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Ronald Dirlt

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1 Introduction

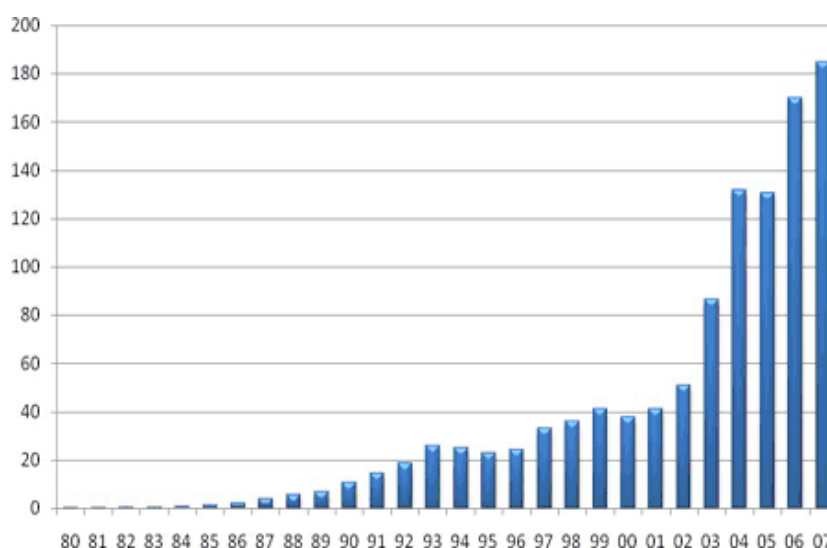
Over the past two decades, managed futures (MF) have attracted a vast number of market participants and the inflow of capital, seeking to be well invested, has increased tremendously. In the quest for new investment opportunities, both institutional as well as private investors now utilise this relatively new investment tool in an attempt to create their optimal portfolio. Up until the early 1970's, stocks were considered to be highly speculative¹ and therefore mostly bonds and properties were to be found as part of the institutional investor's portfolio. However thanks to the Modern Portfolio Theory (MPT), investors have become more keen at also including these stocks as the word "Diversification" had spread quickly. Then the 1980's saw a new strategy in the investment universe, Managed Futures (MFs). This new investment tool, aimed at identifying trends in the futures markets, quickly gained popularity as higher returns could be achieved with apparently lower risk involved. Whether for hedging purposes, a strategy applied by traditional investors or investment funds, seeking to protect their exposure from adverse developments or for speculative reasons, looking for opportunities, in order to simply profit from a trend, both strategies are served in this highly liquid and transparent trading environment. In an attempt to give the reader an intuition of the world of managed futures, the logic and structure behind this investment tool, the author would like, as a live example, utilise the success story of a well established managed futures fund founded in 1996, "Superfund"²: This fund is globally invested in around 100 futures markets, such as commodities, currencies, bonds and stock indices and is looking for trends in their development. Being invested in the futures market, the fund is not forced to only go long, as traditional investment funds would be (traditional investment funds only short for hedging reasons), but also to go short in a position, if a downward trend is identified or expected. This gives the fund the great advantage of flexibility and therefore the opportunity to benefit from negative market developments. The investment strategy is purely computer based. According to Christian Baha, founder of Superfund, there are and there always will be trends in the market. Like in fashion, where a certain colour is "in" or "trendy" for some period, there will always be certain asset classes sought after which consequently means that there are trends. Based on the philosophy that the market is always right, buying and selling signals are sent out

¹ B. Chandler ,1994, preface vii

² Superfund (DVD), 2008

by a computer program searching for these trends in the futures markets worldwide. Once a trend signal has been executed into a buying order, be it long or short, the system stays in that position as long as the trend prevails. Once a limit, a predetermined so called stop, has been reached, the system leaves the market. With this strategy, Superfund has managed to achieve an average annual return of 20% since its incarnation in 1996. If compared to the MSCI world stock market index, where an annual return of 7% has been achieved during the same period, that result is truly remarkable. As we humans are emotional beings, we run danger of leaving losses and take gains, we tend to hang in there and hope that experienced losses might eventually turn into profits, a tendency also known as disposition effect. A computer run trend tracking system does not make these “mistakes” and simply acts on the parameters it is equipped with. Up until the 1990’s, investments in managed futures were almost exclusively aimed at large and financially potent investors and minimum volumes were as high as \$100.000. Private investors rarely could afford that amount. Superfund had also shown innovation in this respect and also offers small investors access to managed futures with investments as low as €1000 and even monthly savings schemes with €50 per month. Taking into account these developments in the rise of market participants, from institutional investors at the beginning right through to the retail customer nowadays, we can see that managed futures have become an integral part in the financial world. The money flow into MF has vastly increased and by 2007, more than \$180 billion had been registered under management. As the chart below illustrates, managed futures have come of age:

Figure 1
The growth of managed futures since 1980



Source: Barclay Trading Group

Arguments³ to underpin why MFs have proven to be a powerful asset to a well diversified portfolio:

- They give exposure to a new asset class
- They show negative or low correlation to other asset classes
- They provide additional diversification to a traditional portfolio
- They decrease overall volatility
- They serve as an inflation hedge
- They can provide incremental return to the portfolio
- They are flexible due to a liquid market environment
- They are regulated and offer high transparency
- Spreads in futures markets are often smaller than in cash⁴ markets
- They tie up less cash than traditional products due to leverage

However, as there is no free lunch, an investment into managed futures certainly also bears risks. To the one, high leverage also means high exposure. Futures contracts are usually agreed upon at an initial margin of 1:20, which means that only 5% of capital is invested. In adverse market conditions, initial margins are quickly exhausted and hanging in can cost dearly. Due rather extensive transaction costs, such as management-, incentive-, kickback fees and other charges, the net returns for investors may be dramatically reduced.

In this thesis, the author aims to draw the reader's attention to the world of managed futures. In the following chapters, the reader will learn about the basic foundations of this derivative, its historical background and its conceptual framework. Next, the question, whether managed futures are an asset class in their own right will be discussed. Further, evaluation and adequate performance measures will be analysed and strategies and trading decisions discussed. Eventually, arguments for the key questions, whether MF should be included in the investor's portfolio will be discussed and underpinnings provided in conjunction with up to date statistics and live examples. During the time of writing this diploma thesis, stock- and bond markets have been experiencing tremendous set backs and investors worldwide have seen their portfolios

³ C. B. Epstein, 1992, p. 3; P. Cottier, 2000, p. 12

⁴ The word "cash" can be understood as either for the holding of cash as well as the holding of "real" products, such as stocks, bonds, commodities, etc; P. Cottier, 2000, p. 12

shrinking by extensive amounts. Therefore the question, whether managed futures might help supporting a portfolio in uncertain times, seems to be just timely. In chapter 6, the concluding part, the author would like to refer to this question.

2 What are managed futures?

Generally speaking, managed futures are characterised to be alternative or non-traditional investments. Other names are “Derivatives Funds”, “Managed Derivatives”, “CTA’s” as well as “Leveraged Funds”. While there are several definitions for MFs to be found in the literature, the author considers the following two to be most comprehensive:

“Public funds, private pools, managed accounts and other investment entities which invest on a long and/or short basis almost exclusively in exchange traded commodity derivatives and/or financial derivatives (futures, options and warrants).”⁵

“Broadly speaking, managed futures is an investment for the purpose of speculating in futures and options markets. A professional trading advisor ... is employed to manage the trading in futures and options markets.”⁶

While some exposures of MFs are also to be found in other derivatives, such as options, warrants, forwards and swaps⁷, they mainly invest in the futures market, that part of the investment horizon, which this work is aimed at. Therefore, let us first focus on futures contracts and how they work in order to understand the idea and purpose of this derivative which MF funds seek to exploit:

2.1 What is a futures contract?

A futures contract is a contract that ties two parties, the buyer and the seller, to receive/deliver a commodity or a financial product in a pre-determined quality at a specified time and place and price in the future. Futures contracts are readily available for a vast number of assets, such as agricultural products, currencies, bonds, metals as well as stock indices. In contrast to the spot market, the investor has the opportunity to gain exposure and to lock in a potential profit/loss in one of the above

⁵ P. Cottier, 2006, p. 11

⁶ Epstein, 1992, p. 35; S. H. Irwin, then associate professor at Ohio State University’s Department of Agricultural Economics and Rural Sociology, is one of the co-authors of this book and his statement is to be found in his article „The Potential Role Of MFs In Institutional Pension Portfolios“

⁷ P. Cottier, 2006, p. 12 and C. B. Epstein, 1992, p. 2

asst classes without having to physically hold them⁸. This represents a distinct difference to holding stocks. The price for the asset is set upon agreement of the contract. Entering into a futures contract entails depositing an initial performance bond, also known as margin. It is not a percentage of the value of the contract, rather a “function of the volatility⁹” of the underlying asset. While the initial idea of a futures contract is a fixed price for a commodity to be delivered in the future, making/taking actual delivery of the underlying is happening in least cases (3%)¹⁰. Instead, shortly before delivery, the contract is being terminated (closed out or also called offset) by the purchase of the opposite position (long or short) and money is paid through the difference in value at that particular time. This automatically applies to stock index futures, where a cash settlement for the price differential is made by one party at time of delivery, simply as physical delivery here is not possible. If positions here are not closed out prior to expiry of the contract, the position’s price is compared with the “Final Settlement Price” (marking-to-market) and credited/debited accordingly.

Futures contracts can be compared to forwards, mutually negotiated agreements between two parties from which futures contracts, as we know them today, have evolved¹¹. Forwards are private agreements between two parties, that are traded OTC, where these parties may set a mutually agreeable contract to suit their individual needs. In contrast to forwards, futures are traded on organised exchanges¹² and contract terms are standardised. The other main difference between futures and forwards lies in the fact, that the price of a futures contract is determined on a daily basis and is continuously available to the public. Gains and losses are settled via the margin (variation margin) account, which is constantly updated. A forward agreement will be settled on expiration of the forward contract and potential gains or losses are revealed then. The key differences between futures and forward contracts are listed in the table as follows:

⁸ D. M. Chance, 1994, p. 1

⁹ CME, 2006, p. 16

¹⁰ CME, 2006, p. 18

¹¹ CME, 2006, p. 5

¹² J. C. Hull, 2006, p. 21

Table 1

Aspect	Forward Contract	Futures Contract
Nature of transaction	Custom tailored agreement	Standardised agreement
Size of contract	Negotiated	Standardised
Delivery Date	Negotiated	Standardised
Pricing	Negotiated	Market determined
Security Deposit	Discretionary	Performance Bond (Margin)
Termination of contract	Difficult	Easy

Source: CME, 2006

2.2 How do managed futures work?

MFs may be regarded as a logical result of the ever increasing complexity of the futures markets. The futures markets have always been frequented by two types of investors: The hedgers and the speculators. While hedgers seek to lock in risk, speculators solely pursue one aim: To make a profit. However, by participating in the market, they add liquidity, hence making the market a more dynamic and stable environment. Due to the increase in numbers of futures contracts and in consequence their trading volumes, these investors have been in search for professionals, helping them to manage their financial endeavours. While the term “futures” stands for a price index for a specific commodity or financial product at any particular point in time, the term managed futures comprises a whole set of futures contracts, which investment funds take exposure in. These funds are managed by professionals, also known as, and the following 3 are the main participants involved with managed futures, Commodity Trading Advisors:

2.2.1 Commodity Trading Advisors (CTA):

These CTAs seek to identify trends in this investment universe in around 150 markets worldwide and therefore focus on specific investment strategies. These CTAs may be persons or companies who give advice on the purchase or sale of futures and options. This advice also includes active trading activity. The advantage of choosing managed futures opposed to investments into single futures lie in the fact that CTAs certainly offer fundamental know-how and expertise in the market.

2.2.2 Commodity Pool Operators (CPO):

CPOs usually assemble commodity pools, which, in the US, are set up as limited partnerships. They are in charge for the pool's structure and its administration. A CPOs employs and controls a CTA who handles the daily futures trading.

2.2.3 Futures Commission Merchants (FCM):

They maintain the managed accounts and execute as well as clear the trades as advised by the CTAs. FCMs have to be equipped with a minimum capital as required by the Commodity Futures Trading Commission (CFTC).

2.3 Ways to get exposure to managed futures:

2.3.1 Investment into a MF fund (Public Fund):

The term fund usually expresses a public offering, that is officially registered at commissions, such as the Security Exchange Commission (SEC) in the US. These funds usually aim at individual investors and offer them access to the MFs world as they tend to demand lower minimum investments.

2.3.2 Private investment (Private Pool) with a Commodity Pool Operator:

Pools can be understood as private partnerships between the investors and the CPOs. As pools comprise a smaller, limited number of partners than those in a fund, their overheads may be considerably smaller and therefore the potential for higher returns may be enhanced.

2.3.3 Private investment (Managed account) with a selected CTA:

Here, the investor's money is managed on an individual basis and the investor has to set up a private trading account with a Futures Clearing Merchant (FCM). A dedicated Trading Advisor is then authorised to trade with the funds on this account based on an agreed strategy. This investment option offers best transparency as well as liquidity as the daily dealings may be checked by the investor at any time.

All managed futures funds follow an individual strategy, also called trading program. While CTA's keep the mechanisms behind their strategies under strict concealment, their nature can basically be divided into systematic and discretionary. A more detailed description on strategies and trading styles will be explained in Chapter 4. All

strategies seek to follow trends, which themselves are a result of the change in risk premiums. A risk premium may be regarded as the investor's compensation for taken risk. Changes in risk premiums affect the price of the underlying asset, which in consequence need to be re-priced. Price changes happen due to the uncertainty about the future. Hence, as long as the future is uncertain, there will be trends that are sought to be exploited by CTA's¹³.

2.4 Historical development of futures:

While future rice contracts had already been around in Japan in the 16th century, the actual origin of today's futures trading is in fact derived from the grain industry in the 19th century in the US, where grain prices had been extremely volatile due to the seasons. Chicago had then become the central trading place for grain and at harvest time, farmers from the surrounding states had brought their merchandise into town to sell it to the local traders. Due to the cycle, grain then was in abundance and prices were accordingly low. Not all grain could be sold and some harvests had to be dumped as not enough buyers were found for the supply seeking demand on the market. In spring time, however, the opposite was the case and grain was scarce. Prices skyrocketed as there was not enough grain around. In order to smooth out prices and to ensure a more stable pricing policy and supply, the Chicago Board of Trade (CBOT) was established in 1848. In 1874, another exchange followed, the Chicago Produce Exchange. It was later called the Chicago Butter and Egg Board and in 1919, as known today, the Chicago Mercantile Exchange (CME). Besides butter and eggs, the CME also traded onions, potatoes and hides. At that time, the so called "To Arrive Contracts" had been introduced, a forerunner of today's futures contracts¹⁴. These contracts simply specified actual delivery of a certain product at a particular time in the future at a pre-set price. These futures for soft commodities were soon followed with the introduction of futures contracts for other assets, such as:

2.4.1 Financial futures:

The Bretton Woods system had been in effect since the end of the war in 1945. It had stipulated, that all currencies had to be tied to the Dollar at a fixed rate of exchange, only allowing a 2% fluctuation to deviate from its original set ratio. It was only the

¹³ T. Della Casa, M. Rechteinert, A. Lehmann, 2007, p. 7

¹⁴ B. Chandler, 1994, p. 4

Dollar, that was tied to gold at a rate of \$35/ounce¹⁵. By 1970 it had become increasingly difficult to keep all currencies within the framework of Bretton Woods and so financial futures had started to emerge after its collapse in 1972. This emergence was certainly also due to a massive inflation at that time leading to monetary instability. As a consequence, the CME introduced the International Monetary Market (IMM) for the trading of currency futures. Besides other introductions of financial futures by the CME, it was the launch of the US Treasury Bond Futures Contract by the CBOT, which proved to be the most famous at that time. These futures contracts eventually led to monetary stability¹⁶.

2.4.2 Cash settled futures and futures on stock indices:

With the introduction of the CME Eurodollar futures in 1981, the beginning for a new generation of futures contracts was set, the trading of stock index futures. The CME Eurodollar futures, an interest rate product, specifies the 3 month interest rate of a \$ 1 Mio. deposit with a deposit bank outside the US. In 1982, the Index and Options Market (IOM) was founded by the CME, which started out by trading futures on the S&P500 Index¹⁷. This introduction of index futures had truly been a revolution. Individual stocks had no longer to be purchased to set up a sizeable portfolio, instead, a whole basket of stocks, represented through an index could be purchased at much lower costs and traded with one single transaction.

