

# AlphaTrader207

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## Disclaimer

THE RISK OF LOSS IN TRADING COMMODITIES CAN BE SUBSTANTIAL. YOU SHOULD THEREFORE CAREFULLY CONSIDER WHETHER SUCH TRADING IS SUITABLE FOR YOU IN LIGHT OF YOUR FINANCIAL CONDITION. IN CONSIDERING WHETHER TO TRADE OR TO AUTHORIZE SOMEONE ELSE TO TRADE FOR YOU, YOU SHOULD BE AWARE OF THE FOLLOWING.

IF YOU PURCHASE OR SELL A COMMODITY FUTURE OR SELL A COMMODITY OPTION, YOU MAY SUSTAIN A TOTAL LOSS OF THE INITIAL MARGIN FUNDS AND ANY ADDITIONAL FUNDS THAT YOU DEPOSIT WITH YOUR BROKER TO ESTABLISH OR MAINTAIN YOUR POSITION. IF THE MARKET MOVES AGAINST YOUR POSITION, YOU MAY BE CALLED UPON BY YOUR BROKER TO DEPOSIT A SUBSTANTIAL AMOUNT OF ADDITIONAL MARGIN FUNDS, ON SHORT NOTICE, IN ORDER TO MAINTAIN YOUR POSITION. IF YOU DO NOT PROVIDE THE REQUESTED FUNDS WITHIN THE PRESCRIBED TIME, YOUR POSITION MAY BE LIQUIDATED AT A LOSS, AND YOU WILL BE LIABLE FOR ANY RESULTING DEFICIT IN YOUR ACCOUNT.

UNDER CERTAIN MARKET CONDITIONS, YOU MAY FIND IT DIFFICULT OR IMPOSSIBLE TO LIQUIDATE A POSITION. THIS CAN OCCUR, FOR EXAMPLE, WHEN THE MARKET MAKES A "LIMIT MOVE."

THE PLACEMENT OF CONTINGENT ORDERS BY YOU OR YOUR TRADING ADVISOR, SUCH AS A "STOP-LOSS" OR "STOP-LIMIT" ORDER, WILL NOT NECESSARILY LIMIT YOUR LOSSES TO THE INTENDED AMOUNTS, SINCE MARKET CONDITIONS MAY MAKE IT IMPOSSIBLE TO EXECUTE SUCH ORDERS.

A "SPREAD" POSITION MAY NOT BE LESS RISKY THAN A SIMPLE "LONG" OR "SHORT" POSITION.

THE HIGH DEGREE OF LEVERAGE THAT IS OFTEN OBTAINABLE IN COMMODITY TRADING CAN WORK AGAINST

YOU AS WELL AS FOR YOU. THE USE OF LEVERAGE CAN LEAD TO LARGE LOSSES AS WELL AS GAINS.

IN SOME CASES, MANAGED COMMODITY ACCOUNTS ARE SUBJECT TO SUBSTANTIAL CHARGES FOR MANAGEMENT AND ADVISORY FEES. IT MAY BE NECESSARY FOR THOSE ACCOUNTS THAT ARE SUBJECT TO THESE CHARGES TO MAKE SUBSTANTIAL TRADING PROFITS TO AVOID DEPLETION OR EXHAUSTION OF THEIR ASSETS.

THERE IS A CONSIDERABLE POSSIBILITIES OF HUGE LOSSES AS WELL AS PROFITS IN TRADING COMMODITY FUTURES CONTRACTS.

PAST PERFORMANCE IS NOT NECESSARILY INDICATIVE OF FUTURE RESULTS.

No decision to invest should be made unless a full understanding of the risk involved is at hand. BEFORE MAKING A DECISION TO INVEST, READ THIS ENTIRE DOCUMENT CAREFULLY AND CONSIDER THE RISK INVOLVED. Investors are encouraged to discuss the investment with a financial and tax adviser.

HYPOTHETICAL PERFORMANCE RESULTS HAVE MANY INHERENT LIMITATIONS, SOME OF WHICH ARE DESCRIBED BELOW. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THOSE SHOWN. IN FACT, THERE ARE FREQUENTLY SHARP DIFFERENCES BETWEEN HYPOTHETICAL PERFORMANCE RESULTS AND THE ACTUAL RESULTS ACHIEVED BY ANY PARTICULAR TRADING PROGRAM.

ONE OF THE LIMITATIONS OF HYPOTHETICAL PERFORMANCE RESULTS IS THAT THEY ARE GENERALLY PREPARED WITH THE BENEFIT OF HINDSIGHT. IN ADDITION, HYPOTHETICAL TRADING DOES NOT INVOLVE FINANCIAL RISK, AND NO HYPOTHETICAL TRADING RECORD CAN COMPLETELY ACCOUNT FOR THE IMPACT OF FINANCIAL RISK IN ACTUAL TRADING. FOR EXAMPLE, THE ABILITY TO WITHSTAND LOSSES OR TO ADHERE TO A PARTICULAR TRADING PROGRAM IN SPITE OF TRADING LOSSES ARE MATERIAL POINTS WHICH CAN ALSO ADVERSELY AFFECT ACTUAL TRADING RESULTS. THERE ARE NUMEROUS OTHER FACTORS RELATED TO THE MARKETS IN GENERAL OR TO THE IMPLEMENTATION OF ANY SPECIFIC TRADING PROGRAM WHICH CANNOT BE FULLY ACCOUNTED FOR IN THE PREPARATION OF HYPOTHETICAL PERFORMANCE RESULTS AND ALL OF WHICH CAN ADVERSELY AFFECT ACTUAL TRADING RESULTS.

