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Investment in the German stock market DAX - low risk and good return

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In this article both returns and risks of two trading strategies for the German DAX stock market index will be presented and compared to the passive strategy ‚buy and hold'. One of the strategies dealt with here was already introduced and discussed in detail in the December issue of 2001 in 'VERSICHERUNGSWIRTSCHAFT' therefore this is a kind of follow up study for that strategy. It will be shown that this strategy can also prevail during down turns of the stock market with considerably less risk than taken with 'buy and hold' and with positive returns. The second strategy presented applies the old stock market rule: *‚sell in May and go away, but remember to be back in November'* . Risk and return for this strategy is shown for the ten year period from 1995 to 2005. Even this simple strategy was much more profitable than 'buy and hold' though taking only half the risk.

Introduction

Meanwhile the international stock markets and among them the DAX have stabilized. Frequently even new three years peaks can be observed, so stocks are rediscovered and return into the focus of investors. However the dreadful experiences of the recent past with unexpected heavy losses through investments in the stock markets are not yet forgotten. This holds particularly for those during the years of 2002 and 2003. Now, with low interests in the money and bond markets the recent returns in the stock markets look quite attractive though the fear for losses makes potential investors still hesitate. Here I would like to show, by giving two examples, that it is nevertheless possible to achieve appreciable returns in the German stock market DAX, while running comparably low risks.

The first example of a low risk investment in the stock market refers to a trading method with DAX equivalents that I have presented earlier in ‚VERSICHERUNGSWIRTSCHAFT' in the December issue of 2001. At that time the method would have been twenty years old and had fared well for more than ten years. Four years have passed since during which the DAX has lossed another ten percent of its value. Here we will look for an answer to the question if the trading systems would have done well even in an enduring down phase.

The second example of stock market investments at reduced risk refers to the old market rule: 'Sell in May and go away, but remember to be back in November'. In Germany this rule is not really popular, a misjudgement as will be observed. There have been efforts to explain why the rule would work, but I will not go further into it here.

Example I – The trading strategies presented in December 2001, applied

In the December issue of 2001 in ‚VERSICHERUNGSWIRTSCHAFT' a method was presented that allowed to invested in the German stock market while taking only low risks. The method was based on following a robust positive market trend, but leaving the market if the trend broke. The expected trend was calculated from recent price data which were suitably weighted. The weighting factors finally applied had been found using DAX prices from 1980 to 1990, with the aid of genetic algorithms. This means they were optimized using principles known from biological evolution, like random mutations, recombinations and selection according to fitness. The weighting factors once found were applied without change during the testing period from 1990 to 2001.

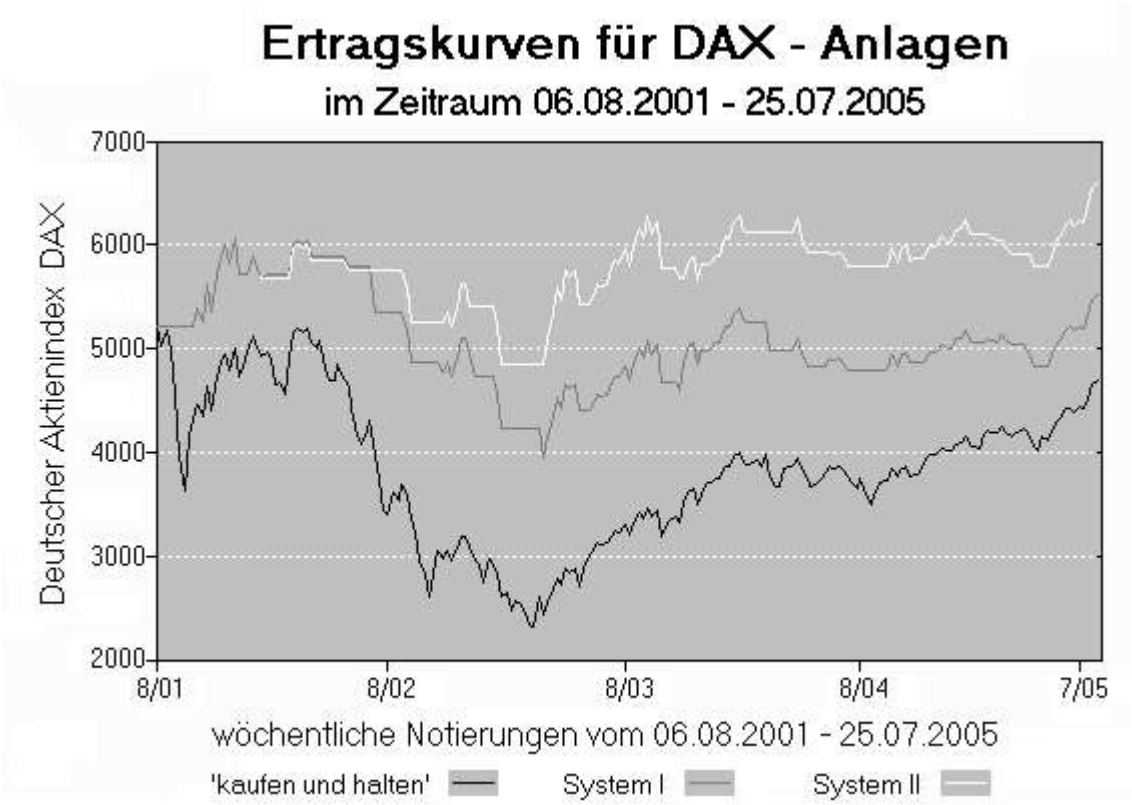
On the the basis of the robust trend a trading system could be developed which followed the simple rule: If the trend shows upward buy DAX equivalents or if already invested, stay with the market. If trend leads downward leave the market or stay outside if not previously invested.