Since the end of World War 2, the futures industry has experienced tremendous growth and besides Chicago with the CBOT and CME, being home to futures of commodities, such as corn, livestock, soy beans and wheat and New York with its New York Mercantile Exchange (NYMEX) for gold, also other, then newly introduced futures exchanges had been attracting significant interest. There had been the London International Financial Futures Exchange (LIFFE) starting in 1982, representing cocoa, coffee, metals and sugar as well as Paris with the Marché A Terme d'Instruments Financiers (MATIF), starting in 1989¹⁸. With the ever increasing speed of information spreading around the globe grace to new technologies since the mid 1980s, more futures exchanges were founded around the globe, shifting the influence of the futures market of the US and England to other parts of the world. While there are 9 future

¹⁵ R. A. Mundell, 2000, p. 334

¹⁶ A. Belchambers in Managed futures, B. Chandler, 1994, p. 5

¹⁷ CME, 2005, p. 12

¹⁸ B. Chandler, 1994, p. 8

exchanges in the US today, there are some other 50 in the rest of the world today. Due to leaps in information technology, the so called open out-cry system, where brokers seek to find a matching offer to their buying order via shouting on the trading floor, as still present in the US today, has been replaced by electronic trading systems. By 2004 , the 10 largest futures exchanges ranked as follows:

Table 2

TOP 10 GLOBAL FUTURES EXCHANGES

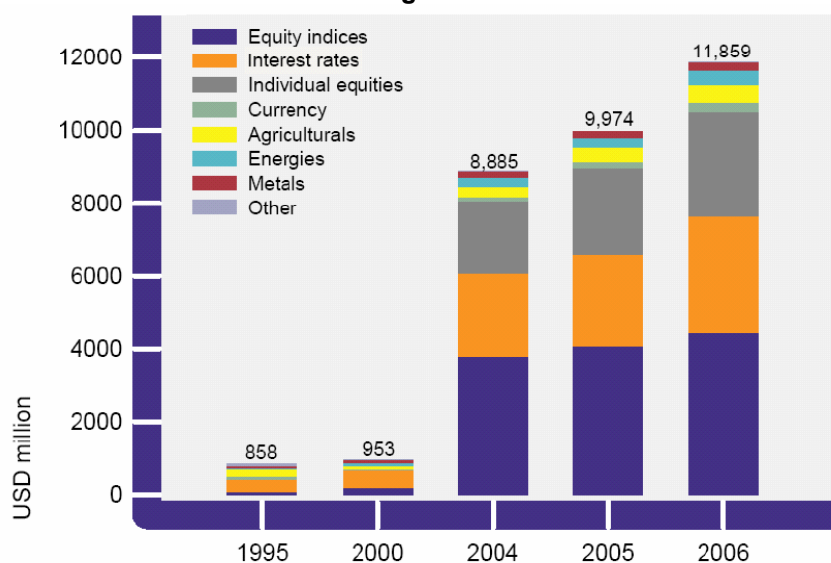
As Measured By Futures Contracts Traded, 2004

Exchange	Futures Contract Volume (rounded)
Eurex	684,631,000
CME	664,885,000
Chicago Board of Trade	489,230,000
Euronext	310,673,000
Mexican Derivatives Exchange	210,355,000
Brazilian Mercantile and Futures Exchange	173,534,000
New York Mercantile Exchange	133,285,000
Dalian Commodity Exchange, China	88,034,000
Tokyo Commodity Exchange	74,447,000
National Stock Exchange of India	67,406,000

Source: CME, 2005

Most futures contracts globally are financially based and the total number of futures contracts agreed upon has been constantly increasing. The following graph shall give an overview over the development of the number of future contracts and their composition:

Figure 2



Source: Futures Industry Association (FIA), 2007

2.5 Mechanism of futures – conceptual framework:

As previously mentioned, there are 2 species of investors in the futures world: The hedgers and the speculators. While both pursue fundamentally different interests, they are both vital to the proper functioning of the market. Hedgers seek to lock in risk. Whether they are commodity merchants or farmers, looking to assure themselves a specific selling price for a future date, they might as well be speculators looking to hedge some exposure in other markets or due to a certain strategy. Speculators offer the advantage of injecting liquidity into the market, giving the hedger the opportunity to close out or leave the market more easily. To put it short: Speculators tend to accept and take on market risk, which hedgers seek to avoid. However, both hedgers and speculators follow the same system in how to participate in the market and to ensure a smooth functioning, the following entities and processes, as outlined, are involved:

2.5.1 Brokers:

Once a commitment in taking exposure in a futures contract is expressed, the investor/CTA instructs a broker to go long/short in a certain position. The broker takes this order to the trading floor and looks for another trader to meet this order. Brokers take brokerage commissions, that are charged on a so called round term basis¹⁹, which refers to a fee charged on the whole contract volume. Once the 2 counterparties have met and agreed upon a contract, the order is passed on to the clearing house.

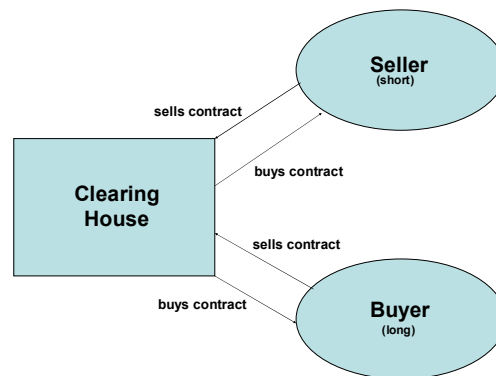
2.5.2 Clearing house

The two parties pass the on trade to the clearing house, which writes the contracts²⁰ and is now partner to each of the parties. The clearing house ensures guaranteed contract delivery. It steps in in case of a default of one of the participants and therefore ensures liquidity. A fee is charged to both parties for taking on credit risk. Therefore, only qualified traders are accepted for entering into a contract. To visualise the exchange of contracts, refer to figure 3:

¹⁹ www.deifin.de, (2nd August, 2008, 18:13)

²⁰ R. Jarrow, S. Turnbull, 1996, p. 7

Figure 3



Source: Ammended by author from R. Jarrow, S. Turnbull

2.5.3 Futures Pricing

The price of a futures contract is basically determined by the spot price of its underlying, multiplied with a continuously compounded discount factor, usually the prevailing risk free rate. Forward and Futures pricing lie very close and assuming same maturity and constant interest rate, similar prices will equally apply to forward as well as futures contracts. However, as we have learned, futures contracts are marked to market on a daily basis and hence are somewhat more delicate to determine.²¹ However, a general formula for a futures contract, such as a commodities futures is written as:

$$F_{0,T} = (S_0 + x)e^{rT}$$

$F_{0,T}$ = Futures Price at time 0 for delivery at time T

S_0 = Spot Price

e = continuously compounded as usually assumed with futures pricing

x = potential additional costs, eg. storage of a commodity

r = risk free rate

T = maturity

Futures contracts prices are determined individually, depending on their category (see Chapter 4). A commodity futures price, for instance, will be determined through factors, such as storage costs, while stock index futures will take dividend payments

²¹ J. C. Hull, 2006 (german version), 2006

into consideration, that need to be deducted. Therefore, the cost of carry²² (interest rate or other discount factor that determines the price) will impact on the futures price.

The above equation is based on a market equilibrium, assuming that all factors, such as interest rate and pricing remain constant. A deviation from this equilibrium creates arbitrage opportunities²³, a technique that will be further explained in chapter 4.

2.5.4 Margins and Gearing/Leverage

Having engaged into a contract, the buying party will have to make some sort of downpayment, a deposit. This however simply represents a gesture of good faith, that the contract is intended to be met. In contrast to the purchase of shares, where the investor is required to pay a deposit, the buyer of a futures contract pays a percentage, usually 5% of the contract volume into a margin account, also called initial performance bond. This initial sum is being balanced against the daily price change of the underlying, which is marked to market on a daily basis. In order to meet a certain balance on this margin account, a maintenance margin is also set. Size of initial margin and maintenance margin is set by the respective exchange while the broker might demand higher levels. The maintenance margin comes into effect, once the initial margin is depleted due to the price volatility of the underlying. Once the maintenance margin is reached, a so called margin call is made to the buyer who needs to “replenish” his margin account by the amount of the maintenance margin. The following example shall give further insight: Let us assume that an investor decides to long a futures contract and buy 100 barrels of crude oil at \$125/barrel on the 1st January. The contract is valid for 4 days before it is closed out on the 4th January. He pays an initial margin of 5%. $100 \times 125 = 12500 \times 5\% = \$625$. As maintenance margins are set at approximately 75% of the initial margin amount, let us assume it to be \$470 ($625 \times 75,2\% = 470$). On the 2nd of January, the futures price for crude oil drops to \$124. This leaves the investor with $\$124 \times 100 = \$12400$. The margin account has now reduced to \$525. On the 3rd of January, the oil price drops another Dollar and stands now at \$122/barrel. The total futures value is now down to \$12200 and this leaves the investor with a margin account of \$325. As the account has now gone below the maintenance margin of \$470, he now gets a margin call, which means that he is required to replenish the margin account back to its initial

²² www.deifin.de/fuwi010.htm, 15th Oct, 2008

²³ Jarrows & Turnbull, 1994, p. 356

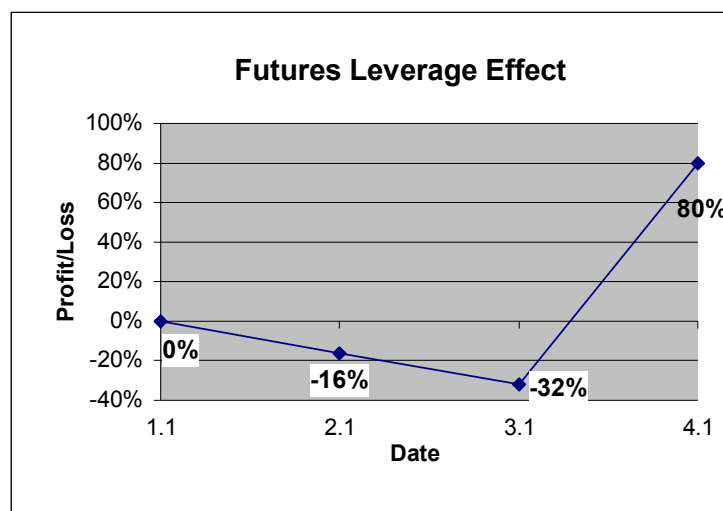
margin of \$625. Therefore, he will have to add another \$300. If he refuses or fails to do so, he will lose it by the clearing house closing it out. Having set the margin back to its initial value, on the 4th of January, the oil price jumps to \$127. The total value of the futures contract is now \$12700 and after the contract has been closed out, the investor is credited \$500 to his account. He may now withdraw the funds or balance them against his margin account.

Table 3

Date	Futures Price \$	Tot. Value \$	Cash Flow	Withdrawal	Margin Acc.\$
01/01	125	12500	-	-	625
02/01	124	12400	-100	-	525
03/01	122	12200	-200	-300	625
04/01	127	12700	+500	+500 or 0	625 or 1125

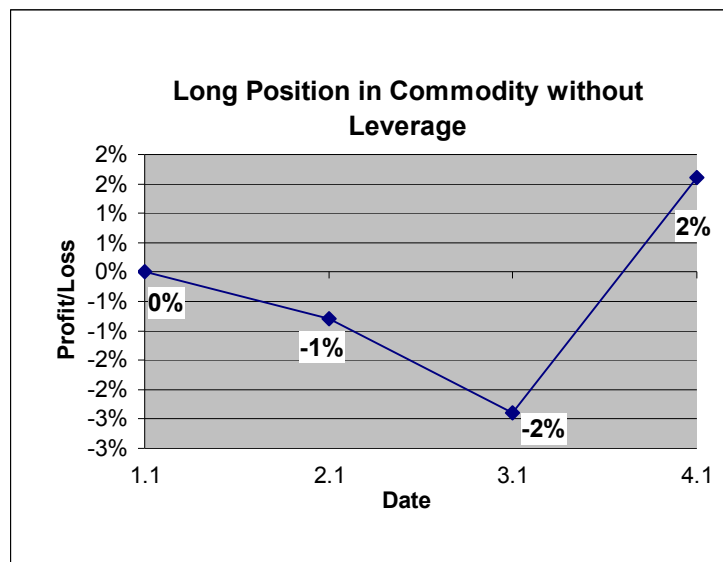
With a rather low initial payment of merely \$625, the investor can take considerable gains/losses, this is due to futures contracts being highly leveraged. As we can see, looking at the last trading day of the above example, a price increase of \$5/barrel results in a gain of \$500. Put into relation with the initial investment, this represents a return of 80%. This makes futures investments a highly volatile and speculative investment tool. To illustrate the daily return in relation to the initial investment of our above example opposed to a simple long position in the actual commodity without leverage, the graphs look as follows:

Figure 4



Returns in the above table have been calculated as a ratio of daily profits or losses to the initial margin. The returns of the below graph are calculated by the daily price change of the long position, the underlying in the money market.

Figure 5



2.6 Historical development of managed futures

Managed futures have their roots in the US. In 1949 Richard Donchian, a broker at the renowned securities firm Hayden Stone, founded the first managed commodity fund called Futures Inc.. Donchian was the first to apply some sort of technical approach to buying and selling decisions using a moving average analysis. Displayed graphically, the moving average strategy indicates buying/selling signals, once the moving average return crosses the actual return of the underlying asset. Donchian's rather individualistic approach, in contrast to the conservative investments at that time, found little attraction and this left this new alternative investment strategy rather unnoticed until the beginning of the 1970s. The first CTAs were Dunn & Hargitt with their managed commodity account in 1965. In 1967, they introduced the first price database, facilitating first computer simulations on trading styles. It was not before 1971 that Donchian's ideas about managed futures had been picked up again, which included trend following techniques, diversification as well as the use of mathematical models. With the introduction of currency futures in 1972, the futures industry had finally moved away from commodity trading only when the CME started financial futures on the Swiss Franc, Dutch Guilder, Japanese Yen, Canadian Dollar, British Pound, French Franc and the Deutsche Mark. In 1978, the McKinnon Futures Fund

was founded, the first MF fund with multiple trading managers in one trading pool. In 1975, the Commodities Futures Trading Commission (CFTC) was founded, overlooking the activities of, then, 225 CTAs. This introduction of a regulatory authority gave way to more CTAs and CPOs entering the market and by 1983 their number had risen to over 3000. In 1987, the Principal Guardians Futures Fund was introduced, which, in its idea, is considered to be a milestone in the MFs' history. It was the first public guarantee fund²⁴ that promised its investors either a return or their principal plus an annual 5% return at the end of a 5 year period, whichever was greater. The idea behind introducing guarantee products was to attract institutional investors and high net worth individuals injecting cash into their ventures. Another innovative idea for attracting a wider range of investors was offered with the introduction of the Kenmar Fund in 1990, where, instead of a margin account, only a Letter of Credit had to be posted to gain exposure to a MF fund. The MF industry has experienced a vast inflow of capital in the past decades. According to Barclay Trading Group, the volume has been ranging from \$5 billion in the 1980s to the current volume of about \$185 billion up to this day.

3 Investing in Managed Futures

Whether or not to take exposure in a new, additional investment vehicle will depend heavily, on how this investment enhances the risk return characteristics of the existing portfolio. While the answer to this will be thoroughly analysed and explained in chapter 5, we will, within this chapter, look at arguments to the question whether MFs represent an individual asset class. We will look at the various possibilities when evaluating MFs on a qualitative as well as quantitative basis and also draw the reader's attention to the potential pitfalls, such as unexpected costs, when dealing with MFs.

3.1 Are Managed Futures an asset class in their own right?

Since the introduction of the Modern Portfolio Theory (MPT), as established by Harry Markowitz in 1955, investors will seek efficient portfolios. A portfolio is regarded as efficient, if no other combination of assets can achieve a higher return for a given level

²⁴ A guarantee fund will split capital into a conservative part for exposure in zero coupon investments and a speculative part. This will be invested into futures contracts where higher returns are expected. The conservative investment will guarantee the investor's principal at maturity.

of risk, or, in other words, if no other combination of assets is able to produce a lower level of risk for an expected level of return. In order to minimise risk, the investor seeks to identify assets that show as little correlation as possible to each other – he strives for diversification. Traditional asset classes are stocks, bonds and treasury bills. But what about futures contracts and futures funds? Before answering this question, the author would first of all like to explain, how an asset class is actually described. While the answer to this question still lacks a clear description as in how an asset class itself is actually defined, here some points²⁵, on which several authors of academic literature agree upon. For an investment vehicle to be independent as an asset class, it ²⁶:

- a. needs to show low correlation to other assets
- b. has to contain assets that are not available in any other asset class
- c. should outperform the risk free interest rate in the long run and possess unique risk-return characteristics
- d. can not be replicated with a linear combination of assets of another class
- e. has sufficient market capitalisation
- f. can be traded passively and be used to track an index

Let us look at arguments in favour of managed futures representing an asset class of their own:

Ad a and b:

Generally speaking, the market portfolio as a benchmark should contain all assets available. Besides stocks, bonds and treasury bills, however, there are also more exotic assets, such as properties, commodities and art, which may round up an investor's portfolio and on which he may generate returns. This lets us conclude that MFs represent a complementing addition to this wide array of asset classes. In addition, futures contracts give the investor the opportunity to invest in a short position, hence widening the horizon for achieving portfolio efficiency. Commodities represent a significant part of the futures environment and looking at historical data, they show

²⁵ P. Mongars, C. Marchal-Dombrat, 2006, p. 3
N. Demidova-Menzel, T. Heidorn, 2007, p. 11 f.
D. M. Chance, 1994, p. 14 ff

²⁶ P. Mongars, C. Marchal-Dombrat, 2006 and D. M. Chance, 1994, p. 12

little to no correlation in comparison to traditional asset classes. It has to be mentioned that there are different ways, other than futures contracts, to gain exposure to commodities, such as stocks and mutual funds, however from a risk perspective, they contain market risk, which is nearly non-existent in futures contracts²⁷. In addition, due to different strategies applied in futures contracts when compared to traditional asset classes, returns may also show a lower correlation than traditional strategies. The following charts are taken from the Center for International Securities and Derivatives, University of Massachusetts (CISDM). With their indices, formerly known as Managed Accounts Reports (MAR), CISDM has been tracking CTA performance since 1979. The table as outlined below shows the extremely low correlation of MFs compared to the S&P500 for stocks and Lehman Index for bonds:

Table 4

Correlations: CISDM CTA Universe Strategies and Traditional Assets (1995 - 2005)

Index	S&P500	Lehman US Gov. Corp	Lehman Aggregate	Lehman U.S. Corp. High Yield
CISDM CTA Equal Weighted Index	-0,1	0,38	0,36	-0,09
CISDM CTA Asset Weighted Discretionary	0,11	0,23	0,22	0,13
CISDM CTA Asset Weighted Systematic	-0,04	0,38	0,37	-0,01
CISDM CTA Asset Weighted Currency	0,16	0,09	0,07	0,19
CISDM CTA Asset Weighted Diversified	-0,09	0,38	0,36	-0,05
CISDM CTA Asset Weighted Financial	-0,11	0,39	0,37	-0,1
CISDM CTA Asset Weighted Equity	-0,01	0,11	0,12	-0,04
S&P 500	1	-0,04	-0,03	0,5
Lehman Gov./Corp.	-0,04	1	0,99	0,18

Source: Center for international Securities and Derivatives, 2005²⁸

Ad c:

Looking at historical data, commodities futures have performed similarly to stocks. This implies that futures outperform the risk free rate on the long run, as underpinned by the graph below:

²⁷ D. M. Chance, 1994, p. 15

²⁸ CISDM paper, 2006 (also applicable to the graph below). For closer description, please refer to footnote 106 in chapter 5.

