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Robust trend
and the French
CAC 40

The robust trend method previously described for the German DAX (Uhlig, H. 2001) was also applied to the French CAC 40 index. It was found that the robust trend did also work in the French stock market, at least during the observation period. It was better than 'buy and hold' both with unidirectional and bidirectional trading (including short sales or puts). Since the time series used was quite short, a thorough statistical analysis could not be carried out and thus the data must not be overinterpreted. But the findings here are quite promising therefore it can be said that the method merits further investigations.

Introduction
Recently I tried to smooth weekly DAX data in order to prepare them for an embedding with differences. This is a method derived from chaos research to find out the dimension of an unknown dynamic system and to model it. For smoothing of the data I used weighted moving averages and in order to find optimal weighting factors I used genetic algorithms, optimizing methods which use principles from biological evolution, like random mutation, recombination and selection for fitness. My aim was to find weighting factors for four week averages which minimized the number of changes in trend direction. The trend thus obtained I called the robust trend. Accidentally I found that the robust trend on it's own was a quite reliable method to predict movements in the German DAX stockmarket index.

Knowing this I tried to apply the method to other stock market indices, like the American S&P 500 and the French CAC 40. While the robust trend was unable at least in an upward moving market, to beat the passive 'buy and hold' strategy with the S&P 500, it was found to be superior to 'buy and hold' with the CAC 40. When I looked at the DAX my focus was on long only trading strategies, whereas here I extended by investigations on possible trading strategies for the CAC 40 to short trading as well. Both futures and options are traded for the CAC 40, by the way this holds true also for the DAX and for these investment vehicles a broader range of trading may be applied therefore it seemed appropriate to bear short sales and puts in mind as well.

The robust trend method does not only work with the DAX. Here I will give a brief demonstration that it would work with the CAC40 as well. Unlike for the DAX only a very small number of data was available to establish the method, therefore one has to be cautious not to over interpret the results presented. Because of this lack of more data I do not present a thorough statistic comparable to the one I made for the DAX.

For the CAC40 the data from Jan 1999 to December 2001 were used. I don't have earlier data, because I used to follow the SBF250, which is a broader index. For the SBF250 I have

data for much longer time periods. But I don't know if the SBF250 can be traded. If it can I suppose that it won't be a liquid market. That is why I stayed with the CAC40 data in this case.

The first half of the data was used to find suitable weights for a weighted average. Again I used genetic algorithms as already done with the DAX data. The weighted average was used to find a robust trend. Some facts seem remarkable. The dynamics of the first and second half of the time series differ considerably. While the first one shows an upward trend, the second one shows a downtrend with a V shaped rebound.

The potential gains of the ordinary long only robust trend method were calculated as follows. If the robust trend indicated an upward move, CAC 40 equivalents would be bought and they would be hold until the trend was expected to lead downwards. If the trend line crossed the zero line the assets would be sold at the next weekly close.