This simple two rule method called system I, though already successful as such could be improved further, making it system II, by an additional safety rule, which was: if two subsequent false positive signals were experienced one was to leave the market and the next positive signal was to be ignored. After this break the usual rule was re-established. With this additional rule which works like a catapult seat, the system became considerably more profitable.

Though these methods would have been better than ‚buy and hold' throughout the ten years observation period, this could be no guarantee for a sustainable success in the future. Because markets are adaptable systems, the market participants take lessons from their false decisions and change their trading rules. There are rules that were successful once, but meanwhile lost their profitability, as it seems forever. A prominent example is the so called 'January effect' observed with small companies in the U.S.A.. The prices of these enterprises used to climb in January each year by about 4% as a long term average. This effect disappeared in the 1990s.

It is conceivable that the stock market in the United States is more efficient than in Germany meaning that market imbalances and over reactions would level out more quickly. This is supported by the finding that the method of the robust trend, if applied to the American S&P 500 stock market index, did not outperform 'buy and hold', at least not in times of a rising stock market. And the additional rule presented above would not help either. Maybe the American investors are better trained and use more sophisticated investment strategies than their German counter parts. Meanwhile DAX futures are traded at the EUREX and are thus more easily accessible to American investors. With their liquidity having been high for years DAX-Futures become increasingly attractive for large scale investors from beyond the Atlantic Ocean. The activities of these investors will of course influence the DAX's price movements.

Can the simple trading system for the DAX still be profitable, despite of the increasing competion? Yes, it can, as will be shown in the following figure.



As already done in the first paper in 2001, I have again taken the logarithms of prices. In order to facilitate interpretation of the data I have re-linearized them before I had the graphical representation printed. Based on the logarithms of prices, the returns and standard deviations of returns as well as accumulated losses were calculated. This is how to proceed if constant investment volumes for each time step are assumed. In this case I used weekly closes and thus a single time step represents one week. Assuming constant investment volumes has the advantage that relative risk and absolute risk become identical. In general the absolute risk is proportional to the amount of capital invested. The following example will make the advantage obvious: If with a given amount of capital a gain of 100% is obtained, only a 50% loss is needed to wipe out the previous gain. This is because the amount invested at the second time was twice as high. Vice versa a 50% loss can only be regained if one wins 100%. If one always assumes constant investment volumes, testing strategies becomes both more easy to perform and more easy to follow. If the returns in question, that is gains or losses are low, the differences between relative and absolute risk stay small, but by summing up many small amounts the differences may be considerable as becomes apparent in table 1 presented overlief.