Table 5

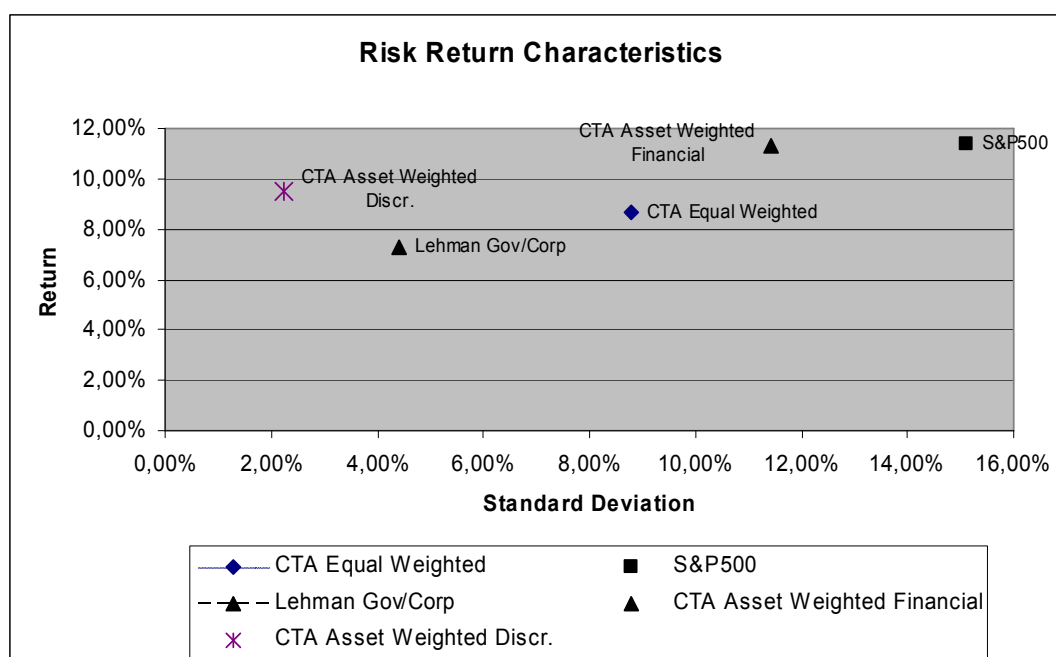
Performance: CISDM CTA Universe Strategies and Traditional Assets (1995 - 2005)

Index	Annualised Returns	Annualised Standard Deviation	Sharpe Ratio	Maximum Drawdown	Skewness	Kurtosis
CISDM CTA Equal Weighted Index	8,65%	8,79%	0,54	-8,75%	0,36	0,02
CISDM CTA Asset Weighted Discretionary	9,50%	5,25%	1,06	-4,52%	0,85	1,2
CISDM CTA Asset Weighted Systematic	7,72%	8,90%	0,43	-7,95%	0,45	0,82
CISDM CTA Asset Weighted Currency	6,66%	6,83%	0,4	-8,55%	0,95	4,04
CISDM CTA Asset Weighted Diversified	8,34%	10,38%	0,43	-11,36%	0,37	0,43
CISDM CTA Asset Weighted Financial	11,29%	11,41%	0,65	-13,83%	0,46	0,35
CISDM CTA Asset Weighted Equity	3,15%	8,52%	-0,09	-24,91%	-0,7	2,76
S&P 500	11,40%	15,10%	0,5	-44,73%	-0,62	0,61
Lehman Gov./Corp.	7,30%	4,42%	0,77	-4,58%	-0,5	1,31

Source: CISDM, 2005

As we can further gather from the table above, MFs present rather impressive risk return characteristics, which may further underpin the argument, that they represent an asset class of their own. When comparing any of the outlined CTAs to the S&P500, we learn that their risk return ratio is indeed enhanced. When comparing to bonds, we observe a higher return on average in conjunction with though a marginally higher risk. To better visualise these arguments, let us look at the graph below:

Figure 6



The author would like to point out, that risk–return characteristics are further described by other and individually distinctive measures as outlined in the above table, such as skewness, kurtosis, Sharpe ratio, etc. However these and more will be thoroughly explained in points 3.2.2.2.1 to 3.2.2.2.11.

Ad d:

Due to futures being derivative instruments, it is their complexity that has as of yet left academic research unable to replicate their returns through a combination traditional assets, simply, as their actual source of risk premium has not yet been identified. Futures contracts are, as we shall read in later chapters, regarded as a zero sum game, meaning, that each long contract is offset by a short contract and that gains to one party automatically means a loss to the other party. However, when looking at absolute returns, MFs have proven to be a successful investment vehicle and financial science is still in dispute, how returns, that benefit the majority of futures market participants are really derived²⁹. – While pinpointing actual sources of returns to MFs would be an interesting title for a thesis, taking these thoughts further would vastly exceed the purpose of this work, it is merely mentioned to underpin the criteria in point d.

So while there is no scientific underpinning that MFs returns can be replicated by traditional assets, there is evidence for a significant correlation between MFs returns and the returns of long straddles³⁰. The test, conducted in the period from 1st January 2000 until 31st December 2003, is a result of comparison between the Standard and Poors Managed Futures Index (SPMFI) and a portfolio consisting of the foreign exchange, interest rate, equity and commodities. While a correlation factor of 0,78 had been identified, MFs showed an incremental return of 9,5% on the selected portfolio³¹. Hence, as options do represent a derivative instrument, the argument, that futures cannot be replicated by traditional assets, still holds.

²⁹ D. Accomazzo, M. Frankfurter, 2007, p. 43.

³⁰ A long straddle is a strategy using a combination of call and put options with same strike price and same maturity. This strategy is usually applied when the price change of the underlying asset price is expected to be highly volatile until maturity of the option. The investor of a straddle will gain, if the exercise price of the option lies above the cost of placing the straddle.

³¹ Fung and Hsieh, 1997b, extracted from L. Stanasolovich, 2006, (www.fa-mag.com, 8th August 2008)

Ad e:

With a market capitalisation of more than \$185 billion by the year 2007, managed futures can be considered as a highly liquid investment vehicle.

Ad f:

Over the past 20 years, MFs have developed quickly and just like mutual funds, there is a multitude of opportunities to invest. However as the term MF says, they are managed, meaning that they are usually traded actively. Still, there are opportunities to invest in a selection of futures. Whether the term managed applies to actively setting up a portfolio of futures and holding it or actively changing exposure is a matter that the investor has to interpret for himself. Futures indices for passive investments are :

saisGroup Futures Index (sGFI)
Goldman Sachs Commodity Index (GSCI)
Dow Jones Futures Index (DJFI)
Commodity Research Bureau Index (CRBI)

These indices however focus on long positioning and do not include financial futures. Other dynamic investible indices are:

Mount Lucas Management Index (MLM)
Barclay Futures Index (BMLM)

However, there are striking arguments weakening the statement, that MFs are convincingly an individual asset class: Heterogeneity amongst their assets, for example. Metals and grain are different to stock indices and currencies, which again are entirely different to bonds – but each are traded in futures contracts. It has therefore to be concluded that, whilst individual futures, such as commodities may constitute an autonomous asset class, managed futures, due to their diversity in their underlying assets, are a strategy in alternative investments rather than an asset class in their own right. D. Accomazzo & M. Frankfurter (2007) even define MFs as the “Anti Asset Class”, the “materialisation of behavioural finance”, where theory separates from practice due to their fundamental differences to traditional assets. In their view, MFs

defy all logic of the CAPM, simply, as a beta within their horizon can not be clearly set or identified because of variables, such as leverage, manager skill and the market being in constant imbalance³².

However, due to their advantageous quality as a mix in a fund, they still add value to a well diversified portfolio striving for efficiency as they reach exposure in parts of the market portfolio, where no traditional assets may be represented.

3.2 Evaluating Managed Futures

Thorough and precise performance evaluation of financial assets is crucial to each investor. Whether it be the investor, seeking to place his funds in a new investment opportunity or the one who simply reviews reports on the past performance of his exposures, both groups are in need for facts, hence objective data, to make trading decisions. In contrast to traditional investments, where standardised and broadly accepted information is available in abundance, the world does not seem to be as straight forward and simple when MFs are concerned. CTA reports as well as MFs indices do not always reflect the true picture of performance and whether it is deception or simply non standardised information, that is based on different assumptions, each investor should take a closer look on the information provided and eventually draw his own conclusions. This chapter shall give the reader a detailed outline on the “grey” zones, potential conflicts of interests, within MFs evaluation and point out the areas that should be paid particular attention to.

Basically, evaluation of all investment opportunities shall be divided into qualitative and quantitative analysis. The first shall clarify into what kind of product, within the boundaries of this investment horizon, the potential investor is in fact putting his money into. Strategies and trading styles can be identified and evaluated. The latter is based on statistical analysis where the actual capability of the manager, as in how to manage risk and generate returns is mathematically documented. Qualitative and quantitative analysis are interdependent components for sound evaluation as, for instance, no quantitative analysis, such as key indicators, is reliable as long as it is not clearly defined, how the actual data provided has been derived before being plucked into any particular formula. Let us therefore first consider the qualitative part:

³² D. Accomazzo & M. Frankfurter, 2007, p. 45 f, 51

3.2.1 Qualitative Analysis³³:

When considering the qualitative part, let this be divided into:

- Fund/Pool analysis
- Fund data provided to the public
- Statistical data contained in common databases and indices

3.2.1.1 Fund/Pool analysis:

Each CTA offers a different risk reward ratio and potential investors should thoroughly perform a quality analysis before committing. Primary source for evaluating a CPO or CTA should be the disclosure documents³⁴, which are required to be presented to a client prior to his engagement. Besides legal aspects that have to be adhered to, the disclosure documents contain vital information about the respective fund in terms of:

- Trading style and strategy
- Statistical information on performance of all accounts managed by the CTA (performance capsule)
- Fees involved
- Potential conflicts of interest

While disclosure documents in their quality are backed up by thorough legal requirements, that generally have to be adhered to, the author would like to draw the reader's attention to the following points for further subjective evaluation:

3.2.1.1.1 Manager's trading history and experience:

When analysing a single MFs fund, the investor should, when reviewing the performance period of the fund, compare the actual performance track record of the trader or particular manager. Traders tend to display a successful trading history as their individual performance, even if they may not have been with that fund for the same sample period. Therefore, the trader's individual trading history should be looked at for a period of at least 2 years³⁵. This leads to the question, how experienced that manager actually is in the markets he is trading in.

³³ B. Chandler, 1995 and K. Avery, 2006

³⁴ National Futures Association (NFA), Disclosure documents, 2005

³⁵ B. Chandler, 1994, p. 51, 53

3.2.1.1.2 Track record:

When looking at the track record of a MFs fund and its provided data, it is important to establish, whether the fund has actually also been physically invested in the markets. Some funds also display hypothetical performance track records, that are partially based on previous simulations, also known as back tests, before having invested into the market. Further, it should be identified whether the track record actually represents the performance of the investors' funds or displays proprietary performance. Proprietary trading, on the CTA's or manager's own account, may entail different and more dynamic investment tactics, such as higher leverage³⁶.

3.2.1.1.3 Auditing:

It should be established, if the provided data have actually been reviewed by an auditor. Further, the question has to be raised whether that auditor does have experience in the derivatives market environment in order not to be deceived by some of the data, which may be less transparent.

3.2.1.1.4 Consistency in trading style:

Whether or not a manager adheres to his trading style, such as trend following, is an issue, that can hardly be identified in a financial report. Therefore, this consistency should be checked, as here in our example, by pinpointing his performance in strong up- or downwards periods, which should be accordingly significant.

3.2.1.1.5 Participation in brokerage commission³⁷:

A conflict of interest may arise, should the manager benefit from brokerage commission. As the amount of round turns³⁸ may be significant in futures trading, the manager might be incentivised to augment this number of trades.

3.2.1.1.6 Interest income to the investor:

As the initial margin is paid, having once engaged into a MFs account, represents a deposit of good faith and not a liability, hence the investor should be entitled to be paid an interest on the free balance available on the account.

³⁶ K. Avery, 2006, p. 92

³⁷ K. Avery, 2006, p. 85

³⁸ The term round turn stands for the transaction cost for each trade made and comprises buying and selling fee. A "Round turn per million per year" is a measure provided in reports as to how many trades have been performed for an account of \$ 1 million .

3.2.1.1.7 Fund data provided to the public:

As initially introduced by the CFTC, MFs funds were required to produce their performance data in the “13 column performance table”. This had later been reduced to 7 columns and has eventually resulted in the “capsule performance table” (See Appendix I). This performance table requires specific information³⁹ to be displayed, primarily

- The return on the last 3 years of a MFs fund per month
- Year to date performance
- The largest monthly drawdown for the account
- The worst peak to valley draw-down for the account during the recent 5 calendar years

In addition, there are generally agreed upon performance key indicators⁴⁰, which shall be further explained in the qualitative analysis. As we shall see, the quality of statistical data provided can be deceiving. A displayed rate of return of one CTA may vary from one to another CTA while both may actually have performed identically good or bad. This may either be due to the following reasons:

- a. Interest payments from the margin accounts are not included in the performance
- b. Possible fees may have been incurred during that trading period⁴¹.
- c. Further funds may have been added to the trading capital of a fund at a later stage during the trading period. The question arises as to how fairly and correctly calculate actual returns. The CFTC states that any funds added to the portfolio value shall only be added at the end of a period, the incremental returns generated through them, however, may be included⁴². This may well lead to a distorted actual return as the following example shall illustrate: Suppose, a MF account trades with a PF value of \$1million on the 1st of January. At the 15th of January, an additional \$300,000 are added. At the end of the month, the fund has a total PF value of \$1,45 million. According to CFTC, the fund is entitled to calculate his return as follows:

³⁹ This is a legal requirement as introduced by the NFA in Rule 2-34 since 1st April 2004

⁴⁰ M. Frankfurter, Managed Accounts Research, 2007, (www.safehaven.com/article-7981.htm, 19. August 2008)

⁴¹ B. Chandler, 1994, p. 50

⁴² D. M Chance, 1994, 27

$$((1,450,000 - 300,000) / \$1,000,000) - 1 = 15 \%$$

However, total returns might look different if returns of respective funds were to be considered. Let us assume, that the fund had generated 7% in the first half of the month, hence

$$\$1,000,000 \times 1,07 = \$1,070,000.$$

- d. At the end of the month, the fund has also achieved a total capital of \$1,45 million with a capital of \$1,370,000 as of 16th January. Therefore, the fund had a performance of

$$(\$1,450,000 / \$1,370,000) - 1 = 5,84\%$$

from 16th to the end of January. Therefore the total return for the whole month would be

e. $(1,15 \times 1,0584) - 1 = 13,2\%$

hence leaving a difference of 1,8%.

3.2.1.2 Statistical data contained in databases and indices – Biases:

Institutional investors make use of databases to evaluate individual CTA's. In those databases, all relevant information is to be found on MF's. Large databases, such as the CISDM database, formerly known as the MAR database are crucial instruments to investors who are in need of sound information. However as is also known with hedge funds, there are data biases contained in those databases and to a certain extent as well in indices, these are:

3.2.1.2.1 Backfill Bias⁴³:

This bias, also called "Instant History Bias", occurs, when the contained data also includes performance history that is purely funded with seed capital⁴⁴ and therefore rather proprietary. It may therefore be concluded that performance of funds providing data about their start up period tends to be higher and therefore biased upwards.

⁴³ T. Schneeweis, B. Gupta, 2006, p. 56

⁴⁴ Seed capital, as described by W. Fung, D. Hsieh, 2001, p. 4, is the funds that friends or relatives may have provided during the start up period of a fund.

3.2.1.2.2 Survivorship Bias⁴⁵:

This bias may occur once a fund no longer produces positive results, goes bankrupt or is excluded from a database (its negative performance or inaccurate reporting may be harming the database vendor's reputation)⁴⁶. It may however also be the case, that the fund has reached its optimal level of capital and is no longer in need of attracting additional capital. The data of that fund will no longer be included in the database and in consequence, overall performance of the remaining MFs may be overestimated due to the lack of poorly performing or failing funds. The level of risk, in turn, will reduce on average.

3.2.1.2.3 (Self) selection Bias⁴⁷:

Selection bias may occur twofold: To the one, positive performance is more likely to be included into a database than an unfavourable one. Therefore, it is usually those funds with a good performance history, that will participate in a database. On the other hand, as has already been mentioned with survivorship bias, funds may not want to participate in a database and in consequence, true average performance may be distorted.

3.2.2 Quantitative Analysis – Performance measures:

Investors want to maximise their capital with as little risk as possible. It is the rate of return (ROR), risk and their relation to each other that play a fundamental role when evaluating all investment vehicles and therefore also MFs. Before analysing performance indicators of MFs, the potential investor should first define his personal expectations from a pool/fund. Return comes as a reward from taken risk and therefore, the individual tolerance for risk has to be determined. Two separate funds may have the same return characteristics, however they may vary fundamentally in their risk exposure. In addition, several risk adjusted performance measures have been introduced to make individual financial products more comparable. The author would like to point out that literature offers a full array of performance measures and it is only the most commonly used ones, that are being presented in the following. As financial statements and statistical analyses do vary between CTAs, so does the application of the various performance measures. Let us look at these in more detail:

⁴⁵ T. Schneeweis, B. Gupta, 2006, p. 56

⁴⁶ W. Fung, D. Hsieh, 2001, p. 3

⁴⁷ F. R. Edwards, J. Lee, 1998, p. 5

3.2.2.1 Determining the Rate of Return (ROR):

The ROR may be calculated in various ways, according to CFTC requirements. However the actual data provided might not reflect the true picture of actual performance as additional deposits or withdrawals during the time period may blur the clear picture. First, however, the Net Asset Value (NAV)⁴⁸ of a fund's share needs to be determined. The NAV is based on the nominal account size⁴⁹ being traded with each particular CTA. Whichever way the ROR is determined, as a standard, it always needs to be shown net of all fees (eg. Brokerage commission, management fees, incentive fees), that may have been incurred during the trading period. The ROR may then be calculated in the following 3 ways that serve for reporting purposes:

3.2.2.1.1 Return on total assets:

Possible additional payments or withdrawals are assumed to happen on the first or the last day of the trading period. Managers, as previously shown, prefer to use the last trading day as it enhances return. This calculation looks as follows⁵⁰:

$$r_t = \frac{TotalNAV_T - \sum_{i=1}^n D_{t_i} + \sum_{j=1}^m W_{t_j}}{TotalNAV_{T-1}} - 1$$

D = deposits

W = withdrawals

i = deposits paid starting with deposit 1

j = withdrawals made starting with withdrawal 1

t = deposit and withdrawal in time t

⁴⁸ Assets of the fund divided by its liabilities, divided by the total amount of shares

⁴⁹ Nominal Account Size: „The account size agreed to by the client that establishes the level of trading in the particular trading program“, NFA, Compliance Rule 1-1. Definitions, www.nfa.com, 20th August 2008

⁵⁰ P. Cottier, 1992, p. 155

3.2.2.1.2 Capital weighted return on assets:

Applying this method, the rate of return is calculated by also considering the individual deposits and withdrawals that may have occurred during a period. To get the return, the calculation needs to be solved for the r:

$$TotalNAV_t = TotalNAV_0 \times (1+r)^T + \sum_{i=1}^n (D_{t_i} - W_{t_i}) \times (1+r)^{T-t_i}$$

