

# BACHELOR DEGREE PROJECT

## Behavioural Finance - The psychological impact and overconfidence in financial markets

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# **Abstract**

## **Title**

Behavioural finance

*-The psychological impact and overconfidence in financial markets*

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## **Purpose**

The main purpose of this paper is to investigate overconfidence and over-optimism in the market. This leads the reader to the question, are the analysts “right” concerning their forecasts? The reader will also get to understand various and sometimes forgotten factors that affect we human beings in our decision making when it comes to investing and analysing which is also known as the behavioural finance theory.

## **Conclusion**

According to the results from my tests it seems that analysts of the S&P500 are exaggerated by the problem of overconfidence and the over-optimistic biases. The analysis part of this study is confirming the discussed theory of anchoring and herding. Analysts tend to “follow the stream”, by evaluate the standard deviations between forecasts and the realized outcome, as well as the indexed analysts’ consensus estimations for twenty-four months of EPS.

## **Key words**

Behavioural finance, Overconfidence, Over-optimism, Cognitive psychology, Irrational markets and Econophysics.

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# 1 Introduction

Behavioural finance applies concepts from other social sciences such as anthropology, sociology and particularly psychology to understand the behaviour of securities prices, Mishkin (2007). The theory also questions the efficient market theory. Instead, behavioural finance assumes the opposite that financial participants might not always behave rationally in the market. In the theory and in this paper it is important to remember the differences for a private investor and a professional in their behavioural biases and how it tends to affect us in our decision making. We can assume that a professional is less affected by behavioural biases than a private investor owing to the professional having more experience in the market.

As we will discuss in the text, an investor may intend to be rational and may try to optimize his actions, but that rationality tends to be hampered by several behavioural biases, such as *cognitive errors, emotions, herding, overconfidence and over-optimistic*. Corcos A., Eckmann J-P., Malaspinas A., Malevergne Y. and Sornette D. (2004).

Reading this paper gives the reader a good view of the psychology of the market participants such as investors, traders and analysts acting in the financial markets all over the world. Some of the behavioural finance theory factors which are illustrated in this study can partly explain the outcome for different happenings, such as human biases which result in upcoming bubbles and crashes in the markets.

Based on these human biases and irrational behaviour this study examines the big problem of overconfidence and over-optimistic biases in the market participants around the world. We will, in the science part of this paper analyze the consensus analysts' capability of predicting companies' future growth of profit, looking per annual, and their estimates of EPS. This is an ongoing study of Löffler G (1998) and Malin (2008) what they have found in their research of analysts'.

As the behavioural finance theory can partly explain why the existents of bubbles and crashes have occurred in the past. I dare to assert that this will happen in the future again. Agreeing with Mr. Alan Greenspan, former chairman of the Federal reserve of USA saying:

*“Human behavior is a main factor in how markets act. Indeed, sometimes markets act quickly, violently with little warning. [. . .] Ultimately, history tells us that there will be a correction of some significant dimension. I have no doubt that, human nature being what it is, that it is going to happen again and again.”* Before the committee on banking and financial services, U.S. house of representatives on July 24, 1998.

## **1.1 Problem**

This study will do some research in the question: Are the analysts overconfident and over-optimistic in their predictions? I have studied data summarizing the last twenty-two years of the consensus expectations of the companies of S&P500 and their growth percentage in profit per twelve months ahead in time and comparing these forecasts with the realized outcome. And also data showing a summary of consensus analysts twenty-four months expectations for companies EPS, earnings per share, at S&P500.

With support of this data I will in this study do some research to test two null hypotheses. The first  $H_0$ : The consensus analysts are correct in their 12 months forecasts. To test if the analysts are overconfident and over-optimistic in their forecasts of the estimation in growth of company profits?

Second  $H_0$ : Analysts are the same in their mean estimates of EPS at time  $t-0$  as  $t-24$ . Whether to test if analysts' are statistically always too optimistic in their forecasts and so have to downgrade their estimates.

## **1.2 Purpose**

The main purpose of this paper is to investigate overconfidence and over-optimism in the market. This leads the reader to the question, are the analysts “right” concerning their forecasts? The reader will also get to understand various and sometimes forgotten factors that affect we human beings in our decision making when it comes to investing and analysing. This causes us, occasionally without being aware of it, to act irrational when it comes to investing. Added to this research, the study will present some conclusions of how to avoid being fooled by human biases.

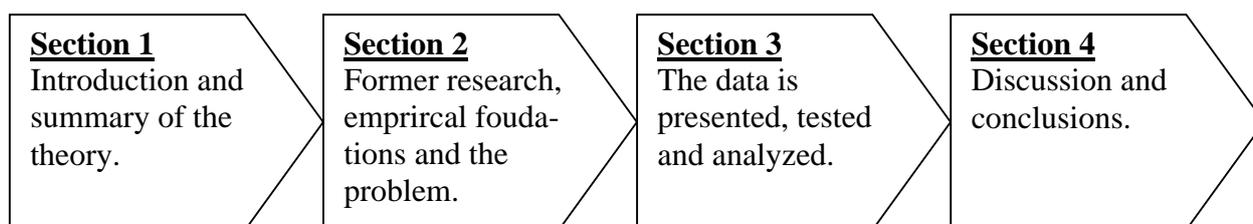
### **1.3 Limitations of the study**

Readers of this paper will understand that behavioural finance is a very big area, *Figure 1: Overview and classification of behavioural finance*. So I am specializing in the overconfident and over-optimistic problem by the analysts which are predicting the discounted future earnings for the companies at S&P500.

## **2 Method**

The scientific method of the research is a quantitative back-testing exercise method based on historic data taken from IBES, Institutional Brokers' Estimate System. The data is a summary of consensus expected growth of profits for the companies at S&P500 for the upcoming 12 months, compared with the realized outcome for the period February 1986 to April 2008, see Appendix 4,5 and 6. We will also study data from the analysts progress of monthly expectations for EPS, earnings per share, per annual from t-24 to t-0. During the period of 1986 to 2001, Appendix 1, 2 and 3. Thereafter we will analyze the material with the Wilcoxon signed ranks test in SPSS, Statistical Package for the Social Sciences, and also using the computer program Minitab.

## **3 Outline**



Section one gives the reader a widely overlooking introduction to the behavioural finance theory. In section two the paper will specialize with theoretical and empirical reference frame about the overconfident and over-optimistic problems. The so far existing theory in overconfidence which has an influence on this study is research from the scientists DeBondt, Thaler, Kahneman and Tversky. Some empirical work in this area is made by Chuang and Lee (2006), Löffler (1998), Friesen and Weller (2006) and Malin (2008).

Löffler (1998) studied several human biases on a large sample of individual analysts and their earning forecasts at the German market. He found that violations of forecast rationality are more likely to stem from overconfidence and underreaction.

In the third section we examine the problem with support from the data, in Appendix 1 and 4. I will empirically try to explain the behavioural finance problem of overconfidence and over-optimistic biases on analysts. The source for the data material is from IBES.

What I will add to the prior findings is to analyse the analysts, by running some back-tests of historical data. With the two following hypotheses:

The first hypothesis:

$H_0$ : The consensus analysts are correct in their 12 months forecasts.

$H_a$ : The consensus analysts are wrong in their 12 months forecasts.

The second hypothesis:

$H_0$ : Analysts are the same in their mean estimates of EPS at time  $t-0$  as  $t-24$ .

$H_a$ : Analysts have always too high expectations of EPS at time  $t-0$  as  $t-24$ .

The data-processing in the study uses the program SPSS and Minitab. I have analyzed the data with a Wilcoxon signed ranks test, Körner and Wahlgren (2006).

Finally in section four it contains the conclusions and discussion. I use the Wilcoxon's signed ranks test to determine the hypotheses whether there are a significant difference at the level of 5% in the data material of forecasts and realized outcome. With confidence of 95% certainty this study can prove that it exists a significant difference and the both  $H_0$  can be rejected. Thus analysts are not really good at their job which they are doing. Based on the results, the conclusion is they do not statistically hit their mean forecasting estimations correctly compared with the realized outcome.

## Section 1

### **4 Behavioural Finance**

Behavioural finance theory can explain partly why share prices and markets sometimes are very volatile and over-/underreact to information. Behavioural finance also argues that the sprawling literature on trading strategies has missed a larger and more important point by overlooking the first implication of efficient markets – the correctness of security prices. Conventional theories presume that investors are rational, behavioural finance starts with the assumption that they might not be according to Bodie, Kane and Marcus (2007). What the traditional theories and models such as CAPM neglect to take into account is that the markets actually are affected by psychology and human biases when setting security prices.

Kahneman and Tversky with co-workers have added several studies to this theory and two very important ones are *Judgment under uncertainty* (1974) and *Frames and brains* (2007). These papers explain, with statistical support, some experiments made on human beings and our cognitive biases. A cognitive bias means that we have mental errors which are emanated by our simplified information processing strategies. When acting and making decisions under uncertainty we often fail to see the probabilities. Various parts of the behavioural finance theory, sometimes called as the base of the theory, belongs to the cognitive bias such as *anchoring, framing, hindsight bias* as we will discuss further down in this paper.

Behavioural finance theory can be categorized in different ways. One way to look at the map of behavioural finance is to sort all the concepts into four different groups of biases. As the authors of the Behavioural finance compendium (2004) issued by Dresdner Kleinwort Wasserstein has chosen to do in the figure below, Appendix 17.

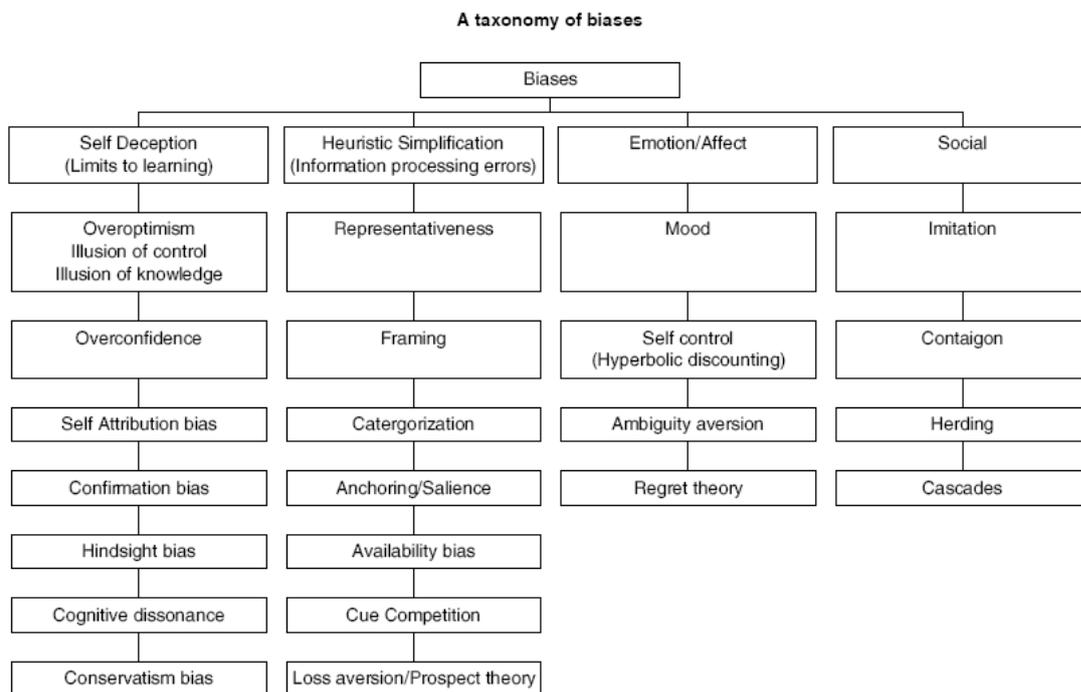


Figure 1: Overview and classification of behavioural finance.

