



# Trend Models

*can simple trend strategies work long term?*

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# Overview

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- ◆ Trend models – general overview
- ◆ In- and out-of-sample testing
- ◆ Trend model enhancements



# Trend models overview

## Trend is popular

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- ◆ 85% of CTA returns are explained by simple trend following
- ◆ The figure rises to almost 100% when carry and option trading are included
- ◆ They are without doubt the most popular systematic rule-based strategies used by overlay managers and currency alpha funds
- ◆ They may be backtested relatively easily

## Trend models

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- ◆ The idea of a trend is intimately connected with that of momentum – if a currency moves in one direction in one period, it is likely to continue that direction in the next
- ◆ However, there will be reversals within larger trends, and the key to successful trend following is to discover when a trend starts and ends, and not be taken in by false signals
- ◆ Moving average models are historically very successful at capturing trends and they have many different variations
  - simple MA
  - multiple MA
  - exponential
  - Garch
  - fade in/out
- ◆ We use the simplest possible – a simple single MA – for research purposes.
  - further complexity may be added if a principle is established

## Historical returns to trend models

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- ◆ Historically, long term trends are displayed in currency pairs which are the exchange rates between disparate economies – USD/JPY, EUR/USD etc.
- ◆ Interestingly, those pairs which do display a marked tendency to trend all have their optimal moving average at about 70 days
- ◆ Those currencies which historically have not trended are the pairs which are the exchange rates between closely linked economies – EUR/CHF, GBP/USD etc.
- ◆ The majority of trend models give very similar results

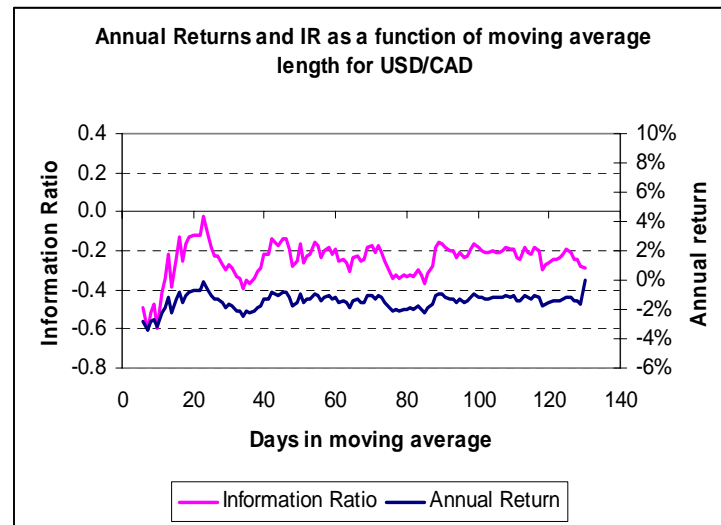
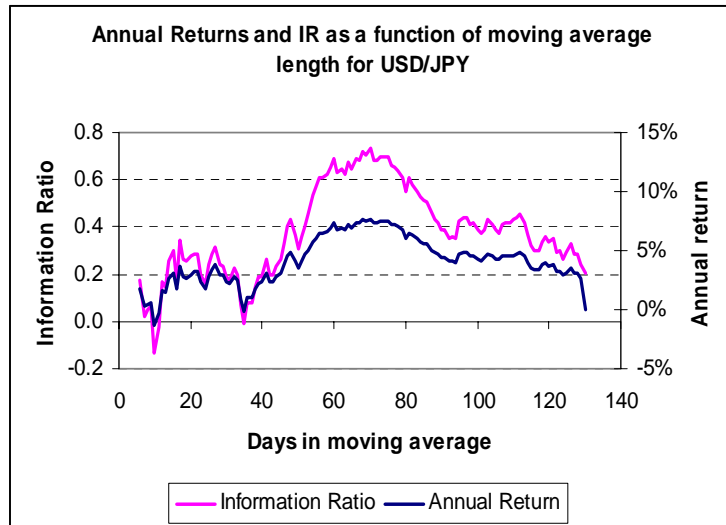
## Trending or not?

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- ◆ We sought to establish which currencies ‘trend’ or not by looking at the results of the simplest possible trend following strategy – that of a single moving average
- ◆ By buying when the rate was above a simple arithmetic moving average, and selling when it was below, we obtained a P/L curve for the trading strategy since the start of the data set, in 1992
- ◆ We looked at every length of moving average strategy from 5 to 130 days
- ◆ We use USD/JPY and USD/CAD as opposite examples
- ◆ Forwards are not included but tests with full MTM calculations indicate that they make little difference, even to USD/JPY

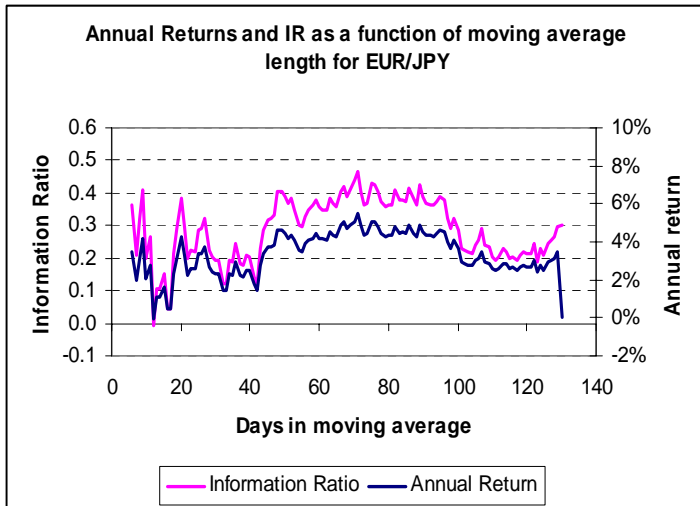
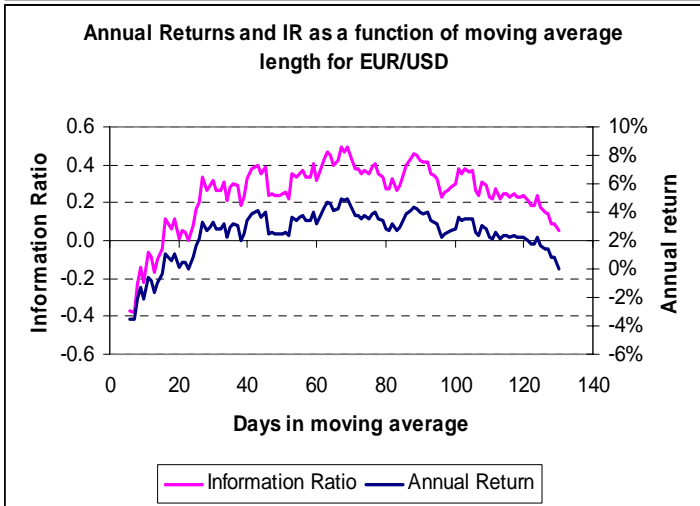
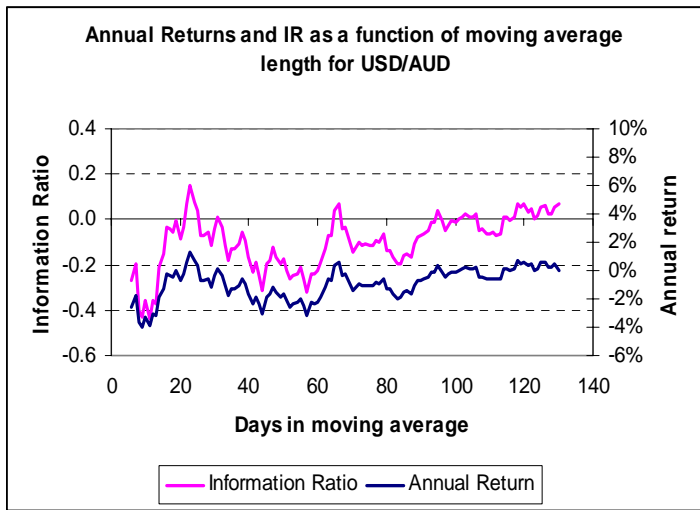
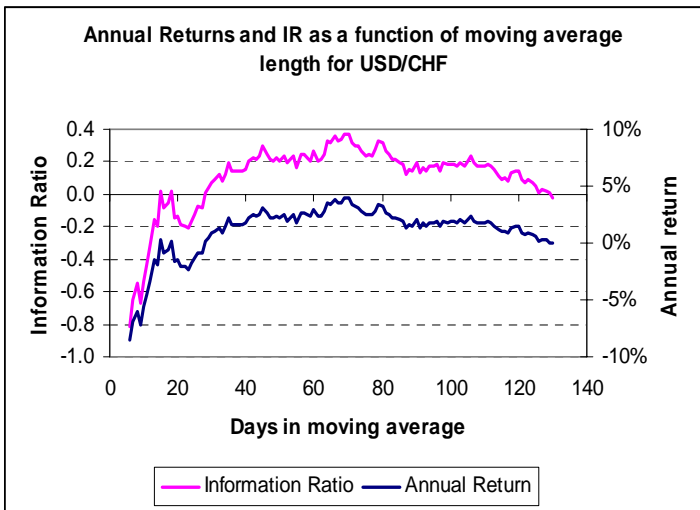
## Two very different currencies