3.2.2.1.3 Time weighted return on assets:

This calculation is probably the most accurate as even very short term differences in NAV are considered. As soon as assets change, the former period is calculated so that only actual deposits/withdrawals are considered:

$$r_t = \left(\sum_{t=1}^T \frac{TotalNAV_{t(e)}}{TotalNAV_{t(b)}} \right) - 1$$

e = end

b = beginning

Having calculated discrete returns in the above formulas, we eventually want to gain a compounded annual return for a total period (eg. One year):

$$r_T = \prod_{t=1}^n (1+r_t)$$

3.2.2.2 Determining risk:

3.2.2.2.1 Standard deviation/volatility

In financial terms, risk or standard deviation σ , is a measure as by how many factors periodic returns vary from an average return μ . Risk need not only mean adverse effects since there is both upside- as well as downside risk. As the investor seeks as low volatility as possible while maximising return, he will opt for investments, that show the lowest standard deviation for a desired expected return.

$$\sigma = \sqrt{\frac{1}{n-1} \times \sum_{i=1}^n (r_i - \bar{r})^2}$$

$\bar{r}$ = Mean

r_t = return of each period

n = number of periods

3.2.2.2.2 Downside deviation:

While risk in general involves both upside as well as downside deviation from the mean, downside deviation, measures adverse side of risk. It represents the deviation from the minimal accepted return (MAR), hence only returns are included that are smaller than MAR:

$$\sigma_d = \sqrt{\frac{1}{n} \times \sum_{y < MAR} (r_t - MAR)^2}$$

n = total number of returns

MAR = minimum accepted return

y = returns (r_t) smaller than MVAR

Due to the non-linear pay out structure of derivatives, returns of MFs do have the tendency not to be normally distributed as empirical evidence underpins⁵¹. 2 separate funds may promise identical risk return properties⁵² but may still vary fundamentally in actual returns, simply due to differences in their return distributions. It is therefore necessary to take higher moments into consideration to determine, whether a derivative is likely to deliver the targeted return. In addition to standard deviation, the second moment, we therefore look at these moments as follow:

⁵¹ W. Bressler, W. Drobetz, J. Henn, Hedge Funds, 2005, p. 30

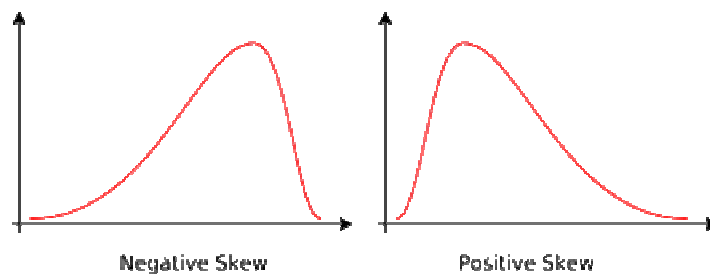
⁵² www.riskglossry.com/link/skewness.htm, 20th October, 2008

Skewness:

Skewness determines on which side the asymmetric returns are more likely to be distributed and is determined as follows:

$$S = \frac{1}{T} \sum_{t=1}^T \frac{(r_t - \bar{r})^3}{\sigma^3}$$

Figure 7



Graph: <http://upload.wikimedia.org/wikipedia/en/9/93/Skew.png>

A normal distribution has a skewness of 0. A distribution with a positive skewness (>0 , right skewed) is likely to comprise more positive returns as would be expected in a normal distribution and vice versa (<0 , left skewed).

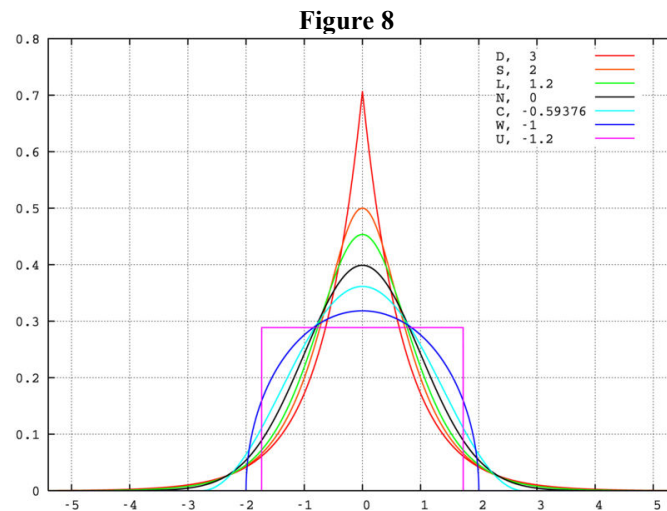
3.2.2.2.3 Kurtosis:

This moment represents a measure of the concentration of positive returns around the mean and is calculated as follows:

$$K = \frac{1}{T} \sum_{t=1}^T \frac{(r_t - \bar{r})^4}{\sigma^4}$$

The kurtosis of a normal distribution has a value of 3. If $K > 3$ (leptokurtic), the returns will be more densely distributed towards both ends of the distribution⁵³. If $K < 3$ (platykurtic), returns tend to be found closer around the mean with higher probability, hence more favourably for the investor.

⁵³ Also known as fat tails

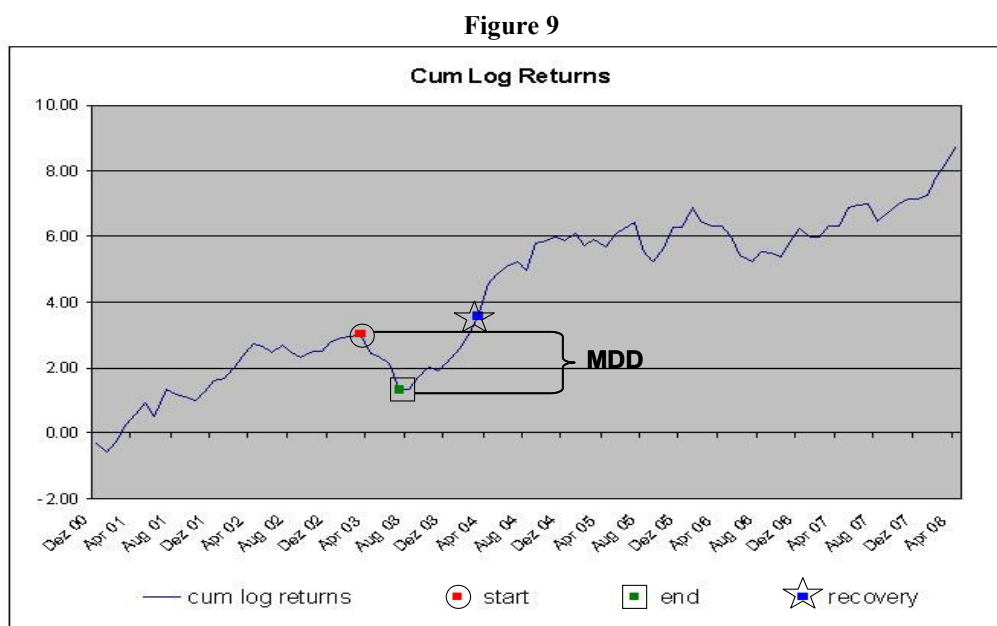


Graph: <http://www.answers.com/topic/kurtosis>, 4th January 2009

3.2.2.2.4 Maximum drawdown (MDD)⁵⁴:

The maximum drawdown period indicates the highest loss a title may have experienced during a particular time and prevails until a new high has been reached. It is the the percentage of loss suffered to the one hand as well as the length of time until losses have been recuperated on the other hand that are of big interest to the investor. As we will see in the next item, the MDD is used in the Calmar Ratio.

$$MDD = \frac{(P_{\min} - P_{\max})}{P_{\max}}$$



Source: amended from <http://www.mathworks.com>, 20th August, 2008

⁵⁴ K. Avery, 2006, p. 29, P. Cottier, 1998, p. 160

3.2.2.2.5 Beta:

Derived from the Capital Asset Pricing Model (CAPM), beta stands for the measure of systematic risk of an individual title in comparison to the overall market. Hence, beta allows to assess volatility of an asset in comparison its index. The market itself always has a beta of 1. A beta higher than 1 indicates higher volatility than the market and vice versa. If, for example, a single title has a beta (β) of 1,5 and the market moves up by 1%, then this title will move up by 1,5%.

$$\beta_i = \frac{Cov(r_i, m)}{\sigma^2(m)}$$

β_i = beta of title

r_i = return of individual title

m = return of market portfolio

Having defined ROR and volatility, let us look at the various risk (adjusted) performance measures that shall give the investor further information when comparing MF's:

3.2.2.2.6 Value at Risk (VAR)⁵⁵:

This risk measure indicates the likelihood of loss of capital at a pre-set confidence level (usually 1% or 5%) for a given time period. It is a measure that probabilistically evaluates the exposure to market risk. While already commonly applied amongst banks (Basel II), it is rather under-represented within MFs evaluation but bears valuable data with regards to thorough assessment of a MF fund. Especially its further developed version, the Modified Value At Risk, offers valuable information in search of identifying optimal CTAs as enhancing assets to a well diversified portfolio as it is :

$$VAR = PV \times \sigma \times \sqrt{\Delta t} \times \alpha$$

PV = Portfolio/Asset Value

σ = Standard Deviation

Δt = Time horizon that is considered

α = Quantile (eg. 1% standardised is 2,33, 5% is 1,65)

⁵⁵ VAR formula extracted from Course Market Risk, Prof. Zechner, summer term 2008

3.2.2.2.7 Calmar Ratio (CR)⁵⁶:

While not being a fully fledged risk adjusted performance measure (no standard deviation flows into the equation), this measure indicates the return for each unit of capital exposed and hence serves as a ratio between annualised compounded return and maximum drawdown for that period. It is common practice to include a 3 year history in the ratio:

$$CR = \frac{r_T}{MDD}$$

r_T = compounded return (%)

MDD= Maximum Drawdown (%)

While the Calmar ratio is a good indicator for return in relation to capital invested/exposed, it does not take utility levels into consideration. As a high return with high risk may lead to a similar result as a lower return with lower risk, it is eventually up to the investor's risk tolerance to choose between the funds in question.

3.2.2.2.8 Sharpe Ratio (SHR)⁵⁷:

Designed by William Sharpe, this ratio calculates the return in excess of the risk free rate of a fund/pool per unit of risk:

$$SHR = \frac{(r_T - rf)}{\sigma}$$

The higher the SHR, the more favourable the title as the investor is better rewarded for his exposure (risk). When comparing data, it has to be pointed out that the same risk free rate (rf) should be applied to draw objective conclusions.

⁵⁶ <http://www.investopedia.com/terms/c/calmarratio.asp>, 19th August, 2008

⁵⁷ For abbreviation reasons, the author gave these initials which, by no means are convention.

3.2.2.2.9 Modified Sharpe Ratio (MSHR)⁵⁸:

When applying MSHR, the Standard Deviation in the denominator is simply replaced by subtracting the MVAR⁵⁹ from the risk free rate. Again, the MSHR now takes higher moments into account, hence delivering more reliable risk adjusted data.

$$MSHR = \frac{(r_t - r_f)}{r_f - MVAR}$$

3.2.2.2.10 Sortino Ratio (SOR)⁶⁰:

Designed by Frank Sortino, the SOR uses a very similar approach as the SHR with the only difference that only the downside deviation will be included in the equation. The higher the SOR, the more favourable the title:

$$SOR = \frac{(r_T - rf)}{\sigma_d}$$

3.2.2.2.11 Sterling Ratio (SR)⁶¹:

The SR measures the annualised compounded ROR for a usually 3 year period over the average maximum drawdown (MDD) less 10% of the MDD. Again, the higher the result, the more favourable the title:

$$SR = \frac{r_T}{AMDD - 10\%}$$

AMDD = Average MDD

3.2.3 What fees are involved when investing in MFs?

As performance of MF's will always be displayed net of all fees involved, the fees, that have been deducted prior to the results may not be of much significance as long as the investor is satisfied with the achieved result⁶². Managed futures indeed do yield high returns even net of all fees, however there are certain frameworks in terms of fees structuring, that the investor should be paying interest to as excessive charging of

⁵⁸ Favre & Galeano, 2002, (www.edhec-risk.com/site_edhec_risk/public/research_news/choice/RISKReview1063703886009117706)

⁵⁹ $MVAR = \mu - \left(z_c + \frac{1}{6}(z_c^2 - 1)S + \frac{1}{24}(z_c^3 - 3z_c)K - \frac{1}{36}(2z_c^3 - 5z_c)S^2 \right) \sigma$

⁶⁰ K. Avery, 2006, p. 52

⁶¹ K. Avery, 2006, p. 55

⁶² www.attaincapital.com/newsletters/255, 20th August 2008

fees inherently means potential loss of profits. As has been noted in the industry, certain charges may well be excessive and it is not always clear which charges actually apply for which services⁶³. Thorough examination of disclosure document is essential to get a feel for the impending charges laid upon the investor. Let us therefore look at the common charges and fees that apply when investing in MFs:

3.2.3.1 Front-end load:

These are costs that apply before actual trading and performance measurement actually takes place. It is for instance the cost of exchanging currency to gain exposure to a certain fund.⁶⁴ Also, sales commissions may apply that can be deducted from the investor's initial amount. These charges range between 0% to 5% and the CTA may participate in these loads.⁶⁵

3.2.3.2 Management fees:

Management fees are charged independently of performance and volatility of the individual fund. They range between 1% to 3% per annum and are usually incurred based on NAV at the end of each month for the settling of sales activities, salaries of traders and operating costs. The level of management fees as contribution to the total level of fee structure is in decline as empirical study suggests⁶⁶, which may be good news to the investor who is inclined to only reward positive performance.

3.2.3.3 Incentive fees:

Incentive fees apply for profits that have been made during a specific period. They are usually calculated on a quarterly and net trading profits (NTP) are taken as a basis. They range between 15% and 25% of NTP. As the term already implies, these fees act as an incentive for the CTA to generate incremental absolute return. Therefore, so called hurdle rates may be embedded in the fee structure. Hurdle rates usually represent benchmarks that the CTA has to exceed before an incentive applies. A hurdle rate may be the prevailing risk free rate, an equity index (here, only the alpha is rewarded) or a fixed return that has to be surpassed. In addition, "high watermarks" may be set. Watermarks represent the last highest level of return that needs to be

⁶³ D. P. Collins, 2005, "How much are you paying? The fee structures for various managed futures products can vary...", (www.allbusiness.com, 22. August 2008)

⁶⁴ P. Cottier, 1998, p. 27

⁶⁵ Suninghill Managed Futures LLC, 2007, p. 13

⁶⁶ Diz and Shukla, 2003, p. 250

exceeded before a new incentive fee may be incurred. Empirical study suggests that CTS's with higher incentive fees tend to show higher return but also higher volatility in their performance⁶⁷.

3.2.3.4 Brokerage commission:

As trades are executed as advised by the CTA, brokerage commissions apply which are charged to the individual investor. These charges are usually calculated as round turns per million. This figure indicates how many executions have been performed per million, for instance Dollars, paid. Trade commissions can vary widely (ranging from \$5 to 55\$ per round turn⁶⁸) and due to the nature of MFs being a high trading velocity environment, this side of charges should be paid particular attention to. It is usually the new CTAs with little trading history that entail high round turn charges.

3.2.3.5 Back-end loads:

Although not widely spread among CTA's, redemption fees may apply. However a more common practice utilised that is similar is the application of bid/ask spreads that are around 1%-2% and incur as the difference between the actual price of a fund on purchase and re-sale. As set out by the NFA, CTA's and CPO's are required to provide a break even analysis. This analysis, as will be displayed in a table, incorporates all potential costs that apply, exclusive of incentive fees. It states both the percentage as well as units of respective currency that the fund has to gain before the investor will benefit from positive returns. A sample table below:

Table 6

	Year 1	Year 2
Initial Investment	\$50,001	\$50,001
Up-Front Fee	\$ 3,000(1)	\$ 0
Management Fee	\$ 500(2)	\$ 500(2)
Commissions	\$ 3,960(3)	\$ 3,960(3)
Incentive Fee	\$ 750(4)	\$ 0(5)
Amount of Income to Break-even	\$ 8,210	\$ 4,460
Break-even %	16.4%	8.9%

Source: www.edwardthomas.com/breakeven.htm, 24th August 2008

⁶⁷ F. Diz, 2003, p. 255

⁶⁸ This term defines the buying and selling as one event as one charge only applies. It includes fees, such as execution costs, charges incurred by the exchange, clearing- as well as settlement costs. (P. Cottier, 1998, p. 33)

4 Managed Futures categories, techniques and trading strategies

As with hedge funds, MFs offer various strategies as to how generate absolute returns. The importance for distinction between these various strategies lies in the fact that each strategy may suit a different investor⁶⁹. Further, as strategies may offer different approaches, they may also show little or even no correlation to one another and hence additionally serve as convenient diversification tools. May the author at this point comment, that the literature offers various, sometimes contradictory ways⁷⁰ as in how trading strategies are characterised. This may be due to the fact that some literature is more dated and that common opinion since may have shifted and/or simply, because no commonly valid conventional definition exists as of yet. The author has therefore chosen to give an insight based on his discretion to offer the reader a plausible view on the diversity of MFs styles. As hedge funds and MFs do bear rather intense resemblance in their nature⁷¹, the author would again like to stress that in this work we look at MFs only in their basic existence – solely trading on futures contracts. Before analysing and defining the ways as to how derive trading signals, generated through the various trading strategies, let us first look at MFs categories, the main columns in futures investments. Finally, we will look at commonly employed trading techniques, such as arbitrage and spreading.

4.1 Categories

4.1.1 Commodities:

A MF fund/CTA may simply take exposure in commodities only. Investments in commodities offer benefits, such as:

- High correlation with inflation, hence serving as inflation hedge
- Similar historical returns as stocks, but lower volatility
- Negative correlation to stock returns⁷²

Commodities may be divided into five major groups⁷³: Grains, Metals, Energy, Food and livestock. While futures contracts exist for each individual commodity, there are

⁶⁹ See Chapter 5 for closer analysis

⁷⁰ The author will highlight inconsistencies in definitions to this subject by confronting clashing definitions.