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## The System

AlphaTrader207 is a complete trading system that uses exponential Moving Average (MA) to enter trades in futures markets. The system is to cover every aspect of the trading, decreasing the change that the trades will be subject to the psychological aspect of the trader. The system has been tested on certain futures markets, but it is the believe of the designer, that the system could be used when trading all traditional trending markets. This system is not considered for use in markets that tend to be volatile or prone to large seasonal swings.

It has been said that most successful traders use trading systems in their trading. This should not come as a surprise, as the biggest drawdown of any trader seems to be his own emotional rollercoaster. A trading system that is followed to the fullest, lowers the possibilities of the traders emotional status interfering in the process.

Contrary to the believe, that the markets are populated with highly professional individuals that make all decisions based on rational evaluation of the markets and items being traded, the market is a emotional rollercoaster where feelings related to greed and fear dominate the decision process.

It is generally believed that a complete trading system has to include rules regarding what to buy or sell, how much asset should be allocated to the trade, when to enter into the trade, when to cut the losses in a losing trade and when to exit a winning position

## Markets

The system is designed to trade markets that tend to trend well and have reasonable volatility and are liquid. THIS SYSTEM IS NOT INTENDED TO BE USED ON MARKETS WITH HIGH VOLATILITY OR LOW LIQUIDITY. This system has been tested using market data from the 1. of January 1996 until 9. of May 2007. The data was supplied from a third party and no verification to its accuracy was made, but we believe the supplier of the data to be respectable and believe the data to be correct. Any error in the data is to be considered unintentional. The following markets were traded:

Symbol	Name	Market
SP	Index-S&P 500-CME(Floor Trading Only)	CME
HG	CopperHG-COMEX(Floor Trading Only)	COMEX
US	T-Bond-U.S.-CBT(Floor+Electronic Combined)	CBT
PA	Palladium-NYMEX (Floor Trading Only)	NYMEX
HU	Petroleum-Gasoline Unleaded-NYMEX(Floor Trading Only)	NYMEX
ND	Index-Nasdaq 100(Floor Trading Only)-CME	CME
CD	FX-Canadian Dollar-CME(Floor+Electronic Combined)	CME
GC	Gold-COMEX(Floor Trading Only)	COMEX
CL	Petroleum-Crude Oil Light-NYMEX(Floor Trading Only)	NYMEX
EC	FX-Euro(Floor+Electronic Combined)-CME	CME
TY	T-Note-U.S. 10 Yr w/Prj A-CBT(Floor+Electronic Combined)X	CBT
JY	FX-Japanese Yen-CME(Floor+Electronic Combined)	CME
PL	Platinum-NYMEX (Floor Trading Only)	NYMEX
AD	FX-Australian Dollar-CME(Floor+Electronic Combined)	CME
DX	Index-U.S. Dollar-FINEX	FINEX
MP	FX-Mexican Peso(Floor+Electronic Combined)-CME	CME
NG	Gas-Natural Henry Hub-NYMEX(Floor Trading Only)	NYMEX
HO	Petroleum-Heating Oil #2-NYMEX(Floor Trading Only)	NYMEX
ED	Eurodollar-3 Mth-CME-Globex(Floor+Electronic Combined)	CME
SF	FX-Swiss Franc-CME-(Floor+Electronic Combined)	CME
SI	Silver-COMEX(Floor Trading Only)	COMEX
EM	Intrbnk Offer Rate-LIBOR(1Mth)-CME(Floor+Electronic Combined)	CME
BP	FX-British Pound-CME(Floor+Electronic Combined)	CME

Agricultural markets were not traded due to high volatility associated with those markets. Some traditional commodity futures markets can be highly volatile due to seasonal or other external reasons. That does not mean that there are no trending markets within the agricultural commodities. Some of these markets can have long and favourable trends, and could therefore be traded. It has to be emphasized that the system has been tested on the above mentioned markets and that should be kept in mind when implementing the system. But even though these

are the markets on which the system was tested, there is nothing that objects to other markets being used to trade. Only that these markets were tested and the results of those markets only are used in the reference material regarding the system. We do not know how or if other markets perform well with this system and can therefore not recommend trading those markets.

## Position Sizing

Position sizing is probably the most neglected factor in all trading. But still it's probably the most important one. Omitting position sizing from the trading equation can spell the doom of any trader. Position sizing is in essence the art of staying in the game. When someone loses money and wants to get it back, he's got to look at the rate of return. Let's look at someone losing 5% of his asset. This person has to profit around 5,26% to get back to even. Now look at someone who loses 50% of his capital. This person has to profit 100% to get back to even. There are not many investment opportunities around that can give 100% profit in a short time. One thing is certain, as difficult it is to profit 100%, it's not at all difficult to lose 50%. The following table shows how much profit is needed to offset a losing trade.

% loss	5	10	15	20	25	30	35	40	45	50
% gain	5.26	11.11	17.65	25.00	33.33	42.86	53.85	66.67	81.82	100.00
% loss	55	60	65	70	75	80	85	90	95	100
% gain	122.22	150.00	185.71	233.33	300.00	400.00	566.67	900.00	1900.00	you're out

As you can see, it's important to limit the losses to be able to stay in the game. This point can never be emphasized too often and shows the importance of position sizing.