- ◆ The behaviour of the two currencies is utterly different
- ◆ USD/JPY makes money and has a positive IR for almost any length of moving average
  - So strong is the trending behaviour of the JPY that similar all-encompassing positive results are obtained for most of its crosses.
- ◆ USD/CAD stubbornly refuses to rise above zero under any circumstances
- ◆ It is not difficult to draw the conclusion that USD/JPY trends and USD/CAD does not





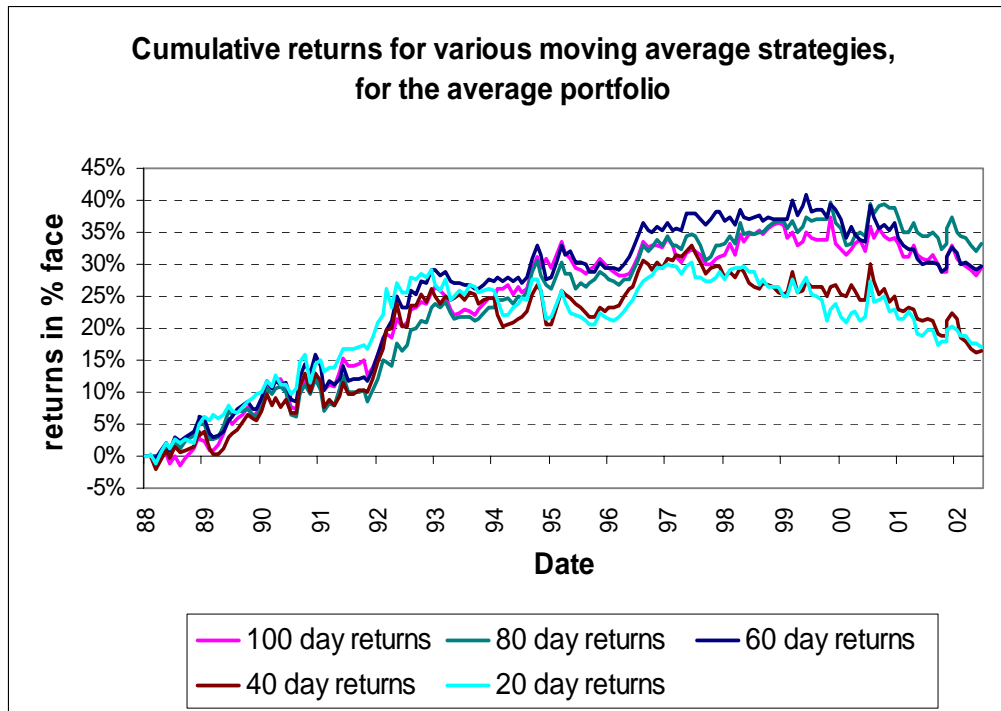
# More currencies



Note that the past about 40 days there is extraordinary stability of performance with respect to the moving average

# Stability of returns and IR

- ◆ We tested out the stability of the strategy with respect to the number of days in the moving average
- ◆ We find that in fact there is a large range of moving averages which deliver similar returns for the average portfolio

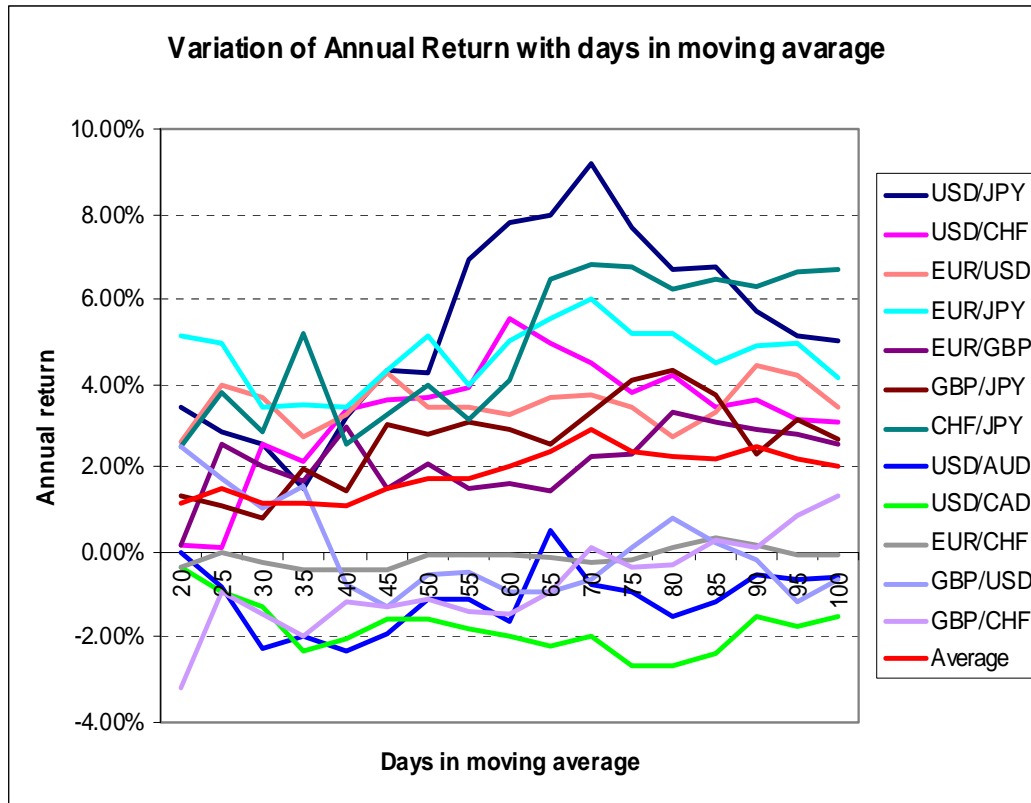


## The 'best' moving average

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- ◆ It is interesting to find the 'best' moving average
  - obviously this is an optimisation, but only of a single parameter
- ◆ Accordingly we repeated the analysis with finer granularity, creating returns and information ratios for moving averages between 20 and 100 days with 'steps' of 5 days
- ◆ The following graphs reveal the optimal region.

