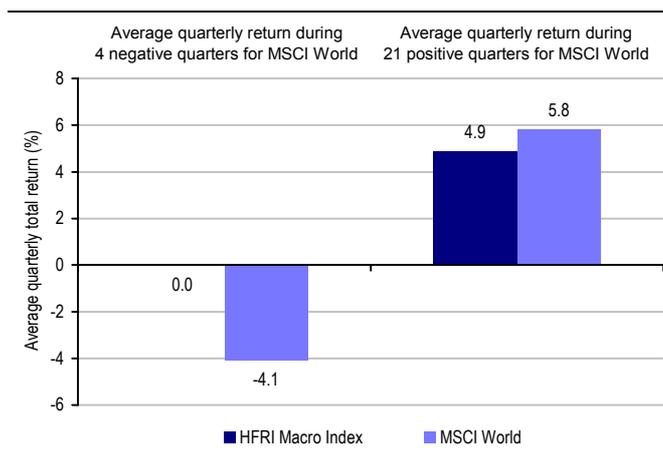
The following two graphs show the performance of the HFRI Macro index in different market environments and average quarterly returns in down-markets versus average quarterly returns in friendly markets. Note that we changed the time period in Chart 61. We have reduced the period to January 1994 through March 2000 period to take into account that macro yielded higher returns in the distant past than they did in the recent past. Chart 61, therefore, is based on 25 quarterly returns.

Chart 60: Scenario Analysis



Source: HFR and Datastream.
 US rate rise: Q1 94; Asian crisis: 1/8/97-31/10/97; Russian crisis: 1/8/98-31/10/98

Chart 61: Average Negative Versus Average Positive Returns



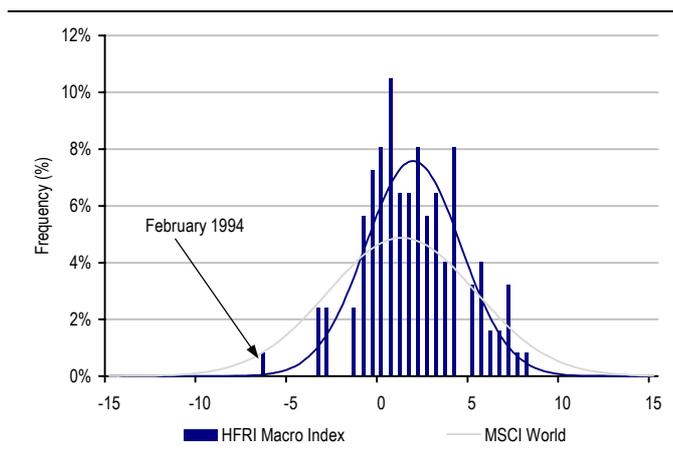
Source: HFR and Datastream.

- Macro funds were hit hard during the US rate rise in Q1 94 and during the Russian credit crisis in 1998. Macro funds, overall, were flat during the Asian crisis in 1997.

- The Asian crisis was much reminiscent of the ERM Crisis of 1992. Substantial amounts of ‘carry trades’ were involved in the build-up of both crises. These carry trades allowed Thai corporations and banks to borrow in foreign currencies, which had a lower interest rate than the domestic currency. As long as the domestic currency did not depreciate, the foreign currency loans represented a cheap source of funding. In the end, the carry trade led to an unsustainable equilibrium. By fixing the exchange rate, the Thai central bank was indirectly paying a risk premium to foreign investors to support domestic funding needs. However, when these foreign ‘lenders’ are themselves highly leveraged institutions such as proprietary desks from investment banks (and occasionally leveraged domestic corporations), the resultant equilibrium is at best tenuous. In July 1997, for whatever reason, some foreign lenders decided to unwind their carry trades in Thailand. They sold baht and bought dollars in the spot market, putting tremendous pressure on the baht.
- Chart 61 shows that since 1994, macro funds provided some downside protection but underperformed equities during bull phases. Since 1990, the HFRI Macro index showed a positive average quarterly return of 1.4%, while the MSCI World total return index fell by an average of 6.7%. The macro index increased by 5.9% in quarters where the MSCI index increase by 5.8% on average. This underlines the observation that terms are deteriorating.

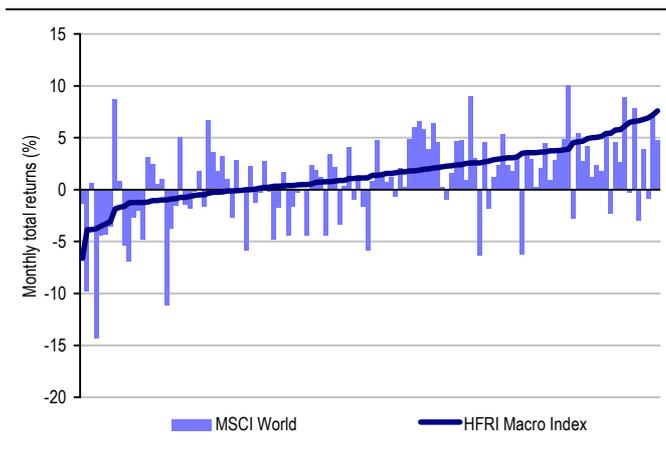
The left graph of the following pair (Chart 63) shows how returns have been distributed in the past and compares the historic return distribution with a normal distribution of macro and a normal distribution of historical MSCI World returns both based on historic mean return and standard deviation of returns. For the graph on the right, we have sorted the macro returns and compared them with the corresponding market returns. This allows us to see in which market environment the extreme positive and negative returns were achieved.

Chart 62: Return Distribution



Source: HFR, Datastream, UBS Warburg calculations.

Chart 63: Correlation



Source: HFR and Datastream.

- There were four outliers lower than two standard deviations from the mean and three returns higher than two standard deviations above the mean. The February 1994 return is outside the 99% range (three standard deviation from mean).

- Chart 63 shows that the negative macro returns occurred in negative markets where as the extremely positive returns were primarily achieved during strong equity markets. This suggests that there is a high correlation to equities both in falling as well as in rising markets.

Conclusion and outlook

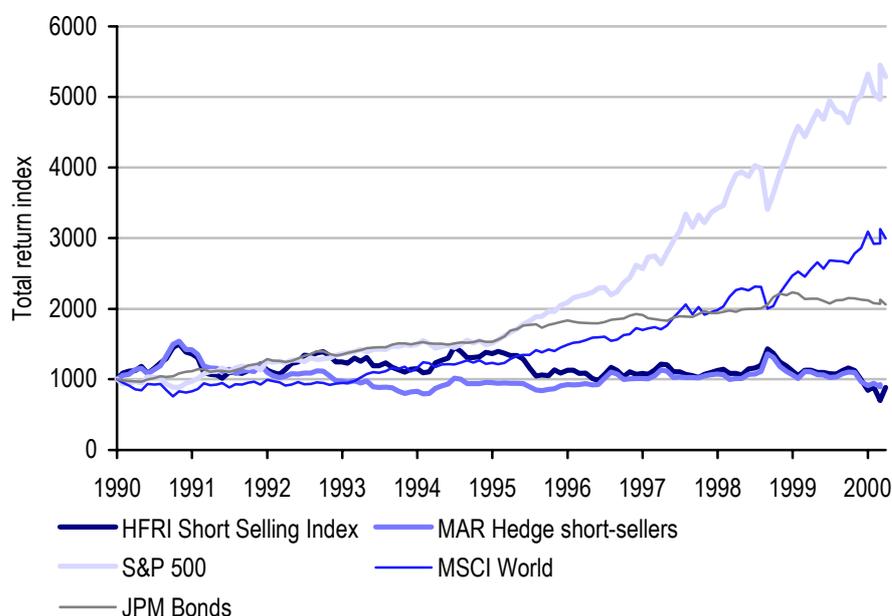
We regard macro funds as one of the least attractive strategies in the hedge fund universe of strategies. The (prior April 2000) 300-fold performance of George Soros Quantum fund is not representative for the discipline as a whole. Macro funds are the least focused, and their investment philosophy most vague.

However, there will probably be always be macro fund managers that will deliver returns of 30-40% to their partners. Given the performance of the euro versus the US dollar and the increase in oil prices so far this year (September 2000), it is certainly not a lack of opportunities that is causing a poor year-to-date performance of macro funds. As Louis Moore Bacon put it: 'At the end of the day, the overall viability of the ... [macro] funds continues to rest on my abilities to call the markets and manage risk'.¹ We expect the popular press to continue to pick macro managers and promote them to 'icons of finance.' Our reservations for macro funds derives from the belief that these icons can be identified ex-post but not ex-ante. In 1969 it was difficult to foresee that a dollar given to a Mr. Soros would grow to US\$300 within three decades.

¹ from Institutional Investor (2000)

Short Sellers

Chart 64: Short Sellers



Source: HFR, MAR and Datastream.

- Given the long bull market, hedge funds dedicated to a short bias have not done extremely well in the past.

Table 48: Short Sellers Risk and Return Characteristics

	# of monthly returns*	Annual return (%)	Volatility (%)	Sharpe ratio**	Worst 1-month return (%)	Negative months (%)	Worst 1-year return (%)
S&P 500 (Total return)	124	18.3	13.7	0.97	-14.5	32	-3.1
MSCI World (Total return)	124	11.7	14.1	0.48	-13.3	36	-16.5
MSCI Europe (Total return)	124	13.5	14.7	0.58	-12.6	34	-12.1
HFRI Short Selling Index	124	-1.1	22.2	-0.28	-21.7	52	-25.4
MAR Hedge short-sellers	123	-0.7	17.2	-0.33	-12.1	50	-27.8
Hennessee HF Index - Short Only	88	-7.7	21.1	-0.60	-13.8	57	-29.3
CSFB/Tremont Dedicated Short Bias	76	-4.9	17.7	-0.56	-8.7	55	-28.0

Source: HFR, MAR, Hennessee, CSFB/Tremont, Datastream, UBSW calculations.

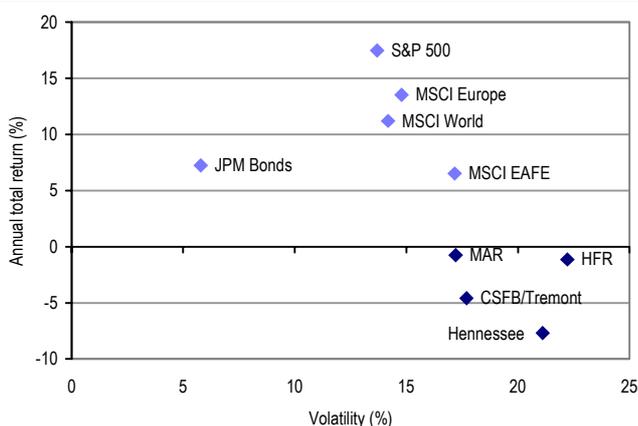
*Ending April 2000 (except MAR: ending March 2000). **based on risk free rate of 5%

- All short selling indices reported negative annual returns over the period available. Volatility was substantially higher than in equities in general.
- The worst one-month return varies between -9% and -22%, respectively. The worst one-year cumulative return varies between -25% and -29%, respectively.

- More than 50% of the returns were below zero due to the extended length of the current bull market.¹

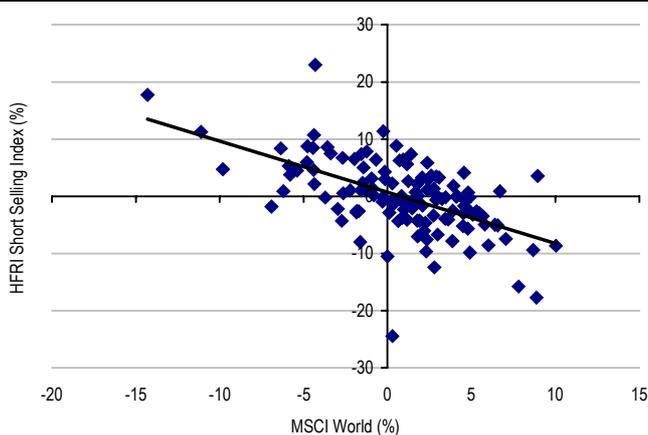
The first of the following two graphs shows the returns of various hedge fund indices with some equity and bond indices. The second graph compares monthly total MSCI World returns with the HFRI Short Selling index.

Chart 65: Return Versus Risk



Source: HFR, MAR, Hennessee, CSFB/Tremont, Datastream, UBSW calculations.

Chart 66: MSCI World Versus Short Selling Returns



Source: HFR and Datastream.

- Chart 66 shows the negative correlation of short selling to equities. Note that the y-axis is of larger scale than the x-axis and the slope is around -1.

The following table shows some further statistics of short selling.

Table 49: Statistical Analysis of Short Selling Returns

	Alpha to MSCI World	Beta to MSCI World	Skew	Excess kurtosis	Correlation MSCI World	Correlation JPM Global Bonds
HFRI Short Selling Index	0.70	-0.90	-0.13	2.46	-0.580	-0.070
MAR Hedge short-sellers	0.62	-0.74	0.37	1.91	-0.610	-0.007
Hennessee HF Index - Short Only	0.85	-1.16	0.88	4.48	-0.708	-0.094
CSFB/Tremont Dedicated Short Bias	0.83	-0.98	0.91	2.49	-0.730	-0.009

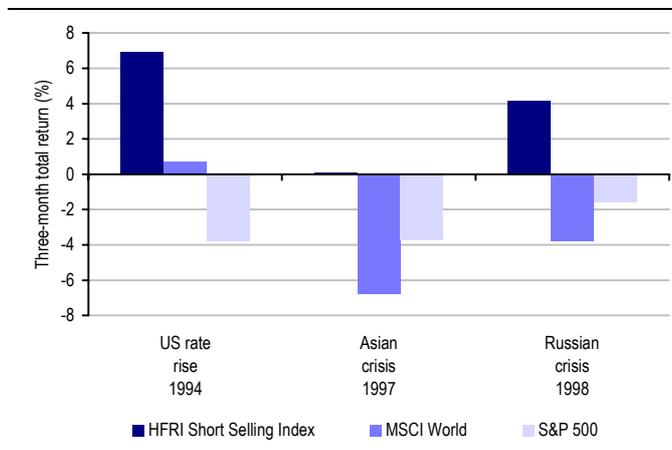
Source: HFR, MAR, Hennessee, CSFB/Tremont, Datastream, UBSW calculations.

- The exposure to the market as a whole is around -1.
- The distribution of returns seems slightly positively skewed when the HFR index is ignored. Returns were also slightly leptokurtic.
- Correlation to MSCI World is around -0.7 and statistically significant. Correlation to bonds is not significant.

¹ We assumed here that we are still in the bull market which started 1982 (September 2000).

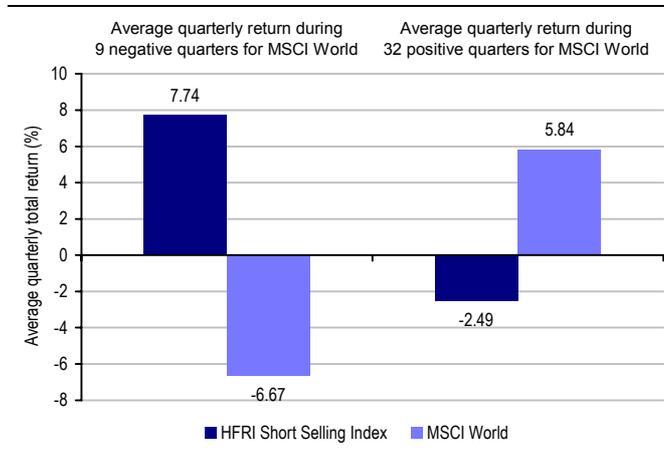
The following two graphs show the performance of the HFRI Short Selling index in different market environments and average quarterly returns in down-markets versus average quarterly returns in friendly markets.

Chart 67: Scenario Analysis



Source: HFR and Datastream.
 US rate rise: Q1 94; Asian crisis: 1/8/97-31/10/97; Russian crisis: 1/8/98-31/10/98

Chart 68: Average Negative Versus Average Positive Returns

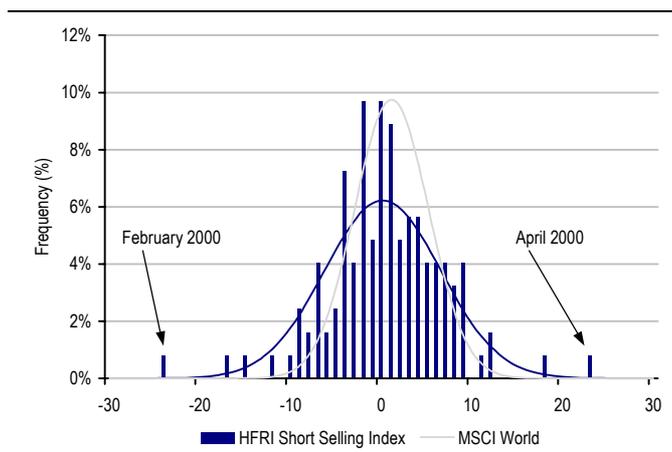


Source: HFR and Datastream.

- Short sellers were the only category reporting positive returns in autumn 1998. Short sellers outperformed the other strategies analysed in this report in Q1 94 but not during the Asian crisis 1997. Long/short equity performed best during the Asian crisis.
- When markets fall by x%, short sellers earn 1.16x on average. However, if markets rise by x%, short sellers lose around 0.42x on average. This asymmetry suggests that short sellers could perform well in flat markets.
- We described fixed income arbitrage and distressed securities being short a disaster put option because of its negative correlation with credit spreads and its erratic and negative returns when markets tumble. Short selling has some elements of a long disaster put option position. Returns are negatively correlated with equity markets. This negative correlation features seem to hold during market crises, ie, if history is any guide, short sellers do well when nearly everyone else in the industry does not.

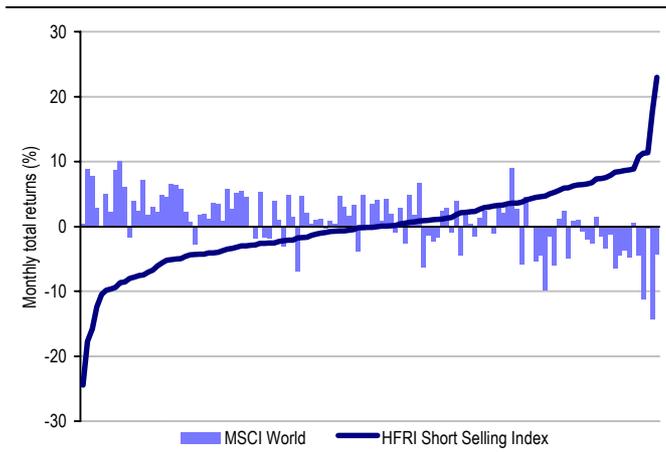
The left graph of the following pair (Chart 70) shows how returns have been distributed in the past and compares the historic return distribution with a normal distribution of short sellers and a normal distribution of historical MSCI World returns, both based on historic mean return and standard deviation of returns. For the graph on the right, we have sorted the short sellers' returns and compared them to the corresponding market returns. This allows us to see in which market environment the extreme positive and negative returns were achieved.

Chart 69: Return Distribution



Source: HFR, Datastream, UBS Warburg calculations.

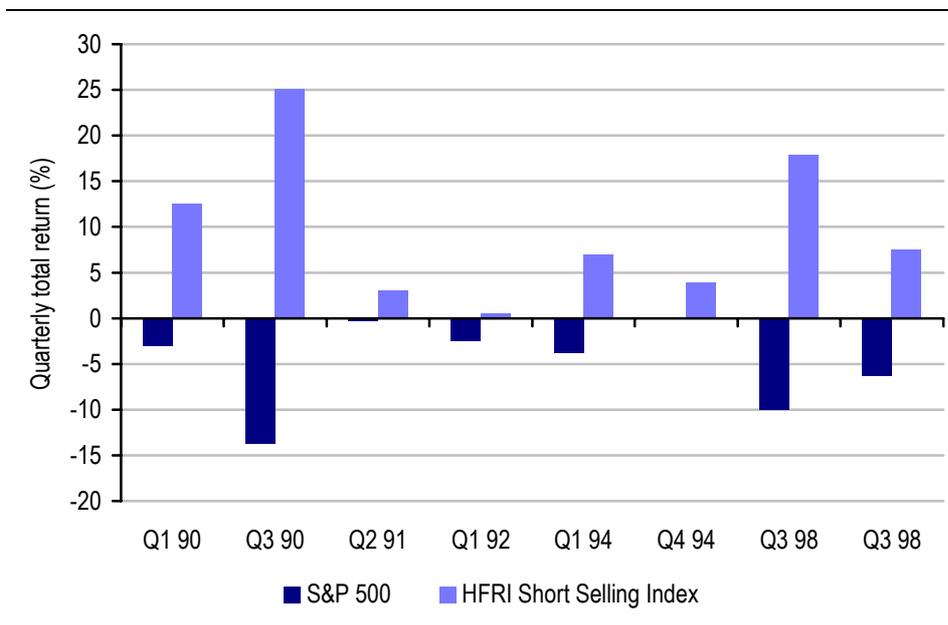
Chart 70: Correlation



Source: HFR and Datastream.