The AlphaTrader207 uses average true range (ATR) to calculate the position of each trade. By using the ATR to calculate positions it normalizes the dollar volatility of a position by adjusting the position size in reference to the dollar volatility of the market. The position will therefore tend to move up or down in any given day, about the same amount in dollar terms, in comparison to other markets, irrespective of the volatility of the particular markets. The ATR sees to it that positions in markets where the prices moved large amount up and down, will have a smaller number of contracts than positions in markets where the price movements are not as large.

### Calculating the ATR

The ATR used by the AlphaTrader207 is a 25 day exponential moving average of the true range. The ATR is the average range in price movement that a particular market makes in a single day, measured in the same points as the underlying contract. The formula requires a previous day's ATR so it's necessary to start with a 25 day simple average of the true range. The method to calculate the ATR is as follows.

First it's necessary to find the daily true range (TR)

$$TR = \text{Maximum}(H - L, H - PDC, PDC - L)$$

H – Current High; L – Current Low; PDC – Previous Day's Close

The ATR is found by using the following formula

$$ATR = \frac{(24 \times PDATR + TR)}{25}$$

PDATR – Previous Day's Average True Range

To determine the position size, it's necessary to determine the underlying markets dollar volatility based on the markets price volatility. The dollar volatility (DV) is calculated using the following formula:

$$DV = ATR \times DpP$$

DpP – Dollars per Point

The position can therefore be calculated into units, where the position's unit is found by using the following formula:

$$Unit = \frac{Rf}{DV}$$

Rf – Risk factor (1% of Account)

In case of fractional numbers, the value of the unit is truncated to an even number. For example a unit of 12.24 will be truncated to an even 12. The reason for the truncation is that it's not possible to trade fractional contracts.

The calculating of ATR as a risk control mechanism puts a limit on the minimum amount of capital needed to trade the system. An asset base of USD 1,000,000 amounts to USD 10,000 after the calculation of 1%. This would amount to 10 contracts in a Unit with USD 1,000 Stop Loss. An account of USD 100,000 on the other hand would amount to 1.000 or 1 contract. Anything less would amount to 0 contracts and thus make the system none tradable. For the risk allocation to work, there is a minimum capital needed. We would not recommend this system to be traded with less than USD 100,000 and believe an amount of USD 500,000 to be the preferred minimum. In essence, the closer to USD 1,000,000 the asset, the better.

## Entry Signals

When discussing trading systems, most people will say that the entry is the most important part of the system. The compulsion of people to buy at the lowest price and sell at the highest, is one of the reason for this kind of thinking. People will think that entering to late is going to cut of potential profit and therefore decrease the quality of the system. The thing people must have in mind is that buying at the lowest price and selling at the highest is more close to prophecy than trading. We believe that it's impossible to know the exact price a commodity or stock will hit at a given time. It's possible to guess the price and the quality of that guess is more close to luck than trading insight.

This is why the position sizing is the most important part of the system, one can not always be right with the entry. And at the same time it's the reason that the entry is not the most important aspect of the trading system. When it comes to trend following systems, the indication of a trend in progress, is the way to implement an entry strategy.

The systems entry signals are quite simple and straight forward. They are based on exponential moving averages (MA) and the closing price. The first thing that has to be done to calculate the exponential MA, is to calculate the exponent (Ex). The calculation is done by taking the number 2 and divide it with the days (D) plus one.

$$Ex = \frac{2}{(D + 1)}$$

For the calculation of the MA the last day exponential MA (LEMA) is needed. In case it's the first day in the calculation, a simple MA is used for the first day. The second number needed is the day's closing price (CP). The following formula is used for the final calculation of the exponential MA.

$$ExponentialMA = (CP \times Ex) + (LEMA \times (1 - Ex))$$

### Long Entry

A long entry is set when the day's closing price is above the 100 day's MA, and the 100 day's MA is above the 150 day's moving average. The trade is entered on the market open the next day and 1 unit is traded.

### Short Entry

A short entry is opposite to the long entry in as much as the entry is made when the day's closing price is below the 100 day's MA and the 100 day's MA is below the 150 day's MA. The trade is entered on the market open the next day and 1 unit is traded.

## **Protective Stops**

As mentioned before, position sizing is the most important factor in any trading system. Protective stops are part of that position sizing and as such can be considered the second most important aspect of the trading system. It's critical for any trader to get out of a losing position. This is specially important when trading highly leveraged futures markets. The problem with most traders is the psychological effect of losing money. Nobody wants to lose money, but when trading, that is a given fact. At one point or another a trader will lose money. This is not to say that the trader is a bad trader, just that the entry signals were not strong enough. It's quite common for traders to hold on to losing positions in the hope of the price movement turning around. By cutting the losses the trader accepts that his evaluation of the market was wrong and he realises that by cutting the loss and taking part of it on him self, he's in a way making it possible to continue with his trading.

To be able to exit a losing position, a trader has to decide where he will exit a losing position before he makes the trade. In theory the trader has to look at a possible trade and ask him self what he's willing to lose on that trade, not ask the opposite question so many ask them self; what is the profitability of this trade. Focusing on the drawdown is something that many traders find uncomfortable, as it's so closely related to the fact that they're losing money on the trade.

This system uses a stop of 1 ATR or 1% of the asset. So if ATR is 1.40 and the entry price is USD 25.10 a Stop Order for a long trade would be put at USD 23.70. For a short trade it would be the opposite, or USD 26.50 for the trade. The Stop Order is to be kept during the duration of the trade and not lifted until at the end of the trade.

Stops based on ATR give a better result as they tend to be more in line with the overall volatility of the market.