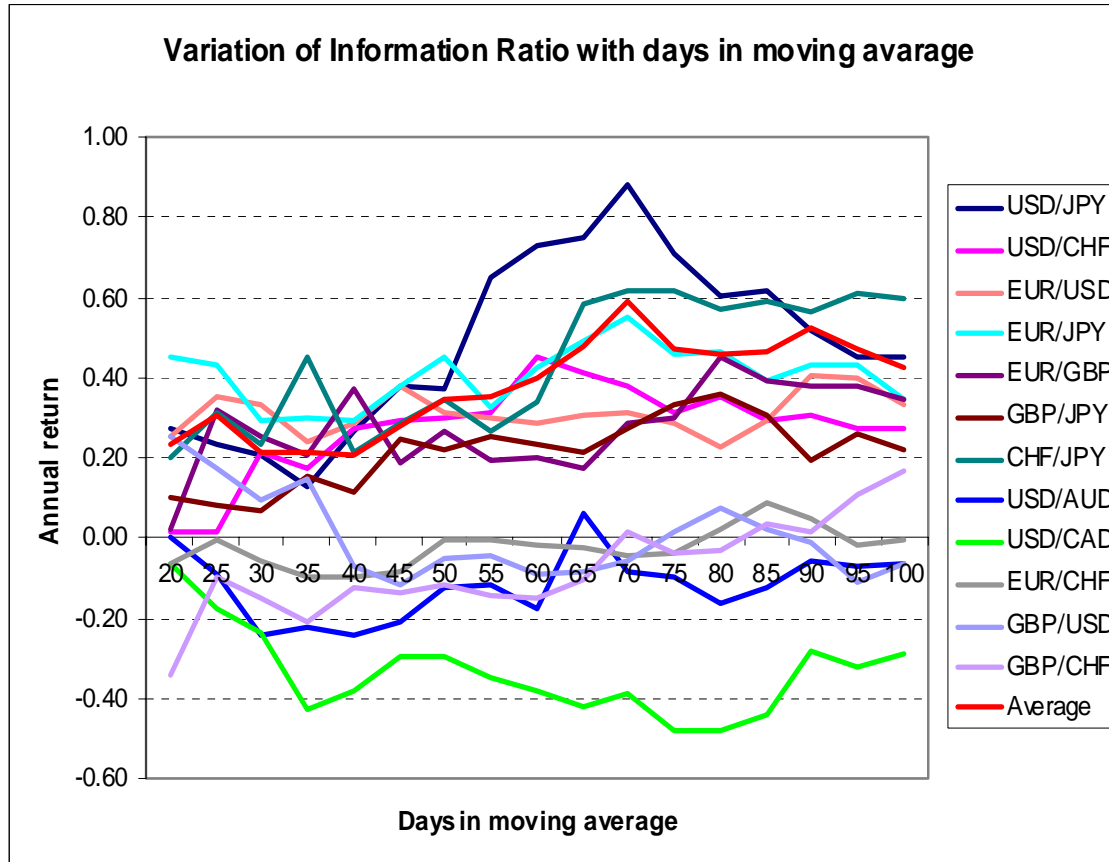
# Optimal region for annual return



There is a best 'region' around 70 days but in general results are not sensitive to the number of days

There is a clear picture of the degree of trend activity in each currency

# Optimal region for information ratio



The best 'region' is the same, as is the lack of sensitivity to the moving average

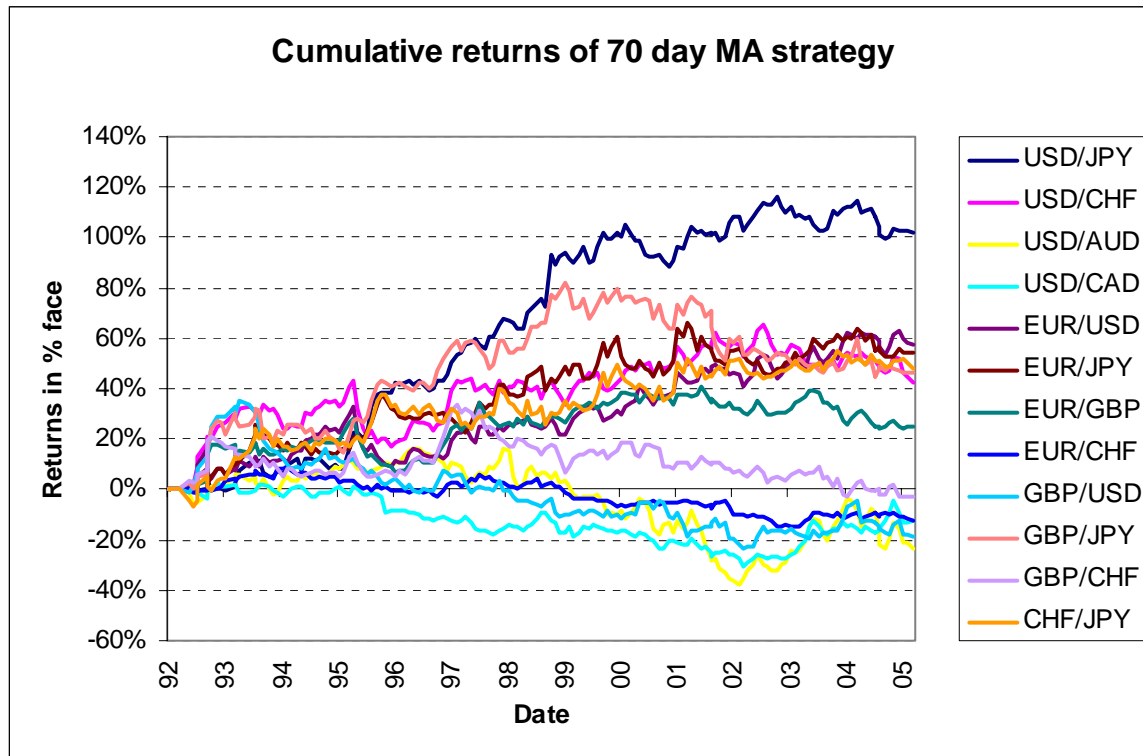
# Single moving average vs multiple moving average

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- ◆ Strategies with multiple moving averages are popular in the FX modelling world. This is for several reasons.
  - (1) As a trend establishes itself then the moving averages will gradually cross over the actual rate and each other, the shorter followed by the longer, until all of them lie below the actual rate. There is thus the possibility to ‘fade in’ and gradually take increasing positions as the trend becomes stronger
  - (2) By optimising the fade levels and the numbers of days in the moving averages, backtested returns can be greatly improved over simpler models
  - (3) For advisory rather than strict model following approaches, there are a number of different strength signals for trends
- ◆ While (1) has some merits, (2) has to be regarded with caution because over-optimisation is very easy to achieve with this method
  - In general, if a currency is not tradable with a simple single moving average, then ‘improving’ its backtested performance by optimising additional moving averages is unlikely to improve returns in the future
  - On the other hand, a currency which already works reasonably well with a single MA might have some robust improvements from the introduction of another. Some kind of plateau optimisation should be performed to reduce the chances of over-optimisation.

# Historical returns to 70 day single moving average model

Currency Pair	USD/JPY	USD/CHF	USD/AUD	USD/CAD	EUR/USD	EUR/JPY	EUR/GBP	EUR/CHF	GBP/USD	GBP/JPY	GBP/CHF	CHF/JPY
IR	0.683	0.302	-0.169	-0.151	0.421	0.357	0.235	-0.226	-0.155	0.267	-0.022	0.319
Annual Return	7.55%	3.14%	-1.73%	-0.94%	4.23%	4.03%	1.83%	-0.91%	-1.40%	3.43%	-0.20%	3.56%

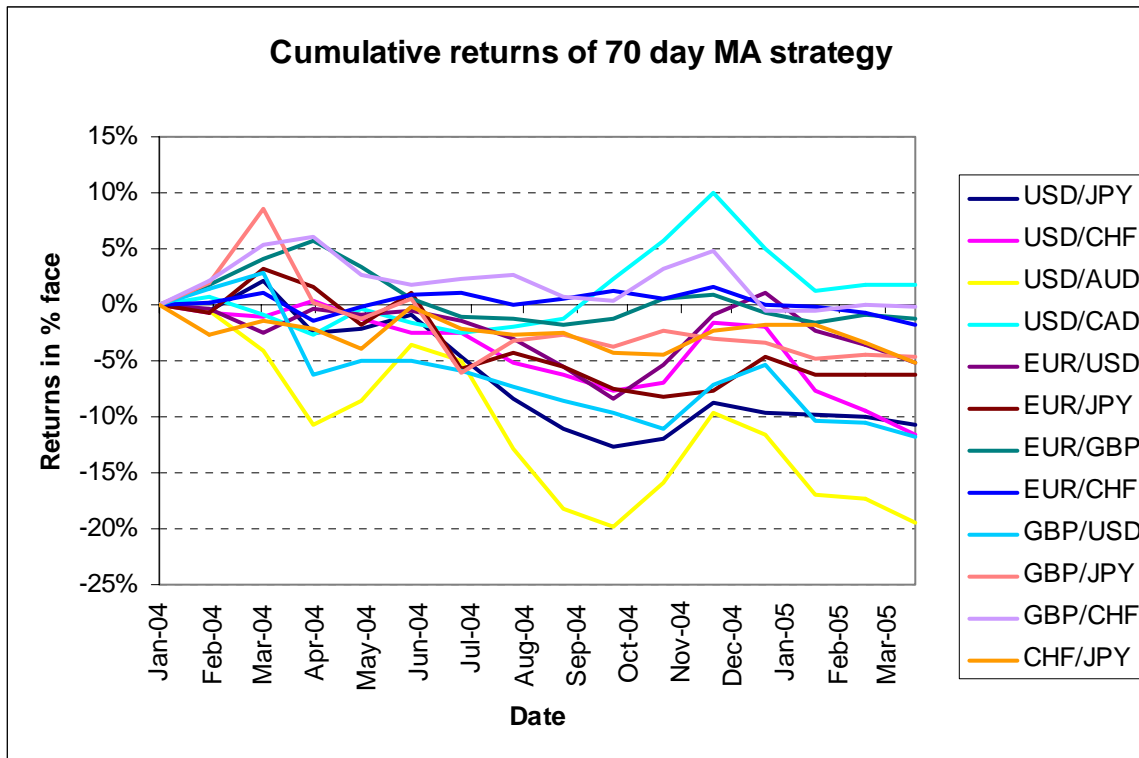


In general returns are positive though a number of pairs display little trending activity

Recent results look less good – but then the same features have occurred in the past...

