

(MR+ Hedge Fund Project)



“MR+” Hedge Fund project

Important: this presentation is destined to professional seeders only

Summary:

- “CTA” or “Managed Futures” style, based on a quantitative model
- trading signals generated by crossing of 2 moving regressions (hence, “MR”), filtered by a proprietary device, based on volatility, and with an efficient set of trade closing rules (hence, “MR+”)
- medium/long term strategy: average duration of opened positions: 6 months
- to be applied to a blend of 12 major futures contracts, i.e., 50% stock indexes, 25% currencies and 25% commodities
- backtested performance (rigorous simulation) since 01/01/2000 allows for a *net* (after fees) performance objective of
 - return: 9 – 10 % p.a.
 - volatility of monthly returns: 12 – 14 % p.a.
 - Sharpe ratio: 0.75 – 0.80 (risk-free rate of 0 %)

(based on an actual leverage of 1)

- HF structure:
 - either, as a compartment to be opened in an existing HF or Fund of HFs,
 - or, as a SIF to be launched in Luxembourg, with all necessary off-sites (fund administration, risk management, audit, compliance, etc).

Trading simulation using moving regressions

The purpose of this note is to present the *trading simulation* of a quantitative trading model using moving regressions for the generation of trading signals. The trading model uses crosses between 2 moving regressions (“MR” hereafter), as well as a proprietary filter, to generate buy and sell orders. This quantitative trading model generates few trades per year, with an average lifetime of about 6 months.

This trading should apply to a set of very liquid *futures contracts*. It has been carefully back-tested from January 2000, and will continue to be tested until its actual implementation through a (hedge) fund. The back-testing has been applied first on an equally weighted set of 6 instruments, namely Stoxx, Dax, Nasdaq, FTSE, Gold and Eurodollar futures, then – from January 2010 – on an equally weighted set of 12 instruments, by adding the SP500, Brent, GBP/USD, USD/JPY, CRB and KOSPI futures. So that it currently applies to a blend of 50% stock indexes, 25% currencies and 25% commodities futures contracts.

This performance can be achieved on a $\times 2$ leverage (called “gross” leverage in the following pages) of the AUM amount. However, since the model generates a small number of trades (cf. details in the next pages), one can consider that, in average, about half of AUM is actually engaged in trades. One can therefore view the average as $\times 2$ on $AUM/2$, that is, an actual (let us call it “net”) average of $\times 1$ on the AUM.

The resulting simulated *gross* (before management & performance fees), yearly performance is, in % p.a.:

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
10.78	17.60	25.53	12.61	1.45	9.77	9.07	10.72	27.76	47.85	6.86	10.52	- 7.75

In summary, over these 12 years:

- average yearly return: 15.88 % p.a.
- average monthly return: 14.06 % p.a.
- volatility of monthly returns: 14.47 % p.a.
- average (12 years) Sharpe ratio: 0.97, using a “risk-free” rate of 0 %

Presentation of the trading features

At first, the use of moving regressions is similar to the use of moving averages. Both aim to capture medium to long term trends, and both are facing the same constraint: the longer the period used for the average or regression, the cleaner the signals, but the more lagged they occur, leading to, at least, opportunity losses. Conversely, shorter periods are too noisy, presenting too many, somewhat costly, false signals. However, moving regressions present a significant advantage towards moving averages: by construction, they are more reactive, given the trend induced by the most recent data is more influential.

The simulation, using trading rules as per the Annex, is based on the general principle of the crossing of 2 long-term moving regression lines, a shorter and a longer one. To improve the moving regression performance, a (proprietary) *filter* has been applied on the signals obtained. This filter involves a volatility measure and leads to reject a significant percentage of the signals.

The trading is simulated from January 2000 to December 2009 on an equally weighted set of 6 instruments, namely Stoxx, Dax, Nasdaq, FTSE, Gold and Eurodollar, and, from January 2010, it has been expanded to an equally weighted set of 12 instruments, by adding the SP500, Brent, GBP/USD, USD/JPY, CRB and KOSPI. In the following pages, some statistics apply from January 2000 to December 2011, i.e., on a round number of 12 years (or 144 months).

Given the small number of simultaneous trades on each of the instruments, this simulation in fact involves an actual leverage of about 0.5 of the AUM in average. For the sub-period of Jan 000 to Dec 2009, there were indeed in average about 3 instruments actually traded, on a total of 6¹.

The simulated trading has been based on open & close mid prices of daily spot data, but this fits with the trading rules that would be applied in practice (cf. Annex). Actual trading should use futures contracts (the most adequate instrument to allow for short as well as long positions).