Even though placing Stop Orders reduce the risk involved in trading, they're not a guaranty for a fill at that price. UNDER CERTAIN MARKET CONDITIONS, YOU MAY FIND IT DIFFICULT OR IMPOSSIBLE TO LIQUIDATE A POSITION. THIS CAN OCCUR, FOR EXAMPLE, WHEN THE MARKET MAKES A "LIMIT MOVE".

THE PLACEMENT OF CONTINGENT ORDERS BY YOU OR YOUR TRADING ADVISOR, SUCH AS A "STOP-LOSS" OR "STOP-LIMIT" ORDER, WILL NOT NECESSARILY LIMIT YOUR LOSSES TO THE INTENDED AMOUNTS, SINCE MARKET CONDITIONS MAY MAKE IT IMPOSSIBLE TO EXECUTE SUCH ORDERS.

## **Exit Signals**

“Taking profit” or “locking in a profit” can be a good thing in a short term trading environment, but when it comes to trend following, this is not necessary the case. When a market makes a long trending move, it does so in a fluctuating way. There can be spikes and bottoms during the trend, swings that can play havoc with the trader’s psychological state of mind. It can be difficult for any trader to see open profit go to 80% and then drop down 60% leaving a profit of 20% on the table. But when trading a trend, this can be necessary for the system to work. There are swings in trend following, swings that can hurt as well as heal the trader. But a trader that begins to “lock in profits” has begun to make changes to his system and thus changing the mechanism. An entry signal does not guaranty a trend and as such can end with a loss, even after a considerable profit has materialised during the trade.

It’s not uncommon for short term swings to emerge when trading in a trend following manner, But for the system to be able to stay in long trends, it has to be able to go through difficult times. Taking losses can be difficult, but has to be sustained to be able to hold on to long trends.

An exit strategy is an important part of any trading system. Protective stops are set for asset protection and loss limitation. But exiting profitable trades are based on different sets of rules. There are various ways to exit trades, apart from placing Stop Orders. The AlphaTrader207 uses exponential MA to signal exits.

### **Exiting Long Positions**

A long position is exited when the current day low exceeds the 150 day’s MA and the 100 day’s MA is below the 150 day’s MA. The trade is entered on the market open the next day and all positions are exited.

### **Exiting Short Positions**

A short position is exited when the current day high exceeds the 150 day’s MA and the 100 day’s MA is above the 150 day’s MA. The trade is entered on the market open the next day and all positions are exited.

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## System Testing

PAST PERFORMANCE IS NOT NECESSARILY INDICATIVE OF FUTURE RESULTS.

HYPOTHETICAL PERFORMANCE RESULTS HAVE MANY INHERENT LIMITATIONS, SOME OF WHICH ARE DESCRIBED BELOW. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THOSE SHOWN. IN FACT, THERE ARE FREQUENTLY SHARP DIFFERENCES BETWEEN HYPOTHETICAL PERFORMANCE RESULTS AND THE ACTUAL RESULTS ACHIEVED BY ANY PARTICULAR TRADING PROGRAM.

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The system has been tested using historical market price data. The starting of the test was 1<sup>st</sup> of January 1996 and it ended on the 9<sup>th</sup> of May 2007. No allocation was made for roll-overs of contracts. Summarized result of the trades are as follows.

The account's starting balance was USD 1,000,000 and the account was set to bear interest of 3% annually. It's not uncommon for large accounts to be held in a interest bearing account. Commission per contract was set at USD 12.5 and a slippage percent of 5% was used to account for

possible slippage in trades. During the simulation, the total wins amounted to USD 846,713,931.15 and total loss amounted to USD 702,810,535.52 or total profit of trades USD 143,903,395.63. Interest earned on account value was USD 23,222,112.27 giving a total profit of USD 167,125,507.90 or ending asset of USD 168,125,507.90 at the end of the test period. A detail of the test results can be seen in the following table showing the trading performance of the system.