# 2004 70 day single moving average model

	USD/JPY	USD/CHF	USD/AUD	USD/CAD	EUR/USD	EUR/JPY	EUR/GBP	EUR/CHF	GBP/USD	GBP/JPY	GBP/CHF	CHF/JPY
<b>IR</b>	-0.891	-0.913	-0.781	0.027	-0.175	-0.351	-0.370	-0.195	-0.468	-0.073	-0.069	-0.589
<b>Annual Return</b>	-7.07%	-7.49%	-11.53%	0.24%	-1.45%	-3.23%	-2.02%	-0.73%	-5.33%	-0.90%	-0.52%	-3.55%



This last year's results have been particularly horrible, with only a few currencies showing a positive return

The latest 6 weeks or so however have been much better, seeing the returns of trends to the markets after the US elections were complete





# In- and out-of-sample tests

*The results we find are surprising...*

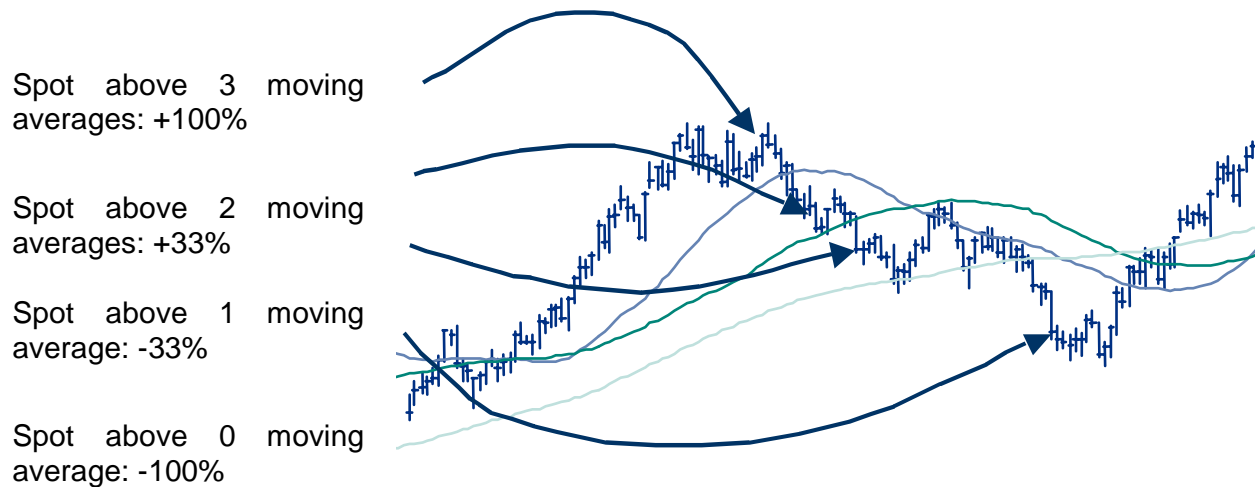
## Test methodology - 2-stage approach

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- ◆ Initially, we select data periods of different lengths and find the best moving averages, over a variety of currency pairs.
  - We examine cases from one to four moving averages.
  - We wish to see what improvement is found in-sample by more moving averages
  - At some point improvement may be purely due to noise fitting, but we would hope to be able to detect this point by looking at the magnitude of changes in IR.
- ◆ Next, we find the optimal moving averages for various in-sample periods, and apply them to subsequent out-of-sample periods
  - This will tell us whether the best moving averages are useful for forecasting purposes
  - We also hope to gain information about the time period necessary for such information to emerge
  - Additionally, we may learn how many moving averages may usefully be extracted from different data periods and applied to future periods. It is entirely feasible that one could extract 2 useful parameters from a data set of a given length but not 3. In this case we would expect to see in- and out-of-sample results show the smallest difference at the 'right' number of parameters

# MA model details

- ◆ We use the simplest moving average crossover strategy
- ◆ Each average is equally weighted



# In-sample optimised results

	Length of data period	EURUSD	USDJPY	AUDUSD	GBPUSD	USDCAD	EURCHF	EURNOK	EURSEK
<b>1MA</b>	2yr	0.960	0.952	0.778	0.312	0.348	0.432	0.568	0.618
	3yr	0.633	0.873	0.558	0.293	0.215	0.260	0.513	0.573
	4yr	0.650	0.827	0.570	0.200	0.207	0.267	0.347	0.400
<b>2MA</b>	2yr	0.980	0.965	0.802	0.312	0.350	0.432	0.600	0.788
	3yr	0.700	0.873	0.568	0.293	0.215	0.265	0.523	0.610
	4yr	0.657	0.827	0.573	0.200	0.207	0.270	0.347	0.417
<b>3MA</b>	2yr	0.977	0.965	0.813	0.312	0.352	0.432	0.597	0.758
	3yr	0.713	0.873	0.570	0.293	0.218	0.265	0.520	0.623
	4yr	0.663	0.827	0.580	0.207	0.210	0.270	0.347	0.430
<b>4MA</b>	2yr	0.980	0.946	0.815	0.322	0.352	0.432	0.600	0.795
	3yr	0.710	0.873	0.570	0.293	0.218	0.265	0.523	0.615
	4yr	0.667	0.827	0.580	0.210	0.210	0.270	0.347	0.440

## In-sample results

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- ◆ Even in-sample, there is very little to be gained from moving to more than one moving average
- ◆ The results in the 4MA section are barely better than those in the 1MA section
- ◆ This begs the question, why do users ever have more than one moving average?
  - Possibly multiple strategies are easier to trade in that positions are built up gradually rather than put on all at once.
  - There seems no reason to do with performance which would lead us to use many rather than one.
- ◆ The second feature of the table worth discussing is that universally, the IRs are better for the shorter data periods
- ◆ This finding is consistent with a lack of stationarity in moving average models

# Out-of-sample testing

	Length of data period	EURUSD	USDJPY	AUDUSD	GBPUSD	USDCAD	EURCHF	EURNOK	EURSEK
1MA	2yr	0.960 0.148	0.952 0.525	0.778 0.053	0.312 -0.208	0.348 -0.298	0.432 -0.248	0.568 -0.045	0.618 0.058
	3yr	0.633 0.128	0.873 0.688	0.558 0.090	0.293 -0.235	0.215 -0.263	0.260 -0.120	0.513 0.043	0.573 -0.010
	4yr	0.650 0.260	0.827 0.520	0.570 -0.133	0.200 -0.253	0.207 -0.193	0.267 -0.103	0.347 -0.060	0.400 0.173
2MA	2yr	0.980 0.157	0.965 0.465	0.802 0.038	0.312 -0.208	0.350 -0.295	0.432 -0.248	0.600 -0.040	0.788 0.015
	3yr	0.700 0.135	0.873 0.700	0.568 0.143	0.293 -0.235	0.215 -0.263	0.265 -0.130	0.523 0.045	0.610 -0.065
	4yr	0.657 0.207	0.827 0.520	0.573 -0.153	0.200 -0.127	0.207 -0.240	0.270 -0.100	0.347 -0.060	0.417 0.110
3MA	2yr	0.977 0.143	0.965 0.458	0.813 0.050	0.312 -0.252	0.352 -0.297	0.432 -0.270	0.597 -0.043	0.758 0.018
	3yr	0.713 0.163	0.873 0.633	0.570 0.085	0.293 -0.235	0.218 -0.265	0.265 -0.130	0.520 0.028	0.623 -0.050
	4yr	0.663 0.203	0.827 0.520	0.580 -0.073	0.207 -0.183	0.210 -0.227	0.270 -0.100	0.347 -0.060	0.430 0.073
4MA	2yr	0.980 0.145	0.946 0.470	0.815 0.050	0.322 -0.248	0.352 -0.297	0.432 -0.265	0.600 -0.040	0.795 -0.027
	3yr	0.710 0.150	0.873 0.655	0.570 0.115	0.293 -0.235	0.218 -0.265	0.265 -0.120	0.523 0.033	0.615 -0.038
	4yr	0.667 0.220	0.827 0.520	0.580 -0.107	0.210 -0.213	0.210 -0.220	0.270 -0.103	0.347 -0.060	0.440 0.080

We expect to see a decrease in IR for the out-of-sample tests, due to inevitable noise-fitting.