But we will here in this paper roughly split the material in three different groups of theories instead. The first out is *information processing* (4.1), the second one is *behavioural biases* (4.2) and the final one is *limits to arbitrage* (4.3). According to Bodie, Kane and Marcus (2007). And then I have added some additional effort to get a good overview of the topic. Let us now roughly look at these three parts one by one.

## 4.1 Information processing

Refers to investor and analyst errors in information processing and can lead to misestimate the true probabilities of possible events or associated rates of return. Several such human biases have been discovered in science. Let us now discuss some of them.

### 4.1.1 Forecasting errors

First one is *anchoring*, which belongs to the cognitive bias of the human being. Basically anchoring implies that we rely too heavily on old information or attach only one variable that may affect a stocks price. People tend to ignore the reality. Also, several experiments by Kahneman and Tversky have added some research to this area.

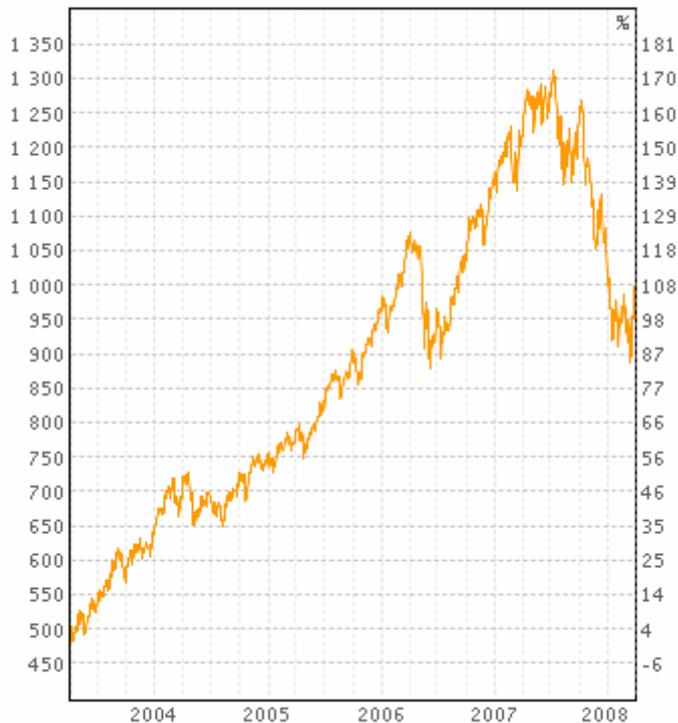


Figure 2: The OMX Stockholm 30 index, 2003-04 to 2008-04, source Swedbank.

As can be read from the graph of the Swedish index, OMX Stockholm 30, an index of the 30 biggest companies listed on the Stockholm stock exchange market. As an example people still tend to *anchoring* values at the highest level of the index, around 1300, Behavioural finance compendium (2004) pp.54-55. Even though it is not that relevant any longer when new information have hit the market summer of 2007. This time the credit turbulence in the American credit market collapsed, the so called subprime credit problems.

Another forecasting error is if analyst's *error in forecasting* discounted future cash flows of a firm. The expected P/E ratio tends to be "too high" only based on historic performance. What we also would need to add into account, but unfortunately we never do, is that unexpected possibilities might occur. As Taleb's name for the unexpected and rare events, *the black swan*. However, the forecast will be too optimistic and if the firm does not reach up to the expected cash flow or profit at the annual account, this tends to be a poor investment. Research from DeBondt and Thaler (1990) added with some thoughts from Taleb (2005).

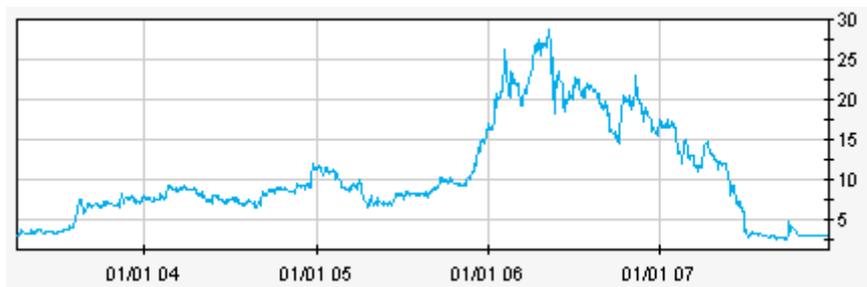


Figure 3: The Scan Mining stock. Former listed on OMX Stockholm and recently went bankrupt, source Nordnet.

Scan Mining, a prospect company former listed on the Stockholm stock exchange market, is a good example of a *forecasting error*. Just look at the figure above and you can first see a radical rise in the stocks value as a result of mineral findings. But soon the market realized its mistake in valuation and discounted it there after. And on November the 15<sup>th</sup> 2007 the company went out of business because of poor liquid assets. For this kind of happenings Taleb (2007) use the expression “one thousand and one night”. Important to remember here is that this example is a prospect company which in a very high grade is valued at expectations of future discounted earnings.

#### 4.1.2 Conservatism

A conservatism bias means that investors are too slow in updating their beliefs in response to new information. It also goes against the theory of efficient markets. In the very readable book of C-G Gyllenram *a speculators psychology* (2004), he suggests that an investor needs to realize that if the market has changed, one needs to change as well and not stick to old information any longer, and as he explains, do not shut your eyes to the reality.

#### 4.1.3 Overconfidence

To look further on forecasting error is that the theory suggests that stock analysts and investors tend to overestimate the precision of their forecast and beliefs. The analyze section of this paper will study this problem closer. People have a tendency to only see the upside of a stock, not the down side, or fail to take into account the probability of a negative outcome. The premise of investor overconfidence is derived from a large body of evidence from cognitive psychological experiments and surveys, which shows that individuals overestimate their own abilities too much and separate the private information with public information. Thaler (2005) express himself in his book that if an investor is overconfident in his ability to

generate information, or to identify the significance of existing data that others neglect, he will underestimate his forecast errors.

If investors are overconfident, they overreact to private information and underreact to public information, Chuang and Lee (2006). This brings us on to the over- and underreaction problems that we will examine and analyze later in this paper.

#### **4.1.4 Sample size neglect and representativeness**

The last problem in information processing is that analysts might let a small sample test represent too large of a population. As the Bodie, Kane and Marcus (2007) literature describes it: “They may therefore infer a pattern too quickly based on a small sample and extrapolate apparent trends too far into the future. It is easy to see how such pattern would be consistent with overreaction and correction anomalies”.

For instance, a small firm has shown really good profit growth over the last year. Analysts and investors will predict same growth in the future and discount the stock’s value thereafter. This will generate a price run-up of the stock. But this is only a small sample of the firms’ history. If the firm shows worse growth when the next annual account is presented the market will correct its stock price immediately, proving that the analysts and investors initial beliefs were too extreme. These are based on research from the *representative heuristic theory*, Kahneman and Tversky (1972).

## **4.2 Behavioural biases**

The second section in this paper’s classification of behavioural finance according to Bodie, Kane and Marcus (2007) is behavioural biases. It deals with the fact that even if information processing were perfect, many studies conclude that individuals would tend to make less-than-fully rational decisions using that information. These behavioural biases largely affect how investors frame questions of risk versus return, and therefore make risk-return trade-offs.

### **4.2.1 Framing**

Decisions are often affected by how information is framed. People tend to be less risk averse, an investor who dislikes risk (investopedia.com), in terms of gains but may be risk seeking in terms of losses. We will look at an example which gives a good overview, taken from the book Bodie, Kane and Marcus (2007). An individual may reject a bet when it is posed in

terms of risk surrounding possible gains, but may accept that same bet when described in terms of the risk surrounding potential losses. Another way of framing is the different ways of presenting the firms annual accounts even when they are all using the FASB's rules. Firms' accountants are able to present the figures so they are perceived advantageously. One good example of framing is the Enron scandal, I believe just to name that company's name is enough to understand the word 'framing'.

#### **4.2.2 Mental accounting**

Faces the classical fact that behavioural investors are reluctant to realize losses, selling winner stocks too early and staying with the loser too long, a framework from Sheferin and Statman (1985). Also, investors often like to focus on gains or losses of the individual stock, rather than on the portfolio as a whole. Under this headline we can also examine the way people think who win money at the casino, they do not perceive it as being their money, so they take on more risky bets. A Comparative event is when after a longer bullish stock market, investors' take on more risk from the capital gain. This is one of the reasons why a bubble escalates which can look like a trend, we will further discuss this event more later on in the text.

#### **4.2.3 Regret avoidance**

Psychologists have found that investors who buy positions that turn out badly regret themselves more when that position taking was more unconventional. Buying a small unknown stock that turns out with a bad outcome is more difficult to handle than losing money on a well-known major company, now it is easier to attribute bad luck to the investment. Besides, when it is a well-known big company and many other shareholders lose money on it as well, it is easier for the human brain to deal with. That is the "not-only-me" way of thinking which is hard weird into the human consciousness. To interpret from the book "Fooled by randomness" by Taleb (2005).

#### **4.2.4 Prospect theory**

Prospect theory is the theory about our way of thinking when wealth increases or decreases and our behaviour to risk. For example, a risk aversion investor, if his income gains with \$1000, his utility increases by less than a loss of \$1000 reduces utility. People tend to become less risk averse as wealth increases. Further recommended reading on Trepel, Fox and Poldrack (2005).

### **4.3 Limits to arbitrage**

Behavioural biases would not matter for stock pricing if rational arbitrageurs could fully exploit the mistakes of behavioural investors. Trades of profit-seeking investors and traders would correct any mispriced securities Bodie, Kane and Marcus (2007). This concludes that several factors exist which limit the ability to make arbitrage profits. And as a result, no efficient market exists either. Limits to arbitrage are together with cognitive science, one of the two building blocks of behavioural finance Thaler (2005).

#### **4.3.1 Fundamental risk**

One of the factors is fundamental risk, which assumes that share prices at the moment are very “cheap” and prices should eventually reach the fundamental value of the stock. But this may take long time. If we are talking about for example a fund manager or a trader, they would not yet buy the stock. Why? Just because it is still a risky downside underlying for the stock. He has to think about losing clients and of course his job if the short-term performance is poor. These events, “to act before the market corrects”, are presumably limiting the opportunity of arbitrage. Also, and this is called *the implementation cost*, big actors in the market such as mutual funds have very strict limits in their daily trading. These implement to shortening stocks and there are often certain rules which must be followed with regards to trading the fund which have been set up at the starting point, with hedge funds and quant funds being exempt.

## **5 Further concepts**

We will now go on to discuss some other areas of the behavioural finance theory.

### **5.1 Volatility**

The volatility can be defined as the standard deviation of the return provided by underlying asset per annum when the return is expressed using continuous compounding. At the macro level, cash flows for stocks can be approximated by GDP. So that variations in the volatility of GDP can partly translate into stock volatility. Stock volatility is negatively correlated to firm profitability and positively related to leverage and uncertainty. The uncertainty in economic variables influences the volatility in a very high grade. People tend to be more risk-averse during recessions, thus gives the market volatility positively related with recessions.

According to a study released by BIS, Bank for International Settlements, *The recent behaviour of financial market volatility* (2006).

Let us look at an example Taleb (2005) about a dentist who does not suffer so much from volatility in his income from his ordinary work. He starts to invest in a portfolio of T-bills and expect to earn a return of 15%, with a 10% error rate per annum (volatility). (As we all know T-bills at a return of 15% cannot be found these days but we use this only as an example). So, out of 100 sample paths, we expect close to 68 of them to fall within a band of +/- 10% around the 15% excess return, between 5% and 25%. Assume normal distribution has 68% of all observations falling between -1 and 1 standard deviations. Gives 95 sample paths falling between -5% and 35%. This looks relatively as a good deal to enter with positive outcome and with the probability in his favour. But when looking at the investment in another time scale other than yearly basis we get:

Scale	Probability
1 year	93%
1 quarter	77%
1 month	67%
1 day	54%
1 hour	51.3%
1 minute	50.17%
1 second	50.02%

*Table 1: Probability of success at different time scales.*

Clearly the dentist should not monitor the screen too much in the short run, science has a name for this long term investors who act as an day trader namely “screenoholics” (C-G Gyllenram). What also Nassim Nicholas Taleb means, what is important here, is to not mix volatility together with return, Appendix 21: *Table of confusion*. We can also assume that it is very difficult to face a volatile market and its challenges on our behaviour and emotions.