- The frequency distribution of historical returns looks fairly normal with a few outliers. There were five outliers outside the 95% range, three on the downside and two on the upside. There were two outliers outside the three standard deviation range, one on each side. The most extreme positive return was achieved in April 2000 when TMT corrected. At the end of July 2000, the HFRI Short Selling Index was up 2% for the year.

Chart 71: Short Sellers in Down-Quarters



Source: HFR and Datastream.

- Chart 70 shows the reverse relationship between market returns and returns from short selling. Note that the extreme returns from short selling are much more erratic than the corresponding market returns. This is due to profits from two different sources, the (possibly leveraged) short equity position and the short interest rebate.

- From eight negative quarters in the S&P 500 (from Q1 90 until Q1 00), short sellers reported positive returns in all cases implying correlation of -0.90 and a beta of -1.6 (Chart 71).

Conclusion

The main advantage of short sellers is their negative correlation with equities. If the equity markets go down one can expect hedge funds with a short bias to make money. In a portfolio context, exposure to short sellers, therefore, can be seen as a partial hedge.

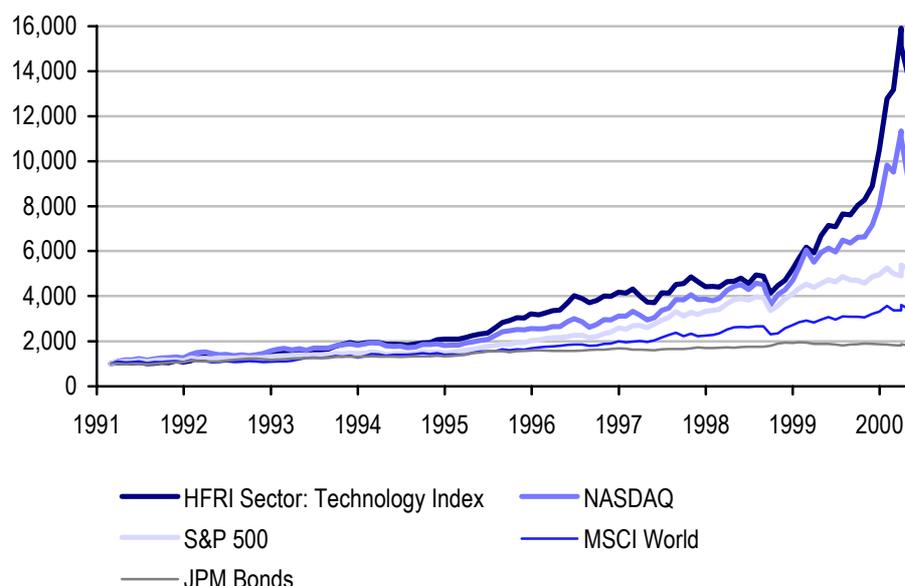
Outlook

According to Tremont (1999) estimates, only around 0.4% of assets under management are in the short selling discipline. We do not believe this to change significantly over time. However, the analysable history of hedge funds has never witnessed an extensive bear market. It is possible that many long/short equity funds employ a short bias during a bear market.

Sector Hedge Funds

In our classification (Chart 4 on page 20) we defined one opportunistic style as ‘Long region, industry or style.’ This covers many different kinds of hedge funds. In the following, we look at a particular sector as an example. The characteristics of the chosen sector – Technology – cannot be representative for all sector hedge funds.

Chart 72: Technology



Source: HFR, MAR and Datastream.

- Based on data from HFR, hedge funds in technology outperformed the NASDAQ index substantially, especially since Q1 99.

Table 50: Technology Risk and Return Characteristics

	# of monthly returns*	Annual return (%)	Volatility (%)	Sharpe ratio**	Worst 1-month return (%)	Negative months (%)	Worst 1-year return (%)
NASDAQ Composite	111	27.3	20.9	1.07	-22.2	32	-5.7
S&P 500 (Total return)	111	18.7	13.1	1.04	-14.5	30	0.5
MSCI World (Total return)	111	13.3	12.8	0.48	-13.3	33	-4.7
MSCI Europe (Total return)	111	14.2	13.9	0.58	-12.6	32	-12.1
HFRI Sector: Technology Index	111	32.9	18.8	1.48	-15.2	32	-8.9
Hennessee HF Index - Technology	52	41.0	18.3	1.96	-10.4	29	4.4

Source: HFR, Hennessee, Datastream, UBS Warburg calculations

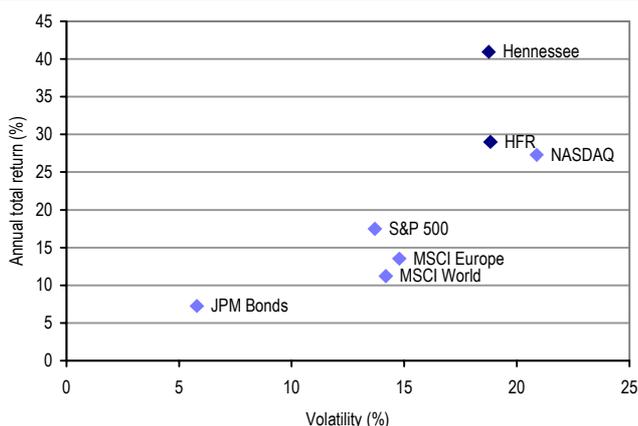
*Ending April 2000. **Based on risk free rate of 5%

- Returns in the technology sector have been between 33% and 41%, to some extent capturing the equity risk premium of the sector. In 1999, the HFRI Technology Index increased by 124.3% and by 3.0% in 2000 (as of July).

- Volatility has been around 18%, which is slightly lower than a comparable index such as the NASDAQ Composite. The low volatility figure is to some extent surprising. Hedge fund portfolios are often strongly concentrated and certainly not as broad as the NASDAQ Composite with more than 4,500 members. The low volatility is an indication that the hedge fund managers do not participate fully in the swings of the sector, ie, hedging early or taking profits early. A further explanation is the low correlation among the various Technology hedge funds. Where one would expect traditional Technology funds to have similar portfolios, portfolios of alternative managers might vary substantially in terms of stock selection, net economic leverage and ratio between long and short positions.
- The worst monthly loss was around 15% in August 1998, which compares with a corresponding fall in the NASDAQ of 22%.

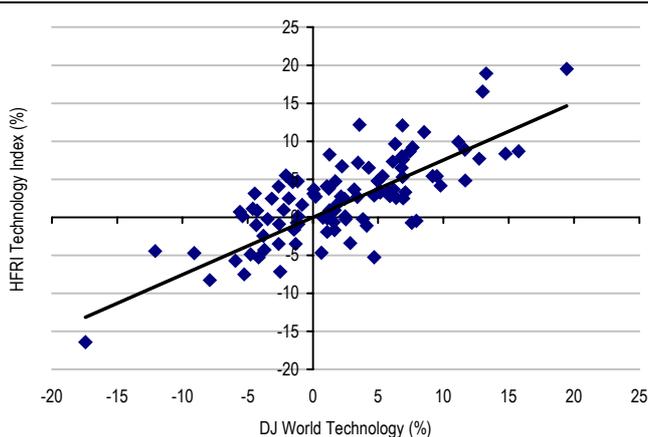
The first of the following two graphs (Chart 74) shows the returns of various hedge fund indices with some equity and bond indices. The second graph compares monthly total MSCI World returns with the HFRI Technology index.

Chart 73: Return Versus Risk



Source: HFR, Hennessee, Datastream, UBS Warburg calculations

Chart 74: MSCI World Versus Technology Returns



Source: HFR, Datastream

The following table shows some further statistics of Technology hedge funds.

Table 51: Statistical Analysis of Technology Returns

	Alpha to NASDAQ	Alpha to NASDAQ	Skew	Excess kurtosis	Correlation NASDAQ	Correlation JPM Global Bonds
HFRI Sector: Technology Index	0.76	0.80	0.20	1.75	0.887	-0.016
Hennessee HF Index - Technology	1.27	0.64	0.13	0.56	0.915	-0.034

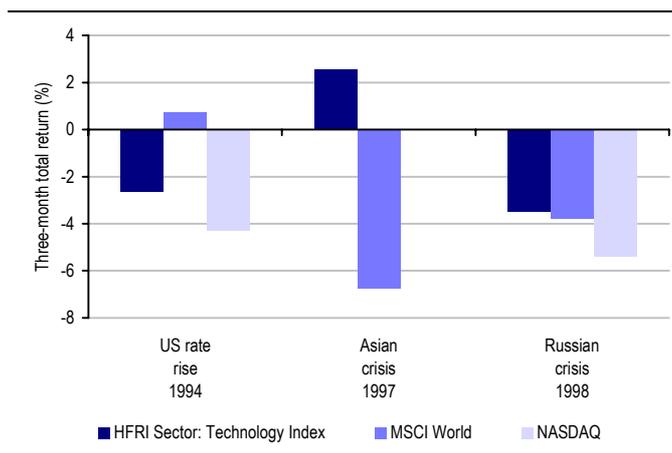
Source: HFR, Hennessee, Datastream, UBS Warburg calculations

- Beta to market is high. In other words, a typical characteristic of sector funds is that they get their returns to a large extent from being long, ie, capturing the equity risk premium.

- The distribution of historic return measured traces of positive skew and positive kurtosis.
- Correlation with NASDAQ is high, ie, around 0.90.

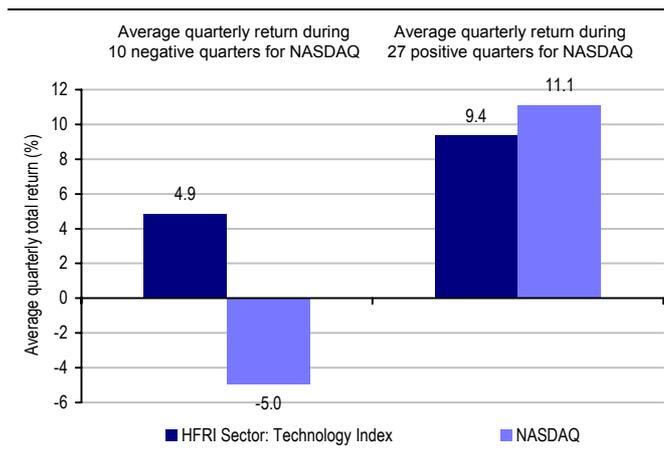
The following two graphs show the performance of the HFRI Technology index in different market environments and average quarterly returns in down-markets versus average quarterly returns in friendly markets.

Chart 75: Scenario Analysis



Source: HFR, Datastream
 US rate rise: Q1 94; Asian crisis: 1/8/97-31/10/97; Russian crisis: 1/8/98-31/10/98

Chart 76: Average Negative Versus Average Positive Returns

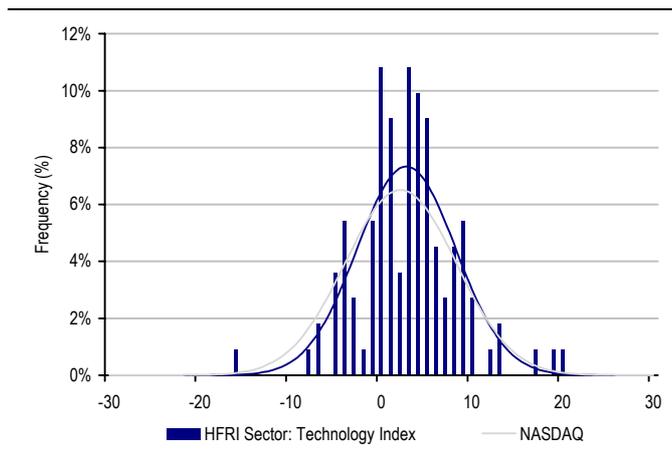


Source: HFR, Datastream

- Technology hedge funds have outperformed the NASDAQ during the US rate rise in 1994, the Asian crisis and even in autumn 1998.
- Technology hedge funds substantially outperform the market when markets fall. On average, hedge funds in the Technology sector have outperformed the NASDAQ by nearly ten percent in down-quarters by underperforming the index by around two percent in up-quarters.

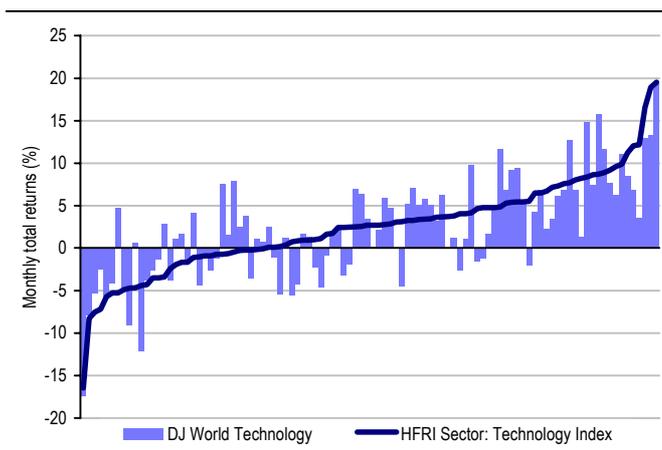
The left graph of the following pair (Chart 78) shows how returns have been distributed in the past and compares the historic return distribution with a normal distribution of hedge funds in the Technology sector and a normal distribution of historical NASDAQ returns, both based on historic mean return and standard deviation of returns. For the graph on the right, we have sorted the hedge funds returns and compared them with the corresponding market returns. This allows us to see in which market environment the extreme positive and negative returns were achieved.

Chart 77: Return Distribution



Source: HFR, Datastream, UBS Warburg calculations.

Chart 78: Correlation



Source: HFR and Datastream.

- The frequency distribution has some resemblance with a normal distribution. The normal distribution derived from Technology sector hedge fund returns has a higher historical mean return with slightly lower volatility than the NASDAQ equivalent normal distribution. There were four returns outside the 95% range from the HFRI Sector Technology Index, three of them positive. A total of three returns were outside the 99% range, two of them positive.
- Chart 76 reveals where this hedge fund style derives its returns. As already mentioned, the primary source of return of sector funds is the return of the underlying sector.

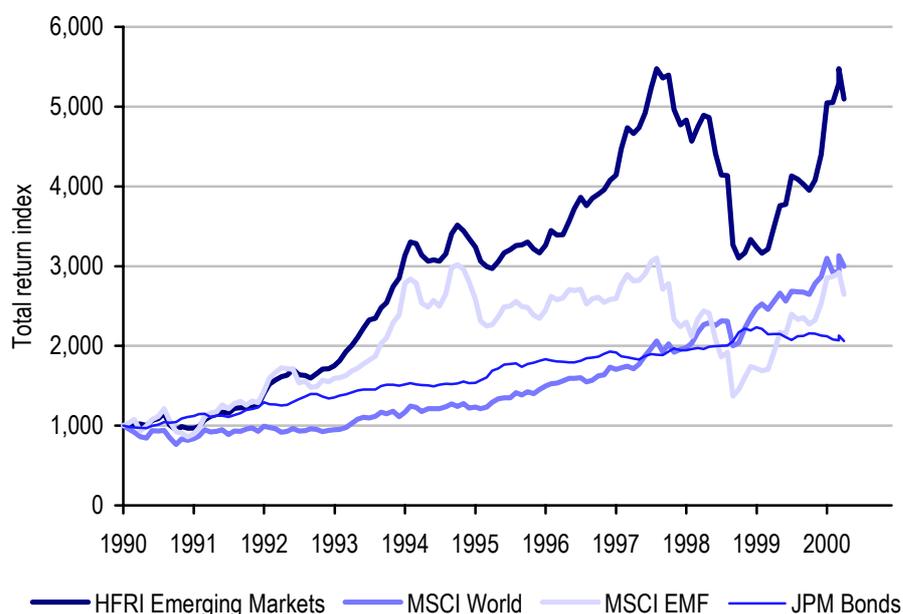
Conclusion and outlook

Sector funds are a combination of beta and alpha. In that sense they are similar to traditional funds. Sector hedge funds have some advantages. One is that they have outperformed traditional funds in the past. Given the regulatory flexibility and principal-aligned incentive structures of hedge funds, there is a sound probability that the outperformance against traditional funds will subsist in the future.

The next opportunistic absolute return strategy is emerging markets. In this report we treat emerging markets as a separate opportunistic hedge fund strategy. One could argue that it should be classified as a long-only hedge fund strategy where the focus is regional. One reason why we separated emerging markets into a separate category is because hedge fund investing often involves exploiting market inefficiencies as opposed to capturing the risk premium of the underlying asset class. Inefficiencies in emerging markets are substantially higher than in developed markets. Hedge funds should be doing well. In addition, hedge funds are not always simply long the asset class in the emerging market.

Emerging Markets

Chart 79: Emerging Markets



Source: HFR and Datastream.

- HFRI Emerging markets has outperformed MSCI EMF by a wide margin over the past ten years.
- Investing in emerging markets via hedge funds is not less volatile than investing in emerging markets through traditional investment vehicles. The HFRI Emerging Markets (Total) Index lost 33% in 1998 and rebounded 56% in 1999. Until July 2000, the hedge fund index was flat.

Table 52: Emerging Markets Risk and Return Characteristics

	# of monthly returns*	Annual return (%)	Volatility (%)	Sharpe ratio**	Worst 1-month return (%)	Negative months (%)	Worst 1-year return (%)
S&P 500 (Total return)	124	18.3	13.7	0.97	-14.5	32	-3.1
MSCI World (Total return)	124	11.7	14.1	0.48	-13.3	36	-16.5
MSCI Europe (Total return)	124	13.5	14.7	0.58	-12.6	34	-12.1
MSCI EMF (Total return)***	124	9.9	24.4	0.20	-34.1	36	-49.6
HFRI Emerging Markets (Total) Index	124	17.1	16.6	0.72	-21.0	33	-42.5
MAR Hedge Global Emerging Markets	123	15.4	17.8	0.58	-26.7	29	-45.1
Hennessee HF Index – Emerging M.	88	10.5	16.0	0.34	-20.1	40	-39.9
CSFB/Tremont Emerging Markets	76	7.1	21.4	0.10	-23.0	43	-44.2

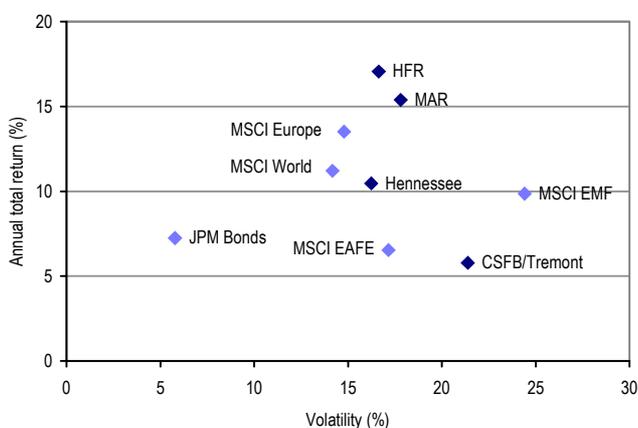
Source: HFR, MAR, Hennessee, CSFB/Tremont, Datastream, UBS Warburg calculations

*Ending April 2000 (except MAR: ending March 2000), **Based on risk free rate of 5%. ***Emerging Markets Free

- Over a period longer than ten years, hedge funds in emerging markets have performed around 16% annually which compares with 10% for the MSCI Emerging Markets Free index. Over shorter periods, emerging market returns have been lower due to market turbulence essentially everywhere (Asia, South America, Russia). Note that the MSCI EMF moved a lot in the second half of the 1990s but ended the half-decade more or less unchanged.
- Volatility was substantially lower than with the MSCI EMF index. Volatility of emerging markets hedge fund returns was around 17%, which compares with 24% in the case of the MSCI EMF. Hence, hedge funds in this segment have produced superior risk-adjusted returns. The lower volatility from the four emerging markets hedge fund indices is derived from the fact that the different hedge funds can run different strategies. Since these strategies are weakly correlated with each other, volatility of the hedge fund index or a portfolio containing different emerging market hedge funds is low. Volatility is most likely lower than comparing a portfolio of traditional emerging market funds, because traditional equity funds are simply long the asset class.
- The worst monthly and worst annual returns were slightly higher in the case of the hedge funds than with the MSCI EMF. This implies that the hedge fund industry invested in this segment has the ability to cut losses short or hedge. However, hedging in emerging markets is difficult or impossible because of market restrictions to sell short either directly or synthetically. Emerging markets, therefore, use lower leverage than hedge funds in developed markets. The lack of hedging possibilities and low use of leverage make emerging markets hedge funds look similar to traditional long-only funds. However, emerging markets have greater flexibility than traditional funds. They are not necessarily long the asset class.

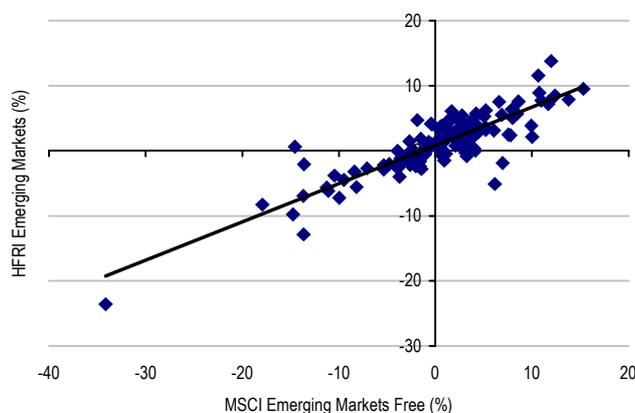
The first of the following two graphs (Chart 81) shows the returns of various hedge fund indices with some equity and bond indices. The second graph compares monthly total MSCI EMF returns with the HFRI Emerging markets index.