Robust Trend Method or "Buy and Hold"?
French Stock Market Index CAC40

Time 1/99 to 12/2001 weekly scale

——— "robust trend"   ········ "buy and hold"
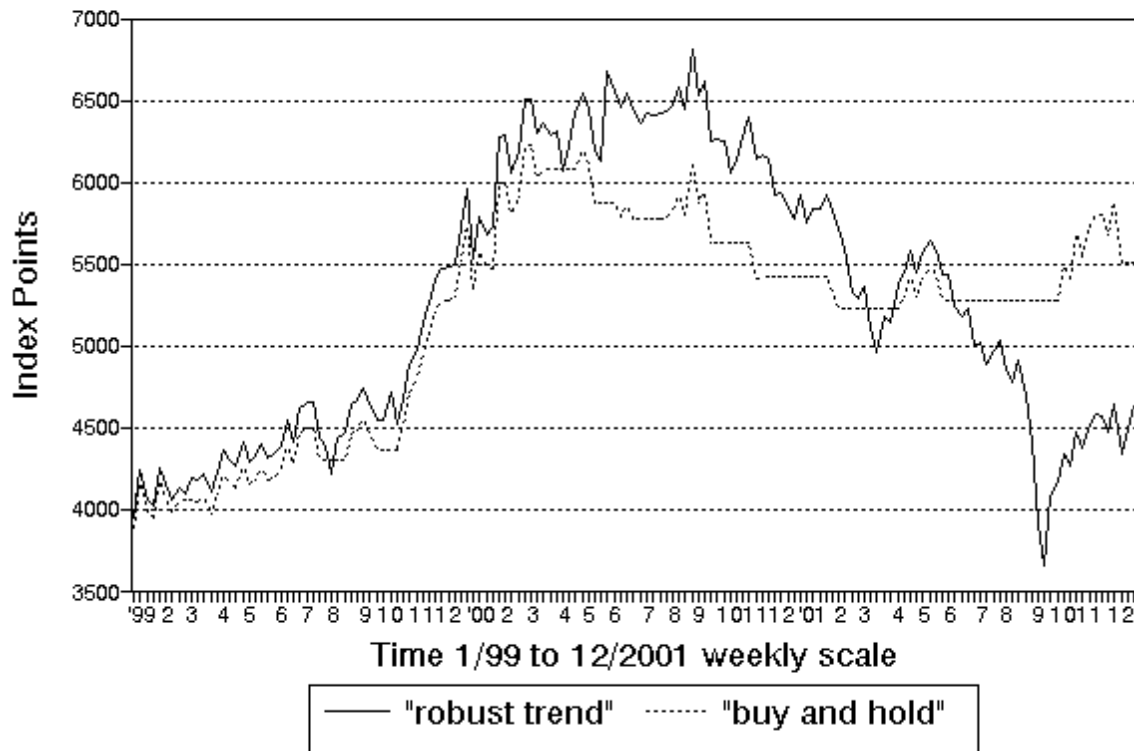
This first graph shows how the system would have acted if the conditions of the trading system had been known from the beginning. This assumption is unvalid, because it includes hindsight. The pure call system would have made a profit of +35% at a standard deviation of 2.2%, while buy and hold would have gained +17% with 3.3% standard deviation. The lower standard deviation results from the absence of the market for about half of the time, indicated by flat parts of the broken lines. The robust trend method had an advantage on risk terms, but not if only gains are considered, because the upward market move favoured 'buy and hold'. The graph was included, because it is known that few systems can beat 'buy and hold' in a bull market, at least hardly on absolute gains terms.
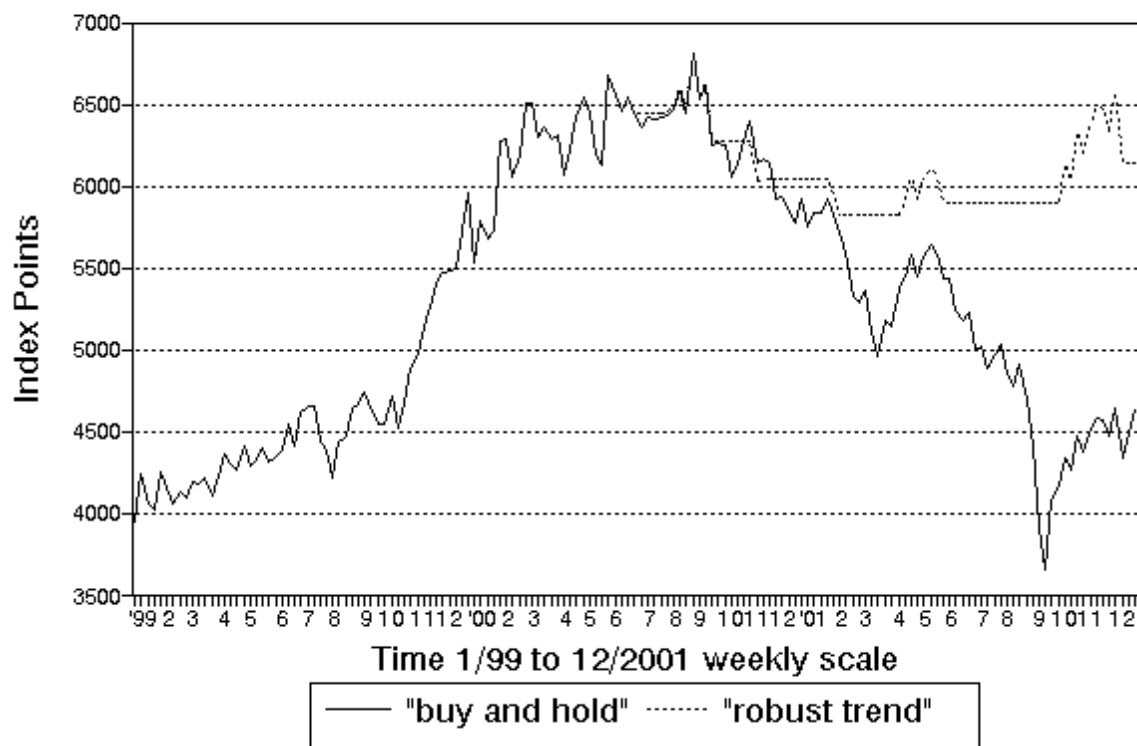
Robust Trend Method or "Buy and Hold"?
French Stock Market Index CAC40