## **5.2 Overreaction and Underreaction**

Experimented and named as *the representativeness bias*, a work from the two well known professors of cognitive psychology, Kahneman and Tversky.

### **5.2.1 Overreaction**

This is one outcome of *overconfidence* (4.1.3), as we discussed earlier in information processing. One has no belief in the possibility of a bear market outcome at a specified

moment. This is also one consequence of the result of “bubbles” being made as we will modestly discuss later. Overconfidence is also people’s tendency to attribute success to skills but failures to bad luck/randomness, Appendix 21: *Table of confusion*.



Figure 4: An overreaction of Sensys traffic’s stock performance with 3 years history, source Swedbank.

In the graph we can see the performance of the Swedish company Sensys traffic’s share price in the market with a history of three years. We can clearly see how the share price is booming according to positive information, but weakening shortly thereafter again due to an overreaction in the market. This was due to analysts and investors realizing that the expected growth for the company could not be sustained any longer.

A gain in the market for a specific time tends to make investors overconfident and thus trade more aggressively. Without being aware of it, investors take on more and more risks, thus underestimating the risk in the underlying assets, Chuang and Lee (2006).

Overreaction in another sense than changes in share prices, is that journalists are likely to go to the extremes when it comes to breaking news. And there is a good explanation here, of course newspapers want our attention and thus rise selling. Taleb (2005) even goes so far as calling

journalists “monkeys on typewriters”. In one way it makes sense, because this affects investor’s behaviour in some serious ways.

### **5.2.2 Underreaction**

The *conservatism* problem leads us to an *underreaction*, that individuals adjust their beliefs too slowly when new information hits the market. An example concerning earnings surprises may well illustrate this underreaction. Prices rise slowly following announcements of positive earnings surprises. Announcements of negative surprises have a similar, but opposite, reaction Ross, Westerfield and Jaffe (2005). Behavioural finance distinguishes this result from a different point of view than the efficient market hypothesis theory does. Fama (1998) is criticising the behavioural finance framework in his paper *Market efficiency, Long-Term Returns and Behavioural Finance*. He argues that behavioural finance must do better at specifying which types of information should lead to overreaction and underreaction, before we reject market efficiency in favour of behavioural finance.

## **5.3 Rational or Irrational investors**

We will soon look at “our emotions” which is connected to our actions thus it affects us in different ways. When it comes to decision making our emotions will led us to act rational or irrational in the market whether or not we are aware of the risk.

What do we mean by rational or irrational? The literature definition of a rational investor is a person who acts in a certain “right” way, given all information known in the market according to Efficient Market Hypothesis, EMH. To give a perfect example of the opposite, irrational, behaviour is the fact that people smoke even though they are fully aware that it will kill them.

It is a fact that our brain tends to go for superficial clues when it comes to risk and probability these clues being largely determined by what emotions they elicit or the ease with which they come to mind Taleb (2007). The behaviour of investors depends very much on in what mood the markets are in. As we discussed earlier, if the market is very volatile and heaps of information and statistics bombards the market at same time with different results. It is very difficult to act rational in such a market.

In addition to such problems with the perception of risk, it is also a scientific fact, and a shocking one, that both risk detection and risk avoidance are not mediated in the “thinking”

part of the brain but largely in the emotional one the “risk as feelings” theory, Taleb (2007). What Nassim means is that rational thinking has little, very little, to do with risk avoidance. Much of what rational thinking seems to do is rationalize one’s actions by fitting logic to them.

C-G Gyllenram (2004) has written about these mistakes in his book, he gives some examples of mental traps investors can suffer from and thus lead to irrational behaviour. To begin with, acting against the trend is to commit financial suicide. Secondly, as also can be placed in the overconfident box, is when investors let the “ego” take over rationality, thinking “I am right the market is wrong”. This is actually extremely irrational and one faces much more risk without being aware of it.

## **5.4 Our emotions**

Cognitive psychologists suggest when it comes to thinking we can divide our brains into two parts:

**The X-system** and this is the emotional part of the brain. Focuses on emotional decisions and it also loves stories. It deals with information in an associative way. And judgements tend to be based on similarity and closeness in time. The way it deals with information makes it possible to handle a vast amount of information at the same time.

**The C-system** is the more “Vulcan” one and prefers facts over fantasy. It is logical and deductive in the way it handles information. But it can only handle one problem at a time, this makes it slower when thinking. In order to convince the C-system that something is true, logical argument and empirical facts are needed.

A good example for the differences between the two parts in our brain is to imagine when you drive a car to a new place for the first time and must concentrate on where you are going, in this case you are using *the C-system*. But after driving the same route several times you can travel without any conscious thought as to where you are going. Now you are using *the X-system*. You have transferred from a C-system to an X-system. Unfortunately we are more likely to use the X-system, the default one, for investment decisions. Behavioural finance compendium (2004), see Appendix 19.

Look at the above example of the dentist regarding volatility and the “noise” from media in the short term. He became very emotional by looking daily at the stock screen. As science has discovered about our human behaviour is that a relatively small loss affecting emotions negatively in a higher degree than a big rate of return makes us happy Taleb (2005).

For instance, Person one is gambling and is up \$100 000 but loses more than half of the win and is cashing out with \$40 000 in profit. It is difficult for our brains to not be affected from the “loss” of \$60 000 before cashing in. Person two who is also gambling, but wins \$40 000 on a lottery straight away will feel much more pleasure than person one. The same behaviour can be applied to share holding. We can assume that person one will act in a more conservative way after his/her experience and person two may take on more risky bets with this money.

Another emotional problem when owning stocks is the problem called “married with the position”. As an investor it is not good to have too strong feelings for a company even though it may seem very interesting. “Loyalty to ideas is not a good thing for traders” Taleb (2007). Let us add here the ongoing science about analysts and their meetings with corporate managements, the discussion deals with if and how analysts who set buy or sell recommendations for companies is affected by emotions for the company they monitor.

A similar problem can also be made if, for instance, the difference between a trader and an investor is the duration of the bet. So the emotional problem here is for example for a trader. When strict rules as a stop-loss (5.7.2), in *Solutions and cure* further down in the text, before a bet is striking and the trader still does not sell the stock, he/she is forced to get married to the position. He or she does not want to realize a loss and thus becomes an investor instead. This was not the purpose of the trade in the beginning.

When our emotions make financial investing decisions and a burst of self-discipline, it might get very dangerous to act in the market and much can go wrong. To deal with this problem C-G Gyllenram has put up some suggested directions to follow for private investors, as we will have a look at in the chapter *Solutions and cure* (5.7.2), C-G Gyllenram (2004), Appendix 20.

## **5.5 Some more basic mistakes**

### **5.5.1 Hindsight bias**

- “It was so obvious”.

The outcome from history is only one outcome from many other possibilities and may not have been the most probabilistic outcome before the fact. But after the fact it is so predictable. This is what Taleb (2005) means by randomness and to not to be aware of the probabilities. Hindsight bias is an important element of investor regret, Kahneman and Riepe (1999).

### **5.5.2 Following the stream**

Investors and analysts especially, tend to follow “the stream”. This is in science called the *herding problem*. Why herding? Because it is better to be part of the horde, than stick out and bet against the market and possibly be the only one to fail. Hence there will be bigger consequences if alone, and also again, the gain if successful is smaller than the loss if the outcome is failure. If we look back in the text we can refer this problem to the Limits to arbitrage (4.3) and fundamental risk (4.3.1). Why analysts are affected by herding is because they have their carrier and reputation to care about.

## **5.6 Bubbles**

Many of these findings which have been discussed so far in the text lead us to the human behaviour and its biases, which have historically and probably will again in the future, create bubbles in the financial markets. This is strongly connected with the human biases as explained earlier in the text. Such as *overconfidence bias*, *irrational investors*, *overreaction*, *our lack in understanding probabilities* and the tendency to listen to our *emotions*, instead of acting rationally on information. Investors and analysts tend to overestimate expected future discounted cash flows too high based only on beliefs, as we will test and discuss in section three. See Appendix 21 *Belief vs. Knowledge*.

This is how we can define a bubble: Stocks are valued on discounted future income in a very high grade and way too high above the shares fundamental intrinsic value. Unfortunately we will have to stop discussing bubbles here as we are specializing in behavioural finance and the problem with overconfidence and over-optimistic biases, even though bubbles and crashes are important outcomes of our human behavioural biases.

## **5.7 Solutions and Cure**

Taleb (2005) says: "I am convinced of that after spending almost all my adult and professional years in a fierce fight between my brain (not fooled by randomness) and my emotions (completely fooled by randomness) in which the only success I have had is in going around my emotions rather than rationalizing them". What he means is that we need moralizing help on our way and to go around our emotions when it comes to investing, as we discussed in *our emotions* (5.4).

### **5.7.1 Do not mixing Volatility and Return together**

For an investor that goes long in the market a simple thing is not to monitor the portfolio screen too often, "screenoholic". Refer to the example above, about the dentist under the headline volatility (5.1). According to his probabilities to receive a positive return. Instead of watching his portfolio on a daily basis, he should watch it at least monthly or quarterly to get a reasonable outlook. Which makes him reduce the "noise" from the media and not mix volatility with return of his portfolio, see Appendix 21: *Table of confusion*.

### **5.7.2 Stop loss**

I will here discuss one of the several ways to set up a stop loss for a bet. For instance, a position that is sold (or called a trigger if the position is bought) automatically when/if a stock reaches a certain level decided by the trader in ahead of time is called a stop loss order. This invention is one of the solutions of the emotion problem in behavioural finance. Let us look at a simple example. It is taken from the ABB share listed on the Stockholm stock exchange market, Large Cap. Clearly, to look at the graph below, I would suggest if buying the stock at current share price at 160 SEK. Set a stop loss at a price of 145 SEK, the horizontal line in the graph, to minimize the downward risk of the share price and sell the bet at an early stage if the share price goes down.



Figure 5: ABB's stock price with one year history, source Swedbank.

### 5.7.3 Over-optimist and Overconfident

Three solutions of ten are taken from Behavioural finance compendium (2004). The top ten list for avoiding the most common investment mental pitfalls, see Appendix 20 for whole table:

1. You know less than you think you to.

“The simple truth is that more information is not necessarily better information, it is what you do with it, rather than how much you have that matters.”

2. Be less certain in your views, aim for timid forecasts and bold choice.

“Overestimate your knowledge, understate the risk, and exaggerate your ability to control the situation. This leads to bold forecasts (over-optimism and overconfidence) and timid choices (understate the risk.)”

3. Don't get hung up on one technique, tool, approach or view. Flexibility and pragmatism are the order of the day.

Be able to change your mind as reality and information changes, Appendix 16.

### 5.7.4 Technical analysis

It is a useful tool to get rid of some of the human emotions when trading. Technical analysis is the forecasting of future financial price movements only based on an examination of past price movements and it does not take fundamental value into account, (stockcharts.com). To try in graphs forecast the future price of the underlying financial asset. Looking at historical

prices the technical analysis tries to find trends, resistance and strength in the financial asset. The technical analysis is sometimes said to find the short price fluctuations in stock prices of the long run fundamental price adjustments. We will not in this paper be too specific in technical analyse, only suggest that this is one of the tools to use in order to lessen the problem with behavioural finance in investing and trading. We can assume it does not include feelings and before taking on a bet in the markets have clear stop losses ready to minimize the loss.