Chart 80: Return Versus Risk



Source: HFR, MAR, Hennessee, CSFB/Tremont, Datastream, UBSW calculations

Chart 81: MSCI EMF Versus Emerging Markets Returns



Source: HFR, Datastream

- Chart 80 shows different risk/return characteristics for different hedge fund indices. This is because we mixed different time periods and the second half of the 1990s was significantly worse than the first half. We therefore suggest comparing the HFR and MAR indices with MSCI EMF since it covers the full decade. The chart illustrates that the industry performs significantly better than the index on an absolute as well as risk-adjusted basis.
- Chart 81 shows that correlation between hedge fund returns and MSCI EMF index returns is high. The outliers are close to the slope.

Table 53: Statistical Analysis of Emerging Markets Returns

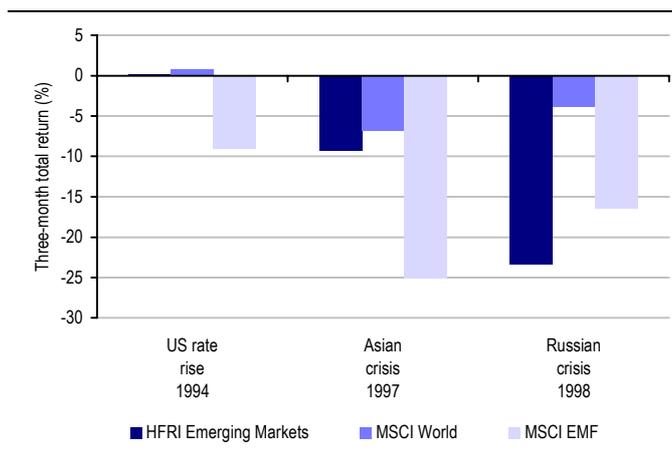
	Alpha to MSCI EMF	Beta to MSCI EMF	Skew	Excess kurtosis	Correlation MSCI EMF	Correlation JPM Global Bonds
MSCI EMF (Total return)	0.00	1.00	-1.31	4.42	1.000	-0.055
HFRI Emerging Markets (Total) Index	0.85	0.59	-1.27	5.54	0.865	-0.057
MAR Hedge Global Emerging markets	0.71	0.55	-1.93	12.72	0.755	-0.071
Hennessee HF Index - Emerg Mkts	0.50	0.57	-1.32	6.30	0.823	-0.227
CSFB/Tremont Emerging Markets	0.52	0.69	-0.91	3.72	0.871	-0.272

Source: HFR, Hennessee, Datastream, UBS Warburg calculations

- Exposure to the region is the main explanatory factor of the emerging markets hedge fund returns. The beta is around 0.6. This is less than with other long biased hedge fund strategies. The reason is that emerging market hedge fund managers do not necessarily exploit inefficiencies in the equity markets only. As we have seen in the previous section, emerging markets were not in equities at all during the Peso Crisis of 1994. Hedge funds exploited market inefficiencies in Brady bonds by hedging currency risk. This flexibility to allocate funds where the opportunities are results in a beta that is significantly lower than one.
- Emerging market hedge fund returns have been negatively skewed and leptokurtic in the past, as have been returns on the MSCI EMF.
- Correlation with the MSCI EMF is high at around 0.8.

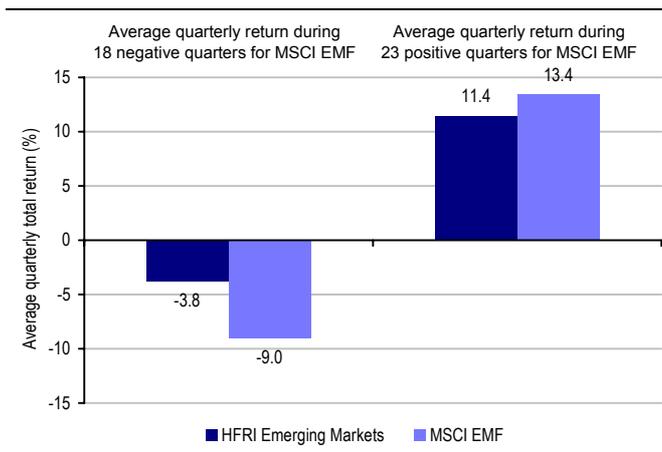
The following two graphs show the performance of the HFRI Emerging Markets index in different market environments and average quarterly returns in down-markets versus average quarterly returns in friendly markets.

Chart 82: Scenario Analysis



Source: HFR and Datastream
 US rate rise: Q1 94; Asian crisis: 1/8/97-31/10/97; Russian crisis: 1/8/98-31/10/98

Chart 83: Average Negative Versus Average Positive Returns

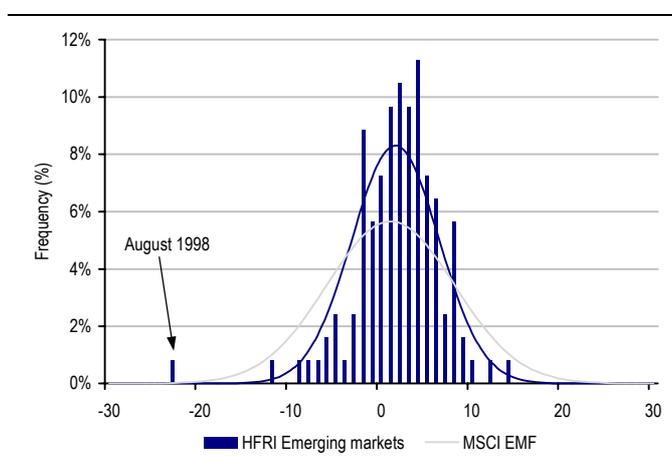


Source: HFR, Datastream

- Hedge funds in emerging markets outperformed the MSCI EMF during rising US interest rates in 1994 and during the Asian crisis in 1997, but heavily underperformed the index during the Russian credit crisis.
- On average, however, hedge funds outperform MSCI EMF by 6% during down-quarters and underperformed the index by only 2% during up-quarters. This pattern lets us assume that hedge funds in this segment hedge so they are not exposed to the full fall and re-enter once the trend has reversed, missing out on some of the early gains of a rebound.

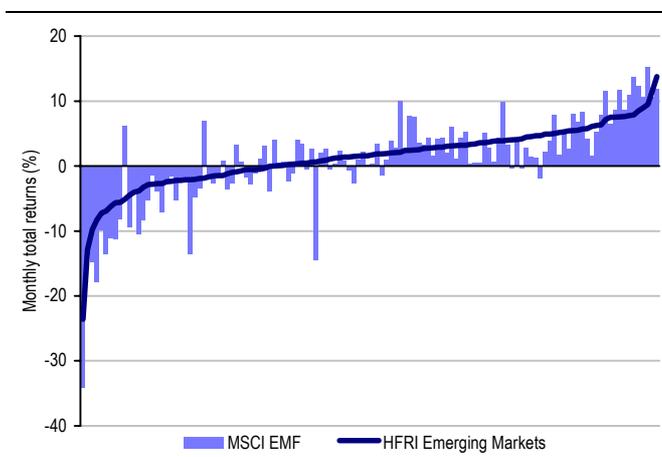
The left graph of the following pair shows how returns have been distributed in the past and compares the historic return distribution with a normal distribution of hedge funds in the emerging market sector and a normal distribution of historical MSCI EMF returns, both based on historic mean return and standard deviation of returns. For the graph on the right, we have sorted the hedge funds returns and compared them to the corresponding market returns. This allows us to see in which market environment the extreme positive and negative returns were achieved.

Chart 84: Return Distribution



Source: HFR, Datastream, UBS Warburg calculations

Chart 85: Correlation



Source: HFR, Datastream

- The frequency distribution has some resemblance with a normal distribution. There were six returns outside the 95% range, two of them were positive. August 1998 was the only monthly return outside the 99% range.
- Chart 83 reveals that negative returns are concentrated in negative market environments and positive hedge fund returns in positive market environments. The graph also shows that hedge fund managers miss some but not all of the falls in the underlying markets. This means hedge fund managers occasionally are hedged, ie, manage to avoid loss of principal. Missing only a few of the corrections increases the performance substantially. Ian Wace of Marshall Wace Asset Management thinks a long these lines. Wace used the term negative compounding:

“This business [hedge funds] has nothing to do with positive compounding; it has to do with avoiding negative compounding... The P&L is the only moderator of hubris. You are not given money to lose it”.¹

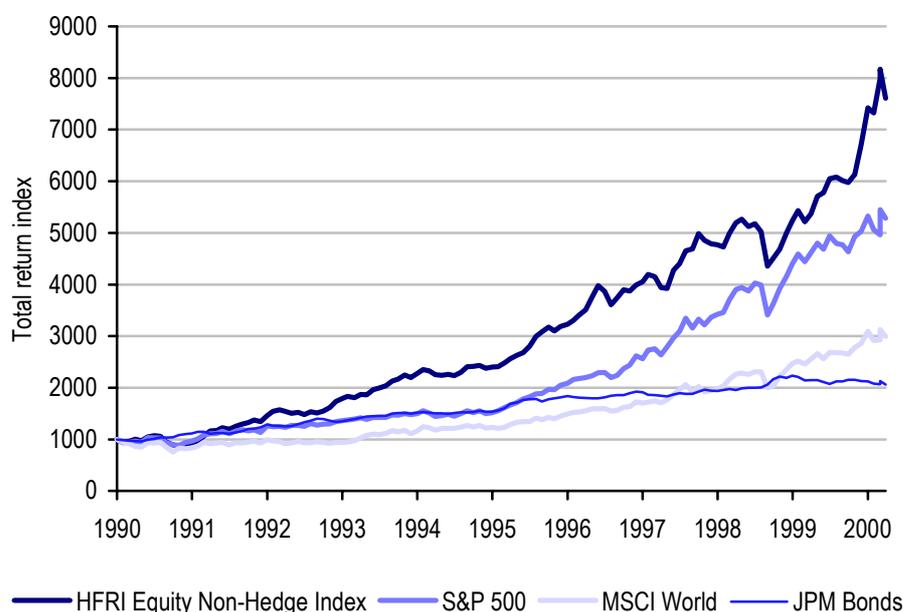
Conclusion and outlook

To us, emerging market hedge funds have some appeal. Emerging markets are inefficient in many ways. The inefficiencies in these markets are full of opportunities for skill-based strategies apart from simply capturing the risk premium of the equity asset class. We believe that exploiting inefficiencies by simultaneously controlling market risk is probably more profitable than in developed markets because there are more inefficiencies. This was true in the past and, in our view, should hold in the future. However, if history is any guide, emerging market hedge funds are of high risk.

¹ “Hedge funds in Europe,” speech at the 2000 Hedge Fund Symposium (EIM/EuroHedge/SFI), “Can Institutions Afford to Ignore Hedge Funds?”, 27 April 2000, London.

Long/Short Equity

Chart 86: Long/Short Equity



Source: HFR and Datastream.

- Long/short equity was one of the most profitable hedge fund strategies in the past. The HFRI Equity Non-Hedge Index, our proxy for this market segment, outperformed even the S&P 500. Long/short equity is not only one of the most profitable, it is also the largest segment with c30% market share.

Table 54: Long/Short Equity Risk and Return Characteristics

	# of monthly returns*	Annual return (%)	Volatility (%)	Sharpe ratio**	Worst 1-month return (%)	Negative months (%)	Worst 1-year return (%)
S&P 500 (Total return)	124	18.3	13.7	0.97	-14.5	32	-3.1
MSCI World (Total return)	124	11.7	14.1	0.48	-13.3	36	-16.5
MSCI Europe (Total return)	124	13.5	14.7	0.58	-12.6	34	-12.1
HFRI Equity Non-Hedge Index	124	21.7	13.8	1.21	-13.3	31	-9.7
CSFB/Tremont Long / Short Equity	76	18.8	12.5	1.10	-11.4	29	-9.9

Source: HFR, CSFB/Tremont, Datastream, UBS Warburg calculations

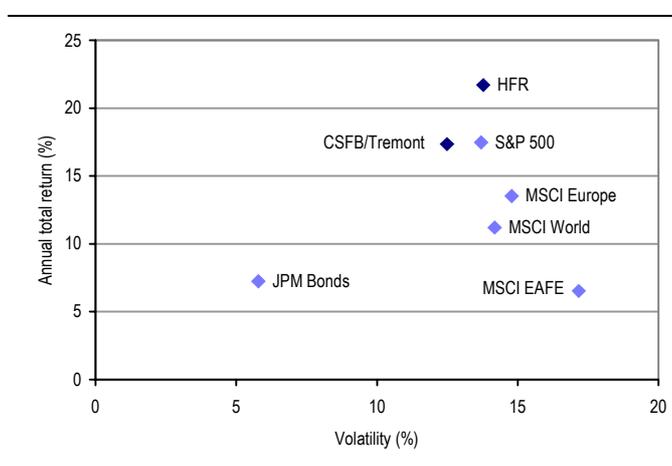
*Ending April 2000. **Based on risk free rate of 5%

- The main characteristic of this category is high historical performance. Based on the two indices used, historical total returns were around 20% outperforming most equity indices. The main focus of this category is to make money and less to control risk. However, the heterogeneity within this category is large. Some long/short managers' main focus is managing risk.

- The volatility of the returns is about the same as with equities in general, ie, around 13% when measured based on monthly returns. Outperformance and equal risk results in higher risk-adjusted returns.
- The strict application of Sharpe ratios as a criterion for hedge fund managers in general and long/short managers in particular suffers the problem of positive upside volatility: Many long/short managers have low downside with some outliers to the upside. These upside outliers inflate the standard deviation of returns, which results in a lower Sharpe ratio. However, based on data from HFR, the outliers are mainly negative.

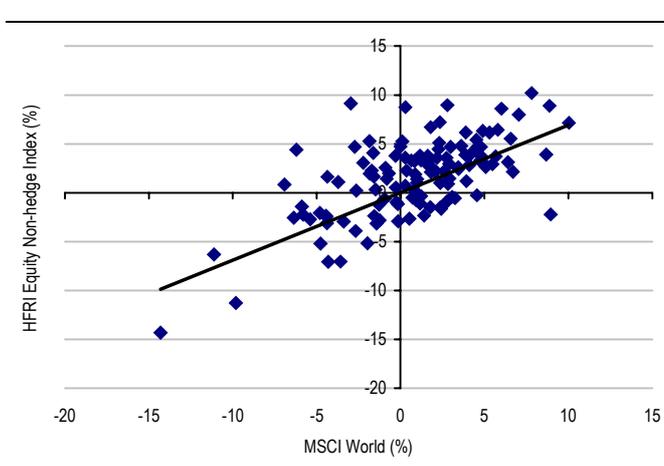
The first of the following two graphs (Chart 88) shows the returns of various hedge fund indices with some equity and bond indices. The second graph compares monthly total MSCI EMF returns with the HFRI Equity non-hedge index.

Chart 87: Return Versus Risk



Source: HFR, MAR, CSFB/Tremont, Datastream, UBS Warburg calculations

Chart 88: MSCI World Versus Equity Long/Short Returns



Source: HFR, Datastream

- In the past, long/short equities had high returns with similar volatility to equities in general. As a matter of fact, the category had the highest returns from the eleven strategies analysed apart from Technology, which we used as an example for sector/theme based strategies. Had we used value biased strategies as an example, long/short equity would top the annual return table.

Table 55: Statistical Analysis of Long/Short Equity Returns

	Alpha to MSCI World	Beta to MSCI World	Skew	Excess Kurtosis	Correlation MSCI World	Correlation JPM Global Bonds
HFRI Equity Non-Hedge Index	1.07	0.64	-0.78	1.92	0.644	0.034
CSFB/Tremont Long / Short Equity	0.56	0.62	-0.29	2.91	0.641	0.000

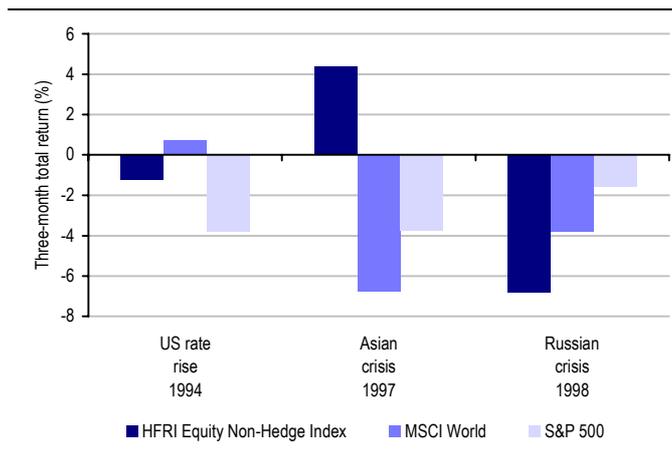
Source: HFR, CSFB/Tremont, Datastream, UBS Warburg calculations

- Skew and kurtosis of returns were minor.
- The exposure to the market was high in general but varies strongly among different hedge funds.

- The correlation with the equity market was high as a result. The strategy had the highest correlation with equities from the range analysed in this report. We do not believe this will change since we defined this category as strategies with a long bias (as opposed to equity market neutral).

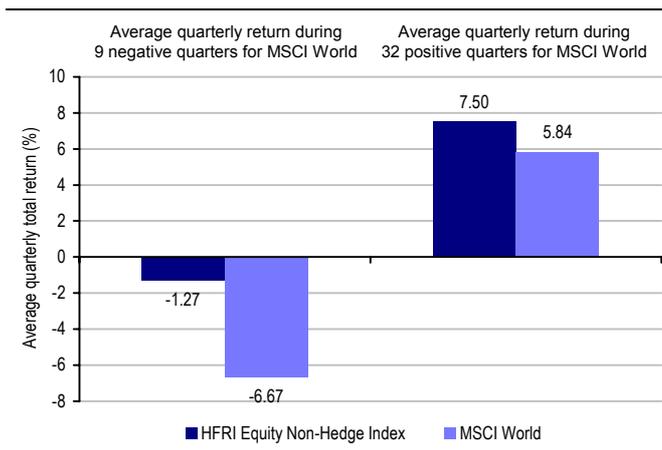
The following two graphs show the performance of the HFRI Equity Non-Hedge index in different market environments and average quarterly returns in down-markets versus average quarterly returns in friendly markets.

Chart 89: Scenario Analysis



Source: HFR and Datastream
 US rate rise: Q1 94; Asian crisis: 1/8/97-31/10/97; Russian crisis: 1/8/98-31/10/98

Chart 90: Average Negative Versus Average Positive Returns

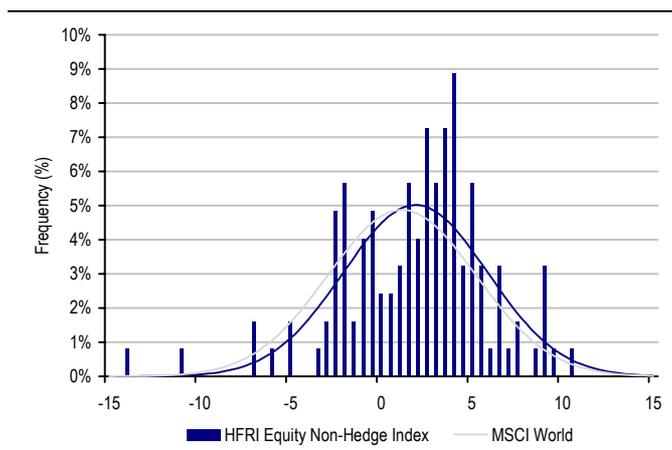


Source: HFR, Datastream

- Long/short equity has underperformed equities during the Russian crisis. As mentioned before this is primarily due to LTCM and hedge funds in general. Long/short equity performed well during the Asian crisis.
- We believe downside protection with long/short equity is limited. However, Chart 90 shows that, on average, long/short equity outperforms equities both in down as well as up markets. Note that the outperformance in down quarters was 540bp, which compares to 166bp outperformance in up quarters. This suggests some sort of payoff, which is similar to that of a call option position (positive delta, long gamma): if the markets rise, one has some leveraged return (as with a long call option) and the exposure to equities rises (as with a long gamma position). If the market falls, the value of the position falls as well, but to a smaller extent than the underlying market.

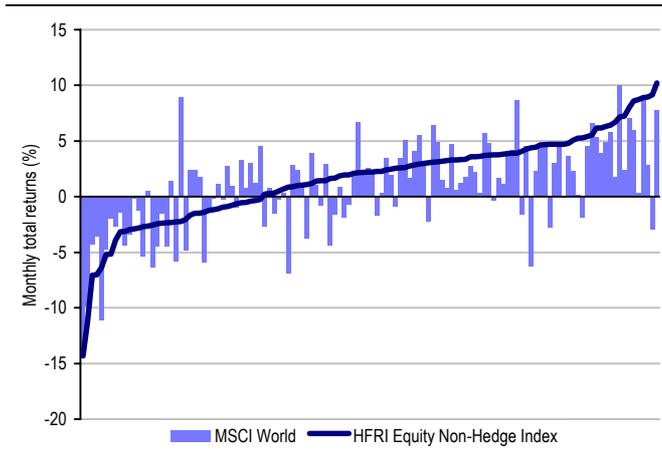
The left graph of the following pair shows how returns have been distributed in the past and compares the historic return distribution with a normal distribution of hedge funds in the long/short equity sector and a normal distribution of historical MSCI World returns both based on historic mean return and standard deviation of returns. For the graph on the right, we have sorted the hedge funds returns and compared them to the corresponding market returns. This allows us to see in which market environment the extreme positive and negative returns were achieved.