What we are searching for is the number of fitted parameters which minimises the decrease between in and out-of-sample tests.

## Out-of-sample results

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- ◆ Unfortunately, it is not possible to draw any firm conclusions about the ideal number of parameters in a trend model
- ◆ It can be said that nothing performs significantly better out-of-sample than the 1MA model
- ◆ There are only two currency pairs for which the out-of-sample results are significantly positive
  - USD/JPY yields good information ratios both in and out-of-sample
  - EUR/USD results are also all positive for out of sample periods, though not quite as high
- ◆ The results for the other currency pairs are either negative or little different from zero for all out-of-sample periods, regardless of the number of MAs used or the length of the sample under test

## Is trend dead??

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- ◆ We find that to our surprise there is no evidence that more than one moving average is useful or necessary
- ◆ Only USD/JPY and EUR/USD show positive out-of-sample results for any trend strategy variant!
- ◆ This does not necessarily mean that trend models are useless for currency pairs other than these two, but it does suggest that they should not be applied blindly
- ◆ An indicator which allowed investors to judge when trend models were likely to work or not would undoubtedly improve their performance
- ◆ Our results indicate that investors should think carefully when designing trend-following strategies, and use these techniques in conjunction with other signals rather than as simple stand-alone strategies.





# A Model Example

***Combining trend and option strategies to  
enhance the results***

## Trends and options

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- ◆ Selling options – carefully – seems to work but only in certain currencies
- ◆ Similarly, using trend following models has for decades been a robust and successful strategy – but not for all currencies
  - Anything with the JPY in it seems to follow trends with great enthusiasm, but some currencies like USD/CAD have proved to be almost impossible to trade in a trend following way.
- ◆ We investigated the joint behaviour of the two strategy types and show that some interesting portfolios may be constructed.

## Simple trend following strategies

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- ◆ We look at the results of the simplest possible trend following strategy – that of a single moving average
- ◆ By buying when the rate was above a simple arithmetic moving average, and selling when it was below, we obtained a P/L curve for the trading strategy since the start of the data set, in 1988
- ◆ We looked at every length of moving average strategy from 5 to 130 days.

# Average Information Ratio

- ◆ It seems reasonable to use the average IR over all moving average lengths as a metric for the degree of trend following behaviour which exists in a currency
  - This precise figure will vary somewhat according to the range of moving average strategies which are tested, but it should be possible to see which currencies ‘trend’ and which do not
- ◆ On the right we tabulate the average IR for a number of different major currencies and crosses
- ◆ Trading costs were included for all currencies.
- ◆ It is very clear that the JPY crosses and a few others exhibit trending behaviour, while others like USD/CAD and USD/AUD are not trend followers at all.

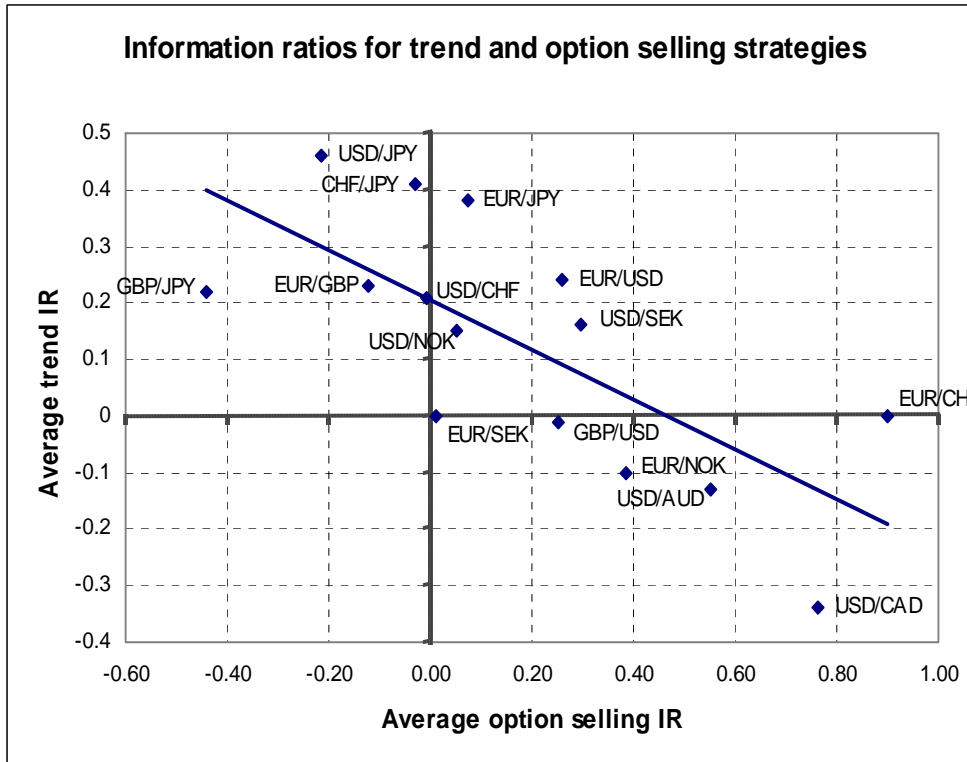
Currency	Average IR for trend following strategies
USD/JPY	0.46
USD/CHF	0.21
USD/AUD	-0.13
USD/CAD	-0.34
EUR/USD	0.24
EUR/JPY	0.38
EUR/GBP	0.23
EUR/CHF	0.00
GBP/USD	-0.01
GBP/JPY	0.22
GBP/CHF	-0.06
CHF/JPY	0.41
USD/SEK	0.16
USD/NOK	0.15
EUR/NOK	-0.10
EUR/SEK	0.00

## Option selling in certain currencies

- ◆ Option selling also seems to apply to a subset of currencies
- ◆ We seek a general metric which will indicate how successful a particular
- ◆ The deciding factor for whether option selling is profitable or not is usually the particular currency, not the particular delta
- ◆ We therefore averaged the results of the option selling strategies at three different deltas – ATM, 25 delta and 10 delta - to obtain information ratios for these average selling strategies for all the currencies
  - Trading costs were included which varied with the currency.
  - To calculate the returns of the option selling strategies, we assumed that for each currency, we sold a straddle, a 25 delta strangle and a 10 delta strangle every business day
  - All of the options were 1 month

Currency	Average IR for option selling strategies
USD/JPY	-0.21
USD/CHF	-0.01
USD/AUD	0.55
USD/CAD	0.76
EUR/USD	0.26
EUR/JPY	0.07
EUR/GBP	-0.12
EUR/CHF	0.90
GBP/USD	0.25
GBP/JPY	-0.44
GBP/CHF	-0.03
CHF/JPY	0.30
USD/SEK	0.05
USD/NOK	0.39
EUR/NOK	0.01
EUR/SEK	-0.21

# Comparing option selling and trend following



It can be seen that the better a trend follower a currency is, the worst it is for option selling, and vice versa!