### **5.7.5 Let the trend be your friend**

The classical expression which is so easy to state but really difficult to follow. As C-G Gyllenram (2004) articulates himself in his “Table of ten most important rules to become a successful trader”, see Appendix 16. “7. Make out a thorough way of handle risk, and do not take on too big positions. Do not be afraid of selling a loss.” Basically, stay with the winners and get rid of the losers. “10. Make a plan of action, which means a well thought-out investment strategy. That personally suits your risk profile and a clear ambition for your trading.” Follow these once and some others in the table will reduce any emotional decision problems in the future.

### **5.7.6 Summary solutions**

To sum up the introduction of the behavioural finance theory. As the well known old cliché states, “always keep in mind that there are no trees growing to the heavens”. Or, as Taleb (2007) express himself: “It is foolish to think that an irrational market cannot become even more irrational.” Perhaps the best defence of all is to design an investment process that deliberately seeks to incorporate best mental practice. So, create and stick to a sound model, no feelings, added with strict stop losses is what we can do to get rid of the human biases that face investors on a daily basis.

## Section 2

### **6 Former research**

To now specialize in the aim of this study we present some former research in the recently named theory of overconfidence and over-optimism. This added with some discussion at the end of the section. Overconfidence by individuals is derived from a large body of evidence from cognitive psychological experiments and surveys. Which show that individuals overestimate their own abilities too much and when separating the private information from public information they tend to feel overconfident in their private information. Several researches have been done into this theory even though it is a relatively new area in the financial sciences. According to Thaler (2005) who are summarizing several other studies in the behavioural finance theory and the area of overconfidence in his book, the theory assumes overconfident individuals got greater beliefs about their expectations. In the theory it is suggested that this will lead to higher volatility in the markets. Some well known scientists doing and who have done research in this area earlier are DeBondt, Thaler, Kahneman and Tversky.

Numerous empirical foundations have been made in the overconfidence and over-optimistic area. I will now present a few articles that have with empirical data created models to explain the problem and one similar study as the purpose of this paper.

Chuang and Lee (2006) have in their study characterized the overconfidence hypothesis by the following four testable implications: “First, if investors are overconfident, they overreact to private information and underreact to public information. Second, market gains make overconfident investors trade more aggressively in subsequent periods. Third, excessive trading of overconfident investors in securities markets contributes to the observed excessive volatility. Fourth, overconfident investors underestimate risk and trade more in riskier securities.” They found empirical evidence in support of these four hypotheses.

Another study made by Löffler G (1998), he investigated a large sample of individual analysts and their earnings forecast of German companies, in order to test several explanations for

human biases. He found that violations of forecast rationality are more likely to stem from overconfidence and underreaction.

Friesen and Weller (2006) have constructed a model with cognitive biases and thus overconfidence consistent with the model of overconfident by Daniel (1998). They have found that analysts observe previous forecasts and combine them with their own private information to produce their own forecasts. And thus analysts place too much weight on their private information.

Malin and associates (2008) have in their study used similar data as in this paper but they have used the broader MSCI All World Universe index. Namely the number of EPS FY1 and FY2 upgrades and downgrades made by consensus analysts in the market in that month. They found strong evidence to suggest that mass downgrades/upgrades by analysts lag rather than lead the market, the strongest correlation was found between six to eight months lagging, Appendix 18.

## **6.1 Discussion**

Based on almost the entire theory of behavioural finance and the former research in this area I was interested in specializing in the problem of overconfidence and over-optimism in the market. Most of the theory relies on how the problems affect investors, but what about the analysts? I will test if the professionals can be affected as well. As I mentioned in the introduction, professionals might be more effective to degrade human biases due to their market experience.

Because of the EMH, efficient market hypothesis, suggest the markets act rational on all available information, especially the strong version of EMH, behavioural finance assume it might not be so. What now if investors act on what the professionals suggests and professionals are not doing their job well? The aim of this paper is to try to explain in a statistically correct way whether analysts have trouble predicting future discounted earnings for S&P500 companies or not.

The science part is based of raw data from IBES, Institutional Brokers' Estimate System, which is a central location whereby investors are able to research the differences in analysts'

estimates. The data summarizing the analysts forecast estimations of the last twenty-two years. Based on the data this study tries to statistically determine if analysts, as one part of the participants of makers for an “efficient market”, are overconfident or over-optimistic in their forecasts.

## Section 3

### **7 Data**

I have tested two types of data for the study in this paper. The first sample of data tested shows the consensus analysts forecasts of expected growth of profit for the companies at S&P500. By testing the difference in the forecasted twelve months ahead in time, compared with the realized growth of profit backwards in twelve months time. We will analyze if there exists any statistically differences. We will use monthly data from February 1986 until April 2008, see Appendix 4, 5 and 6.

The second sample of data material shows a summary of consensus analysts twenty-four months expectations for companies' earnings per share, EPS, at S&P500 during the period 1986 to 2001, Appendix 1. Described as a "graph of worms", showing that the estimates from the analysts are often downgraded by the analysts, it seems that they are being too optimistic about the companies future profits on the S&P500, see Appendix 2 and 3. The tests will analyze if there is a statistically significant difference between the time  $t-24$  and  $t-0$ . What is important to add is that the data in realized growth of company profit is clean from inflation.

## 8 Empirical Analyses

### 8.1 Result

I found proof based Wilcoxon signed ranks test showing, at level of confidence 95% certainty and the statistical significance level of 5%, that analysts are not really good at their job. With good means the consensus estimates do hit the realized outcome correctly without any large deviations.

#### 8.1.1 Result from the first hypothesis

The result from the first hypothesis,  $H_0$ : The consensus analysts are correct in their 12 months forecasts. We can reject this hypothesis based on the p-value of  $P=0,000$ . The consensus analysts' are wrong in their forecasts of the companies at S&P500, in the matter of forecasts for the next upcoming twelve months.

$$\Rightarrow \bar{x}_f \neq x_r$$

#### 8.1.2 Result from the second hypothesis

In the second Wilcoxon signed ranks test I have studied the hypothesis,  $H_0$ : Analysts are the same in their mean estimates of EPS at time  $t-0$  as  $t-24$ . We reject this  $H_0$  as well, according to the p-value of  $P=0,002$ . The mean analysts' are downgrading their prediction of EPS at the S&P500 in twenty-four month time. We can with confidence at 95% practice the alternative hypothesis that forecasts differ from the realized outcome.

$$\Rightarrow \bar{x}_{int-0} \neq \bar{x}_{int-24}$$

#### 8.1.3 Result descriptive statistics

The descriptive statistics shows that there are big differences between the forecasted mean and standard deviation of expected growth of profit for the companies at S&P500, compared with the realized outcome in twelve months time. Mean value for forecasts is 15,43 compared with the realized outcome 10,13. The standard deviation in forecasts is 4,71 and in the realized outcome it is 22,93.

The correlation between forecasts of twelve months growth of profits, compared with realized outcome from the twelve months is -0,282. Remarkably there is a negative correlation. Looking at the probabilities for analysts' being "right" in their predictions at the interval of -

5% and +5% around the realized growth, it is only about 20% of the mean forecasts which are in between this interval.

## 8.2 Analysis

Here in the analysis section we will test the data presented above with its hypothesis. To start out with the first sample of data analyzing whether the consensus analysts expectations of the companies at S&P500 and their growth percentage per twelve months time ahead is statistically significant correct or not, Appendix 4.

$H_0$ : The consensus analysts are correct in their 12 months forecasts.

$H_a$ : The consensus analysts are wrong in their 12 months forecasts.

The hypotheses in parametric values:

$H_0$ :  $a = 0$

$H_a$ :  $a \neq 0$

Where  $a$  is equivalent to  $\bar{x}_f - x_r$ . There  $\bar{x}_f$  is the analysts mean forecasts for the upcoming twelve months and  $x_r$  is the realized outcome of the same period. If the test cannot reject  $H_0$ , then we can assume that the consensus estimates from the analysts are correct. But, if we reject the  $H_0$ , we can assume that there is overconfidence or over-optimistic biases in the analysts' consensus estimations in the market.

The second sample of data is the summary of consensus analysts' twenty-four months expectations for companies' earnings per share, EPS on S&P500. We will analyze whether there exists any statistically differences between the mean t-0 compared with mean t-24, Appendix 1.

$H_0$ : Analysts are the same in their mean estimates of EPS at time t-0 as t-24.

$H_a$ : Analysts have always too high expectations of EPS at time t-0 as t-24.

The hypotheses in parametric values:

$H_0$ :  $\bar{x}_{int-0} = \bar{x}_{int-24}$

$H_a$ :  $\bar{x}_{int-0} \neq \bar{x}_{int-24}$

### 8.2.1 Wilcoxon's test first sample

$H_0$ : The consensus analysts are correct in their 12 months forecasts.

$H_a$ : The consensus analysts are wrong in their 12 months forecasts.

Analysing the data in SPSS with a non-parametric test, the Wilcoxon's signed ranks test, which do not take normal distribution into account, is an advantage in this research because behavioural finance theory rejects the assumption of the normal distribution, Taleb (2007). The test is used when observations of a pair are used to test the null hypothesis,  $H_0$ , that both of the variables are following the same distribution. We analyse the differences of each pair and how big it is.

Practically we got 279 monthly observations, including monthly data from 1986 until 2008. The forecasted and realized growth of profit of the companies of S&P500. Each month's difference is ordered by size, least difference is one and second least is two etc.

This is the sum of an arithmetic series with  $n$  observations after some deletions are done, the one that got the same difference. Let us now calculate the sum of  $T_+$  from the positive differences (analysts' forecasts were higher than expected than the realized observation). And  $T_-$  from the negative differences (analysts' forecasts were lower than the realized observation).

Under the null hypothesis  $T_+$  and  $T_-$  are following the same distribution which is symmetric around the expectation-value ( $E$ ), which is half of the total sum in the hierarchy:

$$n * (1+n)/4$$

This is what we get from analysing the first sample of data in Wilcoxon's signed ranks test:

**Ranks**

		N	Mean Rank	Sum of Ranks
Realized - Forecasts	Negative Ranks	154(a)	157,69	24284,00
	Positive Ranks	125(b)	118,21	14776,00
	Ties	0(c)		
	Total	279		

a Realized < Forecasts

b Realized > Forecasts

c Realized = Forecasts

**Test Statistics(b)**

	Efter - Före
Z	-3,524(a)
<b>Asymp. Sig. (2-tailed)</b>	<b>,000</b>

a Based on positive ranks.

b Wilcoxon Signed Ranks Test

To sum up, it shows us that and the P-value is  $P = 0,000$  with the critical P-value of  $P = 0,05$ . There exist a statistic difference between forecast and realized outcome at the level of significance of 5%. We can with confident at 95% reject the null hypothesis,  $H_0$ , thus analysts consensus forecasted estimates is over-optimistic in their predictions about the twelve months future growth of profits of the companies in S&P500.

### 8.2.2 Wilcoxon's test second sample

$H_0$ : Analysts are the same in their mean estimates of EPS at time t-0 as t-24.

$H_a$ : Analysts have always too high expectations of EPS at time t-0 as t-24.

We also look at the difference of the two means testing again with Wilcoxon's signed ranks test. We use this test to determine how confident we are that there is a significant difference between the twenty-four months forecasts of EPS at time t-0 and t-24.

We test the null hypothesis,  $H_0$ , in the test:

$$\bar{x}_{int-0} - 0 = \bar{x}_{int-24}$$

### Wilcoxon Signed Ranks Test

#### Ranks

	N	Mean Rank	Sum of Ranks
var024 - var001 Negative Ranks	14(a)	9,14	128,00
Positive Ranks	2(b)	4,00	8,00
Ties	0(c)		
Total	16		

a var024 < var001

b var024 > var001

c var024 = var001

#### Test Statistics(b)

	var024 - var001
Z	-3,103(a)
<b>Asymp. Sig. (2-tailed)</b>	<b>,002</b>

a Based on positive ranks.

b Wilcoxon Signed Ranks Test

We can prove that there exists a statistical difference between the mean forecasts of EPS made in t-24 and t-0. Based on the P-value of P= 0,002 we can reject the hypothesis, H<sub>0</sub>, that analysts stay with their forecasts. They tend to change their predictions the closer time t-0 they get.