The investment is supposed to be in EUR: currency fluctuations of Nasdaq, Gold & Eurodol (in USD) and of FTSE (in GBP) have not been adjusted here. The forex risk impact is minor since it applies on the trading profits and losses only, because traded instruments are forward products.

Results of the simulation

The back-testing on a $\times 2$ “gross” leverage leads to the following *net* (after 2% management fee and 20% performance fee) monthly returns, and, as said in the previous page, up to February 2010 on the equally weighted set of 6 instruments, then on the equally weighted set of 12 instruments:

¹ This 0.5 ratio is even lower from January 2010 to July 2012, i.e. with an average of 5 instruments traded on a total of 12.

year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ann.
2013	0.62	0.67	0.82	-0.62	1.03	-0.36	-2.05						-0.27
2012	3.78	2.99	1.30	-1.72	-6.00	-2.30	-4.10	-2.32	-0.38	-2.13	0.30	0.55	-9.58
2011	0.72	3.68	-1.28	2.22	-2.60	-0.42	2.18	4.50	-0.20	-2.02	0.38	1.10	7.65
2010	4.64	0.13	-3.84	-0.56	0.48	-0.56	-1.08	-0.12	0.32	1.34	-0.78	5.52	4.84
2009	4.70	4.08	1.21	4.48	4.56	-1.04	9.02	2.72	4.24	-6.26	9.28	1.65	37.76
2008	4.56	1.26	-2.32	-2.38	-1.00	-2.66	-2.12	-1.54	13.43	12.83	4.51	-1.82	21.67
2007	0.56	6.94	0.53	4.00	1.62	0.14	-2.04	-3.74	-0.98	3.74	-3.44	1.92	8.08
2006	5.57	0.83	3.23	3.94	-7.65	-2.77	1.28	0.48	0.88	-0.24	-1.80	1.92	4.46
2005	-2.68	2.20	-1.25	-1.91	2.10	0.36	2.03	-1.70	5.46	-3.18	4.06	2.32	6.51
2004	-0.63	-0.68	0.44	0.64	-1.72	-1.30	2.46	0.52	-0.24	-1.61	2.16	1.18	-0.08
2003	1.30	-0.98	-0.40	0.64	3.52	-0.80	0.92	2.54	-1.34	3.26	1.20	2.75	11.17
2002	-0.70	-0.80	1.59	0.64	3.76	2.60	10.54	0.80	14.42	-10.86	-1.50	-0.52	18.26
2001	-2.60	6.84	3.23	-4.66	10.72	-0.10	-0.62	0.83	8.96	-4.22	-6.30	-0.06	10.15
2000	-0.28	3.02	0.48	1.95	0.59	-6.34	2.28	-4.86	2.42	3.04	6.50	-0.30	6.5

Global *net* performance, after 13 years, i.e. up to December 2012:

- average yearly return: 9.80 % p.a.
- average monthly return: 10.97 % p.a.
- volatility of monthly returns: 12.99 % p.a.
- average (12 years) Sharpe ratio: 0.84 ("risk-free" rate of 0 %)

Alternative performance features can be obtained through other leverage levels, from less to more aggressive alternatives, such as for example, on the 13-year period of 2000 - 2012:

	Gross leverage: × 1.5	× 2	× 3	× 4
	Net leverage: × 0.75	× 1	× 1.5	× 2
Avg yearly return (% p.a.):	6.39	9.80	16.51	23.13
Avg monthly return (% p.a.):	7.74	10.97	17.43	23.89
Volatility (% p.a.):	9.78	12.99	19.42	25.85
Sharpe ratio (0% risk-free):	0.79	0.84	0.90	0.92

, but to reduce the performance volatility level, I would anyway recommend the gross ×2, net ×1 leverage (even if the high liquidity level of the futures traded would certainly allow for a higher leverage).