Chart 91: Return Distribution



Source: HFR, Datastream, UBS Warburg calculations

Chart 92: Correlation



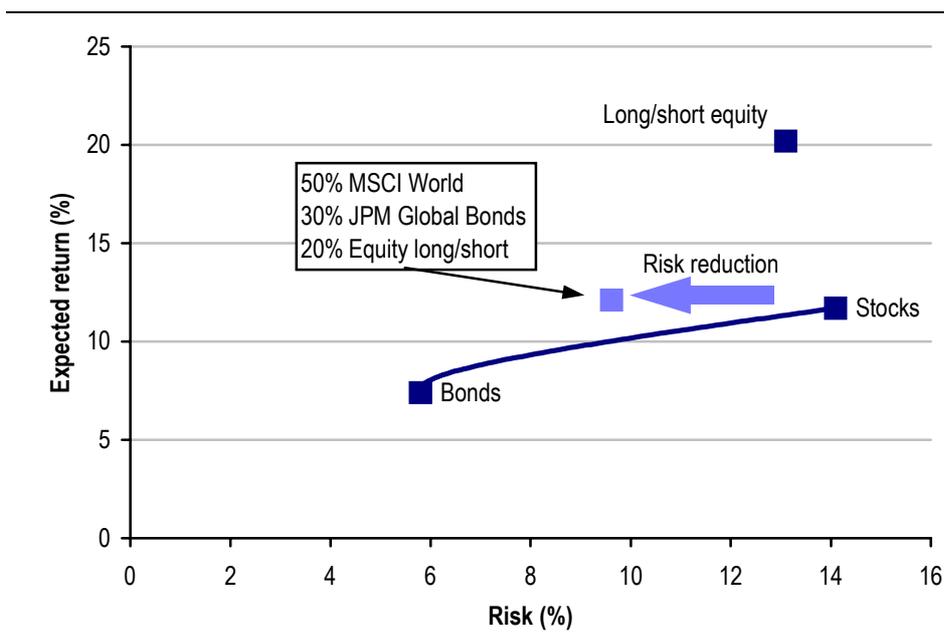
Source: HFR, Datastream

- Chart 91 shows that the normal distribution derived from historical returns and volatility is nearly equal to that of the MSCI World but with a higher mean return. Out of the 124 returns, six were outside the 95% range, of which five were on the downside. One negative return was outside the 99% range. The frequency distribution shows some concentration around -2% as well as +3%. Note that 39 of the 124 returns were negative which compares with 40 in the case of the S&P 500 and 45 with the MSCI World.
- Chart 92 illustrates where the high correlation to the equity market is derived. The extreme negative returns are achieved during down-markets whereas extreme positive returns were associated with positive market environments.

Equity portfolio risk reduction potential with long/short equity strategies

We believe that long/short equity strategies are ideal for equity investors trying to reduce risk without heavily sacrificing expected returns. Chart 93 below shows the efficient frontier for a global investor using risk, return and correlation figures from Table 20 on page 51 and Table 21 on page 53. An investor moving funds from equity to bonds will move down along the efficient frontier, reducing risk as well as expected returns. However, an investor moving into both bonds as well as long/short equity strategies potentially can reduce risk with keeping expected returns stable. The reason for this is not because of low correlation between equities and long/short equity strategies but because of high returns from long/short equity strategies. Correlation between equities and long/short strategies does not support the case. Chart 92 demonstrated that long/short strategies perform poorly when equity markets fall. However, Chart 90 showed that long/short equity strategies outperformed equity by 5.4 percentage points in the quarters where MSCI World yielded a negative return. This is substantially more than the 1.7% outperformance of long/short equity strategies in rising equity markets. Because long/short equity strategies outperform equities more in falling markets than in rising markets, we believe that allocating funds to long/short equity strategies reduces risk in equity-friendly as well as unfriendly markets. However, for this to be true in the future, long/short equity managers will have to continue producing 20% annual returns. We believe this is an uncertainty.

Chart 93: Risk Reduction Potential with Long/Short Equity Funds



Sources: Datastream, HFR, CSFB/Tremont, UBS Warburg calculations.
 Based on monthly US\$ total returns net of fees between January 1990 and April 2000.
 Long/short equity: risk and returns are an equally weighted average from HFR and CSFB/Tremont data. Correlation to equity and bond indices are based from HFR Equity Non-hedge index.
 MSCI World total return: 11.7%, volatility: 14.1%; JPM Global Bonds: 7.4% / 5.8%; Long/short equity: 20.2% / 13.1%.
 Correlation MSCI World/JPM Global Bonds: 0.345; MSCI World/Long/short equity: 0.654; JPM Global Bonds/Long/short equity: 0.036.

Conclusion

To some, long/short equity is the archetype of a hedge fund. Long/short equity, in the past, had high returns, high volatility and high correlation with equities. We believe that these return and risk characteristics will not change significantly. However, the dispersion between different long/short equity managers is wide and we do not expect this dispersion to narrow.

Outlook

A case could be drawn that outperformance will not be as high in the future as it was in the past. The average outperformance against the MSCI World total return index in the first five years of the 1990s was 15.7% but only 5.6% in the second half. This suggest that there will still be outperformance (alpha derived from skill) but that the alpha is deteriorating to some extent. We suspect this is due to the fact that in the recent past, more long-only managers have joined the discipline. As we have pointed out earlier, risk managers have an edge over long-biased managers in the long/short discipline with respect to managing long/short positions in general and to selling short in particular.

Outlook – Future Performance of Hedge Funds

*“We don’t like their sound and guitar music is on the way out.”
Decca, rejecting the Beatles, 1962*

Hedge fund returns will continue to be widely dispersed

In one respect we think the future will be similar to the past. We believe that the nature of the different strategies dictates that the wide dispersion of hedge fund returns will continue to exist. A short seller will likely deliver a return significantly different to a long/short equity hedge funds or convertible arbitrageur.

We believe that there are four main variables, which determine the future of hedge fund returns;

- (1) Corporate activity,
- (2) Volatility,
- (3) Liquidity, and
- (4) Regulation

Corporate activity

There is a natural limit to most absolute-return strategies. There are only a number of merger opportunities at any particular moment to be exploited by risk arbitrageurs or only a certain number of convertibles to be bought and hedged through convertible arbitrageurs. In addition, if the funds chasing a limited number of opportunities increase more rapidly than the number of opportunities, the returns should fall. We believe that corporate activity and issuance of equity-linked debt to rise over the next, say, five years as corporate Europe and Asia undergo vast restructuring. Furthermore, as global equity markets develop, hedging (derivatives and securities lending) activity gets more efficient which increases the breadth of opportunities for hedge funds.

Volatility

Some hedge fund strategies to some degree depend on volatility. If volatility is low, spreads are usually lower. For example, spreads in risk arbitrage have been particularly wide in the past few years, to some extent because of high volatility. Should volatility fall to the mid-1990s levels, opportunities might be less profitable. To some extent, most hedge funds are long volatility.

Liquidity

Liquidity is a variable when assessing the sustainability of the attractive risk, return and correlation characteristics of the past. Many strategies are long a liquid security or instrument and short a less liquid one. In addition, liquidity has a tendency to dry up when most needed: in erratic markets. One way of coping with liquidity risk is a long-term perspective and sound and stable financing. If liquidity is low, less capital is able to exploit inefficiencies in a given segment. However, the inefficiencies are likelier to exist in illiquid markets than in liquid markets.

Regulation

Regulation is the Damocles’ sword swinging over the hedge fund industry. We believe some of the attractive risk/return combinations in the industry are derived from what is called regulatory arbitrage. If traditional managers were not as regulated as they are today, markets would be more efficient. More efficient markets mean fewer opportunities for hedge funds.

Closing Remarks

If we wanted to exaggerate, we would refer institutional investing in hedge funds as a paradigm shift. We believe that paradigm shifts happen when there are anomalies, disparate odd results that cannot be explained away by inadequate methodology alone. When sufficient anomalies occur, any street-smart individual, we would postulate, must begin to consider that the paradigm under which they are doing their work is no longer of use or is actually dysfunctional. We would quote Thomas Kuhn (1962) to emphasise our point:

“[Individuals who break through by inventing a new paradigm are] almost always...either very young or very new to the field whose paradigm they change.... These are the men who, being little committed by prior practice to the traditional rules of normal science, are particularly likely to see that those rules no longer define a playable game and to conceive another set that can replace them.”

This, in our opinion, would be an extreme point of view. We do not want to go as far as referring hedge fund investing as a paradigm shift. However, the investment management profession is a continuum and subject to change. Two changes in recent years are particularly worth pointing out. First, market participants have begun to examine and analyse the downside tail of the distribution more closely. This is a departure from being satisfied with mere statistical variance as a measure for risk. Second, portfolio management is transforming into risk management. Long-held methodologies and investment styles are gradually being replaced with more scientific approaches and tools to manage money.

We believe that hedge fund investing will gain momentum due to these two trends. First, the focus on absolute returns and the fact that failure is defined as destroying value causes some absolute-return strategies to perform significantly better than traditional strategies in falling capital markets. With investors accepting the fact that returns are not normally distributed (fat tails) and the fact that negative utility from falling markets is higher than positive utility from rising markets (prospect theory), we expect more and more investors to acknowledge the benefits from hedge fund investing. Second, trying to win what Charles Ellis calls ‘The Loser’s Game’, ie, trying to beat the market, might become a too mundane of a strategy in the competitive conquest for institutional money. A move away from traditional views and strategies should enlarge the scope for alternative views and strategies. We expect a departure from simple capital markets indices as benchmarks to more tailored benchmarks that take into account idiosyncratic asset and liability characteristics. This could flatten any hurdles towards hedge fund investing.

Appendix

On the Brief History of Hedge Funds

First hedge fund launched in 1949

Hedge funds first came into existence on January 1, 1949 when Alfred Winslow Jones opened an equity fund that was organised as a private partnership to provide maximum latitude and flexibility in constructing a portfolio. He took both long and short positions in securities to increase returns while reducing net market exposure and used leverage to further enhance the performance. Today the term hedge fund takes on a much broader context, as different funds are exposed to different kind of risks.

A sociologist turned philanthropist on Wall Street

Alfred W. Jones was a sociologist. He received his Ph.D. in sociology at Columbia University in 1938. Jones worked for *Fortune* and *Time* and wrote articles on non-financial subjects such as Atlantic convoys, farm cooperatives, and boys' prep schools in the 1940s. In March 1949 he wrote a freelance article for *Fortune* called 'Fashions in Forecasting' which reported on various technical approaches to the stock market. His research for this story convinced him that he could make a living in the stock market, and early in 1949 he and four friends formed A.W. Jones & Co. as a general partnership. Their initial capital was US\$100,000, of which Jones himself put up US\$40,000. In its first year the partnership's gain on its capital came to a satisfactory 17.3 percent.

Jones generated very strong returns while managing to avoid significant attention from the general financial community until 1966, when an article in *Fortune* led to increased interest in hedge funds. Many funds perished during the market downturn of 1969, having apparently been unable to resist the temptation to be net long and leveraged during the prior bull run. By the early 1970s, hedge funds had lost their prior popularity, and did not recover it again until the mid-1980s.

Speculative techniques for conservative ends

Jones merged two speculative tools – short sales and leverage (Tremont 1999). Short selling was employed to take advantage of opportunities. Jones used leverage to obtain profits, but employed short selling through baskets of stocks to control risk. Jones' model was devised from the premise that performance depends more on stock selection than market direction. He believed that during a rising market, good stock selection will identify stocks that rise more than the market, while good short stock selection will identify stocks that rise less than the market. However, in a declining market, good long selections will fall less than the market, and good short stock selection will fall more than the market, yielding a net profit in all markets. To those investors who regarded short selling with suspicion, Jones would simply say that he is using 'speculative techniques for conservative ends.'

Jones' model performed better than the market. While his fund used leverage and short selling, it also employed a performance-based fee compensation. Each of the above characteristics was not unique in itself. What was unique, however, was that Jones operated in complete secrecy for seventeen years. By the time his secret was revealed, it had already become the model for the hedge fund industry.

Fund of funds structure reduces risk

Jones kept all of his own money in the fund, realising early that he could not expect his investors to take risks with their money that he would not be willing to assume with his own capital. Curiously, Jones became uncomfortable with his own ability to pick stocks and, as a result, employed stock pickers to supplement his own stock-picking ability. In 1954, Jones hired another stock picker to run a portion of the fund. Soon, he had as many as eight stock pickers, autonomously managing portions of the fund. By 1984, at the age of 82, he had created the first fund of funds by amending his partnership agreement to reflect a formal fund of funds structure.

Jones outperformed even the best of mutual funds

While mutual funds were enjoying their heyday in the 1960s, Jones' hedge fund was outperforming the best mutual funds – even after the 20% incentive fee deduction. The news of Jones' performance created excitement, and by 1968, approximately 200 hedge funds were in existence, most notably those managed by George Soros and Michael Steinhardt.

Selling short is a risk management discipline not mastered by all

During the 1960s bull market, many of the new hedge fund managers found that selling short impaired absolute performance, while leveraging the long positions created exceptional returns. The so-called hedgers were, in fact, long, leveraged and totally exposed as they went into the bear market of the early 1970s. And, during this time, many of the new hedge fund managers were put out of business. As Jones pointed out, few managers have the ability to short the market, since most equity managers have a long-only mentality.

What goes up can go down

Even Jones, the founder of hedge funds, eventually lost his footing. He earned more than 1,000 percent for his investors from 1958 to 1968, according to his obituary in the New York Times. But by the end of 1970, according to an article by Bloomberg, his assets had dwindled to about \$30 million from more than \$200 million due to losses and withdrawals.

The 1980s

Compounding at 40% draws attention

During the 1980s, only a modest number of hedge funds were established. In 1984, Tremont (1999) identified a mere 68 funds. Most of these funds had raised assets to manage on a word-of-mouth basis from wealthy individuals. Julian Robertson's Jaguar fund, George Soros's Quantum Fund and Michael Steinhardt Partners were compounding at the 40% levels. Not only were they outperforming in bull markets, but they outperformed in bear markets as well. In 1990, for example, Quantum was up 30% and Jaguar was up 20%, while the S&P 500 was down 3% and the MSCI World index was down 16%. The press began to write articles and profiles drawing attention to these remarkable funds and their extraordinary managers.

Tax efficient offshore funds

During the 1980s, most of the hedge fund managers in the US were not registered with the SEC. Because of this, they were prohibited from advertising, relying on word of mouth references to grow their assets. The majority of funds were organised as limited partnerships, allowing only 99 investors. The hedge fund managers, therefore, required high minimum investments. European investors were quick to see the advantages of this new breed of managers, which fuelled the development of the more tax efficient offshore funds.

Alignment of manager and investor interests is one of the main advantages of investing in hedge funds

Successful funds close for new money

The 1990s

During the 1990s, the flight of money managers from large institutions accelerated, with a resulting surge in the number of hedge funds. Their operations were funded, primarily by the new wealth that had been created by the unprecedented bull run in the equity markets. The managers' objective was not purely financial. Many established their own businesses for lifestyle and control reasons. Almost all invest a substantial portion of their net worth in the fund alongside their investors.

The 1990s saw another interesting phenomena. A number of the established money managers stopped accepting new money to manage. Some even returned money to their investors. Limiting assets in many investment styles is one of the most basic tenets of hedge fund investing if the performance expectations are going to continue to be met. This reflects the fact that managers make much more money from performance fees and investment income than they do from management fees. Due to increasing investor demand in the 1990s, many funds established higher minimum investment levels (US\$50 million) and set long lock-up periods (five years).

On the Efficiency of Markets

Has the CAPM run its course?

Hedge fund managers, especially in the relative-value arena, make money by exploiting market inefficiencies. The high-risk adjusted returns are in stark contrast with what is still taught at business schools and what many distinguished academicians and practitioners rely on: the paradigm that capital markets are efficient or close to efficient. The flight to indexation and core-satellite structures are the result of this paradigm. However, the ball is bouncing back. Today, many academics and practitioners believe that with a competitive advantage there is the possibility to gain excess returns not explained by the ageing CAPM.

Are equity markets efficient?

The Efficient Markets Hypothesis (EMH) and its close relative the Random Walk Hypothesis are one of the most controversial and hotly-contested ideas in all the social sciences. It is disarmingly simple to state, has far-reaching consequences for academic pursuits and business practice, and yet is surprisingly resilient to empirical proof or refutation. Even after three decades of research and literally thousands of journal articles, economists have not yet reached a consensus about whether capital markets are efficient or not.

Prices must reflect all available information

The first serious application of the Random Walk Hypothesis to financial markets can be traced to Paul Samuelson (1965).¹ In an information-efficient market - not to be confused with an allocation- or Pareto-efficient market - price changes must be unforecastable if they are properly anticipated, ie, if they fully incorporate the expectations and information of all market participants. Unlike the many applications of the Random Walk Hypothesis in the natural and physical sciences in which randomness is assumed almost by default, because of the absence of any natural alternatives, Samuelson believed that randomness is achieved through the active participation of many investors seeking greater wealth. Unable to curtail their greed, an army of investors aggressively pounce on even the smallest informational advantages at their disposal, and in doing so, they incorporate their information into market prices and quickly eliminate the profit opportunities that gave rise to their aggression. If this occurs instantaneously, which it must in an idealised world of 'frictionless' markets and costless trading, then prices must always fully reflect all available information and no profits can be garnered from information-based trading. Eugene Fama (1970) encapsulated this idea in his pithy dictum that 'prices fully reflect all available information.'

¹ We could go back as far as the early 19th century where the English physicist Robert Brown discovered a phenomenon where molecules randomly collide with one another as they move in space (Brownian motion). Louis Bachelier, a French mathematician, found in 1900 that if stock prices vary according to the square root of time, they bear remarkable resemblance to a Brownian motion. In finance, the Brownian motion came to be called the random walk, which is someone once described as the path a drunk might follow at night in the light of a lamppost (Bernstein 1992). Others would put the start date to 1933 where the founder of 'Econometrica' Alfred Cowles III answered the question 'Can Stock Market Forecasters Forecast?' with a three-word abstract: "It is doubtful" (Cowles 1933). His analysis concluded that the performance of the stocks analysed as a whole were negative relative to the performance of the market as a whole. The results could have been achieved through a purely random selection of stocks.

Market anomalies occur by chance

Fama gained a reputation preaching the EMH. According to Fama (1998), market efficiency survives the challenge from the literature on long-term return anomalies. Consistent with the market efficiency hypothesis that the anomalies are chance results, apparent over-reaction to information is about as common as under-reaction, and post-event continuation of pre-event abnormal returns is about as frequent as post-event reversal. Most important, consistent with the market efficiency prediction that apparent anomalies can be due to methodology, most long-term return anomalies tend to disappear with reasonable changes in technique.

There is no free lunch plan

Three and a half decades after aforementioned statements from Samuelson, Lo and MacKinlay (1999) express the view that financial markets are predictable to some degree, but far from being a symptom of inefficiency or irrationality. 'Predictability is the oil that lubricates the gears of capitalism.' However, despite the occasional 'excess' profit opportunities, on average and over time, it is not possible to earn such profits consistently without some type of competitive advantage, eg, superior information, superior technology, financial innovation, etc. Alternatively, in an efficient market, the only way to earn positive profits consistently is to develop a competitive advantage, in which case the profits may be viewed as the economic rents that accrue to this competitive advantage. The consistency of such profits is an important qualification. In this version of the EMH, an occasional free lunch is permitted, but free lunch plans are ruled out.

Hedge fund managers have competitive advantage

We believe that the consistent high risk-adjusted returns of hedge funds when compared with traditional managers are consistent with the views expressed by Lo and MacKinlay (1999). Occasionally there is a free lunch. Hedge fund managers have a competitive advantage in form of superior risk management skill and/or motivation.

To us it seems that market inefficiencies will likely be around for a while; and – consequently – sophisticated market participants who exploit the inefficiencies by hedging unwanted risks.

On Indexing and Portability of Alpha

Indexing

Sound rationale for indexation

Significant amounts of funds are managed passively. In the UK for example, indexing has come from nearly nowhere to account for 20%-25% of UK institutional assets over the past ten years. According to some estimates, c25% of the US\$2tr in MSCI indexes are indexed as are c10% of the S&P 500. The rationale for indexation is overwhelming:

- Lower costs,¹
- Fewer managers,
- Historically poor performance of many active managers,
- Little to no performance surprises.

Whether indexation point has reached saturation is open to debate.