Set at the 95% confidence limit the test tells us that the hypothesis, H<sub>0</sub>, that there is no significant difference between the two means can be rejected, and that we are 95% confident that the two means at t-24 and t-0 are different.

$$\Rightarrow \bar{x} \text{ in } t - 0 \neq \bar{x} \text{ in } t - 24$$

**8.2.3 Descriptive statistics**

Examine the first sample of data in descriptive statistics of forecasts vs. realized from Appendix 7 and 11 we get:

**Forecasts:**

Mean	15,43
Std. Dev.	4,71
Min.	5,67
Max	30,36

**Realized:**

Mean	10,13
Std. Dev.	22,93
Min.	-53,74
Max	83,21

*Table 2: Descriptive statistics of forecasted estimations vs. realized outcome*

Examining these figures in Table 2, we can read by the standard deviation that it is obviously that reality is more volatile in the growth of company’s profits than the consensus analysts expected ones. The realized standard deviation is greatly higher than the forecasted one. The mean of forecasts is 15,43 thus the realized mean is 10,13. Based on the Wilcoxon test we can prove that the mean analysts are over-optimistic in their forecasts and thus overconfidence exists.

We can analyse that the standard deviation, SD, of the realized outcome is much higher (22,94) than the expected one (4,71). This might be a clue that the analysts are afraid of to differ too much from each other. Also we can see that their predictions are not as volatile as in fact reality is, see Appendix 6.

**8.2.4 Correlation and Covariance**

To read from the result of the first sample of data, forecasts of twelve months growth of profits, compared with realized outcome from the twelve months. When analyzing its

correlation and covariance between the variables forecasts and realized, according to *Pearson correlation*, gives the value -0,282, see Appendix 9, 11, 12 and 13. This result means that it is a negative relation between the variables, which of course is not a good result for the analysts to read. The covariance between these two variables “forecasts” and “realized” shows us that there is a negative association with a value of -30,5203.

### 8.2.5 Analysts probability being right

The table shows from the first sample of data how much the probability is that the consensus analysts forecasts of the companies’ growth of profit at S&P500 are being right in their forecasts. At the interval of -2,5% and +2,5% around the realized growth, it is only about 10% of the mean estimates which belongs in the interval.

**Descriptive Statistics**

	N	Minimum	Maximum	<i>Mean</i>	Std. Deviation
DFF	267	,00	1,00	<b>,8951</b>	,30696
Valid N (listwise)	267				

At the interval of -5% and +5% around the realized growth, it is only about 20% of the mean forecasts which are “right” in their predictions.

**Descriptive Statistics**

	N	Minimum	Maximum	<i>Mean</i>	Std. Deviation
DFF2	267	,00	1,00	<b>,7978</b>	,40243
Valid N (listwise)	267				

### 8.2.6 Summary

To summarize the chapter analysis we can with confidence from the Wilcoxon tests assume that analysts’ of the S&P500 are affected by overconfident and over-optimistic biases. Remarkable results are found in the correlation (-0,282) between forecasts and realized outcome and also the probability of analysts’ to being “right” in their forecasts is only about 20%, in the interval of -5% to +5% of the realized outcome. See a summary of the Minitab analyzes in Appendix 14 and 15.

## Section 4

### 9 Conclusion

As the purpose of my study is to find any signs of existing overconfidence and over-optimism by analysts at the US market. According to the results in my tests it seems that analysts of the S&P500 are exaggerated by the problem of overconfidence and the over-optimistic biases. My analyses are confirming the discussed theory of *anchoring* in (4.1.1) and *herding* (5.5.2). By evaluating the standard deviations between forecasts and realized, as well as the indexed mean analysts' consensus estimations for twenty-four months estimations of EPS. We can conclude with the theory that analysts' are *following the stream* (5.5.2).

No offence against the analyst, although my study has shown that they are not really good at their predictions, they are needed in the financial system to reduce the problem of asymmetric information. We can assume that it is better with forecasts than no forecasts at all. To add some criticism to this study, due to assume analysts' are always wrong is a quite powerful conclusion. We have to remember the restriction of data and period of testing. But these data I have used prove the problem of overconfident and over-optimistic analysts' in the US market. We can further discuss if this overconfidence and over-optimistic biases by analysts indirectly affects the investors to become overconfident as well without being aware of it.

In my conclusion of the work I am not using the normal distribution because the theory of behavioural finance does not assume, as other theories does, that this complex world we are living in is "normally" distributed. Anything unexpected can happen such as *the black swans* (4.1.1) we have discussed in this paper. The Wilcoxon's signed ranks test is not using the assumption with normal distribution. Which gives support to Taleb's work and thoughts of what he suggest, it is not a good way to assume that this uncertain world is "normal". It is important to remember is to differ in forecast and in realized history outcome when we talk about distributions.

To add to former research in this area from chapter six, I have in this paper confirmed findings from Chuang and Lee (2006) of overconfident investors but instead studied the analysts. Thus the theory suggests that overconfident individuals held greater beliefs about

their expectations, Thaler (2005). We can with these empirical findings support this theory, thus analysts having too high expectations.

To sum up, we discussed in the section *Solutions and cure* (5.7) how to get rid of or minimize our human behavioural biases when it comes to investing. Basically using a sound model when investing, with distinct stop losses for minimizing contingent losses and also being aware of our human biases is a good start to surviving in the jungle of finance.

## **9.1 Suggestions for further research**

It would have been interesting to do the same study again, but this time test the Nordic and European markets as well to see if there exists any differences. Another thought would be to do a similar test as I have done but divide the analysts' in two groups, one with male analysts' and the other with female analysts' to test if there are any statistically differences in the overconfident and over-optimistic problem between the groups. My thought is based on the theory of difference in the level of risk taking between the genders.

Another research I believe is very interesting, but might be complicated to exercise in a correct way, is to compare the performance of quant funds (no emotions) with classical mutual funds (being possessed by emotions). And to look further in this problem, as the Swedish pension system recently changed. Where people can invest their pension savings in mutual funds, they are indirectly affected by emotions and behavioural biases in the markets.

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Several articles in the database.

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Graphs.

[www.nordnet.se](http://www.nordnet.se) (5<sup>th</sup> of April 2008)

Graphs.

[www.stockcharts.com](http://www.stockcharts.com) (19<sup>th</sup> of April 2008)

Technical analyze.

# 11 Appendix

## 11.1.1 Appendix 1: Indexed data of expected EPS 24 months

	86	87	88	89	90	91	92	93	94
feb-2	100	100	100	100	100	100	100	100	100
mars-2	101,37655	97,53431	99,85486	101,4999	100,4626	99,571814	98,79732	98,8553	99,51701
april-2	99,944754	95,92297	101,4471	101,5077	99,26044	98,433088	97,48386	99,22965	98,17405
maj-2	98,268956	94,09473	100,1238	103,6013	99,15619	97,95836	96,57552	98,36958	97,23458
juni-2	98,038764	93,53254	100,9007	104,1598	99,32234	97,682212	95,67034	98,00142	97,6999
juli-2	96,758897	92,96149	101,5837	104,984	98,85971	96,720345	94,46449	97,47239	96,81932
aug-2	96,054509	91,80611	102,8259	106,5346	98,61536	95,811226	93,63211	96,24725	95,74731
sept-2	95,110722	90,80567	102,9497	106,7963	98,36124	93,943343	92,79656	95,40884	95,35856
okt-2	94,314258	90,28774	102,9028	107,351	97,39037	91,892395	91,59387	94,09399	94,90208
nov-2	93,45334	89,47764	101,6392	108,3392	96,25334	89,360514	89,94809	91,91907	94,34546
dec-2	92,615441	89,02612	100,6318	108,3861	95,28898	87,284744	87,71996	90,91359	93,65336
jan-1	92,270153	88,37981	100,2092	109,0071	93,37656	86,11499	85,80833	90,05352	93,04668
feb-1	90,750886	87,80876	99,85059	109,882	92,93347	83,400043	84,05811	88,56542	92,976
mars-1	88,527232	87,44577	99,96585	110,3078	91,52603	81,200161	83,21939	87,89098	92,73156
april-1	86,879057	89,3714	100,9904	109,9641	90,16746	78,838934	83,34599	86,55756	92,24856
maj-1	84,982275	87,79991	103,3424	110,214	89,0402	77,287536	82,38068	85,81196	92,67855
juni-1	83,881958	85,84329	104,0895	110,1125	88,38209	75,428961	81,85846	86,19868	92,1072
juli-1	83,002624	82,65162	104,5846	109,4602	87,20923	73,672779	81,22864	85,24889	91,84803
aug-1	81,041389	81,82824	105,8567	108,472	86,35238	72,167923	79,78542	84,6023	92,56958
sept-1	79,374799	81,75299	105,9293	108,2259	85,55092	70,858544	78,80428	84,22486	92,54307
okt-1	78,062704	80,65516	106,305	103,1208	84,13696	69,325763	77,18066	83,9062	92,54602
nov-1	76,897933	80,53564	107,2356	100,5351	82,26038	67,405132	75,39245	83,93095	92,82874
dec-1	76,188942	80,20806	108,5333	99,17585	80,2046	65,959229	74,80694	83,59063	92,66382
jan-0	75,02417	79,84949	109,4596	96,41825	79,08712	65,115269	74,03152	83,76388	93,28229
	95	96	97	98	99	00	01	02	03
feb-2	100	100	100	100	100	100	100	100	100
mars-2	99,704182	99,91175	99,45961	99,52822	99,10625	99,64635	99,2118	96,35792	99,91783
april-2	99,470785	100,6921	99,1161	99,33385	98,62314	99,976755	98,40905	93,84019	98,87339
maj-2	100,08142	101,6791	99,27738	99,23761	98,37641	99,933587	98,50649	92,85474	98,04699
juni-2	99,603767	101,3818	98,89408	98,99983	97,64485	100,71228	98,33779	91,73185	97,29486
juli-2	99,478926	101,6048	98,40186	99,31875	97,01163	100,75545	97,91897	88,66438	95,79693
aug-2	100,32024	102,0112	97,86775	98,98662	96,20415	100,80858	97,06242	87,05753	93,49471
sept-2	100,45865	101,9067	97,541	98,34311	95,85389	100,35697	96,20296	84,36874	92,011
okt-2	101,01501	101,8068	97,58499	98,07137	93,84554	99,873815	94,84032	79,61693	88,84131
nov-2	101,54422	101,6117	97,48026	97,44485	92,27199	99,382357	93,02397	77,53052	87,8174
dec-2	101,4818	101,0753	97,94315	96,80134	90,76055	98,030849	90,0573	76,94861	86,38583
jan-1	101,67449	99,5959	97,68971	96,62018	89,45616	97,946172	87,18516	76,29797	86,09035
feb-1	102,05173	98,51831	97,36715	95,46149	88,89023	98,057414	85,48368	76,43103	84,3712
mars-1	102,12772	97,4802	96,65291	93,88009	88,81431	98,062395	82,71043	76,53337	84,45968
april-1	102,9039	96,52105	96,44346	92,77991	88,77118	97,184081	80,21058	75,80817	84,06624
maj-1	104,06003	96,49783	96,5042	92,40626	88,79533	97,610786	78,94538	75,59178	84,02832
juni-1	103,65294	96,17734	95,97847	91,36646	89,4389	97,323548	77,39369	75,0435	84,15314
juli-1	103,50368	95,92187	96,11042	90,38327	89,29397	96,893523	74,29614	75,20433	84,34118
aug-1	103,85106	95,7477	95,75016	89,2661	89,35609	96,385462	73,0993	72,84743	84,92897
sept-1	103,56881	95,35521	95,17207	88,52447	88,90231	95,601787	71,47199	72,03012	85,17863
okt-1	103,1373	95,28554	94,92491	86,56376	88,25874	94,705208	69,23245	70,76248	85,64476
nov-1	103,22957	95,17871	94,29655	85,05407	88,28117	94,329974	68,36426	70,94963	85,9118