Time 1/99 to 12/2001 weekly scale

——— "robust trend"   ······· "buy and hold"
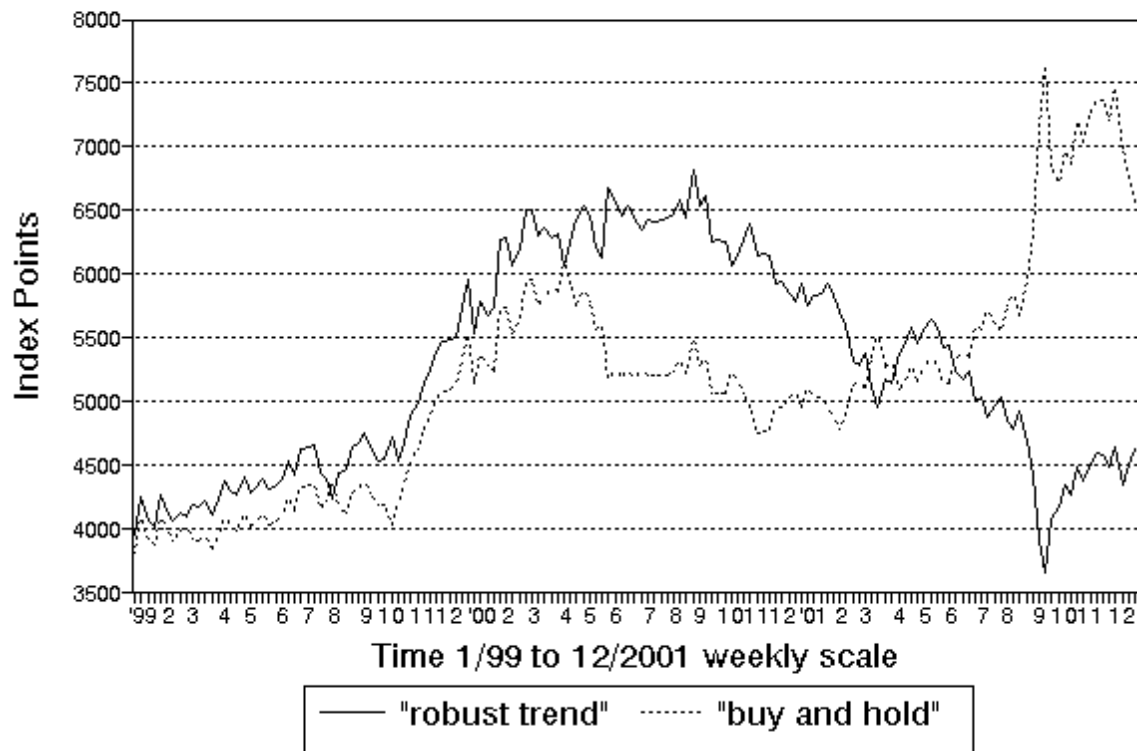
If the method had been followed from the beginning and instead of going out of the market one would have gone short, i.e. would have traded in both directions, one would have gained 58% at the same variance as „buy and hold". This is of course a very simplified look at the possible performance. It is just used here to demonstrate that it is possible at least in principle to use the forecast for bidirectional trading.

## Robust Trend Method or "Buy and Hold"?
French Stock Market Index CAC40

Time 1/99 to 12/2001 weekly scale

——— "buy and hold"   ······· "robust trend"

If the method had been followed immediately after the development phase, that is from July 2000 until December 2001 the pure call system would have incurred a small loss of 4.7%. We have to consider that at the end of June 2000 the CAC40 was near its all time high. During the 79 weeks from from July 2000 until end of December 2001 the system would have been invested only for 30 weeks and could have gained some money during the other 49 weeks in the money market, perhaps. While „buy and hold" was always invested 100% of the time and would have made a loss of -27%.