Table 56: Percentage of Equity Assets Indexed

	1996	2001E
UK	20%	25%
Switzerland	13%	20%
Netherlands	15%	18%
Canada	15%	17%
Australia	10%	14%
Japan	5%	8%
Hong Kong	3%	3%
Germany	3%	3%
France	2%	3%
Ireland	1%	1%

Source: Watson Wyatt

Portable Alpha

The most dramatic change in investment management in the 1990s was the application of financial engineering to enhance portfolio return and control risk. The derivatives revolution of the prior decade provided the tools. The obsession with index benchmarks and indexation created the demand. We believe it is possible, that the concept of transporting alpha to any benchmark is the logic continuation of these trends.

The alpha of any manager can be transported to a target benchmark index

The concept of portable alpha (or alpha transport) is not new. However, the subject is often revisited in connection with hedge funds investing or with long/short or market neutral investing. Conceptually the idea is simple. With the portable alpha approach, the alpha of a manager or group of managers or strategy is transported to

¹ SSGA (2000) measured the trading costs (management fees, custody, taxes, commissions, market impact, and bid/offer) for passive managed money in developed markets at 39 basis points which compares with costs for active management of 209 basis points.

a target index. The net effect is the target index return enhanced by the investment manager's ability to create alpha in any market. For example a pension fund allocates its fund to a bond manager who generates an alpha of 100bp yearly without a significant increase in credit risk or yield curve risk. In addition it swaps total returns of an equity index with the risk free rate. The end result is the total index return plus 100bp.

Separating beta from alpha

The portable alpha concept starts with the basic insight that an active manager provides two basic types of return: beta (the return from a given market or asset class) and alpha (the variation from the market return that comes from skill). Normally, plan sponsors hire managers to achieve a bundled return. Portable alpha, by contrast, involves unbundling the components of an active portfolio and then re-bundling them for an optimal portfolio return.

Derivatives transactions are efficient but not free

This approach can be used quite broadly. Alpha can be generated in many different areas and transported onto virtually any index. The limiting factor is the availability of derivatives to carry out the alpha transfer. The number of basis points negotiated with the swap dealer is expected to have the effect of reducing the alpha. However, if the target index is an index with a liquid futures contract, the costs are usually less than 100 basis points per year. There is also an element of counter-party risk since the derivatives are transacted over the counter.

Jacobs and Levy (1999) illustrate how derivatives allow managers to transfer portfolio alpha from one asset class to another. They contend that skilful quantitative active management utilising derivatives can combine traditional active management with the benefits of passive management, thus offering investors the benefit from security selection while retaining the performance from underlying asset classes. The authors also review benefits from long-short portfolio constructions in pursuing alpha. Long and short position of equal beta can be combine to eliminate systemic risk. The resulting market-neutral portfolio incurs only firm-specific risk, which can be further controlled by an optimisation process.

Outlook

Portable alpha strategies employ the best financial engineering tools available to investment managers to shape returns and control risk. Beta, today, is cheap. We believe that hedge funds will be more utilised in this context in the future than they are already today.

Hedge Fund Performance Data

www.hfr.com

HFR

Hedge Fund Research, Inc. (HFR) is a research and consulting firm that specialises in alternative investments. The HFRI is an equally weighted performance summary of over 1500 hedge funds, comprising over US\$260 billion in assets under management, categorised by strategy and as a final composite index. These indices eliminate the survivor bias problem by incorporating funds that have ceased to exist. All fund performance is re-weighted each month to incorporate new funds and eliminate defunct funds.

Table 57: Annual Returns of the Hedge Fund Research Performance Indices (HFRI)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000*
HFRI Convertible Arbitrage Index	2.2	17.6	16.3	15.2	-3.7	19.9	14.6	12.7	7.8	14.4	12.4
HFRI Distressed Securities Index	6.4	35.7	25.2	32.5	3.8	19.7	20.8	15.4	-4.2	16.9	6.8
HFRI Emerging Markets (Total) Index	-3.4	45.4	24.4	79.2	3.4	0.7	27.1	16.6	-33.0	55.9	-0.1
HFRI Emerging Markets: Asia Index	-3.4	30.2	20.2	80.1	-8.4	-2.4	3.3	-2.2	-11.9	60.3	-12.3
HFRI Emerging Markets: Eur/CIS Index	NA	NA	NA	NA	NA	0.6	83.2	59.5	-63.9	83.3	12.6
HFRI Emerging Markets: Global Index	NA	NA	NA	87.1	7.6	9.0	35.7	19.9	-36.4	40.1	-0.3
HFRI Emerging Markets: Latin Am Index	NA	NA	23.3	74.9	26.0	-5.6	29.8	14.7	-19.2	56.3	5.0
HFRI Equity Hedge Index	14.4	40.1	21.3	27.9	2.6	31.0	21.8	23.4	16.0	44.2	8.5
HFRI Equity Market Neutral Index	15.5	15.6	8.7	11.1	2.7	16.3	14.2	13.6	8.3	7.1	5.5
HFRI Equity Non-Hedge Index	-7.2	57.1	22.8	27.4	5.1	34.8	25.5	17.6	9.8	41.8	0.7
HFRI Event-Driven Index	-0.5	27.4	19.5	28.2	6.0	25.1	24.8	21.2	1.7	24.3	5.4
HFRI Fixed Income (Total) Index	6.5	27.4	18.5	16.7	7.6	12.4	14.8	11.9	-2.0	11.0	1.1
HFRI Fixed Income: Arbitrage Index	10.8	12.9	22.1	16.6	11.9	6.1	11.9	7.0	-10.3	7.4	3.3
HFRI Fixed Income: Convertible Bonds Index	NA	NA	NA	NA	-0.6	19.2	18.2	17.6	7.5	36.9	6.8
HFRI Fixed Income: Diversified Index	NA	NA	NA	NA	NA	NA	11.1	5.8	5.6	2.8	1.6
HFRI Fixed Income: High Yield Index	-12.1	41.8	18.5	22.7	1.5	15.2	16.2	12.5	-5.3	7.3	0.9
HFRI Fixed Income: Mortgage-Backed Index	NA	NA	NA	NA	11.6	16.6	17.1	17.3	-9.2	11.3	-5.2
HFRI Macro Index	12.6	46.7	27.2	53.3	-4.3	29.3	9.3	18.8	6.2	17.6	-1.0
HFRI Market Timing Index	13.5	23.1	7.7	24.2	3.5	12.6	13.5	13.6	24.8	26.2	10.3
HFRI Merger Arbitrage Index	0.4	17.9	7.9	20.2	8.9	17.9	16.6	16.4	7.2	14.3	11.6
HFRI Regulation D Index	NA	NA	NA	NA	NA	NA	NA	26.9	26.3	34.1	18.3
HFRI Relative Value Arbitrage Index	13.4	14.1	22.3	27.1	4.0	15.7	14.5	15.9	2.8	14.7	9.8
HFRI Sector (Total)	32.1	23.4	46.5	33.7	8.0	39.7	30.7	5.2	7.6	67.0	9.1
HFRI Sector: Energy Index	NA	NA	NA	NA	NA	NA	58.4	47.5	-22.5	25.5	25.3
HFRI Sector: Financial Index	NA	NA	NA	39.3	11.1	40.0	26.3	49.3	-12.0	-2.2	3.9
HFRI Sector: Health Care/Biotechnology Index	NA	NA	NA	NA	-10.3	67.6	17.4	1.2	6.8	47.3	42.4
HFRI Sector: Miscellaneous	NA	NA	78.7	43.6	11.6	16.9	25.7	13.7	11.8	32.8	-8.5
HFRI Sector: Real Estate Index	NA	NA	NA	NA	NA	9.1	23.8	18.2	-8.1	2.7	5.0
HFRI Sector: Technology Index	NA	NA	30.7	30.6	10.0	50.9	30.6	6.9	28.5	124.3	3.2
HFRI Short Selling Index	36.2	-17.0	10.0	-7.5	18.5	-17.1	-4.0	3.9	-0.5	-24.4	2.0
HFRI Statistical Arbitrage Index	11.2	17.8	10.8	12.6	4.7	14.2	19.6	19.4	10.1	-0.2	5.1
HFRI Fund of Funds Index	5.8	32.2	21.2	30.9	4.1	21.5	21.1	16.8	2.6	31.3	5.9
HFRI Fund Weighted Composite Index	17.5	14.5	12.3	26.3	-3.5	11.1	14.4	16.2	-5.1	26.5	4.3

Source: HFR

* To July 2000 inclusive

Table 58: Risk, Return and Correlation Characteristics of HFRI Indices

	Number of returns	Annual return (%)	Volatility (%)	Sharpe Ratio*	Highest 1M loss (%)	Negative months (%)	Worst 1Y return (%)	Correl. MSCI World	Correl. JPM Bonds
S&P 500 (Total return)	127	17.7	13.6	0.93	-14.5	33	-3.12	0.803	0.228
MSCI World (Total return)	127	11.2	14.1	0.44	-13.3	37	-16.52	1.000	0.358
MSCI EAFE (Total return)	127	6.5	17.1	0.09	-13.9	40	-23.20	0.938	0.383
MSCI Europe (Total return)	127	13.2	14.6	0.56	-12.6	35	-12.07	0.853	0.361
JPM Global Bond Index (Total return)	127	7.4	5.8	0.41	-3.3	39	-6.18	0.358	1.000
HFRI Convertible Arbitrage Index	127	12.0	3.5	2.01	-3.2	13	-3.8	0.325	0.004
HFRI Distressed Securities Index	127	16.3	6.5	1.74	-8.5	17	-6.4	0.334	-0.167
HFRI Emerging Markets (Total) Index	127	16.5	16.6	0.70	-21.0	33	-42.5	0.594	-0.053
HFRI Emerging Markets: Asia Index	127	11.1	14.3	0.43	-12.1	39	-30.8	0.561	0.010
HFRI Emerging Markets: Eur/CIS Index	75	17.5	38.9	0.32	-38.6	41	-69.5	0.423	-0.225
HFRI Emerging Markets: Global Index	102	17.5	17.8	0.70	-27.5	34	-44.4	0.505	-0.208
HFRI Emerging Markets: Latin Am Index	114	25.9	21.2	0.98	-15.6	33	-28.5	0.417	-0.024
HFRI Equity Hedge Index	127	23.2	9.0	2.02	-7.7	24	0.6	0.546	0.049
HFRI Equity Market Neutral Index	127	11.1	3.2	1.92	-1.7	15	1.6	0.174	0.150
HFRI Equity Non-Hedge Index	127	20.9	14.0	1.14	-13.3	32	-9.7	0.649	0.062
HFRI Event-Driven Index	127	16.8	6.7	1.76	-8.9	16	-1.5	0.525	-0.047
HFRI Fixed Income (Total) Index	127	11.6	3.7	1.80	-3.3	12	-3.1	0.395	-0.066
HFRI Fixed Income: Arbitrage Index	127	9.1	5.0	0.83	-6.5	19	-10.8	-0.045	-0.331
HFRI Fixed Income: Convertible Bonds Index	90	16.7	10.0	1.17	-11.5	27	-6.6	0.702	-0.059
HFRI Fixed Income: Diversified Index	66	6.9	3.1	0.60	-1.4	27	2.6	0.306	0.123
HFRI Fixed Income: High Yield Index	127	10.4	7.1	0.75	-7.2	21	-12.1	0.382	-0.061
HFRI Fixed Income: Mortgage-Backed Index	90	9.3	5.0	0.85	-9.2	12	-9.8	-0.029	-0.108
HFRI Macro Index	127	19.2	9.1	1.55	-6.4	30	-7.1	0.444	0.068
HFRI Market Timing Index	127	16.2	6.7	1.67	-3.0	32	1.0	0.597	0.129
HFRI Merger Arbitrage Index	127	13.1	4.6	1.75	-6.5	9	0.4	0.370	0.018
HFRI Regulation D Index	54	32.2	6.0	4.57	-1.7	2	21.8	0.175	-0.131
HFRI Relative Value Arbitrage Index	127	14.4	4.0	2.34	-5.8	11	1.1	0.330	-0.099
HFRI Sector (Total)	127	27.4	13.1	1.71	-13.0	24	-15.2	0.443	0.050
HFRI Sector: Energy Index	66	31.9	23.5	1.14	-11.8	38	-37.1	0.321	0.166
HFRI Sector: Financial Index	102	19.6	12.5	1.17	-18.7	24	-17.7	0.453	-0.029
HFRI Sector: Health Care/Biotechnology Index	90	24.6	23.8	0.82	-17.7	38	-18.3	0.201	-0.029
HFRI Sector: Miscellaneous	114	23.8	10.8	1.73	-7.6	22	-3.9	0.420	0.145
HFRI Sector: Real Estate Index	77	8.3	7.0	0.47	-7.3	42	-9.7	0.426	0.001
HFRI Sector: Technology Index	114	31.2	19.4	1.35	-15.2	33	-8.9	0.530	0.008
HFRI Short Selling Index	127	-1.4	22.2	-0.29	-21.2	51	-25.4	-0.588	-0.080
HFRI Statistical Arbitrage Index	127	11.7	3.7	1.80	-2.0	23	0.9	0.375	0.221
HFRI Fund Weighted Composite Index	127	12.3	6.2	1.16	-7.5	23	-7.4	0.378	-0.093
HFRI Fund of Funds Index	127	17.8	7.1	1.80	-8.7	24	-6.4	0.618	-0.008

Source: Datastream, HFR, UBS Warburg calculations.

*Assuming 5% risk free rate

Time range: January 1990 to July 2000 (=127 monthly returns)

Table 59: Description of HFRI Indices

HFRI index	Description
HFRI Convertible Arbitrage Index	Convertible Arbitrage involves purchasing a portfolio of convertible securities, generally convertible bonds, and hedging a portion of the equity risk by selling short the underlying common stock. Certain managers may also seek to hedge interest rate exposure under some circumstances. Most managers employ some degree of leverage, ranging from zero to 6:1. The equity hedge ratio may range from 30 to 100 percent. The average grade of bond in a typical portfolio is BB-, with individual ratings ranging from AA to CCC. However, as the default risk of the company is hedged by shorting the underlying common stock, the risk is considerably better than the rating of the unhedged bond indicates.
HFRI Distressed Securities Index	Distressed Securities strategies invest in, and may sell short, the securities of companies where the security's price has been, or is expected to be, affected by a distressed situation. This may involve reorganisations, bankruptcies, distressed sales and other corporate restructurings. Depending on the manager's style, investments may be made in bank debt, corporate debt, trade claims, common stock, preferred stock and warrants. Strategies may be sub-categorised as 'high-yield' or 'orphan equities.' Leverage may be used by some managers. Fund managers may run a market hedge using S&P put options or put options spreads.
HFRI Emerging Markets (Total) Index	Emerging Markets funds invest in securities of companies or the sovereign debt of developing or 'emerging' countries. Investments are primarily long. 'Emerging Markets' include countries in Latin America, Eastern Europe, the former Soviet Union, Africa and parts of Asia. Emerging Markets - Global funds will shift their weightings among these regions according to market conditions and manager perspectives. In addition, some managers invest solely in individual regions. Emerging Markets - Asia involves investing in the emerging markets of Asia. Emerging Markets - Eastern Europe/CIS funds concentrate their investment activities in the nations of Eastern Europe and the CIS (the former Soviet Union). Emerging Markets - Latin America is a strategy that entails investing throughout Central and South America.
HFRI Equity Hedge Index	Equity Hedge investing consists of a core holding of long equities hedged at all times with short sales of stocks and/or stock index options. Some managers maintain a substantial portion of assets within a hedged structure and commonly employ leverage. Where short sales are used, hedged assets may be comprised of an equal dollar value of long and short stock positions. Other variations use short sales unrelated to long holdings and/or puts on the S&P 500 index and put spreads. Conservative funds mitigate market risk by maintaining market exposure from zero to 100 percent. Aggressive funds may magnify market risk by exceeding 100 percent exposure and, in some instances, maintain a short exposure. In addition to equities, some funds may have limited assets invested in other types of securities.
HFRI Equity Market Neutral Index	Equity Market Neutral investing seeks to profit by exploiting pricing inefficiencies between related equity securities, neutralising exposure to market risk by combining long and short positions. One example of this strategy is to build portfolios made up of long positions in the strongest companies in several industries and taking corresponding short positions in those showing signs of weakness.
HFRI Equity Non-Hedge Index	Equity Non-Hedge funds are predominately long equities although they have the ability to hedge with short sales of stocks and/or stock index options. These funds are commonly known as 'stock-pickers.' Some funds employ leverage to enhance returns. When market conditions warrant, managers may implement a hedge in the portfolio. Funds may also opportunistically short individual stocks. The important distinction between equity non-hedge funds and equity hedge funds is equity non-hedge funds do not always have a hedge in place. In addition to equities, some funds may have limited assets invested in other types of securities.
HFRI Event-Driven Index	Event-Driven is also known as 'corporate life cycle' investing. This involves investing in opportunities created by significant transactional events, such as spin-offs, mergers and acquisitions, bankruptcy reorganisations, recapitalisations and share buybacks. The portfolio of some Event-Driven managers may shift in majority weighting between Risk Arbitrage and Distressed Securities, while others may take a broader scope. Instruments include long and short common and preferred stocks, as well as debt securities and options. Leverage may be used by some managers. Fund managers may hedge against market risk by purchasing S&P put options or put option spreads.
HFRI Fixed Income: Arbitrage Index	Fixed Income: Arbitrage is a market neutral hedging strategy that seeks to profit by exploiting pricing inefficiencies between related fixed income securities while neutralising exposure to interest rate risk. Fixed Income Arbitrage is a generic description of a variety of strategies involving investment in fixed income instruments, and weighted in an attempt to eliminate or reduce exposure to changes in the yield curve. Managers attempt to exploit relative mispricing between related sets of fixed income securities. The generic types of fixed income hedging trades include: yield-curve arbitrage, corporate versus Treasury yield spreads, municipal bond versus Treasury yield spreads and cash versus futures.
HFRI Fixed Income: Convertible Bonds Index	Fixed Income: Convertible Bonds funds are primarily long only convertible bonds. Convertible bonds have both fixed income and equity characteristics. If the underlying common stock appreciates, the convertible bond's value should rise to reflect this increased value. Downside protection is offered because if the underlying common stock declines, the convertible bond's value can decline only to the point where it behaves like a straight bond.
HFRI Fixed Income: Diversified Index	Fixed Income: Diversified funds may invest in a variety of fixed income strategies. While many invest in multiple strategies, others may focus on a single strategy less followed by most fixed income hedge funds. Areas of focus include municipal bonds, corporate bonds, and global fixed income securities.
HFRI Fixed Income: High Yield Index	Fixed Income: High-Yield managers invest in non-investment grade debt. Objectives may range from high current income to acquisition of undervalued instruments. Emphasis is placed on assessing credit risk of the issuer. Some of the available high-yield instruments include extendible/reset securities, increasing-rate notes, pay-in-kind securities, step-up coupon securities, split-coupon securities and usable bonds.
HFRI Fixed Income: Mortgage-Backed Index	Fixed Income: Mortgage-backed funds invest in mortgage-backed securities. Many funds focus solely on AAA-rated bonds. Instruments include: government agency, government-sponsored enterprise, private-label fixed- or adjustable-rate mortgage pass-through securities, fixed- or adjustable-rate collateralised mortgage obligations (CMOs), real estate mortgage investment conduits (REMICs) and stripped mortgage-backed securities (SMBSs). Funds may look to capitalise on security-specific mispricings. Hedging of prepayment risk and interest rate risk is common. Leverage may be used, as well as futures, short sales and options.