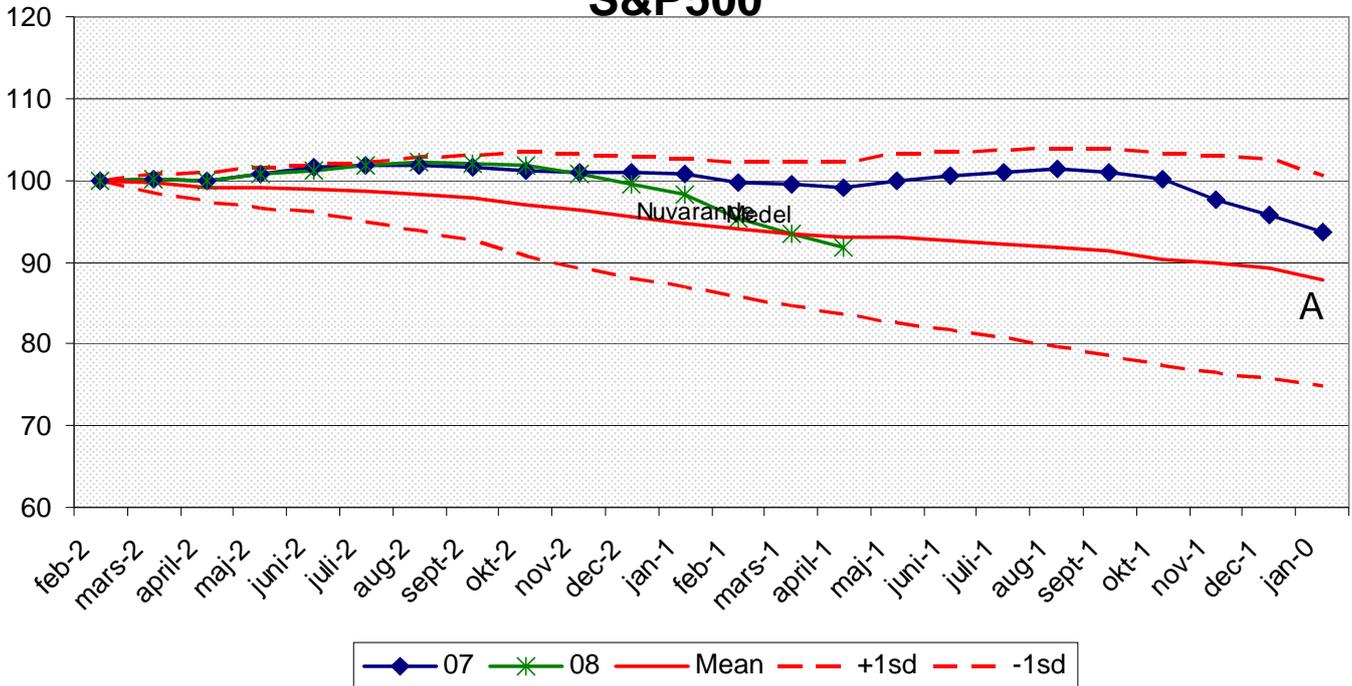
dec-1	102,98803	95,42024	93,93	83,73309	86,90431	93,275665	67,76075	70,15718	85,9671
jan-0	102,55923	95,188	94,36776	82,81218	87,17002	92,717794	67,47426		

	04	05	06	07	08	Mean	+1sd	-1sd
feb-2	100	100	100	100	100	100,00	100,00	100,00
mars-2	99,466941	100,0286	101,1546	100,0609	100,2051	99,72	100,99	98,45
april-2	98,588289	100,9714	101,5035	99,9583	99,87517	99,04	100,85	97,24
maj-2	98,60296	102,7984	101,8214	100,8458	100,7064	98,38	100,97	95,78
juni-2	98,60133	103,2127	101,9505	101,5077	101,2018	98,33	101,35	95,32
juli-2	98,586659	103,3012	102,6544	101,7258	101,7224	97,85	101,47	94,23
aug-2	98,837702	103,7898	103,9196	101,8947	102,2827	97,47	102,06	92,89
sept-2	99,176774	103,7455	105,078	101,621	102,0708	96,84	101,93	91,75
okt-2	99,375652	104,1583	106,6038	101,2425	101,7756	96,08	101,73	90,44
nov-2	99,481612	104,8797	106,317	100,9078	100,7209	94,97	101,33	88,61
dec-2	99,78808	104,8983	105,988	100,9174	99,60036	93,95	100,78	87,11
jan-1	100,08477	104,5697	105,6317	100,8084	98,16342	93,14	100,54	85,74
feb-1	101,20631	104,2198	105,4691	99,6418	95,27984	92,25	100,54	83,95
mars-1	101,68884	105,2126	105,0209	99,52738	93,55357	91,42	100,37	82,48
april-1	102,83972	105,2683	105,998	99,10182	91,68118	90,93	100,33	81,53
maj-1	105,5148	106,1439	106,4847	99,93905		90,39	100,76	80,02
juni-1	106,28423	106,2254	106,7094	100,6309		89,77	100,71	78,83
juli-1	106,67547	106,8282	107,432	101,0618		88,77	100,27	77,27
aug-1	107,57368	108,1867	107,422	101,3655		88,08	100,21	75,94
sept-1	107,40578	109,2038	107,1588	100,9933		87,47	100,03	74,92
okt-1	107,13517	109,6652	107,6989	100,0567		86,14	98,40	73,87
nov-1	108,10185	109,2109	107,9472	97,72139		85,22	97,94	72,51
dec-1	108,28769	108,4609	108,1012	95,69834		84,59	97,84	71,34
jan-0	107,98285			93,60899		84,00	97,54	70,46

### 11.1.2 Appendix 2: Analysts consensus 24 months estimation of EPS

The diagram shows the IBES (Institutional Brokers' Estimate System). The diagram is normalized and indexed from 1985 to 2002. Not to be too specific it basically shows that the further ahead of time the estimates of earnings per share, EPS, the analysts predict the higher deviation. The consensus analysts are showing potential of being overconfident and over-optimistic in their forecasts.

## IBES EPS (normalized) S&P500



### Interpretation of variables.

mars-2 is Consensus eps for year 0 in march year -2.

Exaple a mars-2 reading for 88 is the march 86 consensus eps 1988.

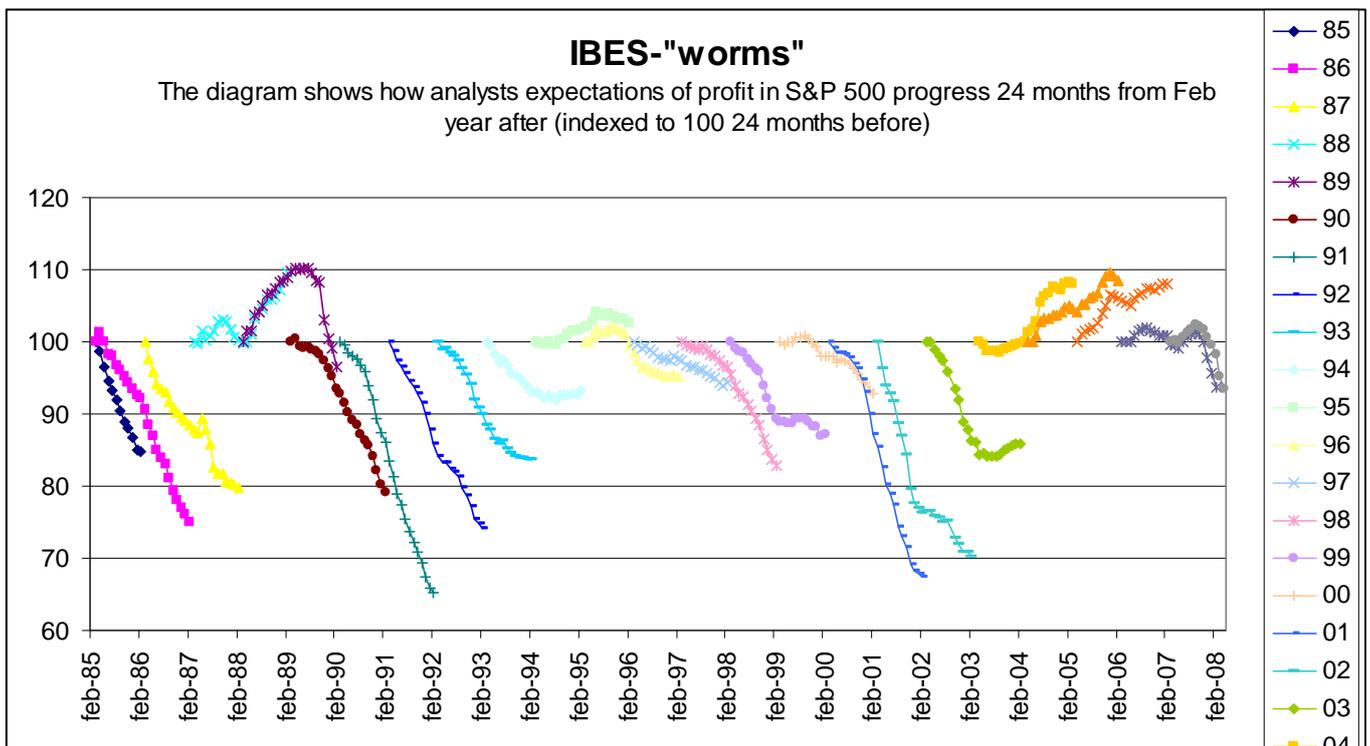
Note that all eps-data are normalized (for comparability) with the value 100 at the first observation (feb-2)

Variable	N	Mean	Median	StDev
feb-2	22	100,0	100,0	0,0
mars-2	22	99,4	99,6	1,1
april-2	22	98,9	99,2	1,8
maj-2	22	98,5	98,9	2,5
juni-2	22	98,4	98,7	2,9
juli-2	22	97,9	98,5	3,7
aug-2	22	97,5	98,2	4,5
sept-2	22	96,9	97,9	5,2
okt-2	22	96,0	97,5	6,4
nov-2	22	95,0	96,8	7,1
dec-2	22	94,0	96,0	7,6
jan-1	22	93,2	95,0	8,0
feb-1	22	92,5	94,2	8,5
mars-1	22	91,7	93,3	8,9
april-1	22	91,1	92,5	9,5
maj-1	22	90,8	92,5	10,3
juni-1	22	90,3	91,7	10,8

juli-1	22	89,4	91,1	11,5
aug-1	22	88,8	91,0	12,2
sept-1	22	88,1	90,7	12,6
okt-1	22	86,9	90,4	12,9
nov-1	22	86,3	90,6	13,3
dec-1	22	85,6	89,8	13,6
jan-0	18	86,1	89,9	12,9

### 11.1.3 Appendix 3: IBES-“worms”

The diagram shows more detailed the same as above for the period February 1985 to February 2008. Analyst’s consensus of 24 months expectations of the S&P500. Basically we can see that analysts have to downgrade their expectations the closer time  $t_0$  they get.



### 11.1.4 Appendix 4: Forecasts vs. Realized growth of profit 12 months

Data summarizing the consensus forecasted expected growth of profit for the next upcoming twelve months. Compared with the realized outcome for growth of profit for twelve months aback in time. For the period February 1986 to April 2008.