#### Trading Performance

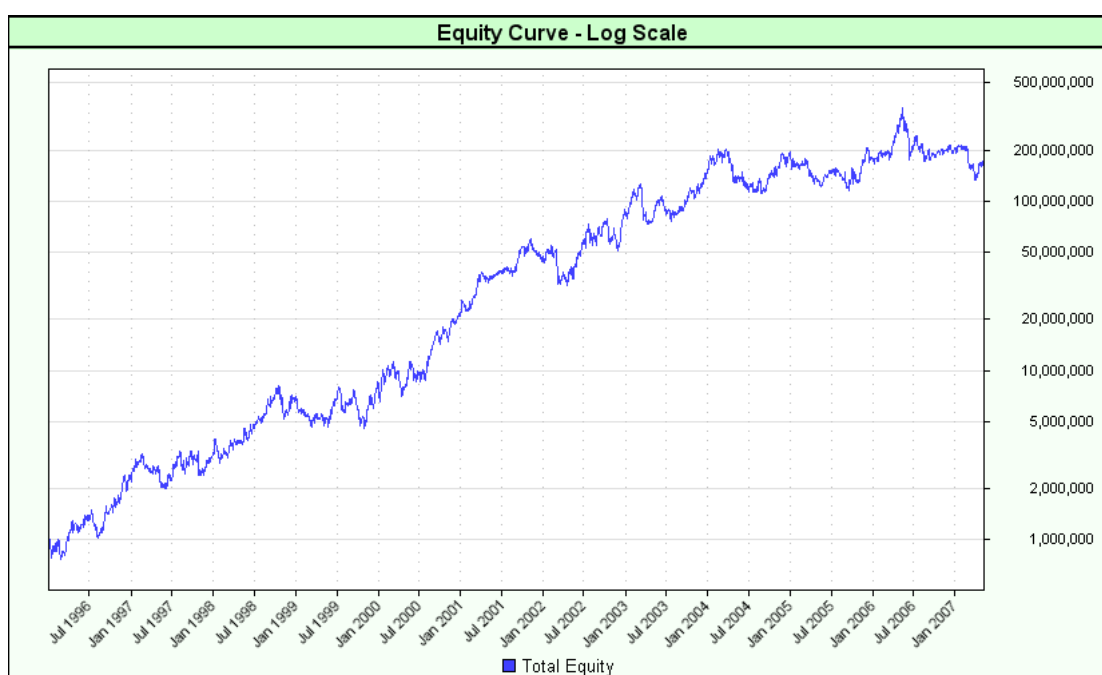
RAR %	68.23%
R-Cubed	1.86
Average Max Drawdown %	48.40%
Average Max Drawdown Length	9.11
Robust Sharpe Ratio	1.16
CAGR %	57.18%
Maximum Total Equity Drawdown %	62.83%
MAR Ratio	0.91
Margin to Equity Ratio	48.34%
Daily Return %	0.2386%
Daily Geometric Return %	0.1731%
Daily Standard Deviation %	3.61%
Daily Downside Deviation %	2.51%
Daily Sharpe %	0.06
Daily Sortino %	0.09
Modified Sharpe Ratio	1.05
Annual Sharpe Ratio	0.94
Annual Sortino Ratio	+ ∞
Monthly Sharpe Ratio	0.29
Monthly Sortino Ratio	0.62
Calmar Ratio	1.08
R-Squared	0.951
Longest Total Equity Drawdown (months)	20.32
Maximum Monthly Total Equity Drawdown %	53.02%
Maximum Monthly Closed Equity Drawdown %	100.00%
Maximum Closed Equity Drawdown %	100.00%
Average Closed Equity Drawdown %	35.11%
Round Turns Per Million	2,512
Round Turns	1,404,567
Total Trades	1,535
Start Account Balance	1,000,000.00
Total Win Dollars	846,713,931.15
Total Loss Dollars	702,810,535.52
Total Profit	143,903,395.63
Earned Interest	23,222,112.27
Margin Interest	0.00
End Account Balance	168,125,507.90
End Open Equity	0.00
End Total Equity	168,125,507.90
Highest Total Equity	356,533,111.47

Highest Closed Equity	171,129,425.49
Total Commissions	17,557,087.50
Commission per Round Turn	12.50
Total Slippage	51,702,231.35
Slippage per Round Turn	36.81

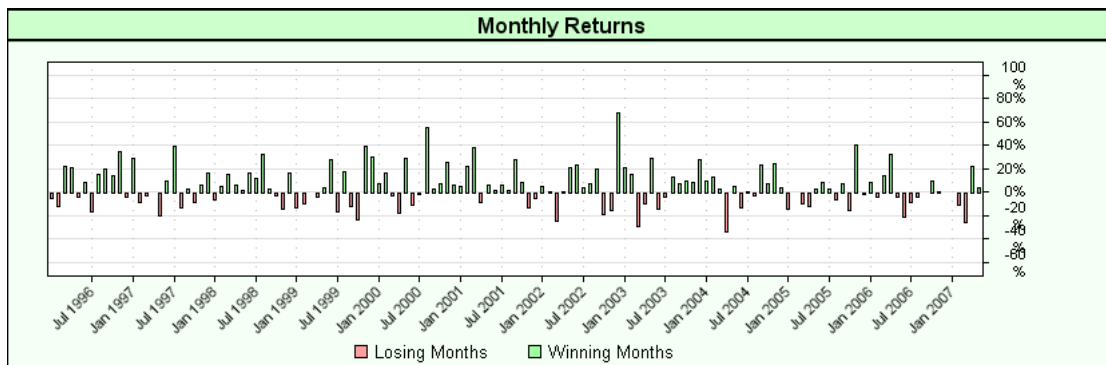
A yearly performance summary shows the trading results by year. This shows that according to the test, the years 2005 and 2007 were the only years which ended in a loss. The year 2005 with a drawdown of 8.5% and the year 2007 with a drawdown of 17.2%. It has to be taken into consideration that the year 2007 ended trading on the 9<sup>th</sup> of May, and can therefore not be considered as a one year result, as it only trades the first five months of the year.

### Yearly Performance Summary

Year	Days	Closed Balance	End Total Equity	Total Equity Gain	Gain %	# Trades
1996	366	-66,680.55	2,216,730.60	1,216,730.60	121.7%	147
1997	365	193,734.85	3,197,309.10	980,578.50	44.2%	145
1998	365	-102,418.55	6,767,908.77	3,570,599.67	111.7%	94
1999	365	-2,320,747.07	8,216,886.98	1,448,978.20	21.4%	158
2000	366	4,602,556.95	21,519,662.00	13,302,775.02	161.9%	102
2001	365	-5,431,930.06	47,194,642.99	25,674,980.99	119.3%	131
2002	365	6,118,626.72	86,800,943.72	39,606,300.73	83.9%	137
2003	365	32,523,057.21	152,506,941.61	65,705,997.89	75.7%	100
2004	366	69,065,619.75	195,034,717.25	42,527,775.64	27.9%	138
2005	365	13,529,542.85	178,403,982.85	-16,630,734.39	-8.5%	143
2006	365	85,392,549.31	203,067,001.51	24,663,018.66	13.8%	159
2007	129	168,103,301.29	168,103,301.29	-34,963,700.22	-17.2%	81



Monthly returns can be seen on a monthly return graph showing the rate of return per month, green being a positive result and red being a month of loss.