Robust Trend Method or "Buy and Hold"?
French Stock Market Index CAC40

Time 1/99 to 12/2001 weekly scale

— "buy and hold" ······· "robust trend"
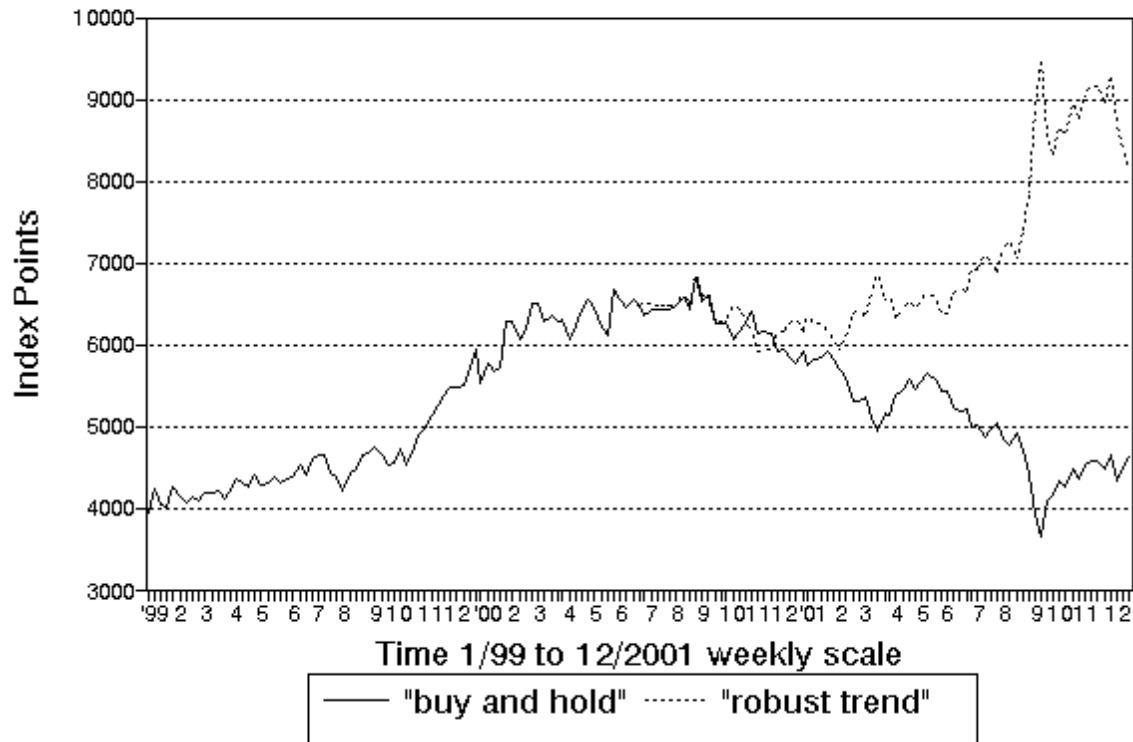
But if the system had been traded in both directions it would have made a profit of +26.5% during the same time period as opposed to a loss of -27% with „buy and hold" and all this at equal standard deviation of returns. I am well aware that looking at possible performance this way is not clean and there may have been unusually favourable conditions for the system, but at least it seems quite encouraging.

The factors used for the robust trend estimation were found without hindsight. I strictly used only the data from the first half of the series to establish the method and the second half for testing. Thus the time of July 2000 to December 2001 could be regarded as a first out of sample test. If I had only seen the CAC40 data it would not have been sufficient to convince me that the method is good, but knowing the data from the DAX makes me more confident in the matter.

For performance estimates of the method constant investment volume was assumed, as was also done for the DAX example published. Transaction costs were not considered, since they can differ widely. If getting consult is not necessary as in this example, order could be placed with discount brokers, the fees for which would lessen the gains only marginally. The long only strategy could use the proceeds of sales when being out of the stock market to get invested in the money market and thus have additional earnings as long as the robust trend suggested that stocks should be avoided.