⁷¹ Hedge funds may trade futures and futures may long/short options

⁷² <http://average.dowjones.com/aig/index.cfm?go=home> (8th October 2008)

major commodity futures indices that represent the development of their individual components and may serve as a benchmark for CTAs. However it is important to mention that these indices only replicate a long strategy, hence not taking exposure in short positions. The 4 major commodity indices are:

Goldman Sachs Commodity Index (GSCI)

Commodity Research Bureau Index (CRB)

Rogers Raw Material Index (RRMI)

Dow Jones-AIG Index (DJ-AIG)

4.1.2 Financial:

4.1.2.1 Interest rate⁷⁴:

A CTA may specialise in interest rate futures. Securities that are traded usually are: Treasury Bonds⁷⁵, Treasury Notes⁷⁶, Swaps, Federal Funds, Eurodollars⁷⁷, Euribor, Libor, Foreign Government Bonds. These futures contracts comprise short-, mid- and long term interest rates. These underlyings for futures contracts are negatively correlated to interest rates and hence offer return opportunities with regards to future expectations of fiscal policy. A CTA, expecting interest rates to drop will go long in a futures contract for treasury bonds, for example and vice versa. Benchmark indices in this category are not as aggregate as with commodities, however the well known ones are:

CME Lehman Brothers US Aggregate Index Futures⁷⁸

JP Morgan Government Bond Index

⁷³ R. F. Seamans, 2003

⁷⁴ While the CME classifies Interest rate futures as financial futures, John C. Hull classifies it as a category of its own. However, as both currency- as well as interest futures are determined by interest rates, the author would like to stick to the category as outlined above.

⁷⁵ More than 15 years to maturity (see John C. Hull, 2006, p 133)

⁷⁶ Bond with a maturity between 6,5 and 10 years (see John C. Hull, 2006, p. 133)

⁷⁷ A Eurodollar is a U.S dollar that is deposited outside the U.S. The interest rate for a Eurodollar is the prevailing interest rate between two banks, such as the LIBOR (London Interbank Offered Rate)

⁷⁸ The author would like to point out that Lehman Bros. was rather heavily involved in Futures Trading until its default on 15th September 2008, the time while this diploma thesis was written. In the course of this work, the reader will come across further information in conjunction with the name Lehman and the fact that this investment bank does not exist further shall not take away from the solidity of the facts provided within this paper.

4.1.2.2 Foreign Currencies:

Taking exposure in currency futures aims at benefiting from the different development of prevailing interest rates in different countries. Looking at currency futures from the U.S perspective, foreign currency futures are displayed in units for each American Dollar. When taking a long position in a foreign currency futures contract, the investor seeks to lock in profit due to his expectation, that the risk free rate r of that particular country exceeds the U.S risk free rate r_f . Therefore, the following equation must hold:

$$F_{0,T} = S_0 e^{(r-r_f)T}$$

$F_{0,T}$ = Futures Price

S_0 = Spot Price

r = risk free rate of foreign currency

r_f = risk free rate of home currency

4.1.3 Equity MFs⁷⁹:

A CTA specialising on equity futures speculates on the price development of an equity index, such as Dow Jones, FTSE 100, etc as well as indices of Exchange traded Funds (ETFs) and seek to benefit from future price developments of these underlying assets by going long or short, depending on their expectations of the markets. Taking exposure in equity futures bears advantages to exposure in equities as future markets may offer more liquidity and simplified transaction (costs) to gain exposure to the markets. The price for an equity futures contract is determined by its current index level and a fixed multiplier (expressed in currency units) that is assigned to each index futures. For example: If the Dow Jones Industrial Index currently stands at 10.000 points and its multiplier is \$100 per indexpoint, the price for a DJ futures contracts will be 10.000 x \$100, which equals 1 Mio. Another way to determine the value of a futures contract is to look at the value of its tick size. The tick size determines, in which steps the futures contract is being marked to market, which is usually 0,5 basis points. Therefore, assigning a value to each tick will lead to the same day end price. Index futures that are vastly represented on the CME and contain products, such as: S&P 500, NASDAQ 100, Nikkei 225, GSCI Futures, etc.

⁷⁹ CME, 2005, p. 88, Jarrow & Turnbull, 1994, p. 354

4.1.4 Multi managers (Diversified) futures funds:

These funds invest across the above mentioned futures categories. A benchmark for multi managers futures funds is:

Managed Futures Index (MFX)

4.2 Strategies

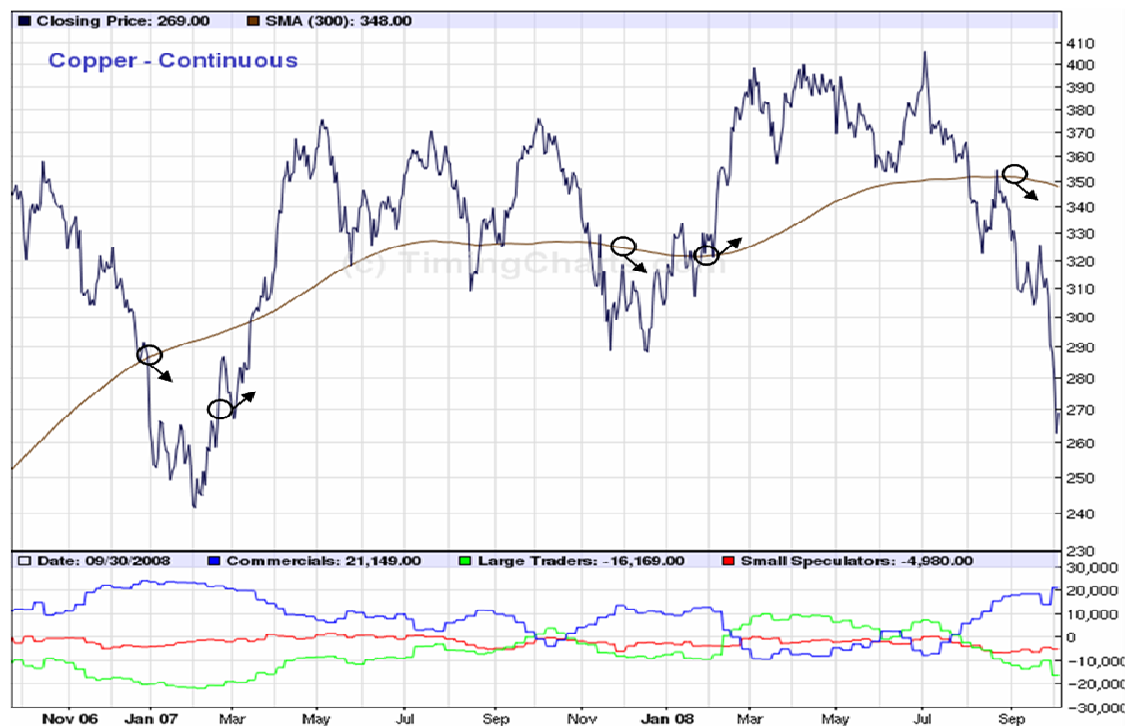
As already mentioned in chapter 3, actual exposure to the futures market can either be gained actively or passively. Let us therefore first expand on the passive alternative before focussing on the more extensive active strategies, the ones that give MFs their true edge in the world of financial investments:

4.2.1 Passive strategy:

The passive approach is defined through the application of a rigid mechanical strategy employed in a Futures Index. The Mount Lucas Management Index (MLMI)⁸⁰, for example comprises 25 futures contracts in 7 categories, such as grains, energy, livestock, currencies, food, fibre, financials and metals. Each of these contracts is tracked with a 12 months moving average and once a month, a view is taken on each of the positions. A buying signal to long a contract is made when the actual price of the respective commodity lies above the moving average line. A short signal is made when the price falls below this line and hence developments move into the opposite direction. This approach may be considered to be passive, since buying signals simply occur through actual pricing in view of current pricing while no other underlying information is considered. The following graph shall illustrate the initiation of buying/selling signals where the author has included arrow signs to graphically underpin the intuition:

⁸⁰ M. Anson and H. Ho, 2003, p. 185

Figure 10



Source: signals included by author, www.timingcharts.com, 4th October, 2008

4.2.2 Active strategies:

4.2.2.1 Trading decisions:

In order for a CTA to take trading decisions whether or not to take exposure in a particular futures contract, he will need some sort of signal to justify that decision, by either fundamental or technical analysis.

4.2.2.1.1 Fundamental analysis:

This analysis requires core information about the market. Supply and demand determinants are closely analysed, such as the current political situation of a country, its fiscal policy, other macro economic data, level of inventory as well as the weather. Fundamentalists seek to exploit the difference between the perceived value of an underlying commodity and its actual futures value. Hence, they take profits through information that has not yet been included into the price.

“Fundamentalists believe that present conditions determine future prices”⁸¹

⁸¹ CME, 2005, p. 69

4.2.2.1.2 Technical analysis:

Here, the CTA reduces some of his buying/selling decision to historical price patterns as he believes that all relevant information is already built into the price. Further, he will consider data, such as volume⁸² and open interest⁸³ to identify trends. They will apply charting techniques to anticipate future price movements. While there are both believers as well as non believers in charting techniques, charting may indeed have an impact on price movements. Should big players believe in similar charting strategies, they will impact on the markets by taking similar trading decisions. With the help of sophisticated computer programs, technical analysts seek to interpret market movements.

4.2.3 Trading methodologies⁸⁴:

Having described trading decisions, let us focus on the various methodologies employed by CTAs as in how he executes these. These methodologies consist of 2 major groups:

4.2.3.1 Discretionary:

While computer system may generate buying/selling signals, there will still be a person at the end of the line to make that final decision, whether the trade is being executed or not. A CTA employing a discretionary approach and using a fundamental approach may quickly engage into a futures contract as data does not need to be further fed into any computer program for a trading decision is made.

4.2.3.2 Systematic:

This trading methodology epitomises the actual character of Managed Futures. It comprises all computer programs and trend following techniques, also described as black boxes⁸⁵ that lead to final trading decisions. Incorporating technical analysis, the systematic trader/advisor will use data, such as price patterns, volatilities, volume,

⁸² Volume defines the number of futures contract trades that have been performed in a day.

⁸³ Open interest defines the number of contracts that have not been offset, meaning, the number of contracts that have not found a buyer/seller (that have not been offset) by the end of the day

⁸⁴ In reference to footnote 1: While B. Chandler, 1994, simply distinguishes between 3 trading styles **fundamental, technical and discretionary**, other literature, such as J. Hedges, 2004 (Commodity Trading Advisor Book) differentiate between **trading decision and trading methodology**. Other literature, such as C. E. Epstein, 1992 simply highlights trading styles as **System vs Discretionary, Technical vs Fundamental and Diversified vs. Specialised** and hence leaves rather room for interpretation as to categorise. This may however be due to the fact that the literature is dated.

⁸⁵ K. Avery, 2006, 63

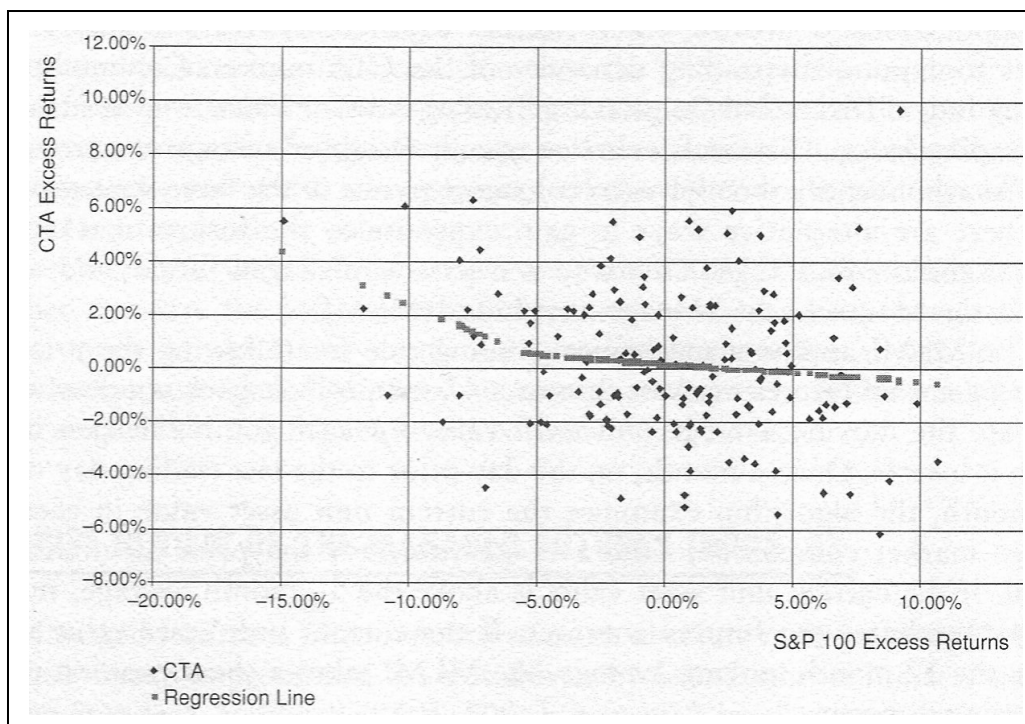
open interest and other that will indicate a trend and hence lead to a buying/selling signal. While it is often thought, that systematic traders seek to exploit the market by investing at the very low or the very peak of a trend, it has to be pointed out, that trend following systems first of all need to identify a trend before a signal is generated, therefore, these systems re-act to prevailing trends. While by some a system approach is applied, others make use of multi system trading, a technique where two or more programs analyse data and produce signals. The advantage of multi system trading lies in the diversified production of signals and a potential safeguard as buying signals may be only executed if both systems are in agreement with their given signal. Trend following strategies seek gains through the volatility in the market and hence may also be described as long volatility⁸⁶ and/or as momentum strategies⁸⁷. A CTA will go long/short once a volatile momentum is identified. Long volatility strategies display positive excess return in volatile market conditions as empirical evidence will highlight. The following graph displays the excess returns of CTAs that are part Barclays Commodity Trading Index (BCTI)⁸⁸. The BCTI in relation to the S&P 500 index. The author would like to draw the attention to the regression line of CTA returns.

⁸⁶ See W. Fung & D. Hsieh, 1999, p. 16, as well as CISDM paper, 2006, p. 11

⁸⁷ M. Anson & H. Ho, 2003

⁸⁸ The unweighted Barclay CTA Index comprises 491 CTAs (year 2008) that have a proven performance history of at least 4 years. (Source: www.barclayhedge.com/research/indices/cta/ub/cta.html , 10th October 2008)

Figure 11



Source: Barclay Commodity Trading Index

As the graph clearly displays, CTAs tend to produce a positive excess return in a volatile, here bearish market environment. As volatility fades, CTAs produce a constant excess return close to 0, supporting the argument, that futures trading is a zero sum game⁸⁹. Taking a closer look at the regression line, the reader will identify the pay off function of a long put option. This can be interpreted as a put option being exercised, once the market turns negative. This synthetic put option may be constituted by defining excess return of the S&P 500 index through regression coefficients⁹⁰:

$$R_{tf} - R_f = (1 - D)[\alpha_{low} + \beta_{low}(R_{S\&P} - R_f)] + D[\alpha_{high} + \beta_{high}(R_{S\&P} - R_f)]$$

R_{tf} = return of trend following strategy

R_f = risk free rate

$R_{S\&P}$ = return of S&P 500

$\alpha_{low}, \beta_{low}$ = regression coefficients on the left side of the curve of regression line

⁸⁹ See also T. Schneeweis & R. Spurgin, 1997, p. 7. In contrast to stocks, where value can be generated leading to overall wealth, a gain in a futures contract will mean loss to a counter party. Wealth will not be generated but only transferred from one party to another (Source: www.investopedia.com, search for “zero sum game”, 12th October, 2008)

⁹⁰ M. Anson & H. Ho, 2003, p. 189

$\alpha_{high}, \beta_{high}$ = regression coefficients on the right side of the curve of regression line

$D = 1$ if $R_{S\&P} - R_f > \text{threshold}$

$D = 0$ if $R_{S\&P} - R_f < \text{threshold}$

As in fact 2 regression lines are drawn (1 left and 1 right to the kink) the equation needs to be altered in order to incorporate both functions into the same formula. Therefore, the following condition shall be incorporated:

$$\alpha_{low} + \beta_{low}(\text{Threshold}) = \alpha_{low} + \beta_{high}(\text{Threshold})$$

Therefore we arrive at:

$$R_{tf} - R_f = (1-D)[\alpha_{low} + \beta_{low}(R_{S\&P} - R_f)] + D[\alpha_{low} + (\beta_{low} - \beta_{high})(\text{Threshold}) + \beta_{high}(R_{S\&P} - R_f)]$$

The following table shall illustrate the result of the above regression:

Table 7
Regression Table Barclay CTA Index vs. S&P 500

	Coefficient	t-stat
Threshold	-0,053	
Alpha low	-0,016	-1,27
Beta low	-0,4	-2,1
Alpha high	0,001	
Beta high	-0,07	-1,18
S.E.	0,026	
Regression		
R square	0,056	
Adj. R square	0,044	

Source: Commodity Trading Advisors, 2004

Interpreting the above table and looking at beta low, we can conclude that applying a trend following strategy, CTAs benefit from a downwards trend of the S&P 500 by 0,4 points in excess return for every point the S&P 500 declines. This result is statistically significant at a confidence level of 5%, an empirical result also found by Fung & Hsieh (1999)⁹¹. When however focussing on beta high, the excess return here is close to 0 (-0,07), indicating, that in a positive course of market development, little to no excess

⁹¹ W. Fung & D. Hsieh, 1999, p. 15

return will be generated, a fact that may be interpreted as the cost for the premium of a long put option.

4.2.4 Trading Types

The above mentioned active trading strategies may further support specific trading type aims within the various categories. These are:

4.2.4.1 Arbitrage⁹²:

As mentioned in Chapter 2, the determination of a futures price is based on the assumption of market equilibrium. Should this equilibrium be violated due to inaccurate pricing⁹³ of the futures contracts, then the opportunity for arbitrage, also called “cash and carry”⁹⁴ or “Basis Trade” arises until the the market is back in equilibrium. May the author outline the intuition of arbitrage with an example from the category Index futures⁹⁵:

German Stock Index (DAX) ⁹⁶ :	4700 points
DAX futures contract (maturity in 60 days):	4790 points
Time to maturity:	135 days
Current interest rate:	4%
Tick size:	25 Euros per basis point

Taking the cost of carry relation into consideration, the formula as follows should hold:

$F_{0,T} = S_0 e^{(r)T}$. However, $F_{0,T} = 4700 \times e^{0,04 \times (135/360)} = 4771$. Therefore, the equilibrium is violated due to a difference of 19 points (= 4790-4771) and there is opportunity for arbitrage profit over 475 Euros (= 19 x 25 Euros). This arbitrage can be made by shortselling the futures contract at the prevailing rate, buying a replicated portfolio of the index (Tracker) and at maturity repaying the short sale, hence:

⁹² Arbitrage: Making a profit without any risk by engaging into two or more transactions, hence gaining a return without the danger of loss. (John C. Hull, 2006, p. 14)

⁹³ This may be due to lag of information transported to all market participants. The arbitrageur seeks to exploit this advantage.