Standard win/loss statistics can be seen in the following table, but as can be seen a 19.5/80.5 ratio show how the majority of the profit comes from few good trades. Missing these trades can be the breaking of the system.

#### Win/Loss Statistics

Wins	299	19.5%
Losses	1236	80.5%
Total	1535	100.0%
Winning Months	82	59.9%
Losing Months	55	40.1%
Total	137	100.0%
Average Risk Percent		0.94%
Average Win Percent		6.48%
Average Loss Percent		0.92%
Average Win Dollars	2,831,819.17	
Average Loss Dollars	568,616.94	
Average Trade Percent		0.52%
Average Trade Dollars	93,748.14	
Profit Factor		1.20
Percent Profit Factor		1.70
Expectation		0.55

The statistics show good results for the system and as such indicate that this system is a system that gives positive results. But to calculate the probabilities of the system, another set of calculations has to be made. To be able to see the futures probability of the system. We will be using a methodology called Monte Carlo Simulation. This simulation uses an algorithm to calculate the percentage probability of the system.

## **Monte Carlo Simulation**

Financial statistical analysis are subject to a fair amount of uncertainty and risk involved with estimating the future value of figures or amounts due to the wide variety of potential outcomes. Monte Carlo Simulation is one technique that helps to reduce the uncertainty involved in estimating future outcomes. Monte Carlo Simulations can be applied to complex, non-linear models or used to evaluate the accuracy and performance of other models. It can also be implemented in risk management, portfolio management, pricing derivatives, strategic planning, project planning, cost modelling and other fields.

Monte Carlo Simulation is a mathematical method that uses algorithm to calculate the probabilities of a given system. In it's analysis, the random variables of a model are represented by statistical distributions, which are randomly sampled to produce the model's output. The output is therefore also a statistical distribution.

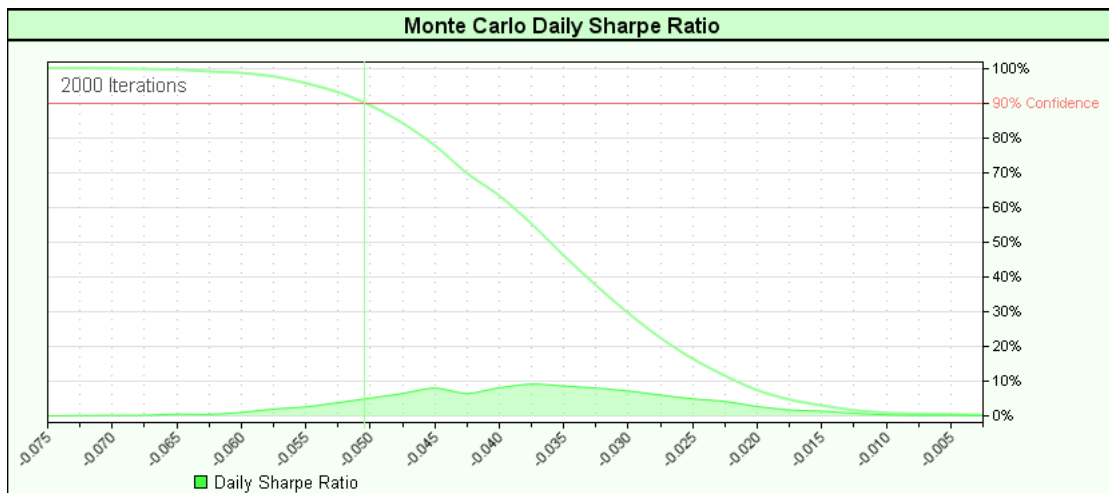
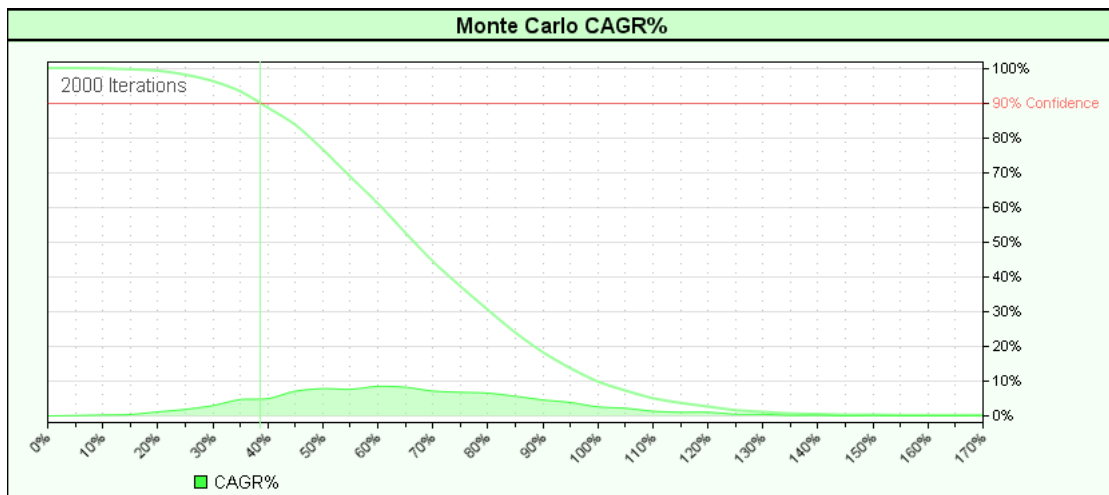
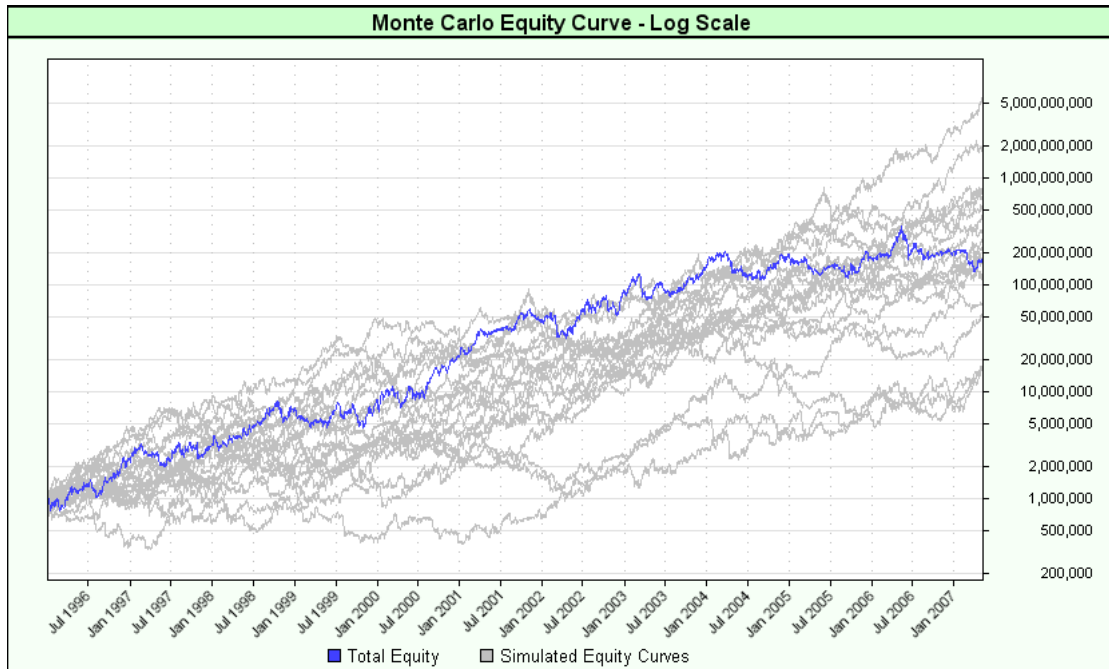
Monte Carlo Simulations are useful for modeling phenomena with significant uncertainty in inputs, such as the calculation of risk in investments. A classic use is for the evaluation of definite integrals, particularly multidimensional integrals with complicated boundary conditions. In general, Monte Carlo methods are used in mathematics to solve various problems by generating suitable random numbers and observing that fraction of the numbers obeying some property or properties. The method is useful for obtaining numerical solutions to problems which are too complicated to solve analytically.