HFRI index	Description
HFRI Macro Index	Macro involves investing by making leveraged bets on anticipated price movements of stock markets, interest rates, foreign exchange and physical commodities. Macro managers employ a 'top-down' global approach, and may invest in any markets using any instruments to participate in expected market movements. These movements may result from forecasted shifts in world economies, political fortunes or global supply and demand for resources, both physical and financial. Exchange-traded and over-the-counter derivatives are often used to magnify these price movements.
HFRI Market Timing Index	Market Timing involves allocating assets among investments by switching into investments that appear to be beginning an uptrend, and switching out of investments that appear to be starting a downtrend. This primarily consists of switching between mutual funds and money markets. Typically, technical trend-following indicators are used to determine the direction of a fund and identify buy and sell signals. In an up move 'buy signal,' money is transferred from a money market fund into a mutual fund in an attempt to capture a capital gain. In a down move 'sell signal,' the assets in the mutual fund are sold and moved back into the money market for safe keeping until the next up move. The goal is to avoid being invested in mutual funds during a market decline.
HFRI Merger Arbitrage Index	Merger Arbitrage, sometimes called Risk Arbitrage, involves investment in event-driven situations such as leveraged buy-outs, mergers and hostile takeovers. Normally, the stock of an acquisition target appreciates while the acquiring company's stock decreases in value. These strategies generate returns by purchasing stock of the company being acquired, and in some instances, selling short the stock of the acquiring company. Managers may employ the use of equity options as a low-risk alternative to the outright purchase or sale of common stock. Most Merger Arbitrage funds hedge against market risk by purchasing S&P put options or put option spreads.
HFRI Relative Value Arbitrage Index	Relative-value Arbitrage attempts to take advantage of relative pricing discrepancies between instruments including equities, debt, options and futures. Managers may use mathematical, fundamental, or technical analysis to determine misvaluations. Securities may be mispriced relative to the underlying security, related securities, groups of securities, or the overall market. Many funds use leverage and seek opportunities globally. Arbitrage strategies include dividend arbitrage, pairs trading, options arbitrage and yield curve trading.
HFRI Sector: Energy Index	Sector: Energy is a strategy that focuses on investment within the energy sector. Investments can be long and short in various instruments with funds either diversified across the entire sector or specialising within a sub-sector, i.e., oil field service.
HFRI Sector: Financial Index	Sector: Financial is a strategy that invests in securities of bank holding companies, banks, thrifts, insurance companies, mortgage banks and various other financial services companies.
HFRI Sector: Health Care/Biotechnology Index	Sector: Healthcare/Biotechnology funds invest in companies involved in the healthcare, pharmaceutical, biotechnology, and medical device areas.
HFRI Sector: Real Estate Index	Sector: Real Estate involves investing in securities of real estate investment trusts (REITs) and other real estate companies. Some funds may also invest directly in real estate property.
HFRI Sector: Technology Index	Sector: Technology funds emphasise investment in securities of the technology arena. Some of the sub-sectors include multimedia, networking, PC producers, retailers, semiconductors, software and telecommunications.
HFRI Short Selling Index	Short Selling involves the sale of a security not owned by the seller; a technique used to take advantage of an anticipated price decline. To effect a short sale, the seller borrows securities from a third party in order to make delivery to the purchaser. The seller returns the borrowed securities to the lender by purchasing the securities in the open market. If the seller can buy that stock back at a lower price, a profit results. If the price rises, however, a loss results. A short seller must generally pledge other securities or cash with the lender in an amount equal to the market price of the borrowed securities. This deposit may be increased or decreased in response to changes in the market price of the borrowed securities.
HFRI Statistical Arbitrage Index	Statistical Arbitrage utilises quantitative analysis of technical factors to exploit pricing inefficiencies between related equity securities, neutralising exposure to market risk by combining long and short positions. The strategy is based on quantitative models for selecting specific stocks with equal dollar amounts comprising the long and short sides of the portfolio. Portfolios are typically structured to be market, industry, sector, and dollar neutral.
HFRI Fund of Funds Index	Funds of Funds invest with multiple managers through funds or managed accounts. The strategy designs a diversified portfolio of managers with the objective of significantly lowering the risk (volatility) of investing with an individual manager. The Fund of Funds manager has discretion in choosing which strategies to invest in for the portfolio. A manager may allocate funds to numerous managers within a single strategy, or with numerous managers in multiple strategies. The minimum investment in a Fund of Funds may be lower than an investment in an individual hedge fund or managed account. The investor has the advantage of diversification among managers and styles with significantly less capital than investing with separate managers.

Source: HFR

MARwww.marhedge.com

Managed Account Reports (MAR) is one of the oldest sources of global managed futures information. Its sister publication, MAR/Hedge, started to report similar information on hedge funds in 1994.

Table 60: Annual Returns of MAR Indices

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000*
Event-Driven Median	2.6	19.9	17.7	27.6	3.4	13.1	15.0	17.3	2.4	16.2	10.0
Event-Driven Median: Distressed SEC. Sub-Median	19.3	25.1	18.3	31.2	-4.3	22.0	21.1	18.7	-4.8	17.9	5.6
Event-Driven Median: Risk Arbitrage Sub-Median	-1.7	18.3	17.4	26.4	5.2	16.6	16.0	18.2	5.7	15.8	9.5
Global Emerging Median	5.1	61.5	21.0	45.9	4.3	-0.8	25.9	14.8	-36.6	42.9	0.8
MAR/Hedge Global International Median	10.4	26.9	9.9	26.8	0.0	14.4	15.8	15.3	1.5	28.9	2.3
MAR/Hedge Global Established Median	-1.5	33.7	17.4	21.6	3.4	26.4	22.3	23.7	9.6	34.4	5.4
MAR/Hedge Global Macro Median	11.3	36.5	22.4	40.9	-5.0	11.2	9.9	16.0	8.1	8.5	1.9
Market Neutral Median	7.9	14.8	11.6	14.5	7.2	11.4	10.7	13.4	8.0	12.3	8.7
Market Neutral Median: Arbitrage Sub-Median	1.0	16.8	15.3	16.6	7.5	15.8	15.4	12.7	7.6	42.6	5.7
Market Neutral Median: Long/Short Sub-Median	10.2	12.4	7.9	9.7	5.1	12.2	13.7	14.9	11.2	9.9	7.3
Short-Sellers Median	41.8	-22.7	-11.2	-14.3	14.0	-2.7	9.2	6.5	-0.8	-14.7	3.3
Fund of Funds Median	7.5	11.3	11.9	24.2	-4.4	12.3	16.7	17.2	1.7	16.2	5.2
MAR/Hedge Fund of Funds Diversified Median	7.5	11.0	12.0	23.3	-4.4	12.5	16.8	17.1	1.8	22.4	5.4
MAR/Hedge Fund of Funds Niche Median	6.7	14.7	2.4	29.1	-5.6	12.4	15.9	17.1	2.0	14.3	9.4

Source: MAR

*To July 2000 inclusive

Table 61: Risk, Return and Correlation Characteristics of MAR Indices

	Number of returns	Annual return (%)	Volatility (%)	Sharpe Ratio*	Highest 1M loss (%)	Negative months (%)	Worst 1Y return (%)	Correl. MSCI World	Correl. JPM Bonds
S&P 500 (Total return)	127	17.7	13.6	0.93	-14.5	33	0.0	0.803	0.228
MSCI World (Total return)	127	11.2	14.1	0.44	-13.3	37	-0.1	1.000	0.358
MSCI EAFE (Total return)	127	6.5	17.1	0.09	-13.9	40	-0.2	0.938	0.383
MSCI Europe (Total return)	127	13.2	14.6	0.56	-12.6	35	-0.1	0.853	0.361
JPM Global Bond Index (Total return)	127	7.4	5.8	0.41	-3.3	39	-0.1	0.358	1.000
MAR Hedge Event-Driven	127	13.5	4.7	1.79	-6.9	11	-0.5	0.413	-0.083
MAR Hedge Event-Driven: Distressed Securities	127	15.5	7.5	1.40	-9.2	22	-7.6	0.427	-0.028
MAR Hedge Event-Driven: Risk Arbitrage	127	13.7	4.5	1.93	-5.6	9	-1.7	0.373	-0.072
MAR Hedge Global Emerging Markets	127	14.2	17.7	0.52	-26.7	30	-45.1	0.541	-0.043
MAR Hedge Global International Markets	127	14.0	7.2	1.25	-10.2	26	-4.8	0.446	-0.087
MAR Hedge Global Established Markets	127	18.0	9.3	1.39	-9.4	24	-2.2	0.692	0.059
MAR Hedge Macro	127	14.5	7.1	1.35	-5.4	29	-7.9	0.382	0.008
MAR Hedge Market-Neutral	127	11.4	1.5	4.30	-0.6	2	6.4	0.355	-0.067
MAR Hedge Market-Neutral: Arbitrage	127	14.4	7.1	1.32	-4.8	7	1.0	0.235	-0.128
MAR Hedge Market-Neutral: Long/short	127	10.8	1.7	3.47	-1.0	2	4.9	0.261	0.211
MAR Hedge Short-Sellers	127	-0.6	17.4	-0.32	-12.1	49	-27.8	-0.615	-0.049
MAR Hedge Fund of Funds	127	11.1	4.7	1.28	-6.4	18	-6.2	0.481	-0.036
MAR Hedge Fund of Funds: Diversified	127	11.6	5.1	1.30	-6.4	18	-6.2	0.489	-0.061
MAR Hedge Fund of Funds: Niche	127	10.8	5.4	1.07	-5.9	24	-6.1	0.525	0.129

Source: Datastream, MAR, UBS Warburg calculations

* assuming 5% risk free rate

Time range: January 1990 to July 2000 (=127 monthly returns)

Table 62: Description of Hedge Fund Indices

STYLE	SUB-TYPE	COMMENT/ DESCRIPTION
Event-Driven Investment theme is dominated by events that are seen as special situations or opportunities to capitalise on price fluctuations.	Distressed Securities	Focused on securities of companies in reorganisation and/or bankruptcy, ranging from senior secured debt (low-risk) to common stock (high-risk)
	Risk Arbitrage	Manager simultaneously buys stock in a company being acquired and sells stock in its acquirers. If the takeover falls through, traders can be left with large losses
FUND OF FUNDS Capital is allocated among funds, providing investors with access to managers with higher minimums than the individual might afford.	Diversified	Allocates capital to a variety of fund types
	Niche	Allocates capital to a specific type of fund
GLOBAL	International	Manager pays attention to economic change around the world (except US); bottom-up-oriented in that they tend to be stock-pickers in markets they like. Use index derivatives much less than macro managers
	Regional- Emerging	Manager invests in less mature financial markets. Because shorting is not permitted in many emerging markets, managers must go to cash or other markets when valuations make being long unattractive. Focus on specific regions.
Global Macro		Opportunistic; the 'classic' Soros-Steinhardt-Robertson type hedge fund manager profiting wherever they see value. Uses leverage and derivatives to enhance positions, which will have varying time frames from short (under one month) to long (more than 12 months).
Long-Only Leveraged		Traditional equity fund structured like a hedge fund; ie, uses leverage and permits manager to collect an incentive fee.
Market Neutral Manager attempts to lock-out or neutralise market risk. In theory, market risk is greatly reduced but it is difficult to make a profit on a large diversified portfolio, so stock picking is critical	Long/short	Net exposure to market risk is believed to be reduced by having equal allocations on the long and short sides of the market
	Convertible arbitrage	One of the more conservative styles. Manager goes long convertible securities and short underlying equities, profiting from mispricing in the relationship of the two.
	Stock arbitrage	Manager buys a basket of stocks and sells short stock index futures contract, or reverse
	Fixed income arbitrage	Manager buys bonds - often T-bonds, but also sovereign and corporate bonds - and goes short instruments that replicate the owned bond; manager aims to profit from mispricing of relationship between the long and short sides.
Sector		Follows specific economic sectors and/or industries: Managers can use a wide range of methodologies (e.g. bottom-up, top-down, discretionary, technical) and primary focus (e.g. Large-cap, Mid-cap, Small-cap, Micro-cap, Value Growth, Opportunistic)
Short-Sellers		Manager takes a position that stock prices will go down. A hedge fund borrows stock and sells it, hoping to buy it back at a lower price. Manager shorts only overvalued securities. A hedge for long-only portfolios and those who feel market is approaching a bearish trend

Source: MAR

Hennessee

www.hennesseegroup.com

The Hennessee Hedge Fund Advisory Group Indices are developed from information supplied by a select group of over 275 hedge funds tracked by the Hennessee Hedge Fund Advisory Group. This Hennessee Index represents over US\$70 billion of capital (50% of the capital in the industry) with an average capitalisation of US\$270 million per manager. The funds are statistically representative of the larger Hennessee Universe of over 1,400 hedge funds. The indices represent equally weighted averages of reported fund performance and are gross of fees and unaudited. The Hennessee hedge fund indices are available on Bloomberg.

Table 63: Annual Returns of Hennessee Hedge Fund Indices

	1993	1994	1995	1996	1997	1998	1999	2000*
Hennessee HF Index	21.3	0.8	15.1	17.1	15.3	1.8	32.6	7.1
Hennessee HF Index - Conv Arb	14.5	-7.1	18.7	10.4	9.9	6.0	16.2	11.2
Hennessee HF Index - Distressed	29.0	6.8	20.8	21.2	11.3	-6.5	24.8	7.2
Hennessee HF Index - Emerg Mkts	54.6	6.8	-7.0	18.3	14.3	-30.0	47.1	-5.5
Hennessee HF Index - Event Driven	NA	6.8	13.0	18.6	38.0	-2.3	24.4	10.4
Hennessee HF Index - Financial Equities	NA	8.7	37.5	29.6	7.2	-19.2	4.6	10.9
Hennessee HF Index - Fixed Income	7.9	1.4	15.6	15.4	7.2	-14.1	14.6	2.0
Hennessee HF Index - Growth	18.3	0.8	27.6	17.4	15.3	20.1	53.2	1.4
Hennessee HF Index - Healthcare	NA	NA	NA	NA	15.5	8.8	60.5	38.0
Hennessee HF Index - High Yield	NA	NA	NA	NA	14.0	-3.7	8.3	1.9
Hennessee HF Index - International	38.7	-1.5	14.5	21.3	24.2	-3.0	44.3	1.6
Hennessee HF Index - Latin America	NA	31.7	-9.5	27.8	9.6	-37.0	74.1	1.8
Hennessee HF Index - Macro	37.8	-13.4	18.3	17.3	17.2	4.1	7.9	-4.7
Hennessee HF Index - Market Neutral	4.5	6.0	11.5	16.1	12.3	5.0	-0.8	3.9
Hennessee HF Index - Merger Arb	23.4	7.3	15.5	13.8	14.3	7.7	16.0	11.4
Hennessee HF Index - Multiple Arb	NA	NA	10.5	14.5	11.6	4.8	16.3	13.6
Hennessee HF Index - Opportunistic	25.7	4.0	20.0	18.5	15.9	16.7	37.2	7.0
Hennessee HF Index - Pacific Rim	36.0	-6.3	-1.7	6.4	1.1	-8.8	81.1	-0.6
Hennessee HF Index - Short Only	-1.1	11.6	-23.3	-14.0	7.1	-23.3	-9.9	5.5
Hennessee HF Index - Technology	NA	NA	NA	20.1	13.0	44.0	101.5	13.2
Hennessee HF Index - Value	20.5	2.0	20.2	21.2	25.6	-0.9	24.6	5.0

Source: Hennessee, Bloomberg.

* To July 2000 inclusive

Table 64: Risk, Return and Correlation Characteristics of Hennessee Hedge Fund Indices

	Number of returns	Annual return (%)	Volatility (%)	Sharpe ratio*	Highest 1M loss (%)	Negative months (%)	Worst 1Y return (%)	Correl. MSCI World	Correl. JPM Bonds
S&P 500 (Total return)	91	19.3	13.2	1.08	-14.5	31	0.00	0.866	0.185
MSCI World (Total return)	91	16.0	12.7	0.87	-13.3	32	-0.04	1.000	0.259
MSCI EAFE (Total return)	91	12.6	14.6	0.52	-12.4	35	-0.12	0.923	0.279
MSCI Europe (Total return)	91	18.0	13.1	0.99	-12.6	29	-0.04	0.851	0.243
JPM Global Bond Index (Total return)	91	5.7	5.4	0.14	-3.3	40	-0.07	0.259	1.000
Hennessee HF Index	91	14.3	7.3	1.26	-9.5	22	-4.9	0.662	-0.085
Hennessee HF Index - Conv Arb	91	10.3	3.7	1.43	-3.3	13	-7.1	0.304	-0.047
Hennessee HF Index - Distressed	91	14.6	7.1	1.36	-8.9	19	-8.6	0.435	-0.160
Hennessee HF Index - Emerg Mkts	91	9.7	16.1	0.29	-20.1	40	-39.9	0.581	-0.202
Hennessee HF Index - Event Driven	79	15.9	8.2	1.34	-8.1	22	-3.3	0.517	-0.129
Hennessee HF Index - Financial Equities	79	10.7	14.0	0.40	-21.7	28	-22.9	0.511	-0.108
Hennessee HF Index - Fixed Income	91	6.1	8.4	0.13	-8.6	33	-14.2	0.315	-0.315
Hennessee HF Index - Growth	91	19.4	13.2	1.10	-11.6	30	-1.0	0.619	0.066
Hennessee HF Index - Healthcare	43	33.1	28.9	0.97	-17.3	40	-13.9	0.274	-0.015
Hennessee HF Index - High Yield	43	5.5	6.6	0.08	-6.8	35	-6.4	0.433	-0.286
Hennessee HF Index - International	91	17.3	10.1	1.22	-7.9	32	-5.7	0.650	-0.075
Hennessee HF Index - Latin America	79	9.9	28.9	0.17	-30.6	39	-47.8	0.536	-0.189
Hennessee HF Index - Macro	91	10.1	9.7	0.53	-7.5	40	-13.8	0.536	-0.013
Hennessee HF Index - Market Neutral	91	7.6	3.8	0.69	-4.4	22	-3.6	0.154	0.130
Hennessee HF Index - Merger Arb	91	14.4	3.5	2.67	-5.0	9	5.6	0.426	-0.084
Hennessee HF Index - Multiple Arb	67	12.8	3.1	2.51	-3.8	6	3.5	0.233	-0.487
Hennessee HF Index - Opportunistic	91	18.8	7.3	1.88	-7.3	16	3.1	0.635	0.058
Hennessee HF Index - Pacific Rim	91	11.1	13.9	0.43	-8.2	46	-27.8	0.507	-0.055
Hennessee HF Index - Short Only	91	-7.2	21.0	-0.58	-13.8	56	-29.3	-0.713	-0.110
Hennessee HF Index - Technology	55	38.5	19.1	1.75	-10.4	31	4.4	0.592	-0.011
Hennessee HF Index - Value	91	15.1	8.3	1.23	-10.6	27	-7.6	0.644	0.017

Source: Datastream, Hennessee, Bloomberg, UBS Warburg calculations.

*Assuming 5% risk free rate

Time range: January 1993 to July 2000 (=91 monthly returns)

Table 65: Description of Hennessee Indices

Style	Definition	Typical Holding Period of Manager's Positions	Expected volatility
Emerging Markets	This style invests in the less mature financial markets of the world such as Russia, Singapore, Pakistan, India, etc. Shorting is not permitted in many of the emerging markets, so managers must resort to cash or other markets to hedge their long positions.	Short/Medium Term	High
Levered Bonds	Employs leverage to buy bonds (mostly government) and sometimes fixed income derivatives to profit mainly from principal appreciation and yield curve spreads.	Short/Medium Term	High
Macro	Dominant strategy is to profit from changes in global economies, typically based on the major currency and interest rate shifts, using leverage and derivatives. Predominantly top down.	Medium Term	High
International	This style also pays attention to economic changes around the world, but they are more bottom-up oriented and tend to be stock pickers in the markets they like. They use index derivatives to a much lesser extent than their macro brethren.	Medium Term	High
Short Only	The entire portfolio consists of short sales, usually fundamental, technical or event-driven. This style is used as a hedge for long-only portfolios and by those who feel the market is approaching a bearish cycle.	Medium Term	High
Latin America	This style invests in debt and/or equity in the Latin American region.	Medium Term	High
Pacific Rim	Invests in Japan and other Asian nations. Many managers also include Australia and New Zealand in this style.	Medium Term	High
Biotechnology	Managers purchase biotech and medical technology stocks long and short.	Medium Term	High
Distressed	Dominant investment theme involves securities of companies in bankruptcy and reorganisation. They range from senior secured debt (low risk) to the common stock of the company (high risk).	Medium/Long Term	Moderate
Growth	Dominant theme is growth in revenues, earnings and market share.	Medium Term	Moderate
Risk Arbitrage	This style involves the simultaneous purchase of stock in a company being acquired and the sale of stock in its acquirer. If the takeover plan falls through, the traders may be left with large losses. However, many risk arbitrage funds reduce this risk by trading only friendly take-overs after they are announced.	Medium Term	Moderate
Multiple Arbitrage	Includes various arbitrage strategies within one fund. Portfolio manager allocates between styles to form the best risk/reward relationships for the fund (risk arb, convertible arb, statistical arb etc.).	Medium Term	Moderate
High Yield	Managers invest primarily in positions that are non-investment grade bonds which offer attractive coupon yields.	Medium Term	Moderate
Event Driven	Combines risk arbitrage, distressed, high yield and selected value stocks into the style. Usually dependent on an 'event' as the catalyst to release positions intrinsic value.	Medium Term	Moderate
Financial Equities	Dominant theme is long and short equity exposure to banks and other financial institutions.	Long Term	Moderate
Technology	Manager invest at least 50% of capital in technology related positions. Many managers may also invest in companies with superior technology platforms.	Medium Term	Moderate
Value	Dominant theme is intrinsic value: asset, cash flow, book value and out-of-favour stocks.	Long Term	Low/Moderate
Opportunistic	Dominant investment theme is momentum trading with a typically short term time horizon of 5-30 days on technicals, IPO, event and ticker tape.	Short Term	Low/Moderate
Convertible Arbitrage	One of the more conservative styles. This style goes long convertible securities and short the underlying equities.	Medium Term	Low
Market Neutral	Equally long and short equities. In theory, market risk is greatly reduced by being dollar, beta and sector neutral. However, it is extremely difficult to make money on a large, diversified portfolio, so stock picking is critical.	Short/Medium Term	Low

Source: Hennessee

CSFB/Tremont

The CSFB/Tremont Hedge Fund Indices

The methodology utilised in the CSFB/Tremont Hedge Fund Index starts by defining the universe it is measuring. Credit Suisse First Boston Tremont Index LLC uses the TASS+ database, which tracks over 2600 funds. The universe consists only of funds with a minimum of US\$10m under management and a current audited financial statement. Funds are separated into primary sub-categories based on their investment style. The Index in all cases represents at least 85% of the assets under management in the universe. CSFB/Tremont analyses the percentage of assets invested in each sub-category and selects funds for the Index based on those percentages, matching the 'shape' of the Index to the shape of the universe. The Index is re-balanced monthly. Funds are re-selected on a quarterly basis as necessary.