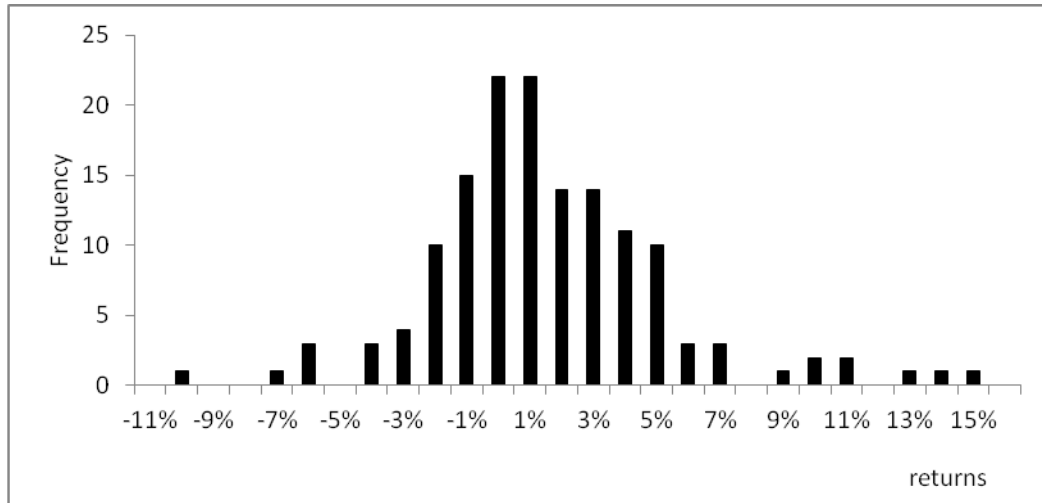
Value of a share (starting @ 100): @ 315.9714 by December 2012:



other statistics (up to end 2012):

- positive closed trades: 56 (53 % of the total)
- negative closed trades: 49
- positive months: 93 (60 % of the total)
- negative months: 62
- volatility of positive monthly returns: 10.64 % p.a.
- volatility of negative monthly returns: 7.16 % p.a.
- max number of consecutive negative months (net): 7 (from APR to OCT 12 – with a cumulated loss of -18.95 %, to be compared to a global -9.58% (net) on year 2012)
- MDD (net):
 - o on a single month: - 10.86 % (in OCT 02)
 - o cumulated: - 18.95 % (from APR to OCT 12)
- Skewness: 0.71
- Kurtosis: 2.31

♦ Histogram of the net monthly returns (in %):



♦ trades duration:

- min duration of a trade: 1 -2 days, with 3 occurrences (i.e. about 2% of the trades), due to Stop Loss rules (cf. further)
- max duration of a trade: 18 months (rounded)
- weighted average duration of trades: 6 months (rounded)

♦ Correlation of performance with SP500:

Over the 10-year period (2000 – 2011), the correlation coefficient between the SP500 and our net monthly performances was = - 0.23. On the same period, the volatility (p.a.) of the SP500 was 14.81 % p.a. (based on monthly data), to be compared with 13.09% for the simulated trading.

♦ Correlation of the performances of each traded instrument:

One must take into account that, even if 2 instruments are more or less correlated in prices, their performance obtained by moving regressions trading is clearly less correlated, because the filtered trading signals are different and occur on different dates. Taking an extreme example, the Stoxx and Dax are highly correlated *per se* (with a $\rho >> 90\%$), but in our simulation, their monthly performances show a ρ of 0.75. The diversification is thus much more effective than by trading in a conventional way.

♦ number of trades closes per full year (2000 to 2011):

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
7	8	6	5	3	8	6	10	5	6	10	12	19

NB: from July 2010: on 12 instead of 6 traded instruments!