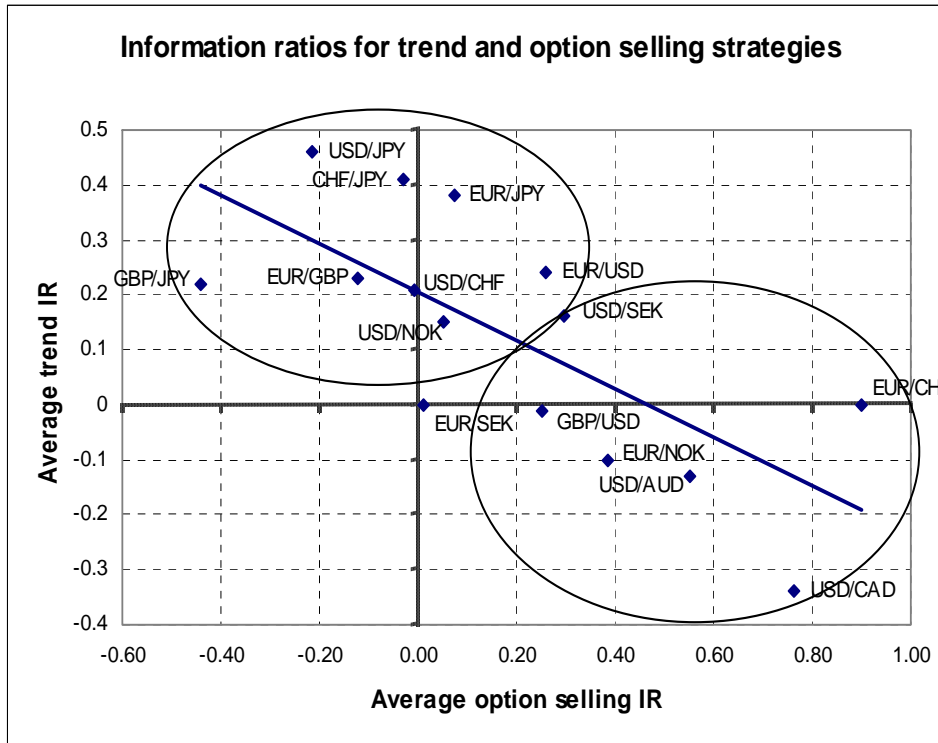
The only currency which gives acceptable returns in both is EUR/USD.

## Combining the two strategies into a portfolio

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- ◆ The previous graph strongly suggests that the returns of the two strategy types might well be anticorrelated
- ◆ We need to select specific examples of the two to use
- ◆ For each trend following currency, we chose a 65 day moving average, and for each option selling currencies, we selected the 25 delta systematic selling strategy
  - These particular parameter values were selected as being representative of their respective strategy types, rather than because they were optimal
  - It should be noted that this choice means that the precise trend following or option selling strategies are not necessarily the optimal ones for their individual currencies.
  - However, selecting these very general parameters means that the results are also generally applicable and would be expected to hold under a variety of scenarios.

# Grouping currencies into option sellers and trend followers



**Trend followers:**  
 USD/JPY, CHF/JPY,  
 GBP/JPY, EUR/JPY,  
 EUR/GBP, USD/CHF,  
 EUR/USD and  
 USD/NOK

**Option sellers:**  
 USD/SEK, GBP/USD,  
 EUR/NOK, USD/AUD,  
 EUR/CHF



# New portfolio using appropriate strategies for their currencies

- ◆ The trend following results in general confirm us in the belief that if the average trend following results were good, then so should the results of arbitrarily choosing a single moving average of 65 days
- ◆ However, in the case of GBP/JPY, the 65 day moving average strategy was obviously non optimal.
- ◆ One notices immediately that although the information ratios are good for the option selling strategies, the annual returns are low, and so the option strategies would need to be leveraged to construct a reasonable trading portfolio.
- ◆ We selected a leverage factor of 6 because this made the cumulative returns of the two strategies roughly equal over the testing period.

Trend following currencies for 65 day moving average

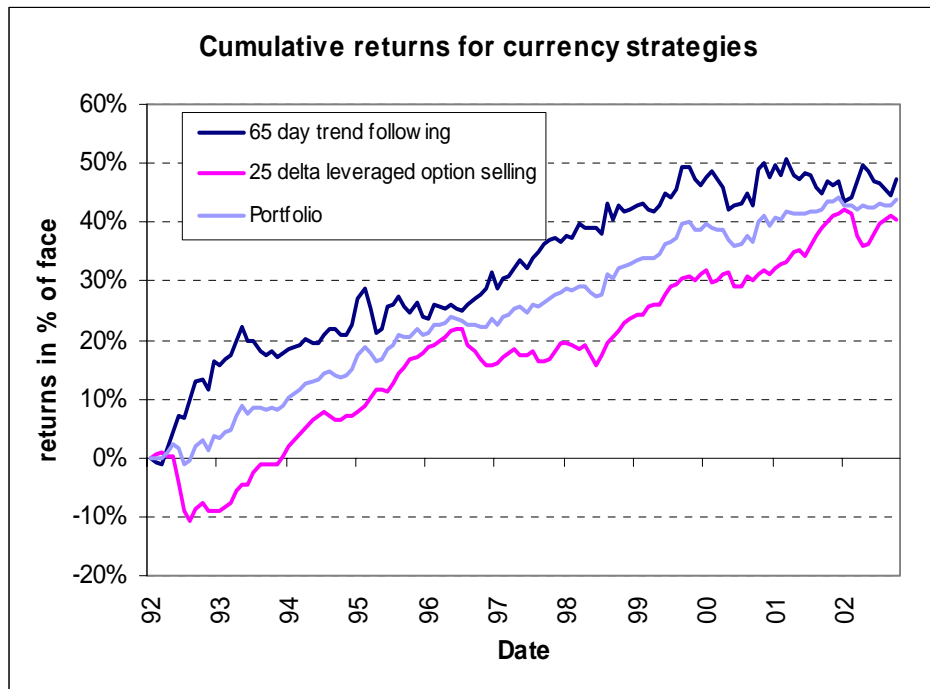
Currency	Information ratio	Average annual return
USD/JPY	0.754	7.97%
USD/CHF	0.399	5.11%
EUR/USD	0.284	3.89%
EUR/JPY	0.483	5.63%
EUR/GBP	0.165	1.60%
GBP/JPY	-0.035	-0.15%
CHF/JPY	0.570	6.53%
USD/NOK	0.197	2.40%
Average	0.695	4.37%

Option selling currencies for 25 delta strategy

Currency	Information ratio	Average annual return
AUD/USD	0.433	0.56%
USD/CAD	0.915	0.69%
USD/SEK	0.291	0.43%
GBP/USD	0.341	0.64%
EUR/NOK	0.686	0.55%
EUR/CHF	1.132	0.69%
Average	0.887	0.62%

## Combined portfolio result

- ◆ Simply by eyeballing the cumulative returns we suspect that there is a pleasing degree of diversification occurring
  - this is confirmed by looking at the correlation for the monthly returns of the two strategy types which is  $-0.156$



The information ratio of the combination strategy is a very satisfactory 1.16

In practice this might not be achievable, for a variety of reasons

## Stationarity of behaviour

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- ◆ A legitimate concern with this type of strategy is that the alpha-generating behaviour does not persist, and will not be there to exploit in the future
- ◆ These concerns may be minimised by using as little optimisation as possible, which we have done
  - there is only one moving average used for the whole time period, and only one option selling strategy
- ◆ Also, for those currencies which ‘work’ as either trend followers or option sellers, they seem to deliver a roughly constant performance over past years
- ◆ There is nothing to suggest that results for 92 – 97 would be significantly different from results from 97 – 02.



# Trend-option switching strategy

*Using implied volatility to say when to trend,  
and when to sell vol*

## The best of trends and options

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- ◆ It seems that these strategy types are mutual opposites
- ◆ but.... some currencies which are in general non trending have trending 'periods'
- ◆ some currencies which don't do well overall selling vol have profitable option selling periods.
- ◆ We wish to find a 'switch' to go from one strategy type to the other
- ◆ An obvious one to try is volatility



## Which options? Which vol switch?

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- ◆ We do not wish to get hurt by the switch to trend when holding written options
- ◆ Thus short options are best
- ◆ Weekly options are those which we have the best data for
  
- ◆ Weekly vol however is too date-affected to use as a switch
- ◆ But we find that all of 1, 2, 3, 6 month vols work well!

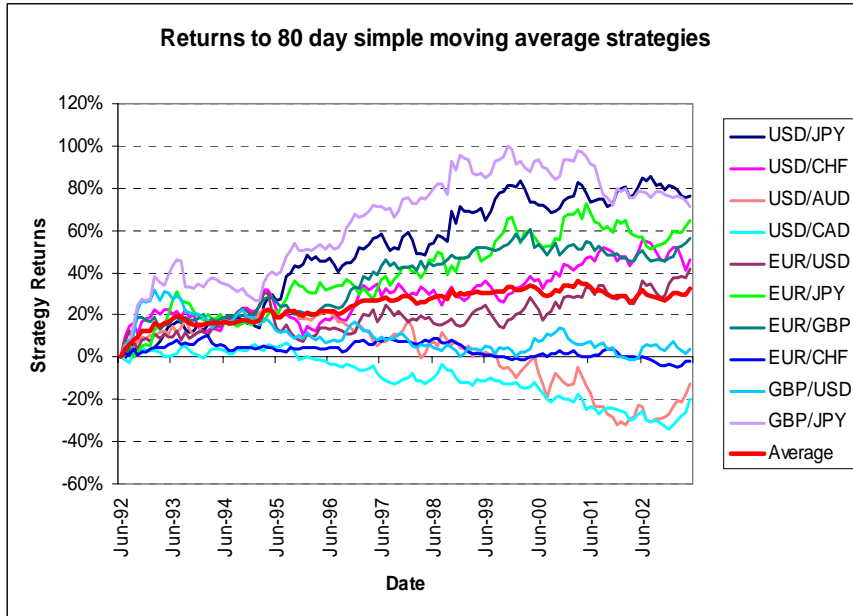
## Which trend?