⁹⁴ Jarrow & Turnbull, 1994, p. 36

⁹⁵ Updated by author from www.deifin.de/fuwi012b.htm, 17th October 2008

⁹⁶ It has to be mentioned, that holders of stock index futures do not benefit from dividend payments. Therefore, the formula $F_0 = S_0 e^{(r-q)T}$ must hold. However, in contrast to the S&P 500, the DAX index does not include these dividends.

Purchase of Index Tracker at prevailing rate:	$4700 \times 25 = 117500$
Short sale of current DAX Futures:	$4790 \times 25 = 119750$

At maturity, 2 scenarios may arise:

Scenario 1:

Final DAX Index:	5000 points		
Closing of long position:	$5000 - 4700 = +300$ points		
	$300 \times 25\text{€} =$	+7500	€
Closing of short position:	$4790 - 5000 = -210$ points		
	$-210 \times 25\text{€} =$	- 5250	€
Repayment of interest:	$119750 \times e^{0,04 \times (135/360)}$	-1796,25	€
Profit:		453,7	€

Scenario 2:

Final DAX Index:	4500 points		
Closing of long position:	$4500 - 4700 = -200$ points		
	$200 \times 25\text{€} =$	-5000	€
Closing of short position:	$4790 - 4500 = +290$ points		
	$290 \times 25\text{€} =$	+7250	€
Repayment of interest:	$119750 \times e^{0,04 \times (135/360)}$	-1796,25	€
Profit:		453,7	€

4.2.4.2 Spread Trading:

This technique aims to benefit from the varying development of future prices of two (highly) correlated, hence similar futures contracts. Therefore, a spread in futures trading terms may be regarded as the price difference between two separate futures contracts. This technique entails taking a long position as well as a short position in 2 futures contracts. With the expectation in mind for long positions to rise and vice versa, it is exactly this spread where the investor locks in profits. By applying this

technique, potential gains and losses are more predictable as the investor does not take full exposure in one futures contract, engaging in this technique therefore aims at locking in a relative⁹⁷ profit in contrast to an absolute one when taking exposure in a single contract (outright position). Types of spreads are⁹⁸:

4.2.4.2.1 Intra Market Spread (Time Spread):

Taking a long and short position in 2 futures contracts for same underlying but with different maturities with the aim that the market will influence the price to his benefit at the time, when one contract has already expired.

4.2.4.2.2 Inter Market Spread (Location Spread):

Taking a long and short position in 2 futures contracts for the same underlying and maturity, however in different locations. Here, the investor seeks to lock in profits from the difference in prices in these geographically different locations.

4.2.4.2.3 Inter Commodity Spread:

Taking a long and short position in 2 highly correlated futures contracts. It is usually substitutes, such as beef/port, wheat/corn that are traded.

4.2.4.2.4 Product spread:

Taking a long and short position in 2 futures contracts for a basic commodity and its derivative. An investor may take a long position in heating oil and a short position in crude oil as price movements may vary in winter time.

5 Managed futures as an integral asset to the investor's portfolio

5.1 Modern Portfolio Theory (MPT):

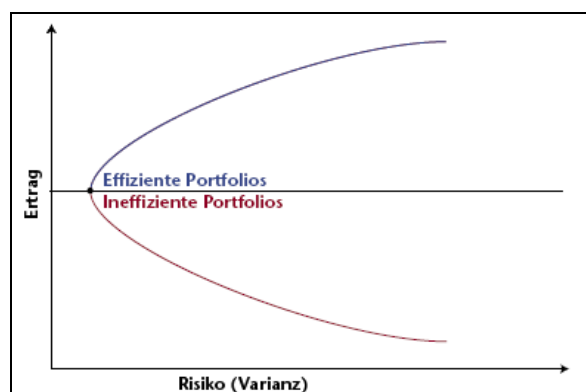
As already mentioned in the introduction (Chapter 1), there are convincing arguments, why MFs, when added to a portfolio, may enhance returns. Before however diving into underpinning these arguments, let us first recap on Modern Portfolio Theory, as established by Harry Markowitz in his work "Portfolio Selection", in 1952, to understand as in how MFs may benefit the investor as a contribution to an existing

⁹⁷ Interpreted from www.deifin.de/fuspread.htm, 18th October 2008

⁹⁸ See CME, 2005, p64

portfolio⁹⁹: A rational investor would choose an asset, that yielded the best relationship between expected return and risk, where risk is defined as the standard deviation of historic returns. Further, a diversified portfolio will yield lower risk with higher return than any single asset as long as the comprised assets within this portfolio show no or very little correlation to each other. Such a portfolio is considered to be efficient¹⁰⁰.

Figure 12



Source: http://at.e-fundresearch.com/tmp/Futures_200608.pdf, 23rd October 2008

However, as the reader has already learned in Chapter 4, returns of futures funds are sometimes far from normally distributed and these skewed distributions may well distort the practical outlook for future returns, thus putting the model into question when applied in practice. Besides the fact, that the investment world has therefore refined the initial model and replaced standard deviation by downside deviation, also known as “Post Modern Portfolio Theory”¹⁰¹, the author’s intention of the above simply stresses at the idea of diversification and its benefits.

5.2 The benefits of MFs:

In order for a new asset to fit or optimise an existing portfolio, it needs to provide a return stream, which is somewhat different to the other investments. It hence needs to be a diversifier at all times. One of the first empirical studies¹⁰² on MFs as a beneficial diversification tool was written by John Lintner, professor at Harvard University, in 1983. Lintner had studied the returns of 8 CTAs and 15 CPOs of commodity and

⁹⁹ Futures, „Markowitz und seine Erben“, 2006, p. 2

¹⁰⁰ A portfolio is efficient, when no other portfolio offers a higher return at the given level of risk, or in other words, there is no portfolio offering lower risk at the given expected return.

¹⁰¹ Futures, Markowitz und seine Erben, 2006, p. 6

¹⁰² J. Lintner, “The Potential Role Of Managed Commodity Financial Futures Accounts (and/or Funds) In Portfolios Of Stocks and Bonds”, 1983

financial futures markets in comparison to a portfolio of all stocks listed on the NYSE and AMEX, as well as the Solomon Brothers High Grade Corporate Bond Index, U.S Treasury Bills and Consumer Price Index¹⁰³. Performance of MFs were put in comparison of a portfolio of stocks and bonds in a ratio of 60:40. The observation period of this study were 42 months for the period July 1979 until December 1982. His conclusion:

“Indeed, the improvements from holding efficiently selected portfolios of managed accounts...are so large - and the correlations between...futures-portfolios and....stock and bond portfolios...so low...that the return/risk tradeoffs provided by...portfolios...of futures managers combined with...portfolios of stocks alone (or in mixed portfolios of stocks and bonds), clearly dominate the tradeoffs available from portfolios of stocks (of from portfolios of stocks and bonds). Moreover, they do so by very considerable margins.”¹⁰⁴

A lot of empirical work has been performed since and various intervals within history underpin Lintner's comments. In order to visualise the enhancements that MFs may offer, the graph below displays a portfolio mix of stocks (E) and bonds (B) as well as a diversified portfolio of stocks, bonds as well as MFs (F). Stocks are represented by the MSCI world index, bonds by the REX¹⁰⁵ performance index and MFs by the CISDM¹⁰⁶ CTA Index. The observed period is January 1996 until June 2006.

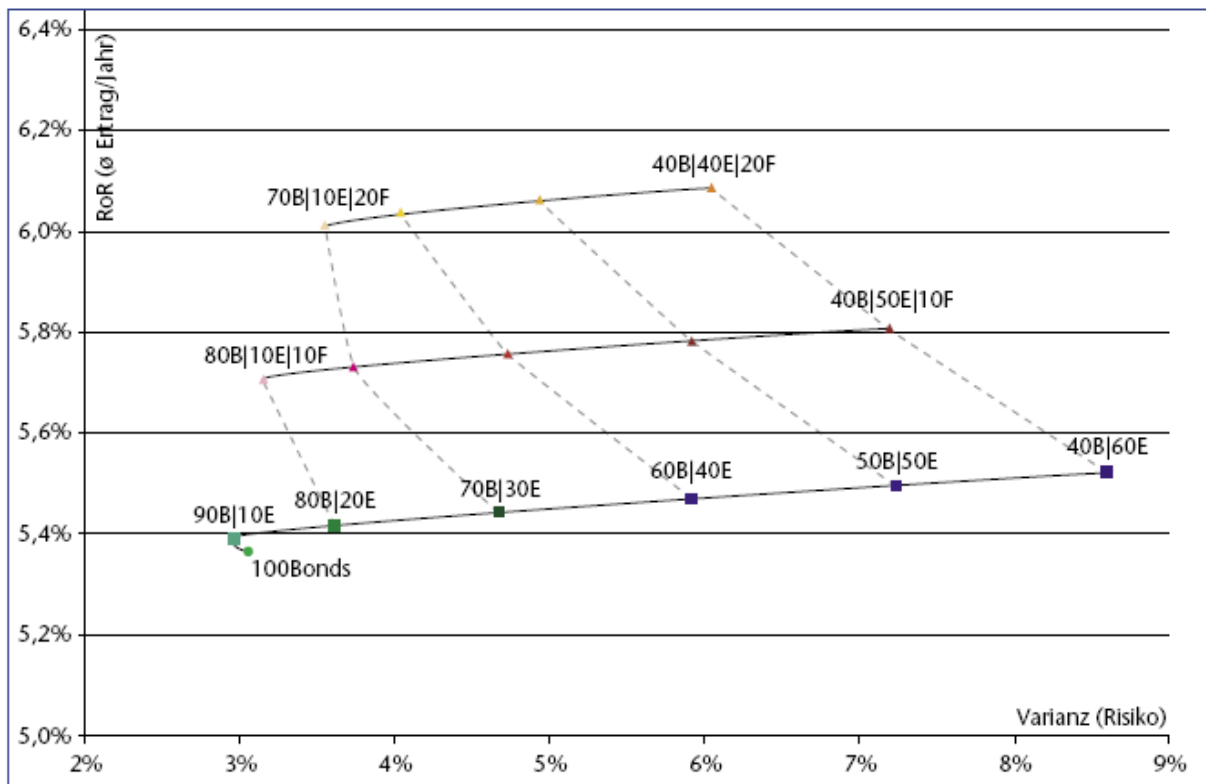
¹⁰³ List of asset classes in comparison taken from D. Accomazzo & M. Frankfurter, 2007, p. 48. It has to be pointed out that this information differs from C. B. Epstein, 1992, p. 46 as here, only 8 CTAs are mentioned.

¹⁰⁴ Shortened by author. For full text, see C. B. Epstein, 1992, p. 46

¹⁰⁵ The REX Index comprises the performance of 30 representative government as well as treasury bonds with a maturity between 1 and 10 years. (www.deutsche-boerse.com, 24th October 2008)

¹⁰⁶ CISDM: Center for International Securities and Derivatives Markets. Established by M. Philipp and A. Jain, both graduates of the University of Massachusetts. The CISDM index is a non investible index, containing data of over 5000 hedge funds, CTAs and CPOs.

Figure 13



Source: http://at.e-fundresearch.com/tmp/Futures_200608.pdf, 23rd October 2008

In the above graph we can see three individually composed portfolio curves, which are described by specific portfolio mixes. The bottom curve displays the historical returns of a portfolio mix of stocks and bonds at their given level of risk. As we move on to the next curve above, the one in the middle, we can already observe an ever increasing up shift to the left, hence reducing risk but increasing returns through the addition of MFs on either end of the curve. This improvement here is achieved by the replacement of stocks by a mere 10% in favour of MFs. Moving on to the third curve on the top, the risk return characteristics are further enhanced when once again increasing the percentage of MFs within the portfolios. We have shifted a portfolio, taking for instance the mix of 70% bonds and 30% equity on the bottom curve, from an initial return of 5,4% and a variance of just below 5%, to an expected return of above 6% with a reduced variance of below 4%, simply by reducing the equity part in favour of 20% MFs. Therefore the arguments of both Markowitz as well as Lintner hold: To the one, a well diversified portfolio yields the best return at a given level of risk, to the other, that MFs do indeed improve returns and further reduce volatility¹⁰⁷. However, in

¹⁰⁷ For another independent underpinning to above arguments, please refer to Appendix II

order to fully verify Lintners hypothesis, let us take a view on empirical data to underpin that MFs do have low correlation to other asset classes.

5.2.1 Correlation:

Empirical evidence shows that MFs are generally not only uncorrelated to stocks, they are further negatively correlated when equity markets are in decline and tend to show positive correlation, when equity markets experience positive trends¹⁰⁸. For better intuition, let us therefore consider 3 tables. The author would like to point out that reliable data for truly long term observation (such as 1980 until today), that would be indeed desirable, is scarce. Let us therefore consider individual intervals of historical observation by utilising empirical studies performed by T. Schneeweis¹⁰⁹ in 1999 and 2002 to draw final conclusions: Tables¹¹⁰ 8 and 9 cover the period January 1990 until December 2001:

Table 8

Jan. 1990 - Dec. 2001	Zurich CTA\$	Zurich Fund Of Funds	S&P 500	Lehman Gov./Corp Bond	MSCI	Lehman Global Bond
Annualised Return	11,20%	13,80%	12,90%	8,10%	6,50%	6,90%
Annualised St. Dev.	10,30%	4,30%	14,60%	4,20%	14,60%	4,90%
Sharpe Ratio	0,56	1,96	0,51	0,63	0,07	0,31
Min. Monthly Return	-6,00%	-4,50%	-14,50%	-2,50%	-13,40%	-3,00%
Correaltion with Zurich CTA\$	1,00	0,22	-0,10	0,27	-0,12	0,19

Source: see footnote 110

Table 8 shows the correlation between the Zurich CTA universe Dollar weighted Index in comparison to other asset classes. As we can clearly see, correlations have been historically low, suggesting, that CTAs are a good diversification both to traditional asset classes as well as alternative investments, such as hedge funds. Let us further take a glance at a graph with the risk return characteristics of the above represented asset classes:

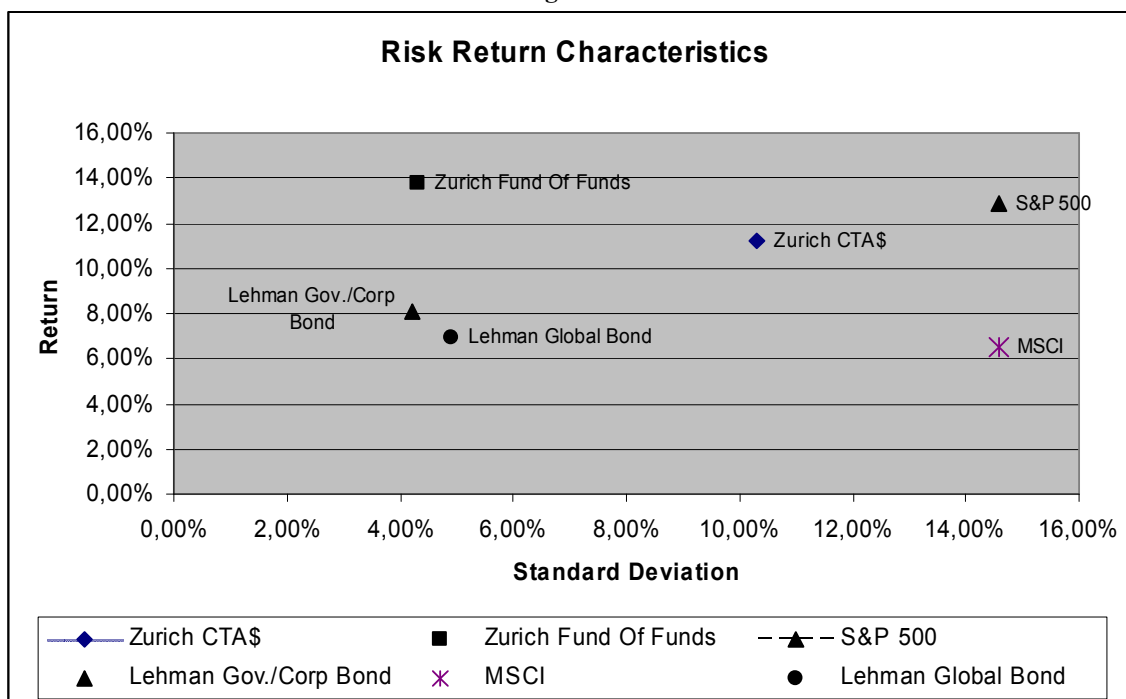
¹⁰⁸ T. Schneeweis, R. Spurgin, M. Potter, 1996, p. 2

¹⁰⁹ Professor of finance, University of Massachusetts & director of CISDM

¹¹⁰ From T. Schneeweis & G. Georgiev, 2002, p. 3

The Zurich CTA universe, formerly known as the MAR (Managed Account Reports) CTA Index, represents the Dollar weighted CTA universe. The other asset classes compared are the Zurich Fund of Funds (Hedge Funds), the S&P 500, the Lehman Government and Corporate Bond Index, the MSCI as well as the Lehman Global Bond Index

Figure 14



As we can gather from figure 14, the Zurich CTA displays enhanced characteristics to other representatives of the investment horizon, such as bonds and world stocks. While it displays a more volatile risk profile than the pool of hedge funds, let us though once again consider its favourable correlation results with its peers.

Table 9

Jan. 1990 - Dec. 2001	Annualised Return	Annualised St. Dev.	Sharpe Ratio	Min. Monthly Return	Correlation S&P 500	Correlation Lehmann Bond
Zurich CTA\$	11,20%	10,30%	0,56	-6,00%	-0,10	0,27
Zurich CTAEQ	9,90%	9,90%	0,45	-5,40%	-0,14	0,20
Zurich Currency	10,10%	12,80%	0,36	-8,20%	0,01	0,14
Zurich Discretionary	12,60%	7,00%	1,03	-4,60%	-0,06	0,18
Zurich Diversified	9,70%	11,80%	0,36	-7,50%	-0,13	0,25
Zurich Financial	11,20%	13,40%	0,43	-8,60%	-0,06	0,35
Zurich Trendfollowing	10,60%	16,60%	0,31	-10,40%	-0,14	0,27
S&P 500	12,9%	14,6%	0,51	-14,5%	1,00	0,28
Lehman Brothers Gov./Corp Bond	8,1%	4,2%	0,63	-2,5%	0,28	1,00

Source: By author, extracted from: see footnote 110, p. 56

Table 9 displays the various trading strategies comprised in the Zurich CTA universe in comparison to traditional asset classes. All strategies show extremely low, to the majority negative correlations to the S&P 500 for the indicated period. This further leads to the conclusion, that MFs can offer some protection from extreme down turn

events in the equity markets¹¹¹. Regarding correlation coefficients with Bonds, this tends to be slightly higher, especially with financials. This is certainly due to the fact that financial strategies aim at interest rate futures, which themselves are represented in bonds as their underlyings.