Index construction

- The Index is asset-weighted and includes only funds, as opposed to separate accounts.
- A fund must have US\$10m in assets.
- Only funds with audited financials are included.
- Funds must meet the Credit Suisse First Boston Tremont Index LLC reporting requirements.
- Funds are not removed from the Index until they are liquidated or fail to meet the financial reporting requirements. The objective is to minimise survivorship bias.
- The Index is calculated on a monthly basis.
- Funds are re-selected quarterly.
- Returns are net of fees.

The CSFB/Tremont Hedge Fund Sub-indices

While more than 70% of the total assets under management in hedge funds are invested in the equity markets, the investment disciplines are diverse and distinct. Credit Suisse First Boston Tremont Index LLC's series of sub-indices is designed to track the primary categories of investment styles used by hedge fund managers. Each sub-index is calculated using the same exacting methodology as the master Index.

Table 66: Annual Returns of CSFB/Tremont Hedge Fund Indices

	1994	1995	1996	1997	1998	1999	2000*
CSFB/Tremont Hedge Fund Index	-4.4	21.7	22.2	25.9	-0.4	23.4	1.9
Convertible Arbitrage	-8.1	16.6	17.9	14.5	-4.4	16.0	19.8
Dedicated Short Bias	14.9	-7.4	-5.5	0.4	-6.0	-14.2	-6.8
Emerging Markets	12.5	-16.9	34.5	26.6	-37.7	44.8	1.1
Equity Market Neutral	-2.0	11.0	16.6	14.8	13.3	15.3	10.9
Event Driven	0.8	18.3	23.1	20.0	-4.9	22.3	5.2
Fixed Income Arbitrage	0.3	12.5	15.9	9.3	-8.2	12.1	3.4
Global Macro	-5.7	30.7	25.6	37.1	-3.6	5.8	-0.7
Long / Short Equity	-8.1	23.0	17.1	21.5	17.2	47.2	1.1
Managed Futures	12.0	-7.1	12.0	3.1	20.6	-4.7	-8.0

Source: CSFB/Tremont

* To July 2000 inclusive

Table 67: Risk, Return and Correlation Characteristics of CSFB/Tremont Hedge Fund Indices

	Number of returns	Annual return (%)	Volatility (%)	Sharpe ratio*	Highest 1M loss (%)	Negative months (%)	Worst 1Y return (%)	Correl. MSCI World	Correl. JPM Bonds
S&P 500 (Total return)	79	20.3	14.0	1.09	-14.5	30	0.0	0.908	0.191
MSCI World (Total return)	79	13.9	13.0	0.69	-13.3	33	0.0	1.000	0.227
MSCI EAFE (Total return)	79	8.4	14.0	0.24	-12.4	37	-0.1	0.926	0.235
MSCI Europe (Total return)	79	15.5	13.3	0.79	-12.6	29	0.0	0.857	0.207
JPM Global Bond Index (Total return)	79	4.9	5.6	-0.02	-3.3	43	-0.1	0.227	1.000
CSFB/Tremont Hedge Fund Index	79	13.4	10.0	0.84	-7.5	30	-7.3	0.506	-0.170
CSFB/Tremont Convertible Arbitrage	79	9.0	5.2	0.76	-4.7	18	-9.0	0.133	-0.237
CSFB/Tremont Dedicated Short Bias	79	-4.7	17.8	-0.55	-8.7	54	-28.0	-0.736	-0.038
CSFB/Tremont Emerging Markets	79	6.9	21.1	0.09	-23.0	43	-44.2	0.555	-0.252
CSFB/Tremont Equity Market Neutral	79	11.0	3.5	1.73	-1.1	18	-2.0	0.435	0.032
CSFB/Tremont Event Driven	79	12.1	7.0	1.02	-11.8	20	-7.2	0.641	-0.165
CSFB/Tremont Fixed Income Arbitrage	79	6.2	4.6	0.27	-7.0	22	-10.1	0.070	-0.308
CSFB/Tremont Global Macro	79	12.3	14.5	0.51	-11.6	38	-22.2	0.285	-0.206
CSFB/Tremont Long / Short Equity	79	18.0	12.5	1.04	-11.4	30	-9.9	0.649	0.026
CSFB/Tremont Managed Futures	79	4.5	11.1	-0.05	-9.4	48	-15.4	0.044	0.244

Source: CSFB/Tremont

Table 68: Description of CSFB/Tremont Hedge Fund Indices

Hedge fund style	Description
Convertible Arbitrage	This strategy is identified by hedge investing in the convertible securities of a company. A typical investment is to be long the convertible bond and short the common stock of the same company. Positions are designed to generate profits from the fixed income security as well as the short sale of stock, while protecting principal from market moves.
Dedicated Short Bias	Dedicated short sellers were once a robust category of hedge funds before the long bull market rendered the strategy difficult to implement. A new category, short biased, has emerged. The strategy is to maintain net short as opposed to pure short exposure. Short biased managers take short positions in mostly equities and derivatives. The short bias of a manager's portfolio must be constantly greater than zero to be classified in this category.
Emerging Markets	This strategy involves equity or fixed income investing in emerging markets around the world. Because many emerging markets do not allow short selling, nor offer viable futures or other derivative products with which to hedge, emerging market investing often employs a long-only strategy.
Equity Market Neutral	This investment strategy is designed to exploit equity market inefficiencies and usually involves being simultaneously long and short matched equity portfolios of the same size within a country. Market neutral portfolios are designed to be either beta or currency neutral, or both. Well-designed portfolios typically control for industry, sector, market capitalisation, and other exposures. Leverage is often applied to enhance returns.
Event-driven	This strategy is defined as equity-oriented investing designed to capture price movement generated by an anticipated corporate event. There are four popular sub-categories in event-driven strategies: risk arbitrage, distressed securities, Regulation D and high yield investing.
	Risk Arbitrage Specialists invest simultaneously in long and short positions in both companies involved in a merger or acquisition. Risk arbitrageurs are typically long the stock of the company being acquired and short the stock of the two companies. The principal risk is deal risk, should the deal fail to close.
	Distressed Securities Fund managers invest in the debt, equity or trade claims of companies in financial distress and generally bankruptcy. The securities of companies in need of legal action or restructuring to revive financial stability typically trade at substantial discounts to par value and thereby attract investments when managers perceive a turn-around will materialise.
	Regulation D, or Reg. D This sub-set refers to investments in micro and small capitalisation public companies that are raising money in private capital markets. Investments usually take the form of a convertible security with an exercise price that floats or is subject to a look-back provision that insulates the investor from a decline in the price of the underlying stock.
	High Yield Often called junk bonds, this sub-set refers to investing in low-graded fixed-income securities of companies that show significant upside potential. Managers generally buy and hold high yield debt.
Fixed Income Arbitrage	The fixed income arbitrageur aims to profit from price anomalies between related interest rate securities. Most managers trade globally with a goal of generating steady returns with low volatility. This category includes interest rate swap arbitrage, US and non-US government bond arbitrage, forward yield curve arbitrage, and mortgage-backed securities arbitrage. The mortgage-backed market is primarily US-based, over-the-counter and particularly complex.
Global Macro	Global macro managers carry long and short positions in any of the world's major capital or derivative markets. These positions reflect their views on overall market direction as influenced by major economic trends and/or events. The portfolios of these funds can include stocks, bonds, currencies, and commodities in the form of cash or derivatives instruments. Most funds invest globally in both developed and emerging markets.
Long/Short Equity	This directional strategy involves equity-oriented investing on both the long and short sides of the market. The objective is not to be market neutral. Managers have the ability to shift from value to growth, from small to medium to large capitalisation stocks, and from a net long position to a net short position. Managers may use futures and options to hedge. The focus may be regional, such as long/short US or European equity, or sector specific, such as long and short technology or healthcare stocks. Long/short equity funds tend to build and hold portfolios that are substantially more concentrated than those of traditional stock funds.
Managed Futures	This strategy invests in listed financial and commodity futures markets and currency markets around the world. The managers are usually referred to as Commodity Trading Advisors, or CTAs. Trading disciplines are generally systematic or discretionary. Systematic traders tend to use price and market specific information (often technical) to make trading decisions, while discretionary managers use a judgmental approach.

Source: CSFB/Tremont

References

Glossary

Aggressive growth	Hedge Funds that trade aggressively in order to produce the highest possible returns. These funds often use leverage and trade options, but generally can be considered opportunistic and can not be pigeon-holed into a single definition.
AIS	Alternative Investment Strategy
Alpha	Difference between a portfolio's risk-adjusted return and the return for an appropriate benchmark portfolio. Most active investors are trying to maximise alpha.
Alpha transport strategy	See portable alpha approach.
Asset swaps / asset swapping	Asset swapping in, for example, convertible arbitrage this involves stripping out the equity derivative from the convertible and is the optimal hedge for convertible arbitrage funds as it allows them to finance the position cheaply, and removes interest rate risk and credit risk.
Capital structure arbitrage	While a company is restructuring, the prices of its different financial instruments can become mispriced relative to one another. This is an opportunity for what is referred to as capital structure arbitrage. The distressed securities specialists purchase the undervalued security and take short trading positions in the overpriced security to extract an arbitrage profit. aka intra-capitalisation arbitrage
Convertibles arbitrage	Convertible arbitrageurs are simultaneously long the convertible securities and short the underlying securities of the same issuer, thereby working the spread between the two types of securities. Returns result from the difference between cash flows collected through coupon payments and short interest rebates and cash paid out to cover dividend payments on the short equity positions. Returns also result from the convergence of valuations between the two securities. A typical investment is to be long the convertible bond and short the common stock of the same company. Positions are designed to generate profits from the fixed income security as well as the short sale of stock, while protecting principal from market moves.
Core-satellite approach	The core-satellite approach is an alternative to the 'all inclusive' balanced asset allocation approach. In a core-satellite strategy, a money manager will invest typically 70-80% of its assets in an index tracking fund. Specialist fund managers are hired around this 'passive core' as 'satellites' to invest in sectors where index-tracking techniques are difficult to apply, for example AIS, smaller companies or emerging markets. See also portable alpha approach.
CSFB/Tremont Hedge Fund Index	The CSFB/Tremont Hedge Fund Index provides the financial industry with the most precise tool to measure returns experienced by the hedge fund investor. The methodology utilised in the CSFB/Tremont Hedge Fund Index starts by defining the universe it is measuring. Credit Suisse First Boston Tremont Index LLC uses the TASS+ database which tracks over 2,600 funds. The universe consists only of funds with a minimum of US\$10 million under management and a current audited financial statement. Funds are separated into primary sub-categories based on their investment style. The Index in all cases represents at least 85% of the assets under management in the universe. CSFB/Tremont analyses the percentage of assets invested in each sub-category and selects funds for the Index based on those percentages, matching the 'shape' of the Index to the shape of the universe. The Index is re-balanced monthly. Funds are re-selected on a quarterly basis as necessary.
CTAs	CTA is short for Commodity Trading Advisor. CTA's generally trade commodity futures, options and foreign exchange and most are highly leveraged. See Managed Futures
Current Leverage	The amount of leverage currently used by the fund as a percentage of the fund. For example, if the fund has US\$1,000,000 and borrowing another US\$2,000,000, to bring the total dollars invested to US\$3,000,000, then the leverage used is 200%.
Current Net Exposure	The exposure level of the fund to the market at the present time. It is calculated by subtracting the short percentage from the long percentage. For example, if a fund is 100% long and 25% short, then the net exposure is 75%.
Dedicated Short Bias	Dedicated short sellers were once a robust category of hedge funds before the long bull market rendered the strategy difficult to implement. A new category, short biased, has emerged. The strategy is to maintain net short as opposed to pure short exposure. Short biased managers take short positions in mostly equities and derivatives. The short bias of a manager's portfolio must be constantly greater than zero to be classified in this category.
Distressed Securities	Distressed securities is an event-driven strategy. Fund managers invest in the debt, equity or trade claims of companies in financial distress and generally bankruptcy. The securities of companies in need of legal action or restructuring to revive financial stability typically trade at substantial discounts to par value and thereby attract investments when managers perceive a turn-around will materialise.
Downside Deviation (DD)	See Sortino ratio
Downside risk	Because standard deviation measures risk as dispersion on either side of the mean, it cannot distinguish between good volatility and bad volatility. Both practitioners and academics have recognised the need to make this distinction, resulting in a search for a better risk measure. Several measures claim the title of 'downside risk'.

Emerging Markets	This strategy involves equity or fixed income investing in emerging markets around the world. Because many emerging markets do not allow short selling, nor offer viable futures or other derivative products with which to hedge, emerging market investing often employs a long-only strategy.
Equity Market Neutral	This investment strategy is designed to exploit equity market inefficiencies and usually involves being simultaneously long and short matched equity portfolios of the same size within a country. Market neutral portfolios are designed to be either beta or currency neutral, or both. Well-designed portfolios typically control for industry, sector, market capitalisation, and other exposures. Leverage is often applied to enhance returns.
Event-driven Strategy	<p>Manager takes significant position in limited number of companies with 'special situations': companies' situations are unusual in a possible variety of ways and offer profit opportunities; e.g., depressed stock; event in offering offering significant potential market interest (e.g., company is being merged with or acquired by another company); reorganisations; bad news emerging which will temporarily depress stock (so manager shorts stock), etc.</p> <p>See risk arbitrage, distressed securities, Regulation D, and high yield.</p>
Exit Catalyst	An event on the horizon that the distressed securities specialist expects to change the market's perception of (and therefore the value of) the distressed company.
Feedback Trading	<p>Although hedge funds have the flexibility to take short positions, they can also be the first to take long positions in currencies that have depreciated in the wake of a speculative attack, providing liquidity to illiquid markets and helping the currency establish a bottom. Clients' expectations that hedge funds will make above-normal returns - as they often do - will discourage managers from buying the same assets being purchased by other investors since these asset prices already reflect others' moves.</p> <p>Hedge funds' greater flexibility makes them less inclined than other investors to buy and sell in the same direction as the market. Hedge funds are not bound by their prospectuses, as mutual funds often are, to invest new inflows of capital in the same manner as existing capital. When a market is falling, hedge funds can wait it out, while mutual funds may be required by their internal controls to liquidate positions, or they may have to pay off withdrawals by their investors.</p>
Fixed Income Arbitrage	The fixed income arbitrageur aims to profit from price anomalies between related interest rate securities. Most managers trade globally with a goal of generating steady returns with low volatility. This category includes interest rate swap arbitrage, US and non-US government bond arbitrage, forward yield curve arbitrage, and mortgage-backed securities arbitrage. The mortgage-backed market is primarily US-based, over-the-counter and particularly complex.
Forward Yield Curve Arbitrage	See Fixed income arbitrage
Fulcrum rule	US mutual fund performance-based fee must satisfy the 'fulcrum' rule. That is, gains and losses must have a symmetric effect, in the sense that the same amount of over- and underperformance relative to a benchmark must result in the same amount of positive and negative incentive fees for a mutual fund manager. Hedge fund managers are not subject to the 'fulcrum' rule, or for that matter, any rules other than what the investors would bear.
Fundamental spread trading	Fundamental spread trading strategies focus on buying and selling of comparable financial instruments based on a fundamental view of the relationship between them. The fundamental view is most often based on macro-economic factors and/or technical supply and demand factors that are believed to cause temporary distortions of spread relationships.
Funds of funds	A 'Fund of Funds' is simply a fund of hedge funds and there are many benefits to a multi-manager approach to investing. Most fund of funds are of the diversified type, meaning assets of the Limited Partners are allocated among many strategies.
Global Macro	<p>Opportunistic; the 'classic' Soros-Steinhardt-Robertson type hedge fund manager profiting wherever they see value. Use leverage and derivatives to enhance positions, which will have varying timeframes from short (under 1 month) to long (more than 12 months).</p> <p>Global macro managers carry long and short positions in any of the world's major capital or derivative markets. These positions reflect their views on overall market direction as influenced by major economic trends and/or events. The portfolios of these funds can include stocks, bonds, currencies, and commodities in the form of cash or derivatives instruments. Most funds invest globally in both developed and emerging markets.</p>
Haircut	(1) In determining whether assets meet capital requirements, a percentage reduction in the stated value of assets. (2) In computing the worth of assets deposited as collateral or margin, a reduction from market value.
Hedge Directional Strategies	Hedge directional strategies involves buying and/or selling a security or financial instrument based primarily on fundamental or technical research analysis. Hedged-directional strategies take both long and short positions in securities believed to be significantly over or under priced by the market in relation to their potential value. The strategy might concentrate on a specific company, industry, or country. The goal of these strategies is to generate profit through price movements of debt and equity securities, as well as through financial instruments based on interest-rates, currencies, commodities and market indices.
Hedge Fund	Hedge Funds are investment partnerships that seek above average returns through superior portfolio management and whose primary compensation is a percentage of the profits. Because hedge funds are private limited partnerships, the SEC limits hedge funds to sophisticated accredited investors.

Herding	<p>Hedge fund managers are often regarded as astute and quick off the mark. Mere rumour that they are taking a position may encourage other investors to follow. Although pension funds, insurance companies, and mutual funds are subject to prudential restrictions on their foreign exchange market positions, they still have some freedom to follow. And their financial assets are far larger than those of hedge funds.</p> <p>Despite the possibilities, the evidence on whether other investors engage in such copy-cat behaviour is mixed or even negative. Analysis of reported large transactions gives no evidence that other traders are guided by the positions taken by hedge funds in prior periods. When big moves are under way, the data show hedge funds often act as contrarians, leaning against the wind, and therefore often serve as stabilising speculators.</p>
HFR	<p>Hedge Fund Research, Inc www.hfr.com</p>
High Watermark	<p>The assurance that a fund only takes fees on profits unique to an individual investment. For example, a US\$1,000,000 investment is made in year 1 and the fund declines by 50%, leaving US\$500,000 in the fund. In year 2, the fund returns 100%, bringing the investment value back to US\$1,000,000. If a fund has a high watermark, it will not take incentive fees on the return in year 2, since the investment has never grown. The fund will only take incentive fees if the investment grows above the initial level of US\$1,000,000.</p> <p>High watermark contracts have the appealing feature of paying the manager a bonus only when the investor makes a profit, and in addition, requiring that the manager make up any earlier losses before becoming eligible for the bonus payment. On the other hand, their option-like characteristics induce risk-taking behaviour when the manager is below the high watermark, and the large bonus above the benchmark reduces long-run asset growth.</p>
High Yield	<p>'High yield' is an event driven strategy. Often called junk bonds, this sub-set refers to investing in low-graded fixed-income securities of companies that show significant upside potential. Managers generally buy and hold high yield debt.</p>
Hot issue	<p>A newly issued stock that is in great demand and rises quickly in price. Special rules apply to the distribution of hot issues.</p>
Hurdle Rate	<p>The return above which a hedge fund manager begins taking incentive fees. For example, if a fund has a hurdle rate of 10%, and the fund returns 25% for the year, the fund will only take incentive fees on the 15% return above the hurdle rate.</p>
Incentive Fee	<p>The fee on new profits earned by the fund for the period. For example, if the initial investment was US\$1,000,000 and the fund returned 25% during the period (creating profits of US\$250,000) and the fund has an incentive fee of 20%, then the fund receives 20% of the US\$250,000 in profits, or US\$50,000.</p>
Interest rate swap arbitrage	See Fixed income arbitrage
International credit spreads	See TED spreads
Intra-capitalisation arbitrage	See capital structure arbitrage
Jones Model	<p>The first hedge fund on record, the Jones Hedge Fund, was established by Alfred Winslow Jones in 1949. The fund invested in US stocks, both long and short in an attempt to reduce market risk and focus on stock selection. Jones generated very strong returns while managing to avoid significant attention from the general financial community until 1966, when an article in <i>Fortune</i> led to increased interest in hedge funds. Two years later in 1968, the SEC estimated that approximately 140 hedge funds were in existence. However, many funds perished during the market downturn of 1969, having apparently been unable to resist the temptation to be net long and levered during the prior bull run. By the early 1970s, hedge funds had lost their prior popularity, and did not gain it back again until the mid-1980s.</p> <p>See Long/short Equity</p>
Leverage	<p>When investors borrow funds to increase the amount that they have invested in a particular position, they use leverage. Investors use leverage when they believe that the return from the position will exceed the cost of the borrowed funds. Sometimes, managers use leverage to enable them to put on new positions without having to take off other positions prematurely. Managers who target very small price discrepancies or spreads will often use leverage to magnify the returns from these discrepancies.</p> <p>Leveraging both magnifies the risk of the strategy as well as creating risk by giving the lender power over the disposition of the investment portfolio. This may occur in the form of increased margin requirements or adverse market shifts, forcing a partial or complete liquidation of the portfolio.</p>
Long/Short Equity	<p>This directional strategy involves equity-oriented investing on both the long and short sides of the market. The objective is not to be market neutral. Managers have the ability to shift from value to growth, from small to medium to large capitalisation stocks, and from a net long position to a net short position. Managers may use futures and options to hedge. The focus may be regional, such as long/short US or European equity, or sector specific, such as long and short technology or healthcare stocks. Long/short equity funds tend to build and hold portfolios that are substantially more concentrated than those of traditional stock funds.</p> <p>Also: Long/Short Hedged, Jones-Model</p>
Long/Short Hedged	See Hedge directional strategies
Long-only Leveraged	Traditional equity fund structured like a hedge fund; ie, uses leverage and permits managers to collect an incentive fee.
Loss Carryforward	Synonymous with high watermark.