Date	Forecasts	Realized	Date	Forecasts	Realized	Date	Forecasts	Realized
1986-02-01	18%	24%	1989-05-01	23%	18%	1992-08-01	15%	-3%
1986-03-01	16%	25%	1989-06-01	23%	22%	1992-09-01	18%	-8%
1986-04-01	15%	22%	1989-07-01	21%	24%	1992-10-01	21%	-11%
1986-05-01	14%	17%	1989-08-01	19%	27%	1992-11-01	24%	-10%
1986-06-01	13%	18%	1989-09-01	18%	54%	1992-12-01	27%	-18%
1986-07-01	13%	8%	1989-10-01	16%	49%	1993-01-01	30%	-18%
1986-08-01	13%	8%	1989-11-01	14%	36%	1993-02-01	29%	-19%
1986-09-01	13%	8%	1989-12-01	12%	50%	1993-03-01	27%	-26%
1986-10-01	14%	1%	1990-01-01	9%	44%	1993-04-01	26%	-24%

1986-11-01	15%	-3%	1990-02-01	9%	40%	1993-05-01	25%	-25%
1986-12-01	16%	-3%	1990-03-01	10%	34%	1993-06-01	24%	-22%
1987-01-01	18%	-8%	1990-04-01	10%	37%	1993-07-01	24%	-24%
1987-02-01	16%	-5%	1990-05-01	10%	38%	1993-08-01	24%	-22%
1987-03-01	18%	-9%	1990-06-01	10%	35%	1993-09-01	23%	-12%
1987-04-01	17%	-13%	1990-07-01	10%	31%	1993-10-01	23%	-13%
1987-05-01	15%	-11%	1990-08-01	9%	32%	1993-11-01	24%	-11%
1987-06-01	14%	-14%	1990-09-01	9%	19%	1993-12-01	24%	0%
1987-07-01	14%	-11%	1990-10-01	9%	17%	1994-01-01	24%	0%
1987-08-01	14%	-12%	1990-11-01	12%	17%	1994-02-01	24%	2%
1987-09-01	14%	-12%	1990-12-01	14%	7%	1994-03-01	23%	13%
1987-10-01	16%	-9%	1991-01-01	15%	5%	1994-04-01	22%	19%
1987-11-01	18%	-6%	1991-02-01	16%	4%	1994-05-01	20%	21%
1987-12-01	19%	-4%	1991-03-01	16%	-4%	1994-06-01	20%	20%
1988-01-01	21%	-3%	1991-04-01	15%	-6%	1994-07-01	20%	22%
1988-02-01	20%	-4%	1991-05-01	14%	-4%	1994-08-01	19%	23%
1988-03-01	24%	-3%	1991-06-01	14%	-13%	1994-09-01	19%	13%
1988-04-01	24%	-2%	1991-07-01	14%	-10%	1994-10-01	19%	14%
1988-05-01	24%	-2%	1991-08-01	14%	-15%	1994-11-01	19%	14%
1988-06-01	24%	5%	1991-09-01	14%	-17%	1994-12-01	18%	13%
1988-07-01	24%	2%	1991-10-01	14%	-14%	1995-01-01	18%	13%
1988-08-01	25%	5%	1991-11-01	13%	-15%	1995-02-01	17%	14%
1988-09-01	27%	-4%	1991-12-01	13%	-8%	1995-03-01	16%	11%
1988-10-01	28%	0%	1992-01-01	14%	-10%	1995-04-01	16%	15%
1988-11-01	30%	5%	1992-02-01	15%	-8%	1995-05-01	16%	14%
1988-12-01	29%	3%	1992-03-01	14%	-5%	1995-06-01	17%	14%
1989-01-01	30%	7%	1992-04-01	13%	-7%	1995-07-01	17%	14%
1989-02-01	23%	9%	1992-05-01	12%	-7%	1995-08-01	17%	14%
1989-03-01	26%	20%	1992-06-01	13%	-2%	1995-09-01	17%	30%
1989-04-01	25%	21%	1992-07-01	14%	-3%	1995-10-01	17%	29%

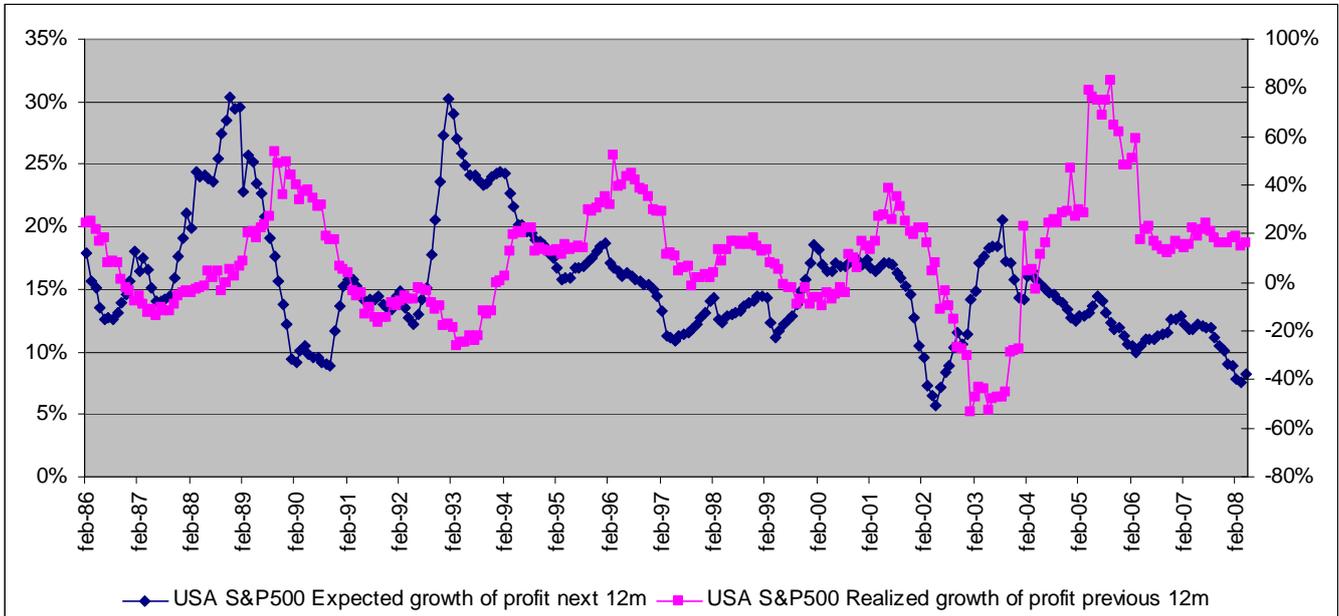
<i>Date</i>	<i>Forecasts</i>	<i>Realized</i>	<i>Date</i>	<i>Forecasts</i>	<i>Realized</i>	<i>Date</i>	<i>Forecasts</i>	<i>Realized</i>
1995-11-01	18%	31%	1999-02-01	14%	14%	2002-05-01	6%	8%
1995-12-01	18%	32%	1999-03-01	12%	8%	2002-06-01	7%	-11%
1996-01-01	19%	35%	1999-04-01	11%	7%	2002-07-01	8%	-4%
1996-02-01	17%	32%	1999-05-01	12%	5%	2002-08-01	9%	-10%
1996-03-01	17%	52%	1999-06-01	12%	-1%	2002-09-01	10%	-15%
1996-04-01	16%	39%	1999-07-01	13%	-2%	2002-10-01	12%	-27%
1996-05-01	16%	40%	1999-08-01	13%	-2%	2002-11-01	11%	-28%
1996-06-01	16%	44%	1999-09-01	14%	-9%	2002-12-01	11%	-30%
1996-07-01	16%	45%	1999-10-01	15%	-7%	2003-01-01	14%	-54%
1996-08-01	16%	42%	1999-11-01	16%	-2%	2003-02-01	15%	-47%
1996-09-01	16%	39%	1999-12-01	17%	-9%	2003-03-01	17%	-43%
1996-10-01	15%	38%	2000-01-01	19%	-6%	2003-04-01	18%	-44%
1996-11-01	15%	35%	2000-02-01	18%	-6%	2003-05-01	18%	-53%
1996-12-01	15%	30%	2000-03-01	17%	-10%	2003-06-01	18%	-48%
1997-01-01	14%	29%	2000-04-01	16%	-5%	2003-07-01	18%	-47%
1997-02-01	13%	29%	2000-05-01	16%	-7%	2003-08-01	20%	-47%
1997-03-01	11%	12%	2000-06-01	17%	-5%	2003-09-01	17%	-45%
1997-04-01	11%	12%	2000-07-01	17%	-2%	2003-10-01	17%	-29%
1997-05-01	11%	10%	2000-08-01	17%	-5%	2003-11-01	16%	-28%
1997-06-01	11%	5%	2000-09-01	17%	12%	2003-12-01	14%	-28%
1997-07-01	11%	6%	2000-10-01	17%	10%	2004-01-01	14%	23%

1997-08-01	12%	6%	2000-11-01	17%	6%	2004-02-01	16%	5%
1997-09-01	12%	-2%	2000-12-01	17%	16%	2004-03-01	16%	5%
1997-10-01	12%	2%	2001-01-01	17%	15%	2004-04-01	16%	-3%
1997-11-01	13%	2%	2001-02-01	17%	13%	2004-05-01	15%	12%
1997-12-01	13%	3%	2001-03-01	16%	17%	2004-06-01	15%	16%
1998-01-01	14%	2%	2001-04-01	17%	27%	2004-07-01	15%	24%
1998-02-01	14%	4%	2001-05-01	17%	28%	2004-08-01	15%	26%
1998-03-01	13%	13%	2001-06-01	17%	39%	2004-09-01	14%	24%
1998-04-01	12%	8%	2001-07-01	17%	25%	2004-10-01	14%	28%
1998-05-01	13%	14%	2001-08-01	16%	35%	2004-11-01	13%	29%
1998-06-01	13%	17%	2001-09-01	16%	31%	2004-12-01	13%	47%
1998-07-01	13%	16%	2001-10-01	15%	25%	2005-01-01	13%	27%
1998-08-01	13%	16%	2001-11-01	15%	21%	2005-02-01	13%	30%
1998-09-01	14%	17%	2001-12-01	13%	20%	2005-03-01	13%	29%
1998-10-01	14%	16%	2002-01-01	10%	22%	2005-04-01	13%	79%
1998-11-01	14%	18%	2002-02-01	10%	22%	2005-05-01	14%	76%
1998-12-01	14%	15%	2002-03-01	7%	16%	2005-06-01	14%	75%
1999-01-01	15%	13%	2002-04-01	7%	5%	2005-07-01	14%	69%

<b>Date</b>	<b>Forecasts</b>	<b>Realized</b>
2005-08-01	13%	75%
2005-09-01	12%	83%
2005-10-01	12%	64%
2005-11-01	12%	62%
2005-12-01	11%	48%
2006-01-01	11%	48%
2006-02-01	10%	51%
2006-03-01	10%	59%
2006-04-01	10%	18%
2006-05-01	11%	21%
2006-06-01	11%	23%
2006-07-01	11%	17%
2006-08-01	11%	15%
2006-09-01	11%	13%
2006-10-01	12%	12%
2006-11-01	13%	13%
2006-12-01	13%	17%
2007-01-01	13%	16%
2007-02-01	12%	14%
2007-03-01	12%	15%
2007-04-01	12%	23%
2007-05-01	12%	19%
2007-06-01	12%	22%
2007-07-01	12%	24%
2007-08-01	12%	21%
2007-09-01	11%	18%
2007-10-01	10%	16%
2007-11-01	10%	16%
2007-12-01	9%	16%
2008-01-01	9%	18%
2008-02-01	8%	19%
2008-03-01	8%	15%
2008-04-01	8%	16%