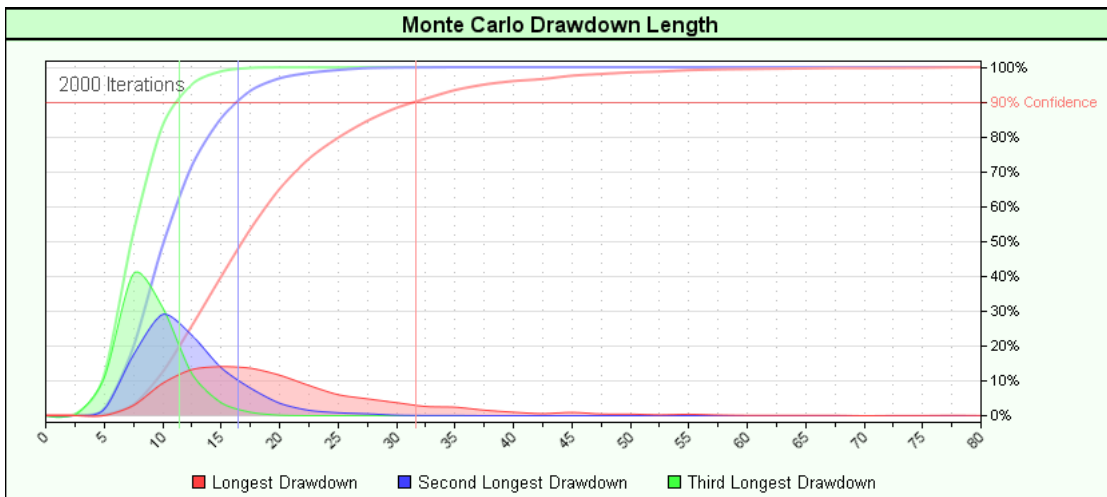
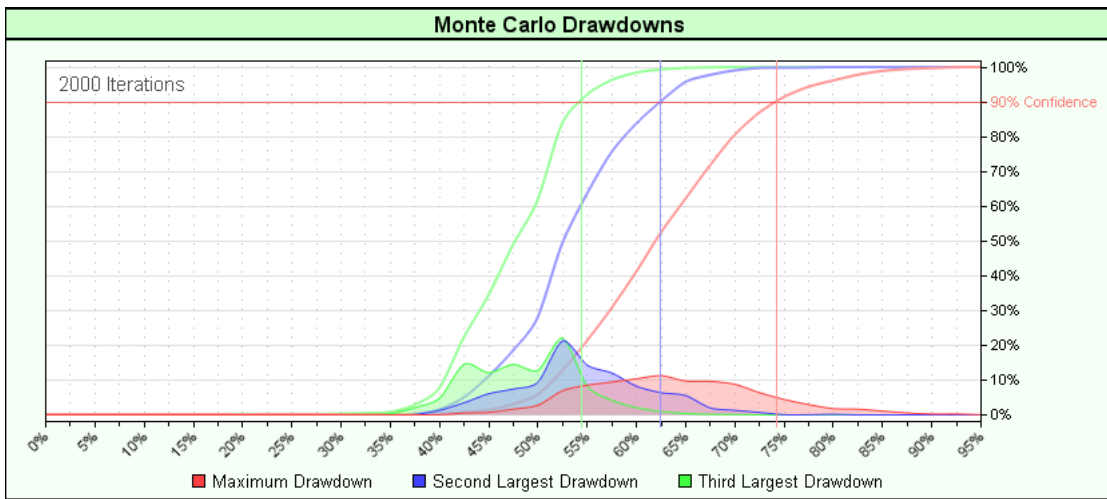
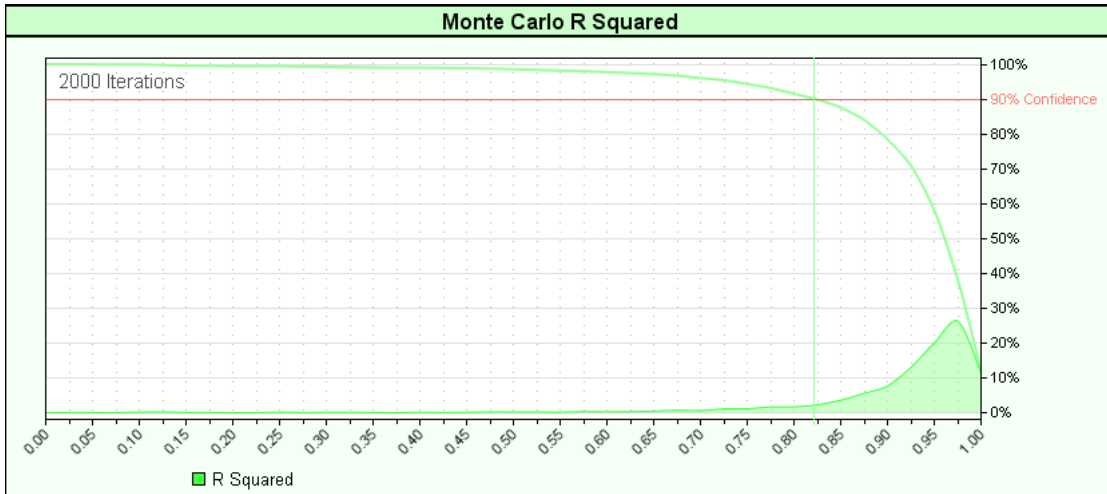
A special care has to be taken in reference to defining the uncertainty of an input value by a probability distribution that does not correspond to the real one and sampling from it will give incorrect results. In addition, the assumption that the input variables are independent might not be valid. Misleading results might come from inputs that are mutually exclusive or if significant correlation is found between two or more input distributions. Also note that the number of trials should not be too small, as it might not be sufficient to simulate the model, causing clustering of values to occur.