For a private inestor it may be unusual to consider constant investment volume, since the capital growth depends largely on reinvesting capital gains. This is reasonable in case of a savings account or with government bonds, since these investment vehicles are practically without risk. That means, increasing capital amounts invested do not lead to increased risk of loss. However, if capital assets with variable returns are considered, the risk of loss has to be taken into account. Therefore with institutional investors at least it is common practise to adjust the capital amount invested to the risk involved.

Tabelle 1 **Return of investment – DAX equivalents**
Period considered 06- Aug-2001 – 25-Jul- 2005

Trading Strategy:	**‚buy and hold'**	**System I**	**System II**
Net return	-10,61% (-10,07%)	+ 5,59 % (+5,75%)	+23,56% (+26,57%)
Standard deviation	3,76%	2,26%	2,02%
Weeks invested	207/207 = 100%	119/207 = 57%	107/207 = 52%
No. of winning weeks	111/207 = 53,6%	66/119 = 55,5%	60/107 = 56,1%
No. of investment cycles	1	20	20
mean length of cycle	207 Wochen	5,95 Wochen	5,35 Wochen
No. of transactions	2	39	39

We can read from the table that the DAX lost during the observation period, while the trading systems could harvest a profit. The row headed net return contains two values each per cell. The first of which refers to constant investment volume, while the second value, given in brackets, refers to reinvested capital returns. The two trading strategies outperformed 'buy and hold' also in terms of risk as can be read from the standard deviation of returns. The lower risk is owed to the fact that the trading strategies would have been invested only a little more than half of the time. Noteworthy are the numbers for winning weeks of the three strategies.The method ‘buy and hold’ would have been right to invest in DAX equivalents in 53.6% of the decisions, nevertheless this strategy would have lead to an overall loss. While the two other strategies were only marginally better in terms of the number of correct decisions, they have been successful. This contradicts the famous advertisement of DEUTSCHE BANK during 2004: saying (translated into English): “Success is the sum of correct decisions.” (original text: “Erfolg ist die Summe richtiger Entscheidungen.”)

The calculation of returns did not consider transaction costs or dividends. Transaction costs with discount brokers are rather low and dividends of DAX noted companies used to be about 1,5% on the average. But since possible gains in the money market during times not invested in the stock market were likewise not taken into account, the calculation seems not to be biased in favour of either strategy.

While table 1 focuses on returns, table 2 emphasizes the risks of the different investment strategies. As risk measures several criteria are in constant use, one of which is the standard deviation of returns, others are the biggest single loss and the biggest accumulated loss. Risk is considered proportional to these measures. The accumulated loss deserves thorough consideration since it shows how long loss periods can be and how much loss can accumulate in those times. From this measure one con calculate the capital requirements for a given trading strategy.

Tabelle 2 **Risks of different investment strategies**

investing in DAX-equivalents from 06- Aug-2001 to 25-Jul-2005

investment strategy	**‚buy and hold'**	**System I**	**System II**
Biggest single loss	-13,92%	-8,18%	-7,36%
5 weeks accumulated loss	-32,10%	-11,11%	-11,11%
10 weeks „ „	-36,10%	-18,74%	-14,58%
15 weeks „ „	-44,41%	-19,22%	-14,58%
20 weeks „ „	-61,80%	-20,26%	-11,04%
25 weeks „ „	-64,80%	-23,26%	-17,14%
30 weeks „ „	-68,02%	-31,45%	-17,14%
40 weeks „ „	-68,38%	-38,87%	-18,80%
50 weeks „ „	-80,90%	-40,53%	-21,44%
60 weeks „ „	-76,20%	-37,38%	-22,12%
70 weeks „ „	-71,46%	-42,25%	-21,19%