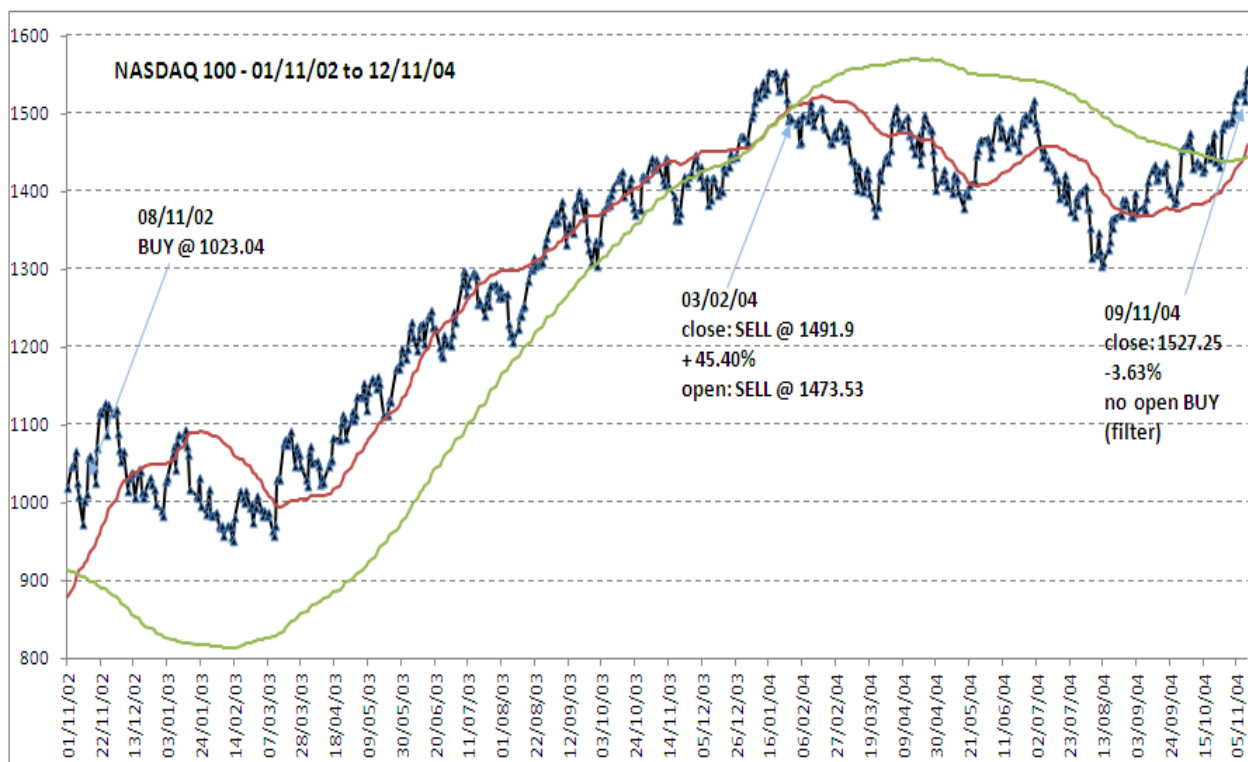
◆ *Negative (loss) trades:*

- From 2000 to 1011, on 37 negative trades, 23 (i.e. 62 %) were due to a Stop Loss; average duration of trades ended by a Stop Loss: 40 days.

The importance of the filter:

As said earlier, the moving regression signals are filtered through a proprietary indicator (cf. Annex – trading rules). Globally speaking (from January 2000 up to July 2012) the filter has **eliminated 45% of the possible trades**, i.e., signals given by crossing of the two moving regressions. Thanks to the volatility filter, the **global performance has been improved by 24 %**. The filter has **eliminated 59 % of potentially negative trades, but 26 % of positive trades as well** (opportunity loss).

Example of trades:



MR TRADING RULES

1 – moving regressions “MR”

- use of a “short MR” and a “long MR”
- regression lines are based on daily market CLOSE prices

2 – general

1 – BUY opening & closing rules are symmetrical of SELL rules

2 – opening positions are taken the *next* day morning (following the crossing of moving regressions), at the OPEN market price. Closing positions are taken at the market CLOSE price, the day the moving regressions are crossing again. This avoids to be affected by possible abnormal HIGH or LOW during the current day

3 – opening a trade

♦ BUY signal: if together

- “day -2”: short MR below long MR
- “day -1”: short MR above long MR
short MR crosses long MR upwards: → expect an upward trend
(as said above, the trade is made at the opening of the next day after crossing, i.e., on day “d”)
- filtering: current moving prices volatility positively oriented: → expecting large(r) prices moves

♦ SELL signal: if together

- “day -2”: short MR above long MR
- “day -1”: short MR below long MR
short MR crosses long MR downwards: → expect a downward trend
(as said above, the trade is made at the opening of the next day after crossing, i.e., on day “d”)
- filtering: current moving prices volatility positively oriented: → expecting large(r) prices moves

4 – closing a trade

♦ closing a BUY trade:

- “day -1”: short MR above long MR
- “day d”: short MR below long MR
short MR crosses long MR downwards: → expecting the end of the upward trend
- alternatively: closing based on STOP LOSS rules:

- current market price at loss
 - current price is lower than the initial value of long MR (at the day of having opened the trade)
 - current loss is higher than some fraction of 1 standard deviation of the returns, in average (= average volatility of the instrument)
- ◆ closing a SELL trade:
- “ day -1”: short MR below long MR
 - “ day d”: short MR above long MR
short MR crosses long MR upwards: → expecting the end of the downward trend
 - STOP LOSS rules:
 - current market price at loss
 - current price is higher than the initial value of long MR (at the day of having opened the trade)
 - current loss is higher than some fraction of 1 standard deviation of the returns, in average (= average volatility of the instrument).
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