### **Monte Carlo Confidence Level Statistics**

90% Return	33.78%
90% Sharpe	-0.05
90% MAR	0.48
90% R Squared	0.798
90% Maximum Drawdown	74.08%
90% Second Largest Drawdown	62.42%
90% Third Largest Drawdown	54.18%
90% Longest Drawdown	31.4
90% Second Longest Drawdown	16.4
90% Third Longest Drawdown	11.1

A graphical presentation of the Monte Carlo Simulation can be seen in the following graphs.





Even though the Monte Carlo Simulation gives a better and more probable result than traditional statistical method and presentation, it must be noted that past results are not indicative of future profits.

# 4

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## **Risk involved**

THERE IS CONSIDERABLE RISK INVOLVED IN TRADING COMMODITIES FUTURES AND ALL INVESTMENT CAN BE LOST.

### ***Market risk***

All investments incur a certain amount of risk. Commodity futures markets can be highly volatile and subject to occasional rapid and substantial price changes. In such an environment all or substantially all of the investment can be lost.

Commodity futures trading is based on margin and therefore highly leveraged. As such a small movement in the market will have a multiplied effect on the asset. Such movements can work for, as well against the investor.

Due to the different volume of each market, some markets should be considered illiquid and as such, can cause huge losses. Markets can stay with low volumes for a long time, making it difficult to exit open positions.

### ***Trading risk***

A technical trading system is used to analyse the market and make trading decisions and is as such subject to the current market behaviour. The profitability of the system, is among other things, related to the occurrence of significant price trends. If no such price trends come into being, the profitability of the system can not be guaranteed and as such, there is no way of guarantying any precise profit or general profitability.

Market regulatory institutions, such as the CFTC, can establish limits on the maximum net long or short positions which any person can hold or control in certain futures contracts. Exchanges may also set similar limits. All such limitations can limit the amount invested and as such decrease the profitability of the investment.

The asset can also incur limitations on the amount invested. With larger asset, each percentage of the capital will increase and therefore become larger in dollar value. Increased amount to be invested can pose a problem in markets where volume is low and full amount invested represents a major part of investments in the market.