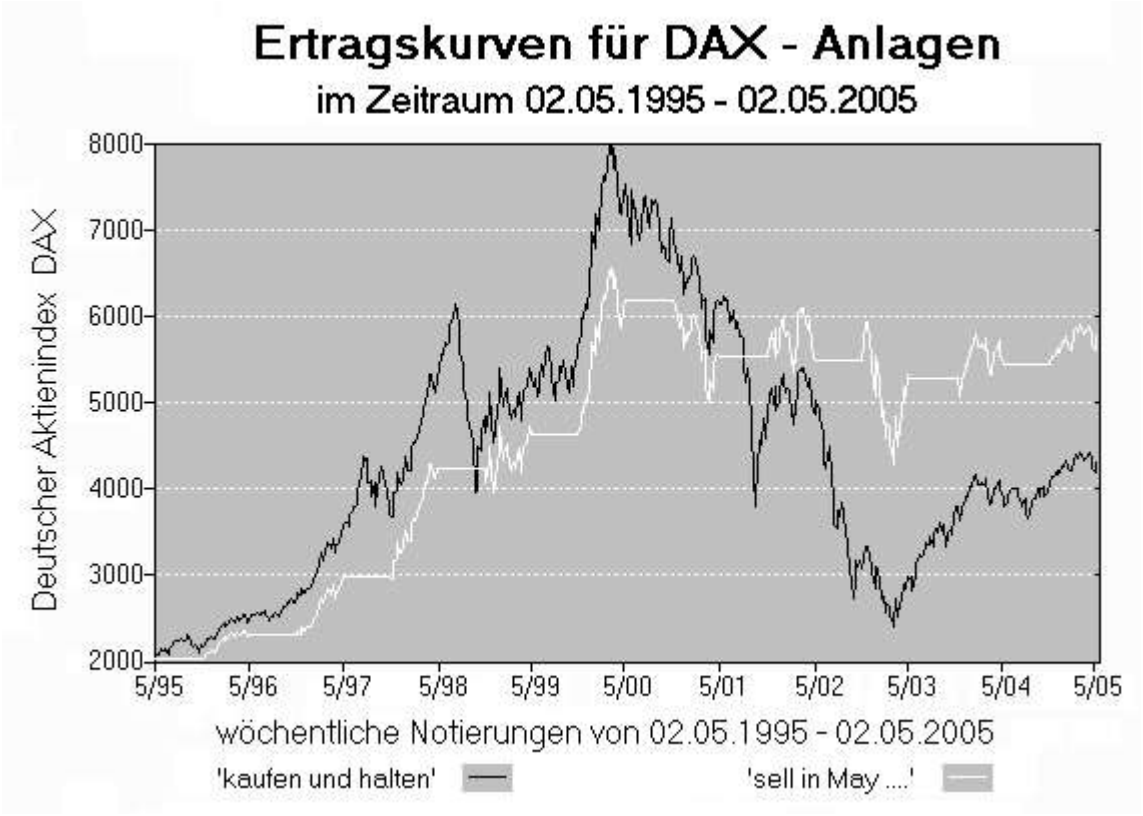
Table 2 shows impressively that trading systems may have considerably lower risk measures than passive investment following the 'buy and hold' rule. The very high risk readings occur because constant investment volume was assumed, which is inadequate for 'buy and hold', since with buy and hold the investment amount becomes automatically less in losing times. Therefore the maximum loss during the observation period was 55.9% which is the difference from the peak of 5433.49 on 6th August 2001 to the trough of 2398,11 on 17th March 2003. The tables do not show every possible outcome, but I have looked at all of them. Therefore I can confirm that the values given are representative. After 70 weeks the risks start diminishing, however this holds true only for the observation period mentioned above. One should bear in mind that the absolute peak of the DAX on a weekly close was on 10th March 2000 at 7975,95 points compared to that value the trough on 17th March 2003 was 105 weeks later and the maximum loss was about 70%. The data given in the table suffice as points of orientation for the sizes of risks to prepare for and also for the relative risk one would have to face with different trading strategies.

In summarizing it may be said that the method of the robust trend is still successful if applied to trading with German DAX-equivalents. At the same time the investment risk was considerably lower than that taken with the alternative strategy 'buy and hold'. The additional safety rule of system II was particularly useful to prevent losses in times when the DAX went downwards. As table 1 shows it is not sufficient to make the right decision most of the time. The rational for this is that in this investment environment the average single loss is bigger than the average single gain.

Example II - following the rule „sell in May and go away ....be back in November“

To follow this rule on the basis of weekly closes, as done here, DAX-equivalents are bought on the first November weekend at the close. These are sold on the first May weekend at the close. This procedure will be repeated every year. The money would be invested in the stock market for just half a year and during the other half it could be invested in the money market.

The usefulness of the rule is investigated over a ten year period and is compared to the method ‘buy and hold’ precisely from the beginning of May in 1995 until the beginning of May in 2005.