Managed Futures	This strategy invests in listed financial and commodity futures markets and currency markets around the world. The managers are usually referred to as Commodity Trading Advisors, or CTAs. Trading disciplines are generally systematic or discretionary. Systematic traders tend to use price and market specific information (often technical) to make trading decisions, while discretionary managers use a judgmental approach.
Market Neutral	Any strategy that attempts to eliminate market risk and be profitable in any market condition.
Market Timer	Manager attempts to 'time the market' by allocating assets among investments primarily switching between mutual funds and money markets.
Mortgage-backed securities (MBS) arbitrage	Seeks to benefit from relative mispricings in the mortgage-backed security sector while neutralising interest rate risk. See Fixed income arbitrage
Master-Feeder Fund	A typical structure for a hedge fund. It involves a master trading vehicle that is domiciled offshore. The master fund has two investors: Another offshore fund, and a US (usually Delaware) Limited Partnership. These two funds are the feeder funds. Investors invest in the feeder funds, which in turn invest all the money in the Master fund, which is traded by the manager.
Minimal Acceptable Return (MAR)	If there is a minimum return that must be earned to accomplish some goal (the minimal acceptable return [MAR]), then any returns below the MAR will produce unfavourable outcomes and any returns greater will produce good outcomes. Risk is associated only with bad outcomes; therefore, only returns below the MAR are associated with risk. The MAR separates the good volatility (above the MAR) from the bad volatility (below the MAR). See Sortino ratio
Offshore Hedge Fund	Offshore hedge funds usually are mutual fund companies that are domiciled in tax havens, such as Bermuda, and that can utilise hedging techniques to reduce risk. They have no legal limits on numbers of non-US investors. Some meet requirements of the US Securities and Exchange Commission that enable them to accept US investors. For the purposes of US investors, these funds are subject to the same legal guidelines as US-based investment partnerships.
Opportunistic	A general term describing any fund that is 'opportunistic' in nature. These types of funds are usually aggressive and they seek to make money in the most efficient way at the given time.
Options Arbitrage	Manager will seek to capture 'the spread' between similar options through inefficiencies in the market.
Pair Trading	A pair trade involves the purchase of one share category and the sale of another on the same stock, for example, A versus B's in Sweden, bearer versus registered shares in Switzerland or ordinary versus saving shares in Italy.
Poison Put	A poison put is change of control feature of certain convertible bonds that enable the holder to put the bond back to the company at par value.
Portable Alpha Approach	With the portable alpha approach, the alpha of a manager or group of managers or strategy is transported to a target index. For example a pension fund allocates its fund to a bond manager who generates an alpha of 200bp yearly without an increase in credit risk. In addition it swaps total returns of an equity index with the risk free rate. The end result is the total index return plus 200bp. This approach can be used quite broadly. Alpha can be generated in many different areas and transported onto virtually any index. The limiting factor is the availability of derivatives to carry out the alpha transfer. One of the disadvantages is cost of the transfer. However, if the target index is an index with a liquid futures contract, the costs are usually much less than 100 basis points per year. aka Alpha transport strategy
Prudent Expert Rule	The 'Prudent Expert Rule' established by ERISA differs from the common-law standard. The major distinguishing difference is that the rule is applied to the total portfolio rather than to individual investments within the portfolio.
Prudent Man Rule	In the US, for more than a century, the investment actions of fiduciaries have been subject to the test of the 'Prudent Man Rule' as interpreted by US courts. As enacted into legislation by most states, the Prudent Man Rule holds that a fiduciary shall exercise the judgement and care, under the circumstances then prevailing, which men of prudence, character and intelligence exercise in the management of their own affairs, not in regard to speculation but in regard to the permanent disposition of their funds, considering the probable income as well as the probable safety of their capital.
Quadra Appreciation Fund (QAF)	The Quadra Appreciation Fund, Inc. (QAF) is a privately offered offshore investment fund whose flexibility allows investment in AIS/Hedge funds pursuing a variety of relative-value, event driven, and hedged-directional strategies. The QAF is a Cayman Island Company and a 'pass-through' vehicle in which an underlying portfolio of diversified, unaffiliated and external AIS/Hedge funds are managed and pooled. The QAF was established in 1995. UBS has selected the QAF as the underlying fund for the STAR Notes as it provides a simple and convenient reference for both redemption and listing purposes and is a flexible vehicle to actively manage the underlying AIS/Hedge funds.
Quadra Capital Management, L.P.	Quadra Capital Management, L.P. is a Seattle/New York based AIS/Hedge fund advisory firm and multi-fund manager. Quadra manages a proprietary database of AIS/Hedge funds and screens over 3,000 funds to create customised investment return profiles for clients. Quadra has worked closely with UBS since 1995 structuring AIS/Hedge funds products for investors.
Regulation D, or Reg. D	Regulation D is an event-driven strategy. This sub-set refers to investments in micro and small capitalisation public companies that are raising money in private capital markets. Investments usually take the form of a convertible security with an exercise price that floats or is subject to a look-back provision that insulates the investor from a decline in the price of the underlying stock.
Relative-value Strategies	Relative-value strategies seek to profit from the mispricing of related financial instruments. These strategies utilise quantitative and qualitative analyses to identify securities or spreads between securities that deviate from their fair value and/or historical norms. Typical strategies

	include convertible bond and warrant trading, long/short equity basket trading, pair trading and fixed income spread trading.
Reward-to-variability Ratio (RVAR)	See Sharpe-ratio
Risk arbitrage	Risk arbitrage is an event-driven strategy. In a risk arbitrage (or merger arbitrage, or event driven) strategy, the manager takes a long position in the stock of a company being acquired in a merger, leveraged buyout, or takeover and simultaneously takes a short position in the stock of the acquiring company.
Sharpe Ratio	The reward-to-variability ratio (RVAR) was proposed by William Sharpe and is commonly referred to as the Sharpe ratio. The numerator of the Sharpe ratio is the difference between the return on the portfolio and the risk-free rate. A comparable downside risk ratio that has come to be called the Sortino ratio has for the numerator the difference between the return on the portfolio and the MAR. The denominator for the Sharpe ratio is standard deviation, and for the Sortino ratio it is downside deviation. See Sortino ratio
Short Bias	Any manager who consistently has a 'net short' exposure to the market. This category also includes short only funds. See Dedicated short bias
Short Rebate	When a stock is sold short, the seller borrows that stock and immediately sells it on the market with the intention of buying it back later at a lower price. The cash proceeds from the sale are held in a money market account earning interest. This interest is known as a short rebate or short interest rebate.
Short-term Trading	Manager focuses on short duration, opportunistic trades, and sometimes this strategy will include 'Day Trading.'
Small / Micro Cap	Usually long biased, the manager will exclusively focus on small and micro cap stocks.
Sortino Ratio	The Sortino Ratio is similar to the Sharpe Ratio, except that instead of using standard deviation as the denominator, it uses Downside Deviation. The Sortino Ratio was developed to differentiate between 'good' and 'bad' volatility in the Sharpe Ratio. If a fund is volatile to the upside (which is generally a good thing) its Sharpe ratio would still be low. To quote the Sortino web site: 'A comparable downside risk ratio that has come to be called the Sortino ratio has for the numerator the difference between the return on the portfolio and the MAR. The denominator for the Sharpe ratio is standard deviation, and for the Sortino ratio it is downside deviation.' The MAR is the Minimum Acceptable Return (usually 5%).
Special Situations	'Special Situations' may broadly consist of some type of event driven strategy. Managers will opportunistically trade in any type of security that they deem to be a 'special situation.' See Event driven strategy
STAR Note	See UBS STAR Note
Statistical Arbitrage	Believing that equities behave in a way that is mathematically describable, managers perform a low risk, market neutral analytical equity strategy. This approach captures momentary pricing aberrations in the stocks being monitored. The strategy's profit objective is to exploit mispricings in as risk-free manner as possible.
Survivorship Bias	Survivorship bias occurs when data samples exclude markets or investment funds or individual securities that disappeared. The data sample of survivors describes an environment that overstates the real-world return and understates the real-world risk. A classic example of survivorship bias is the paradigm that equities do well in the long run since market studies primarily focus only on returns for securities in the US. At the turn of the twentieth century, active stock markets existed in Russia, France, Germany, Japan, and Argentina, all of which have been interrupted for a variety of reasons, including political turmoil, war, nationalisation, and hyper-inflation.
TED Spreads	The initial <i>TED</i> originally referred to Treasuries over eurodollars, but now usually refers to all global government bonds hedged against par swaps in the same currency. These spreads seek to take advantage of the differences in yields between government securities and LIBOR contracts of similar maturity. aka international credit spreads
UBS STAR Note	UBS note on funds of funds. Usually five-year maturity, US\$50,000 denomination, and listing in Luxembourg. At redemption the note pays out the liquidation value of a hedge fund portfolio unless extended by a further five-year period.
Value	Manager invests in stocks which are perceived to be selling at a discount to their intrinsic or potential worth; i.e., 'undervalued,' or stocks which are out of favour with the market and are 'underfollowed' by analysts. Manager believes that the share price of these stocks will increase as 'value' of company is recognised by the market.
Venture Capital / Private Equity	Any manager who focuses on, or has a component of, venture capital or private equity. As hedge funds are not restricted to trade only 'listed' securities, some manager will make private investments.
Vulture Investing	Derogatory term applied when a venture capitalist or a distressed securities investor gets an unfairly large equity stake

Source: UBS Warburg

Bibliography

- 20th Century Volatility, A Review of the Stock and Derivatives Markets in the 20th Century, UBS Warburg equity derivatives research report (December 1999).
- Ackermann, C. (1998) The impact of Regulatory Restrictions on Fund Performance: A Comparative Study of Hedge Funds and Mutual Funds, FMA Presentation, October 1998.
- AIMR (1999) *Standards of Practice Handbook*, Eighth edition.
- Bacon, Louis Moore, Keynote speech at the 2000 Hedge Fund Symposium, Can Institutions Afford to Ignore Hedge Funds? 27 April 2000, London.
- Bekier, Matthias Dr. (1996) 'Marketing Hedge Funds - A Key Strategic Variable in Defining Possible Roles of an Emerging Investment Force,' Peter Lang AG, European Academic Publishers, Bern.
- Bernstein, Peter L. (1992) 'Capital Ideas - The Improbable Origins of Modern Wall Street,' The Free Press, New York.
- Bogle, John C. (1991) 'Investing in the 1990s: Remembering of Things Past and Things Yet to Come,' *Journal of Portfolio Management*, Spring, pp.5-14.
- Bogle, John C. (1998) 'The Implication of Style Analysis for Mutual Fund Performance Evaluation,' *Journal of Portfolio Management*, pp.34-42.
- Brown, S.J., W.N. Goetzmann, R.G. Ibbotson and S.A. Ross (1992) 'Survivorship Bias in Performance Studies,' *Review of Financial Studies*, vol. 5, no. 4 (Winter), pp.553-580.
- Brown, Stephen J.; William N. Goetzmann, and James M. Park (2000) 'Hedge Funds and the Asian Currency Crisis,' *Journal of Portfolio Management*, Vol. 26, No. 4, Summer, pp.95-101.
- Chandler, Beverly (1998) 'Investing with the Hedge Fund Giants – Profit Whether Markets Rise or Fall,' Financial Times Pitman Publishing.
- Chopra, Navin, Josef Lakonishok, and Jay Ritter (1992) 'Measuring Abnormal Performance,' *Journal of Financial Economics*, pp.235-268.
- Coleman, Thomas S. (2000) 'Compensating Fund Managers for Risk-Adjusted Performance,' www.aima.org
- Cottier, Phillip Dr. (1996) 'Hedge Funds and Managed Futures - Performance, Risks, Strategies and Use in Investment Portfolios,' Thesis, <http://www.aima.org/aimasite/indexfrm.htm>
- Cowles, Alfred 3rd. (1933) 'Can Stock Market Forecasters Forecast?' *Econometrica*, Vol. 1, July, pp.309-324.
- Crerend, William J. (1995) 'Institutional Investment in Hedge Funds,' in Jess Lederman and Robert A. Klein ed. 'Hedge Funds', McGraw-Hill, pp.21-28.
- Crerend, William J. (1998) 'Fundamentals of Hedge Fund Investing – A Professional Investor's Guide,' McGraw-Hill.
- Daniel, Kent, Mark Grinblatt, Sheridan Titman, and Russ Wermers (1997) 'Measuring Mutual Fund Performance with Characteristic-Based Benchmarks,' *Journal of Finance*, Vol. 52, No. 3, pp.1035-1058.
- Edwards, Franklin R. (1999) 'Do Hedge Funds Have a Future?,' *Journal of Alternative Investments*, Fall, vol. 2, no. 2, pp.63-68.
- Eichengreen, Barry, and Donald Mathieson (1999) 'Hedge Funds: What Do We Really Know?' *Economic Issues* No. 19, IMF, September, <http://www.imf.org/external/pubs/ft/issues/issues19/#1>
- Elton, E., M. Gruber, and C. Blake (1996) 'The Persistence of Risk-Adjusted Mutual Fund Performance,' *Journal of Business*, vol. 69, no. 2 (April), pp.133-157.
- Endlich, Lisa (1999) 'Goldman Sachs – The Culture of Success,' Simon & Schuster, Inc.
- EuroHedge, Issue 5: May 2000
- Fama, Eugene F. (1970) 'Efficient Capital Markets: A Review of Theory and Empirical Work,' *Journal of Finance*, 25, pp.383-417.
- Fama, Eugene F. (1998) 'Market efficiency, long-term returns, and behavioral finance,' *Journal of Financial Economics*, vol. 49, no. 3, pp.283-306.
- Fortune (1966) 'Personal Investing – Those fantastic, "hedge funds"', April.
- Friedland, Dion (1998a) 'Taking the Mystery Out of Hedge Funds,' http://www.trading-ideas.com/hedgefund_chap1.html
- Friedland, Dion (1998b) 'Reducing Market Risk with Merger Arbitrage,' <http://www.magnumfund.com/article5.html>
-

- Fung, William, and David A. Hsieh (1997) 'Empirical Characteristics of Dynamic Trading Strategies: The Case of Hedge Funds,' *The Review of Financial Studies*, vol. 10, no. 2, pp.275-302.
- Fung, William, and David A. Hsieh (1999) 'A Primer on Hedge Funds,' Working paper, <http://faculty.fuqua.duke.edu/~dah7/vitae.htm>
- Fung, William, and David A. Hsieh (2000) 'Measuring The Market Impact of Hedge Funds,' Working paper, forthcoming in *Journal of Empirical Finance*, <http://faculty.fuqua.duke.edu/~dah7/vitae.htm>
- Goetzmann, William N., Jonathan Ingersoll, Jr., and Stephen A. Ross (1998) 'High Water Marks,' Yale School of Management working paper, January. http://papers.ssrn.com/paper.taf?ABSTRACT_ID=57933#PaperDownload
- Grinblatt, Mark, and Sheridan Titman (1989) 'Mutual Fund Performance: An Analysis of Quarterly Portfolio Holdings,' *Journal of Business*, 62, pp.393-416.
- Grossman, S., (1976) 'On the Efficiency of Competitive Stock Markets Where Trades have Diverse Information,' *Journal of Finance*, 31, pp.573-585.
- Haugen, Robert A., Philippe Jorion (1996) 'The January Effect: Still There after All These Years,' *Financial Analysts Journal*, vol. 52, no. 1 (January/February), pp.27-31.
- HBS (1999) 'Long-Term Capital Management, L.P. (A),' Harvard Business School, 9-200-007, 5 November.
- Hopkins, Simon (2000) 'On phenomenal growth track,' *Investment & Pensions Europe*, June, p.40.
- Ikenberry, David L and Richard L. Shockley and Kent L. Womack. (1998) 'Why Active Fund Managers Often Underperform the S&P 500: The Impact of Size and Skewness,' *Journal of Private Portfolio Management*, pp13-26.
- Institutional Investor (2000), Europe edition, 15 July.
- Jacobs, Bruce I. (1998) 'Controlled Risk Strategies,' in *Alternative Investing*, ICFA Continuing Education, AIMR, August, No 5, pp.70-81.
- Jacobs, Bruce I. and Kenneth N. Levy (1999) 'Alpha Transport with Derivatives,' *Journal of Portfolio Management*, pp.55-60.
- Kahn, Ronald N. (1998) 'Bond Managers need to Take More Risk,' *Journal of Portfolio Management*, Spring, pp.70-76.
- Kuhn, Thomas (1962) 'The Structure of Scientific Revolutions,' University of Chicago Press
- Lavinio, Stefano (2000) 'The Hedge Fund Handbook – A Definitive Guide for Analysing and Evaluating Alternative Investments', McGraw-Hill, New York.
- Liang, Bing (1999) 'On the Performance of Hedge Funds,' *Financial Analysts Journal*, vol. 55, no. 4 (July/August), pp.72-85.
- Lo, Andrew W., and A. Craig MacKinlay (1999) 'A Non-random Walk Down Wall Street,' Princeton University Press, New Jersey.
- Malkiel, B.G. (1995) 'Returns from Investing in Equity Mutual Funds, 1971 to 1991,' *Journal of Finance*, vol. 50, no. 2 (June), pp.549-572.
- McCarthy, David and Richard Spurgin (1998) 'A Comparison of Return Patterns in Traditional and Alternative Investments' in Sohail Jaffer ed. *Alternative Investment Strategies* (Euromoney, 1998), pp.157-188.
- Nicholas, Joseph G. (1999) 'Investing in Hedge Funds – Strategies for the New Marketplace,' Bloomberg Press Princeton.
- Pension & Endowment Forum (2000) 'Hedge Funds Revisited,' Goldman Sachs & Co. and Financial Risk Management Ltd.
- Rao, Rama, and Szilagyi, Jerry J. (1998) 'The Coming Evolution of the Hedge Fund Industry: A Case for Growth and Restructuring,' RR Capital Management Corp./KPMG Peat Marwick LLP monograph, www.rcm.com/index.htm
- Samuelson, Paul A. (1965) 'Proof That Properly Anticipated Prices Fluctuate Randomly,' *Industrial Management Review*, 6 (2), pp. 41-49.
- Schneeweis, Thomas (1998), 'Dealing with Myths of Managed Futures,' *Journal of Alternative Investments*, Summer, pp. 9-17.
- Schneeweis, Thomas (1998b), 'Dealing with Myths of Hedge Funds,' *Journal of Alternative Investments*, Winter.
- Schneeweis, Thomas and Joseph F. Pescatore (1999) 'Alternative Asset Returns: Theoretical Bases and Empirical Evidence' in *The Handbook of Alternative Investment Strategies*, Institutional Investor Inc., New York
-

Schneeweis, Thomas and Richard Spurgin (1998a) 'Multi-Factor Analysis of Hedge Fund, Managed Futures, and Mutual Funds Return and Risk Characteristics' *Journal of Alternative Investment Investments*, Fall.

Schneeweis, Thomas and Richard Spurgin (1998b) 'A comparison of return patterns in traditional and alternative investments,' in Sohail Jaffer ed., 'Alternative Investment Strategies,' Euromoney.

Shefrin, Hersh (2000) 'Beyond Greed and Fear', Harvard Business School Press, Boston.

Shiller, Robert J. (1989) 'Market volatility,' MIT Press.

SSGA (2000) Speech by Stuart Martin, State Street Global Advisors "Overview on Enhanced Indexing: Definitions, Market Developments and Methodologies," at IIR Investment Management conference "Enhanced & Synthetic Indexing, London, April.

Swensen, David F. (2000) "Pioneering Portfolio Management – An Unconventional Approach to Institutional Investment," The Free Press, New York.

The Reality of Hedge Funds, UBS Warburg equity derivatives research report, 30th October 1998.

Thomas, Lee R. III (2000) "Active Management," *Journal of Portfolio Management*, Vol. 26, No. 2, Winter, pp.25-32.

Tremont Partners Inc. and TASS Investment Research (1999) "The Case For Hedge Funds"

VAN Hedge Fund Advisors (1999) "Quantitative analysis of hedge funds return/risk characteristics"
<http://www.vanhedge.com/quantit.htm>

Wace, Ian (2000) "Hedge funds in Europe," speech at the 2000 Hedge Fund Symposium (EIM/EuroHedge/SFI), "Can Institutions Afford to Ignore Hedge Funds?", 27 April 2000, London.

Weinstein, Meyer H. (1931) "Arbitrage in securities," Harper & Brothers, New York.

Wermers, Russ (2000) "Mutual Fund Performance: An Empirical Decomposition into Stock-Picking Talent, Style, Transaction Costs, and Expenses," *Journal of Finance*, Vol. 55, No. 4, August, pp.1655-1695.

White, David A. (1995) "Investing in Hedge Funds: Investment Policy Implications," in Jess Lederman and Robert A. Klein ed. "Hedge Funds", McGraw-Hill, pp.29-40.

White, David A. (1996) "Introduction to market-neutral investing," in Jess Lederman and Robert A. Klein ed. "Market Neutral", McGraw-Hill, pp.1-16.

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