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- ◆ Overall, the exact trend strategy has little impact on results.
- ◆ We selected an 80 day moving average strategy for all ccys
- ◆ The results hardly change for other days

Moving average length	Information ratio	Average annual return
70	0.601	2.93%
80	0.627	2.94%
90	0.588	2.71%

# Trend only results ... mediocre



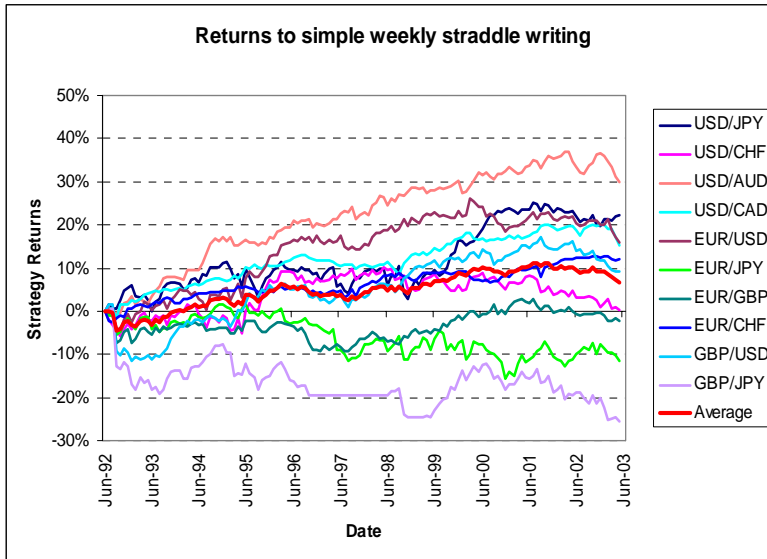
Trend following results for 80 day moving average

Currency	Information ratio	Average annual return
USD/JPY	0.618	6.88%
USD/CHF	0.384	4.15%
USD/AUD	-0.109	-1.14%
USD/CAD	-0.285	-1.81%
EUR/USD	0.377	3.81%
EUR/JPY	0.510	5.86%
EUR/GBP	0.619	5.08%
EUR/CHF	-0.042	-0.16%
GBP/USD	0.040	0.33%
GBP/JPY	0.499	6.42%
Average	0.627	2.94%

As expected, these results are overall mediocre, with only the very strong trending currencies like USD/JPY delivering good returns.



# Weekly straddle writing - poor



Straddle writing results with 2x leverage

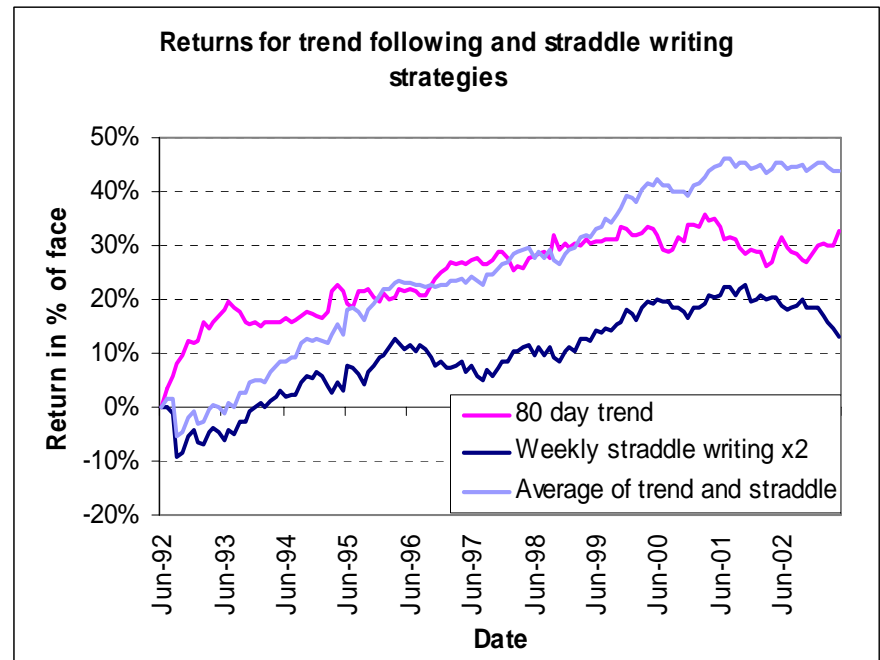
Currency	Information ratio	Average annual return
USD/JPY	0.385	4.04%
USD/CHF	0.005	0.04%
USD/AUD	0.718	5.42%
USD/CAD	0.550	2.78%
EUR/USD	0.314	2.90%
EUR/JPY	-0.195	-2.10%
EUR/GBP	-0.053	-0.41%
EUR/CHF	0.470	2.19%
GBP/USD	0.167	1.64%
GBP/JPY	-0.347	-4.61%
Average	0.229	1.19%

This is not a particularly inspiring result, and the risks of systematic option selling are high.

To successfully combine two different strategies, they need to have comparable levels of returns. The straddle writing strategy returns are small compared with the trend following, so we introduced a leverage factor of 2.

## Simple combination of the two

- ◆ It is clear that they are anticorrelated; in fact the correlation between the monthly returns is  $-0.24$ . The graph shows the 2x leveraged results for the option selling
- ◆ Note that these results are for the average portfolios for all the currencies.
- ◆ The IR for the trend and straddle writing strategies are 0.63 and 0.23 respectively. The portfolio formed by the addition of the two has a much healthier IR of 0.91
- ◆ However, a switching rule which intelligently chooses which strategy is currently likely to do best should better this result again.



## Detailed strategy rules for switching

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1. Is 1m ATM volatility above the trailing 5 year average?
2. If yes, sell a 1 week straddle every day with notional  $2/5P$  (the factor of 2 comes from the leverage, the factor of  $1/5$  from the fact that we are dealing a 5 day product every day and need to normalise)
3. If no, check whether the FX spot rate is above its 80 day trailing moving average
4. If it is above, take a long position with notional amount  $P$
5. If it is below, take a short position with notional amount  $P$
6. If the 1m ATM volatility is initially below and rises above its trailing 5 year average, neutralise the spot position and sell a straddle
7. If the 1m ATM volatility is initially above and falls below its trailing 5 year average, do not cut out the option position but allow it to expire. However, immediately put on a long or a short spot position to trend follow with the 80 day moving average.

## Strategy implementation

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- ◆ Option positions are allowed to expire naturally even when they are no longer appropriate – this is because the high costs of unwinding an oddly dated and probably out of the money option position are not worthwhile.
- ◆ What actually happens in the market at the trend/volatility selling switchover points?
- ◆ When the 1m implied volatility falls below its trailing average, there is a good chance that a trend will be starting or in place. But because volatility is low, the trend will in all likelihood not start aggressively.