In the figure above the return curves of both trading strategies are shown. The black line represents 'buy and hold', while the white line shows ‘sell in May …’. It is easily recognized because it regularly shows horizontal lines which start in May each year and go on until October. These horizontal lines represent the time when the strategies is out of the market. Furthermore it can be seen that during a strong upward trend (bull market) of the DAX ‘sell in May …’ will stay somewhat behind. The merit of this strategy becomes apparent in a downward trend (bear market). While the DAX slides incessantly ‘sell in May …’ takes a pause and thus cuts the losses. Obviously there is a seasonal influence exploited by this strategy. The gains missed are outnumbered by the losses not taken.

The impression given by the figure receives further support from the following tables.

Tabelle 3 - **Return of investment in DAX equivalents**
Investment period 02-May-1995 until 02-May-2005

Trading strategies:	**‚buy and hold'**	**‚Sell in May ... in November'**
Total return	+75% (+113%)	+ 101% (+175%)
Standard deviation	3,34%	2,17%
Average anual return	7,56%	10,15%
Time invested (weeks)	522/522 = 100%	261/522 = 50%
No. of winning weeks	292/522 = 55,9%	153/261 = 58,6%
Investment cycles	1	10
Transactions	2	20

Table 3 shows that the rule ‚sell in May ...' is superior to the passive strategy 'buy and hold' this is true not only with respect to total return but also in terms of standard deviation of returns. The performance was calculated assuming constant investment volume. The values given in brackets refer to reinvested returns. Both strategies made the right decision in the majority of cases, but 'sell in May …' was better in this respect. As in table 1 for the first example of low risk investment, transaction costs, dividends and possible money market returns were not considered here.

However returns are just one side of an investment decision, risk is the other. Here we are interested, how much risk was involved in the returns obtained. Institutional investors pay attention to the SHARPE-ratio of an investment, that is the total return devided by the standard deviation of returns. This formula should be used to compare returns obtained with different standard deviations, that is risks. If this formula is applied, the advantage of 'sell in May …' over 'buy and hold' is even more impressive.

Table 4 **Investment risks of trading strategies in DAX-equivalents**
Observation period 02-May-1995 until 02-May-2005

Trading strategy	**‚buy and hold'**	**‚sell in May ..in November'**
Biggest single loss	-14,07%	- 8,36%
5 weeks accumulated loss	-32,12%	-18,55%
10 weeks „ „	-44,80%	-25,64%
15 weeks „ „	-49,08%	-32,33%
20 weeks „ „	-61,80%	-24,78%
25 weeks „ „	-64,80%	-24,78%
30 weeks „ „	-68,02%	-24,78%
40 weeks „ „	-68,32%	-24,78%
50 weeks „ „	-80,90%	-35,02%
60 weeks „ „	-76,19%	-30,32%
70 weeks „ „	-81,37%	-25,58%
80 weeks „ „	-80,60%	-25,57%
90 weeks „ „	-90,52%	-25,56%
100 weeks „ „	-96,54%	-23,28%

The empirical risk of losses using ‚sell in May ...' is compared with that of the passive investment strategy ‚buy and hold'. Table 4 shows biggest single losses and accumulated losses over several periods. The high numbers for 'buy and hold' are due to the assumption that constant investment volume would be applied. As already said in the previous section,

this does not apply to 'buy and hold'. But the true maximum accumulated loss of 70% is terrible enough. Again ‘sell in May …’ is superior to ‘buy and hold’. This table suggests that 'buy and hold' cannot be recommended with good conscience. Moreover it shows that the old rule 'sell in May ...' deserves more attention than is commonly paid to it, because it is more profitable and considerably less risky than the passive investment according to 'buy and hold'.

To summarize, the simple rule 'sell in May ...' if applied consequently may lower the risk of investment in the stock market considerably as compared to the passive 'buy and hold' strategy. Nevertheless 'sell in May...' takes the lion share of the upward moves and thus gains considerably in those times. You would probably like to know how 'sell in May ...' has fared during the observation period chosen for the first example presented here, that is from 6th August 2001 to 25th July 2005. Though it could be estimated from the graph, it would be somewhat imprecise. Therefore to state it clearly, better than the DAX. The gains would have been modest, just 0.9% but one could have had additional earnings in the money market and one would have avoided the major part of the nerve shaking down turn in 2002.

If you have questions, you can contact the author under the email address

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