Table 10¹¹² shows historical data from the period 1995 until the end of 2005 from the CISDM CTA universe and displays correlations to traditional asset classes¹¹³. Motivation of displaying another table for comparative purpose is to examine constancy of the hypothesises, that MFs are not correlated to other asset classes:

Table 10

CISDM Indices 1995 - 2005	S&P 500	Lehman U.S. Gov./Corp. Bond	Lehman Aggregate	Lehman U.S. Corporate High Yield
CISDM CTA Equal weighted Index	-0,10	0,38	0,36	-0,09
CISDM CTA Asset weighted discr.	0,11	0,23	0,22	0,13
CISDM CTA Asset weighted syst.	-0,04	0,38	0,37	-0,01
CISDM CTA Asset weighted curr.	0,16	0,09	0,07	0,19
CISDM CTA Asset weighted div.	-0,09	0,38	0,36	-0,05
CISDM CTA Asset weighted financ.	-0,11	0,39	0,37	-0,10
CISDM CTA Asset weighted equity	-0,01	0,11	0,12	-0,04
S&P 500	1,00	-0,04	-0,03	0,50
Lehman Brothers Gov./Corp Bond	-0,04	1,00	0,99	0,18

Source: see footnote 112

5.3 Historical data underpinning MFs as a diversification tool:

Having provided statistical evidence about potential benefits for diversification, let us take a view on various potential portfolio mixes within the above investment horizon. Data from the five year period 2001 until 2005 (including events of 9/11 and the Iraq war) was taken as a sample period. The following Table 11 shows the statistical risk adjusted performance of individually selected portfolios:

¹¹¹ D. K. C. Lee, F. Koh & K. Phoon, Commodity Trading Advisors, 2003, p. 336

¹¹² CISDM, The Benefits of Managed Futures, 2006

¹¹³ **Lehman Aggregate Bond Index:** A non investible index comprises government securities, mortgage-backed securities, asset-backed securities and corporate securities (www.investopedia.com, 26th October 2008)

Lehman U.S. Gov./Corp. Index: A non investible index and subset of the Lehman Aggregate Bond Index. It comprises government and investment grade corporate debt instruments (www.investopedia.com, 26th October 2008)

Lehman U.S. Corp. High Yield Index: Includes non-investment grade bonds. High yield is a synonym for lower rating and therefore higher interest yield, due to risk premium. Emerging Markets debt is not represented. (www.lehman.com/fi/indices/factheets.htm#, 26th October, 2008)

Table 11

	Portfolio	Ann. Return	Ann. Std. Dev.	Sharpe Ratio	Max. Drawdown
1	50% S&P 500 50% Lehman Gov./Corp Bond	3,67%	7,06%	0,22	-14,62%
2	40% S&P 500 40% Lehman Gov./Corp Bond 20% CISDM Equal weighted HFI	4,75%	6,50%	0,4	-11,98%
3	90% Portfolio 2 10% CTA Equal Weighted	5,19%	6,29%	0,48	-10,91%
4	50% MSCI 50% Lehman Global Bond	4,81%	7,76%	0,34	-16,21%
5	40% MSCI 40% Lehman Global Bond 20% CISDM equal weighted HFI	5,68%	7,05%	0,5	-13,29%
6	90% Portfolio 5 10% CISDM CTA equal weighted	5,87%	6,38%	0,58	-10,34%

Source: see footnote 112

As Table 11 shows, an addition of 10% to a portfolio mix of traditional investments as well as hedge funds clearly improves performance.

5.4 Historical data underpinning MFs as a div. tool with MVAR:

Having identified improved performance when including MFs in an investor's portfolio for the given period 1995 until 2005, let us consider a different approach in identifying benefits by optimising a portfolio with a MVAR approach. The observed period is January 1990 until February 2003. Included assets are: CISDM Aset weighted Index, the SCM Bond Index¹¹⁴, the S&P500 Toronto SE Index (S&P/TSX), S&P500 as well as the Capital Index for Europe, Asia and Far East (MCI EAFE). The following table provides statistical as well as risk adjusted data with VAR calculated at a 1% confidence level:

Table 12

Jan. 1990 - Feb. 2003	Annualised Return	Annualised St. Dev.	Skewness	Excess Kurtosis	Monthly VAR	Monthly MVAR	Monthly Sharpe Ratio	Modified Sharpe Ratio
CTA Asset weighted Index	11,80%	10,20%	0,70	2,20	-5,90%	-5,30%	0,18	0,1
SCM Bond Index	9,80%	5,50%	-0,20	0,70	-2,90%	-3,40%	0,23	0,11
S&P/TSX Index	7,30%	15,70%	-0,70	2,30	-9,90%	-13,90%	0,04	0,01
S&P 500	11,10%	15,20%	-0,50	0,60	-9,30%	-11,20%	0,11	0,04
MSCI EAFE Index	1,90%	16,40%	-0,50	0,80	-10,80%	-13,10%	-0,05	-0,02

Source: M. Kooli, 2004¹¹⁵

¹¹⁴ Scotia Capital Markets (Scotia Bank Group). The Index comprises Canadian Federal, Provincial, Municipal and Corporate Bonds with short-, mid- and long term maturity.

¹¹⁵ From Book Commodity Trading Advisors, 2004, p. 362ff, the following tables are taken from the same source

As we can once again take from the above, CTAs offer higher annualised returns in comparison to other asset classes. In conjunction with a relatively lower volatility, they also seem to perform better on a risk adjusted basis, which is reflected in the monthly Sharpe ratio, except bonds. However, as we have learned in Chapter 4, the danger of actual risk is underestimated without having established the MSHR, incorporating Skewness as well as Kurtosis. But also in that respect, MFs seem to outperform all but Bonds.

When looking at the correlation coefficients, we again see that no other investment vehicle correlates as low with others as CTAs do:

Table 13

Jan. 1990 - Feb. 2003	CTA Asset weighted Index	SCM Bond Index	S&P/TSX Index (Canada equities)	S&P 500	MSCI EAFE Index
CTA Asset weighted Index	1,00				
SCM Bond Index	0,20	1,00			
S&P/TSX Index (Canada equities)	-0,12	0,32	1,00		
S&P 500	-0,13	0,26	0,75	1,00	
MSCI EAFE Index	-0,19	0,20	0,66	0,70	1,00

An efficient frontier portfolio is calculated based on the VAR framework with 1% VAR and a maximum weight of 10% for MFs to be included in the portfolio as constraints. The 2 portfolios with and without CTAs as a result of this VAR based optimisation are constituted as follows:

Table 14

Jan. 1990 - Feb. 2003	No CTAs	10% CTAs
CTA Asset weighted Index	0%	10%
SCM Bond Index	50%	50%
S&P/TSX Index (Canada equities)	15%	15%
S&P 500	29%	17%
MSCI EAFE Index	6%	8%

Having identified the efficient set of assets, we arrive at the following result:

Table 15

Jan. 1990 - Feb. 2003	Average monthly return	Annualised return	MVAR	Modified Sharpe Ratio
Portfolio without CTAs	0,59%	7,12%	5,93%	0,100
Portfolio with 10% CTAs	0,58%	6,97%	4,56%	0,128

Due to the implied constraint MVAR, returns of the new portfolios are accordingly lower. When comparing the 2 portfolios in our table, we notice, that portfolio with CTAs delivers a slightly lower return. However both MVAR as well as MSHR indicate better results. We therefore arrive at the conclusion, that MFs do indeed improve an existing portfolio in terms of risk/return adjustment.

5.5 Explanatory factors for the returns of managed futures

Having looked at various trading styles in Chapter 5 where we analysed as in how and where individual CTAs seek exposure, let us turn to the derivation of return factors, which determine the favoured performance of MFs. As has been identified so far in this diploma thesis, MFs heavily benefit from their ability, in contrast to traditional funds, to take exposures in long as well as short positions, thus potentially benefiting from both positive as well as negative market development. Lower transaction costs¹¹⁶ in dealing futures may also enhance returns. Further, through their ability in trading in broader markets (commodities, currency, etc.) there is opportunity for more extensive diversification. However having identified the sources of return still leaves the open question and hence does not explain, how returns are achieved. Let us therefore consider the following regression analysis¹¹⁷:

The period January 1990 until December 1995 serves as sample. A multi regression model was established and individual CTA trading style performance as endogenous variable was examined through explanatory variables, indices, such as the Mount Lucas Management (MLM), Goldman Sachs Commodity Index (GSCI)¹¹⁸, S&P500, Solomon Brothers Government Bond (SBBI)¹¹⁹ and the US Dollar Trade Weighted

¹¹⁶ T. Schneeweis, R. Spurgin, 1999, p. 7

¹¹⁷ T. Schneeweis, R. Spurgin, CISDM, 1999, p. 5, 6, 11, 26

¹¹⁸ GSCI: Investible futures index comprising 24 commodities ranging from energy, agriculture industrials, live stock to precious metals (<http://wirtschaft.t-online.de/c/13/27/18/00/13271800.html>, 25th October 2008)

¹¹⁹ SBBI: Bonds, other than U. S. issues traded by institutional investors with maturity of 1 year or longer

Currency (USD¹²⁰). The MLM Index should serve as a proxy for price trends. The whole set of variables was divided into 3 coefficients representing return strategies as follow:

Nominal Index Coefficients: Normal return through holding the asset (representing a long only strategy)

Absolute Index Coefficients: Ease long as well short exposure (representing a clever market timing)

Intra-month Volatility: Representing timing skill when exploiting intra-month volatility

Data of CTA performance was provided by MAR, Barclay Trading as well as EACM¹²¹. Adjusted R Square represents the coefficient of determination, F-stat the value of the F-statistics. The intercept represents alpha. The regression provides the following result:

Table 16

					Nominal Index Coefficients					Absolute Index Coefficients				Intramonth StDev Coefficients			
Index	Adj. R ²	F-stat	Intercept	MLM	GSCI	SP500	SBBI	USDX	GSCI	SP500	SBBI	USDX	GSCI	SP500	SBBI	USDX	
M.F. Strategies	Dollar Weight	0,32	3,57	-0,015	0,555*	0,027	-0,122	0,474	-0,265	-0,034	0,183	0,149	1,035**	3,074	-0,677	-1,079	-2,815
	Diversified	0,3	3,39	0,006	0,745*	-0,16	-0,216	0,736	-0,28	-0,029	0,307	-0,2	1,001**	1,67	1,484	-0,799	-4,754*
	Equal-Weight	0,42	5,04	-0,001	0,427	0,048	-0,161	0,501	-0,211	-0,05	0,168	-0,03	0,974**	2,946	-0,103	-0,987	-5,431**
	Energy	0,32	3,57	-0,015	0,555*	0,027	-0,122	0,474	-0,265	-0,034	0,183	0,149	1,035**	3,074	-0,677	-1,079	-2,815
	Currency	0,53	7,22	-0,042	0,358	0,077	-0,092	1,312*	-0,439**	-0,231	0,102	-0,93	2,128**	7,401**	4,967	-1,203	-6,442**
	Financial/Metal	0,35	3,97	-0,003	0,231	-0,055	-0,182	0,792	-0,491**	-0,051	0,34	0,422	1,099**	3,321	-0,366	-1,323	-5,27*
	Discretionary	0,14	1,88	-0,014	0,379	0,05	-0,173	0,557	0,124	0,022	0,001	0,156	0,339*	1,371	1,358	-0,49	0,882
	Trend-Following	0,41	4,83	-0,018	0,756	0,039	-0,275	1,032	-0,486*	-0,116	0,537	-0,37	1,726**	4,322	0,844	-2,04	-7,338**

* significant with 95% confidence interval, ** significant with 99% confidence interval

Source: T. Schneeweis, R. Spurgin, CISDM, 1999

When looking the intercept column, representing alpha¹²², we may ascertain, that all trading strategies have achieved an insignificant, but negative alpha.

(www.traing-glossary.com/s0021.asp, 25th October 2008)

¹²⁰ USD^X: Indicator of Dollar Value relative to largest international trading partners. Currencies compared are: Euro, Japanese Yen, Canadian Dollar, British Pound, Swedish Krona, Swiss Franc
(www.investopedia.com/terms/u/usdx.asp, 25th October 2008)

¹²¹ EACM: Evaluation Associats Capital Management. While Schneeweis indicates EACM as provider for CTA performance data, it has to be pointed out, that after internet research, EACM is a fund of funds hedge fund provider. EACM has been taken over by Mellon Financial Corporation in 2004 and it may be assumed that their investment universe may have shifted.

¹²² Alpha represents the return above that of a benchmark index. It may also be interpreted as the excess return of the predicted return of the CAPM. (www.investopedia.com/terms/a/alpha.asp, 26th October 2008)

5.5.1 Interpretation of Nominal Coefficients:

Considering both Dollar weighted as well as Diversified Index, we observe that both are significantly driven by the MLM in the nominal coefficients section. This indicates that both trading styles rather heavily depend on trend following techniques. Same applies to Energy as well as Trend following Index¹²³. The Currency Index is significantly determined by Bonds. Interpreting this result leads to the conclusion that Currency CTAs heavily take exposure in bond futures, which are part of the interest future universe while at the same time, rather significant under exposure is taken in foreign currencies, as indicated through the USDX. Same applies to the Financial/Metal Index. May the author however stress at this point that it is the long exposure that is underrepresented, an investment strategy that fundamentally differs from the absolute exposure, as we shall observe shortly. Equal Weighted as well as Discretionary Indices show insignificant coefficient factors in the nominal section. This may interpreted that to the one hand, the Equally weighted CTAs take even exposure and Discretionary ones are not tied to any specific trading strategy on the other.

Interpretation of Absolute Coefficients:

We can observe that all CTA strategies are significantly determined through the USDX, leading to the assumption, that all take absolute return exposure in foreign currency trading. On the other hand, none of the the indices are significantly driven by the other asset classes.

Interpretation of Intra-month Coefficients:

The majority of trading strategies are once again dominated by the USDX, however it is important to notice the negative algebraic sign next to the data. The explanation lies in the relative high intra-month volatility that cuts returns of trend following strategies. With the currency index, it appears unusual that this index is positively dominated by the GSCI and despite closer examination a conclusive explanation could not be found.

In the next table, the same multi regression analysis has been performed. However in this sample, CTAs have been divided into 4 categories: All CTAs, the best 5, median and the worst 5.

¹²³ The author would like to stress that the asterisk for significance is missing in the table and makes the assumption that this is due to a printing error originated at source.

Table 17

Index	Adj. R ²	F-stat	Intercept	Nominal Index Coefficients					Absolute Index Coefficients				Intramonth StDev Coefficients			
				MLM	GSCI	SP500	SBBi	USDx	GSCI	SP500	SBBi	USDx	GSCI	SP500	SBBi	USDx
All CTAs	0,38	4,34	0,002	0,976**	0,035	-0,124	0,405	-0,404*	-0,091	0,191	-0,149	1,366**	3,489	-1,986	-1,077	-6,219*
Best 5	0,42	5,02	0,085	1,582*	0,3	-0,257	0,109	-0,980**	-0,132	0,584	0,287	3,256**	8,966	0,642	-0,933	-11,102*
Median	0,38	4,36	0,005	0,919**	0,029	-0,043	0,225	-0,443**	-0,069	0,173	-0,025	1,125**	2,844	-3,32	-1,273	-5,139*
Worst Five	0,25	2,83	-0,081*	1,410**	-0,126	-0,136	0,79	-0,288	-0,133	-0,346	-0,319	0,814*	1,88	-2,337	-1,389	-8,502*

* significant with 95% confidence interval, ** significant with 99% confidence interval

Source: T. Schneeweis, R. Spurgin, CISDM, 1999

As the regression analysis indicates, the group All CTAs on average displays an insignificant positive alpha¹²⁴. Looking at the determining coefficients constituting CTAs, we learn, that almost all are significantly driven by the MLM Index in the column for nominal coefficients, indicating long positioning. As previously diagnosed, the result may be interpreted in the way that almost all CTAs pursue a trend following strategy, a result also empirically obtained in other literature¹²⁵. In the section for absolute coefficients, here it is exclusively the USDx with high significance that drives CTAs. This reflects the fact, that CTAs take major exposure in currency trading, taking both long as well as short positions. With regards to Intra-month volatility, similar observations apply as above.

6 Conclusion

The investor strives towards optimising his portfolio, making it efficient. In order to achieve this state, he needs to, according to his own aversion of risk, find an ideal opportunity set, where no other portfolio delivers a better risk-return structure. Having gained an insight into the world of MFs, we have learned, that MFs offer this opportunity, enhancing returns while potentially reducing risk. As the MPT teaches us, an ideal portfolio should be composed of assets with correlations as low as possible. Further, ideal diversification is achieved through the mix of individual asset classes - two requirements that are met by MFs. As we have learned in chapters 3 and 5, MFs offer unique risk-return characteristics that will enhance an existing portfolio with a proportional addition of as little as 10%. While the evaluation of MFs is twofold, qualitative on the one hand and quantitative on the other, we have learned about the

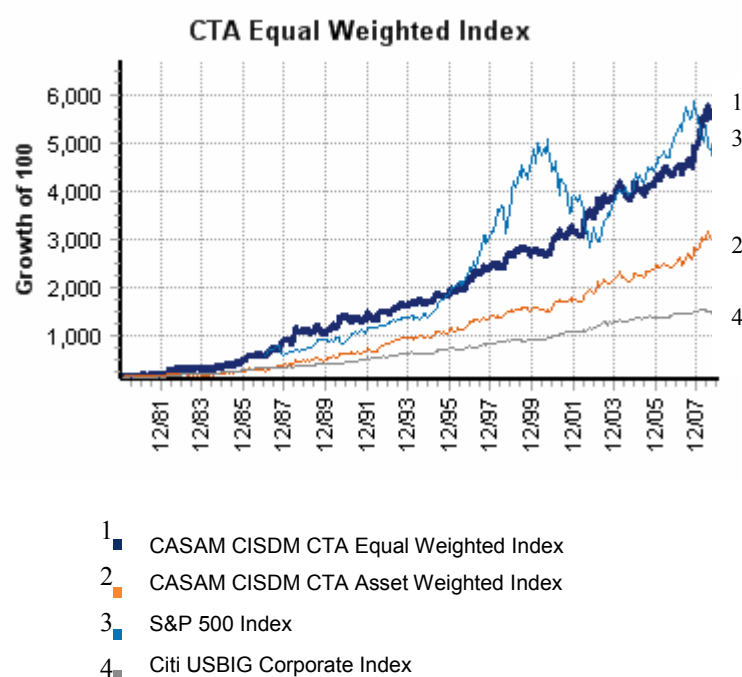
¹²⁴ Alpha represents the return above that of a benchmark index. It may also be interpreted as the excess return of the predicted return of the CAPM. (www.investopedia.com/terms/a/alpha.asp, 26th October 2008)

¹²⁵ F. R. Edwards & J. Liew, 1998, p. 17

various performance measures as well as delicate soft facts, which the potential investor should by all means draw his attention to. MFs can be divided into commodities, financials, equities and diversified categories and various strategies are run by the individual CTAs. The widest spread are active systematic approaches based on technical analysis, where computer programs seek to identify trends in the markets.