# Results

Information ratios for individual and combined strategies

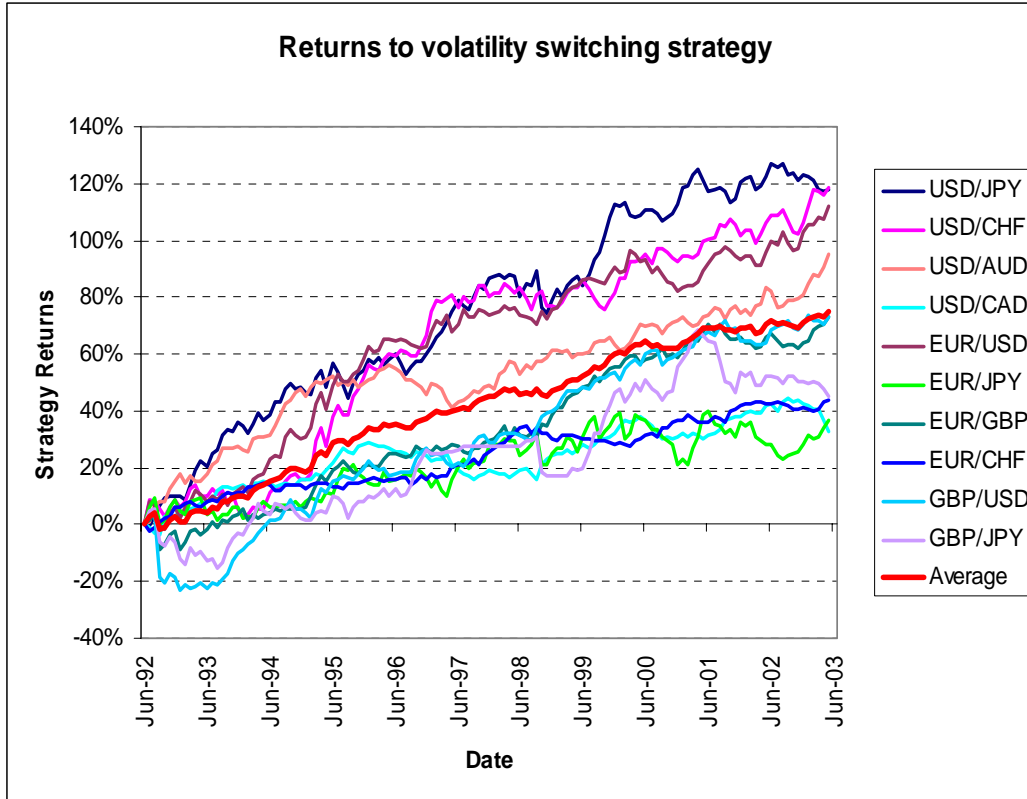
Currency	80 day trend following	Daily straddle writing	Combined portfolio
USD/JPY	0.618	0.385	0.960
USD/CHF	0.384	0.005	0.958
USD/AUD	-0.109	0.718	1.128
USD/CAD	-0.285	0.550	0.546
EUR/USD	0.377	0.314	1.009
EUR/JPY	0.510	-0.195	0.293
EUR/GBP	0.619	-0.053	0.847
EUR/CHF	-0.042	0.470	0.919
GBP/USD	0.040	0.167	0.664
GBP/JPY	0.499	-0.347	0.370
Average	0.627	0.229	1.492

Average annual returns for individual and combined strategies

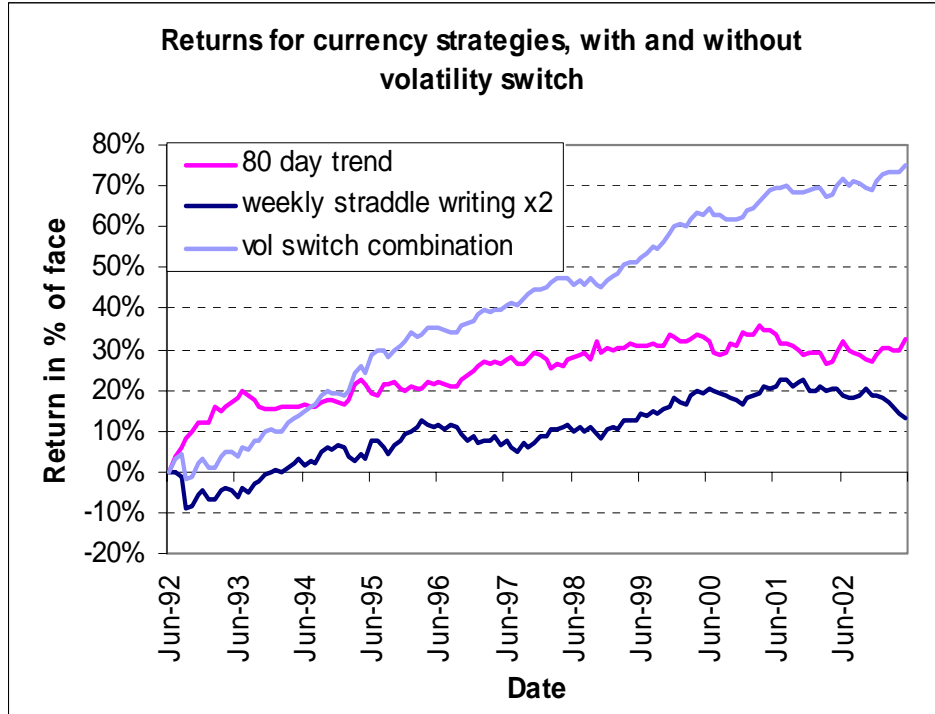
Currency	80 day trend following	Daily straddle writing (2x leverage)	Combined portfolio
USD/JPY	6.88%	4.04%	10.68%
USD/CHF	4.15%	0.04%	10.70%
USD/AUD	-1.14%	5.42%	8.63%
USD/CAD	-1.81%	2.78%	2.99%
EUR/USD	3.81%	2.90%	10.16%
EUR/JPY	5.86%	-2.10%	3.30%
EUR/GBP	5.08%	-0.41%	6.60%
EUR/CHF	-0.16%	2.19%	3.94%
GBP/USD	0.33%	1.64%	6.59%
GBP/JPY	6.42%	-4.61%	4.06%
Average	2.94%	1.19%	6.76%

In nearly every currency the IR has improved dramatically  
 The IR of the average portfolio has leaped to 1.49  
 We can see above that the switching rule has enabled the combination of two strategies, which yielded 2.94% and 1.19% annual returns, to reach a substantial 6.76% per annum  
 Given that the identical strategy is applied to each currency without change, there can be little doubt that this is a real and useful effect.

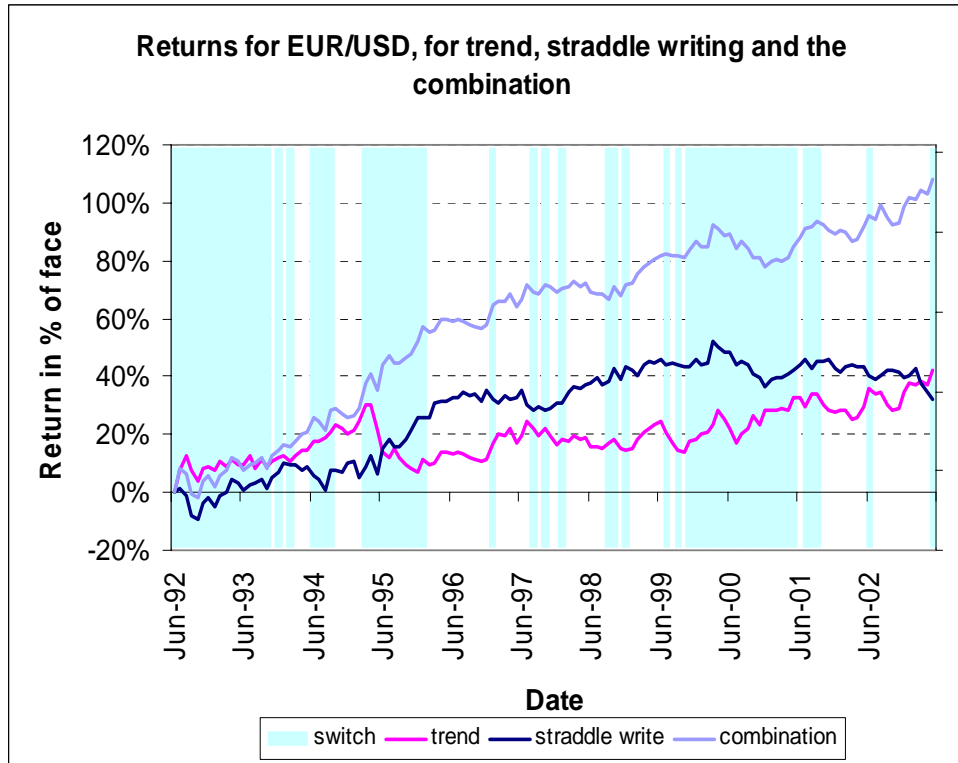
# Results



# Results



# Single Currency Illustration



The pale blue regions indicate the high vol periods where straddle writing was the selected strategy, and the white regions similarly are the trend following periods

The strategy is very successfully indicating which periods are best for the different strategies

Note that as this is monthly data, not quite every 'switching' period is represented, as these can vary on a sub-monthly level.



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