In times of financial instability, as we have been experiencing them throughout the year 2008 (and with the highest likelihood also in 2009), the question arises, as in how MFs have been performing in comparison to traditional asset classes, such as stocks and bonds. Media report that MFs have been the winner of the financial crisis we are currently experiencing¹²⁶. To see, whether this statement holds, let us look on the following graph in order to draw a conclusion:

Figure 15



Source: <http://www.casamhedge.com/IndexDetail.aspx?ID=7129&G=3>, 15th December 2008¹²⁷

¹²⁶ Der Standard, Thursday, 20th November 2008, see Appendix III for article

¹²⁷ **CASAM CISDM CTA Asset Weighted Index:** Dollar-weighted performance of CTAs that report to the CASAM CISDM Database. **CASAM CISDM CTA Equal Weighted Index:** Average performance of commodity Trading Advisors (CTAs) reporting to the CASAM CISDM Database. To be included in the asset weighted index universe, a CTA must have at least \$500,000 under management and at least a 12-month track record. The index goes back to 1980. **Citi USBIG Corporate Index:** Corporate Bond Index

As we can clearly see, MFs have outperformed both stocks as well as corporate bonds in the recent past. Further, CTAs have been performing exceptionally well due to the fact of being able to benefit from short selling. Following latest performance data, the CISDM Equal Weighted Index rose 5.79% in October 2008 while the S&P 500 lost 16,79% during the same period. Looking at the year to date performance, both the equal weighted index as well as the asset weighted index of CTAs outperformed both stocks as well as bonds by far as the table below clearly outlines:

Table 18

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	CTA Asset Weighted Index	S&P 500 Index	Citi USBIG Corporate Index
2003	3.24%	2.71%	-4.25%	1.06%	5.23%	-2.20%	-1.05%	0.92%	1.09%	1.22%	-0.69%	3.65%	11.07%	13.25%	28.68%	8.72%
2004	0.69%	3.97%	0.59%	-3.59%	-1.14%	-2.52%	-0.73%	-1.06%	1.38%	2.70%	4.06%	-0.27%	3.83%	4.24%	10.88%	5.62%
2005	-2.86%	-0.53%	-0.48%	-2.39%	2.65%	1.98%	-0.16%	0.74%	0.68%	-0.53%	3.76%	-0.25%	2.44%	5.01%	4.91%	1.96%
2006	1.33%	-1.68%	1.88%	4.47%	-0.71%	-1.66%	-2.05%	0.80%	-0.57%	0.92%	2.66%	0.34%	5.66%	6.17%	15.79%	4.57%
2007	1.17%	-1.69%	-2.03%	2.10%	1.78%	2.31%	-1.06%	-2.93%	6.18%	3.38%	0.11%	2.04%	11.57%	9.14%	5.49%	4.90%
2008	2.34%	7.86%	-0.14%	-0.46%	2.11%	3.29%	-3.83%	-0.61%	0.28%	5.79%	1.96%		19.62%	16.25%	-37.66%	-4.01%

Source: CISDM

A year to date performance of 19,62% and 16,25% respectively is truly remarkable compared to a negative performance of -37,66% for stocks and -4,01 for corporate bonds. This good performance of MFs was certainly supported by the clear downwards trend, which the capital have been experiencing over the recent months, which again was optimally exploited by CTAs trend following strategies.

When looking at more stable previous periods in the above table, the years before 2007, the results are clearly in line with the findings as indicated in figure 9, Chapter 4, where we have ascertained, that MFs produce exceptional returns in times of drawbacks and average excess returns in periods when capital markets perform well. This again conclusively supports the argument that MFs do enhance stability to the investor's portfolio when negative trends prevail.

Let us finally look at another table of facts, provided by Credit Suisse/Tremont, where MFs year to date performance is compared to the S&P500, the GSCI as well as the DJ Index:

Table 19

Net Performance	Managed Futures (USD)	S&P 500 (USD)	GSCI (USD)	DJ World Index (USD)
1 month	3.32%	-7.18%	-14.84%	-6.82%
3 months	12.05%	-29.65%	-46.46%	-34.90%
6 months	8.94%	-35.20%	-52.32%	-42.51%
1 year	17.00%	-38.09%	-34.71%	-45.77%
2 years	27.15%	-33.31%	-23.93%	-39.11%
3 years	27.98%	-23.82%	-28.46%	-27.47%
3 year average	8.57%	-8.67%	-10.56%	-10.15%
since rollout	45.49%	-12.73%	-22.11%	-13.18%
average performance since rollout	9.42%	-3.22%	-5.82%	-3.34%

Source: www.hedgeindex.com¹²⁸, 2nd January, 2009

Concluding from this independent source, we see once again that MFs have remarkably outperformed traditional asset classes.

Table 20

Stat.	Managed Futures (USD)	S&P 500 (USD)	GSCI (USD)	DJ World Index (USD)
Avg Month	0.80%	-0.19%	-0.15%	-0.17%
Best Month	7.19%	4.87%	15.14%	5.51%
Worst Month	-5.71%	-16.79%	-28.20%	-19.96%
Monthly Std. Deviation	3.14%	4.00%	8.21%	4.68%
Ann. Std. Deviation	10.87%	13.85%	28.44%	16.20%
Sharpe Ratio	0.55	-0.48	-0.33	-0.42

Source: www.hedgeindex.com, 2nd January, 2009

¹²⁸ The joint venture, **Credit Suisse Tremont Index LLC**, combines the expertise of Credit Suisse, one of the world's leading global investment banking firms, and the data research group of Tremont Capital Management, Inc., a full-service hedge fund of funds investment management firm. The Credit Suisse/Tremont Hedge Fund Indices are asset-weighted benchmarks of hedge fund performance and are derived from the Credit Suisse/Tremont database.

This table represents data from these **9 MF funds**: Aspect Diversified Fund Ltd , BlueTrend Fund Ltd , Boronia Diversified Fund Ltd., Campbell Global Assets Fund Ltd (Class A), Graham GlobalInvestment Fund (Proprietary Matrix Portfolio), Lynx (Bermuda) Ltd., SMN Diversified Futures Fund (Euro), Sunrise Capital Diversified Ltd, Winton Futures Fund.

Each of these funds disposes of a trading volume of at least \$500 Mio. Provided returns are net (after fees). Rollout is Oct. 2004

When looking at the statistics in table 20, MFs have produced the best risk return characteristics compared to the other indices and are hence the only investment strategy with a positive Sharpe Ratio¹²⁹.

With this convincing data, we may conclude that MFs certainly do represent an integral, rather vital part of an investor's portfolio. While producing average excess returns in bullish times, MFs have proven to be some sort of sound insurance against direful set-backs, they provide a soft landing when all else is in demise. The world is experiencing a financial crisis as it has not done since the late 1920s. Capital markets are shrinking, liquidity is low, therefore which time other than this is a better reality check for alternative investment strategies?

And which other investment strategy has convinced more successfully than
Managed Futures?

¹²⁹ Sharpe Ratio has been calculated using a rolling 90 day T-bill rate (Source: Credit Suisse/Tremont).

Appendix I:

Sample Performance Capsule Table



www.forwardthinking.vc

VCM PERFORMANCE CAPSULE

Vision Capital Management (VCM) specializes in absolute return strategies investing in a broad range of global futures markets, sectors and geographical areas around the world. VCM's objective is to achieve long-term capital growth utilizing a systematic, trend following futures strategy.

VCM Monthly Returns

July 2008 returns are estimated

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YTD
2006		6.68	9.34	5.45	-4.54	-3.45	-4.57	-2.06	-4.66	9.45	10.82	2.14	25.15%
2007	3.01	0.47	-4.78	6.34	16.79	3.94	-1.95	-14.80	20.71	17.51	-9.05	16.04	59.09%
2008	-8.46	44.16	-26.00	-1.97	4.57	26.53	-33.12						-15.29%

Performance Analysis

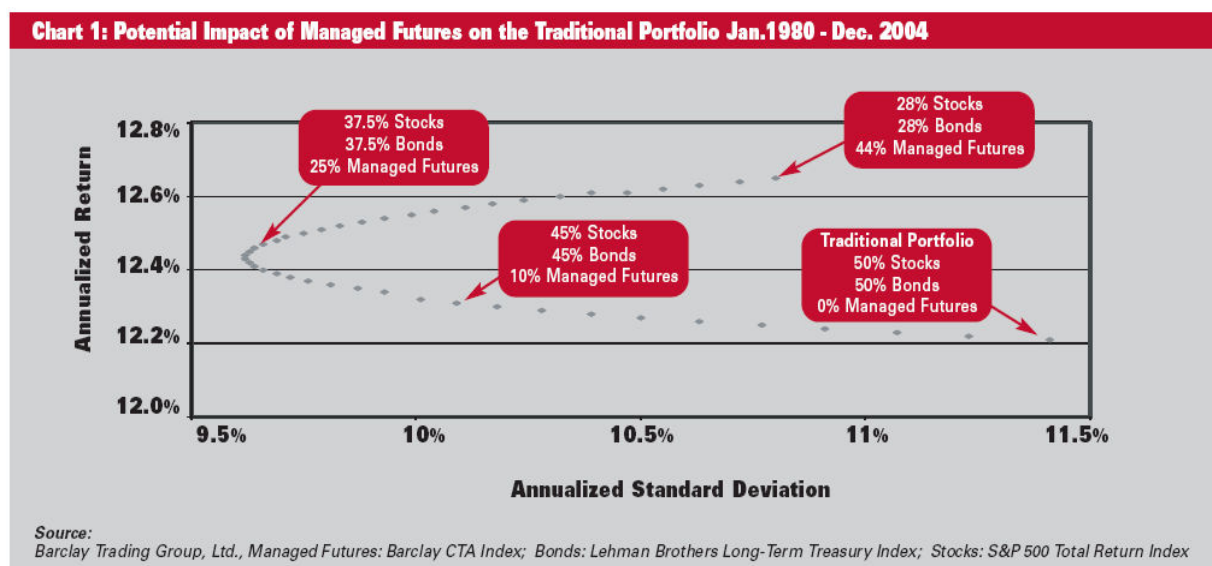
Total Returns Since Inception	68.66%	% Winning Months	56.67%
Compounded Annual Return	23.26%	Maximum Drawdown	35.81%
Average Monthly Return	2.82%	Monthly Volatility	14.86%
Average Monthly Gain	12.00%	Correlation S&P 500	0.14
Average Monthly Loss	-9.19%	Sharpe Ratio (rf=5%)	0.35

Vision Capital Management

Minimum Investment	\$250,000	Management Fee	2%
Incentive Fee	20%	Program Assets	\$12,300,000

Appendix II:

Figure 1



Source: CBOT, Portfolio Diversification Opportunities

Appendix III:

Managed Futures - Die Trendfolger sind zurück

Diese Strategie gilt als
Gewinner der Finanzkrise

Managed-Futures-Strategien haben seit Beginn der Finanzkrise im August 2007 massiv zulegen können und liegen laut Daten des „Credit Suisse/Tremont Index“ allein 2008 knapp zwölf Prozent im Plus. Damit sind sie die erfolgreichste Hedgefonds-Anlagekategorie. Die Fonds arbeiten mit Algorithmen, werten Marktdaten aus, ein Modell gibt Kauf- und Verkaufssignale, und Computer investieren über Derivate wie Futures in die Werte.

Managed Futures haben ein weltweites Volumen von 234 Mrd. Dollar (185 Mrd. Euro), so Barclay Hedge (keine Beziehung zur britischen Bank Barclays). Für viele Experten ist die starke Rendite der Fonds der Nervosität an den Börsen zu verdanken. In den vergangenen Jahren, als die Volatilität, also die Schwankung an der Börse, niedrig war, haben Managed Futures eher schwach abgeschnitten.

„Dramatische Bewegungen“

Mit der Finanzkrise sind die Volatilitäten in die Höhe geschossen, davon profitieren die Fonds. John W. Henry, dessen „Global Analytics-Fonds“ seit Jahresbeginn mehr als 70 Prozent zulegen konnte, sieht in einem Gespräch mit dem *Wall Street Journal* die gute Performance als Folge der „dramatischen Bewegungen, sowohl nach oben als auch nach unten“.

Die Managed-Futures-Fonds konnten besonders von den fallenden Kursen bei Rohstoffen profitieren, aber auch durch den starken Anstieg des US-Dollars. Bei Aktien konnten sie von den fallenden Kursen in den Schwellenländern profitieren. Insgesamt ist den Produkten das Krisenszenario zugutegekommen. Anleger dürften diese Anlagekategorie daher auch als Diversifikation sehen. Eine Anlageklasse, die in Krisenzeiten deutlich im Plus liegt, ist auch bei vorsichtigen Investoren interessant, die ihr Aktieninvestment schützen wollen. (sulu)

Source: Der Standard, 20th November 2008

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Zusammenfassung über den Inhalt der Diplomarbeit

Die Arbeit bietet dem Leser einen Einblick in die Welt der Managed Futures, einer jüngeren Investmentstrategie, die das Ziel verfolgt, Trends in den Märkten zu erkennen und diese auszunutzen. Seit Beginn der 80er Jahre erfreuen sich Managed Futures einem stetigen Kapitalzustrom und das verwaltete Vermögen betrug im Jahr 2008 180 Milliarden Dollar. Im Zuge dieser Arbeit erfährt der Leser über das zugrunde liegende Derivat Futures, ihren historischen Hintergrund und wie sie grundsätzlich aufgebaut sind und bewertet werden. Dabei geht der Autor auf die unterschiedlichen Kontrakte ein, wie Rohstoff-, Geld-, Zins- und Aktienfutures. Weiters wird auf die, für den reibungslosen Ablauf involvierten Marktteilnehmer eingegangen und ebenfalls festgestellt, dass Futureskontrakte dem Investor, bedingt durch ihre gehebelte Natur, einerseits große Renditen aber auch herbe Verluste bescheren können.

Im Zuge der Arbeit wird das eigentliche Kernthema Managed Futures behandelt. Für eine optimale Diversifizierung des eigenen Portfolios ist es von Wichtigkeit, möglichst unkorrelierte Anlageklassen mit einzubeziehen, um bei einer erwarteten Rendite einem möglichst geringen Risiko ausgesetzt zu sein. Daher eröffnet sich die Frage, ob Managed Futures überhaupt eine eigene Anlageklasse darstellen, was im Zuge der Arbeit eingehend analysiert wird. Zur Findung eines optimalen, zum Portfolio passenden, Managed Futures ist es notwendig, diesen einer gründlichen, sowohl quantitativen als auch qualitativen Analyse zu unterwerfen. Zwar existieren Reporte, Beschreibungen über Strategien, historische Handelserfolge und Statistiken, doch sind diese stets mit einem kritischem Auge zu betrachten, da erzielte Renditen einerseits „geschönt“ dargestellt werden können und Handelserfolge andererseits auf rein fiktiven Handelsperioden basieren können, diese aber nicht unbedingt echten „Exposures“ zugrunde liegen müssen. Hier verweist der Autor auf die zu beachtenden Aspekte und beleuchtet die in der Branche weit verbreitet angewandten risikoadjustierten Schlüsselindikatoren für einen objektiven Vergleich zu anderen Anlageklassen für eine bessere Entscheidungsfindung.

Managed Futures werden auch als Trendfolger beschrieben und wie bei Hedge Funds werden auch hier unterschiedliche Strategien und Techniken angewandt, um Renditen zu maximieren. Dabei beschreibt der Autor die Unterschiede zwischen Aktiv- und

Passivstrategien und geht weiters auf die einzelnen Methoden innerhalb der individuellen Strategien ein.

Empirische Studien zeigen, dass eine Beimischung von Managed Futures das Portfolio des Investors erheblich verbessern kann und mit Hereinnahme einiger, von einander unabhängiger akademischer Quellen, wird diese Behauptung sachlich anhand von Tabellen und „Hard Facts“ untermauert.

Ronald Dirl

Akademischer Werdegang Ronald Dirl

Motivation zu Studieren:	Bildungszuwachs, Interesse am Kapitalmarkt
Studienrichtung:	Internationale Betriebswirtschaft (157)
Studienbeginn:	Wintersemester 2005/2006
Kernfachvertiefungen:	Banking (Prof. Zechner) Investementanalyse (Prof. Dockner)
Thema Diplomarbeit:	Managed Futures
Betreuer:	Prof. Engelbert Dockner
Abschluss:	März, 2009

Über mich:

Nach einem 9 jährigen Auslandsaufenthalt mit Hilton International, Großbritannien, gleich nach meiner ursprünglichen Ausbildung als Touristikkaufmann in der Hotelfachschule Bad Hofgastein, wechselte ich die Branche und arbeitete 2 Jahre als Großhandelsleiter bei Harley Davidson in Wien.

Die Arbeit war interessant und abwechslungsreich, doch war ich stets von dem Gedanken getrieben, eines Tages doch noch ein Studium zu absolvieren. Den endgültigen Entschluss dafür fasste ich im Sommer 2005. Von Anfang an war es für mich klar, dass die Finanzwirtschaft das Kernthema meines Studiums darstellen sollte und so habe ich mich für die KFKs Banking und Investmentanalyse entschieden.

Nach 7 Semestern stetigen Lernens und einem von Entbehrungen getragenen Sommer 2008, aus Gründen der zu schreibenden Diplomarbeit, ist das Studium nun beendet.

Dank dieses Studiums habe ich die Gelegenheit bekommen, ab Mai 2009 bei der Erste Group in der Abteilung Group Capital Markets zu arbeiten, was nicht zuletzt, bedingt durch die exzellente Betreuung, auch auf Prof. Engelbert Dockner zurückzuführen ist, wofür ich mich bei ihm herzlich bedanken möchte.

Ronald Dirl