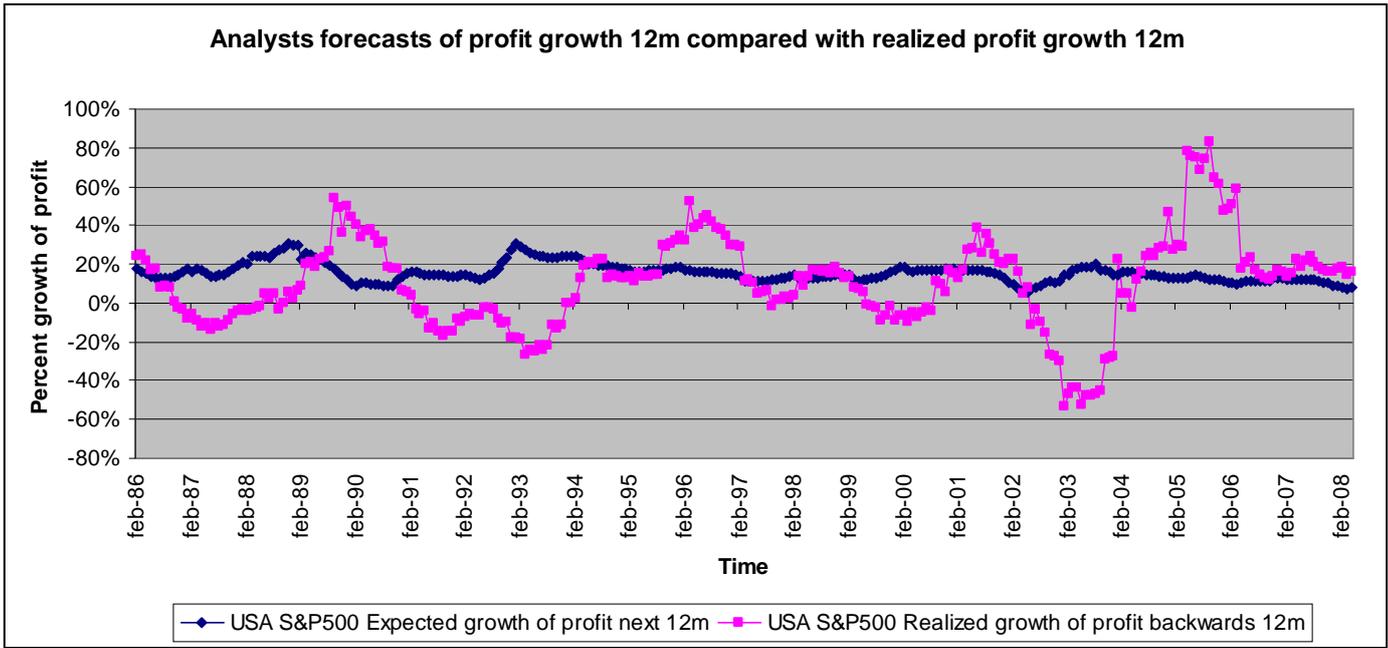
### 11.1.5 Appendix 5: Diagram of Analysts 12 months predictions 1

The diagram shows, from the data above, the expected growth of profit the next 12 months from the mean expectations within analysts. Compared with realized growth of profit in 12 months backwards in time for the S&P500.



### 11.1.6 Appendix 6: Diagram of Analysts 12 months predictions 2

This diagram shows the same data as above, but is using only one y-axis. It gives a good overlook of the analysts' forecasts of growth expectations and the realized outcome of the growth. We can assume that analysts like to anchor on recent figures. And also that as we have discussed in this paper, they are not changing their forecasts as much as reality is changing. Reality is more volatile.



### 11.1.7 Appendix 7: Data analysed with Wilcoxon's test in SPSS

#### Descriptives

**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Forecasts	279	5,67	30,36	15,4336	4,71456
Realized	280	-53,74	83,21	10,1320	22,93859
Valid N (listwise)	279				

#### NPar Tests

**Descriptive Statistics**

	N	Mean	Std. Deviation	Minimum	Maximum
Forecasts	279	15,4336	4,71456	5,67	30,36
Realized	280	10,1320	22,93859	-53,74	83,21

## Wilcoxon Signed Ranks Test

### Ranks

		N	Mean Rank	Sum of Ranks
Realized - Forecasts	Negative Ranks	154(a)	157,69	24284,00
	Positive Ranks	125(b)	118,21	14776,00
	Ties	0(c)		
	Total	279		

a Realized < Forecasts

b Realized > Forecasts

c Realized = Forecasts

### Test Statistics(b)

	Efter - Före
Z	-3,524(a)
Asymp. Sig. (2-tailed)	,000

a Based on positive ranks.

b Wilcoxon Signed Ranks Test

## 11.1.8 Appendix 8: Changes in analysts forecasts

*We can proof that there is a statistical difference between the forecasts made in t-24 and t-0.*

*Based on the P-value of  $P = 0,002$  we can reject the hypothesis that analysts stay with their forecasts. They change their predictions the closer time t-0 they are.*

## Wilcoxon Signed Ranks Test

### Ranks

		N	Mean Rank	Sum of Ranks
var024 - var001	Negative Ranks	14(a)	9,14	128,00
	Positive Ranks	2(b)	4,00	8,00
	Ties	0(c)		
	Total	16		

a var024 < var001

b var024 > var001

c var024 = var001

### Test Statistics(b)

	var024 - var001
Z	-3,103(a)
<b>Asymp. Sig. (2-tailed)</b>	<b>,002</b>

a Based on positive ranks.

b Wilcoxon Signed Ranks Test

## 11.1.9 Appendix 9: Correlation and Covariance

### Correlations: Estimates; Realized

Pearson correlation of Forecasts and Realized = -0,282  
P-Value = 0,000

### Covariances: Estimates; Realized

	Estimates	Realized
Forecasts	22,2271	
Realized	-30,5203	527,1833

## 11.1.10 Appendix 10: Probability of analysts being right

### Descriptives

*The table shows how many times the consensus analysts estimates of the companies growth of profit on S&P500. At the interval of -2,5% and +2,5% around the realized growth, it is only about 10% of the mean estimates which belongs in the interval.*

Descriptive Statistics

	N	Minimum	Maximum	<b>Mean</b>	Std. Deviation
DFF	267	,00	1,00	<b>,8951</b>	,30696
Valid N (listwise)	267				

### Descriptives

*At the interval of -5% and +5% it is only about 20% of the mean estimates which are “right” in their predictions.*

Descriptive Statistics

	N	Minimum	Maximum	<b>Mean</b>	Std. Deviation
DFF2	267	,00	1,00	<b>,7978</b>	,40243
Valid N (listwise)	267				

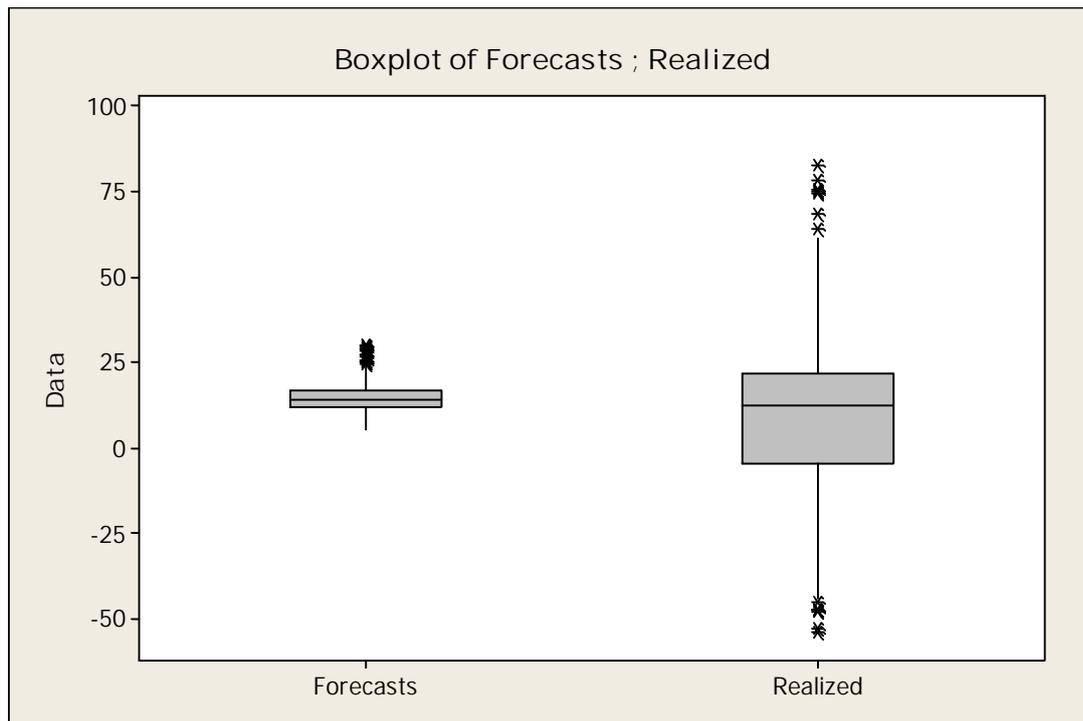
### 11.1.11 Appendix 11: Box plot of the data

The box plot graph shows clearly that forecasts are not as volatile as the realized outcome.

#### Descriptive Statistics: Estimates; Realized

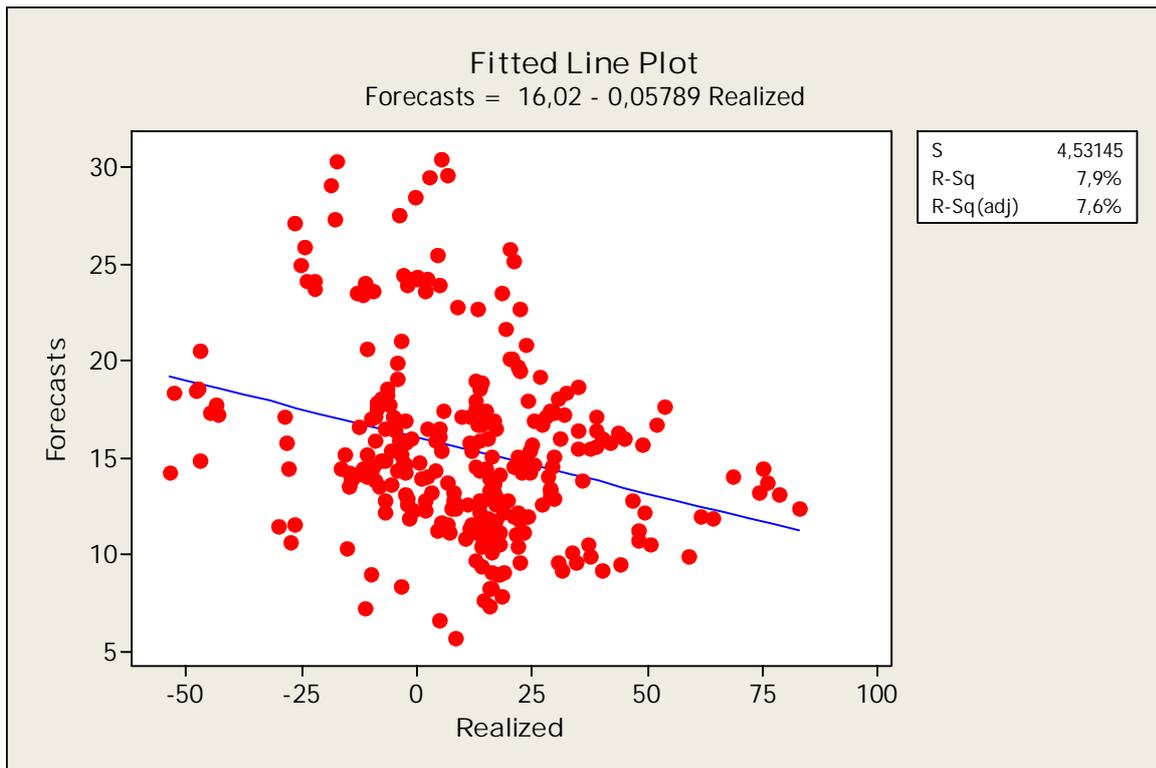
Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3
Forecasts	279	0	15,434	0,282	4,715	5,667	12,250	14,562	17,251
Realized	279	0	10,08	1,37	22,96	-53,74	-4,36	12,75	22,13

Variable	Maximum
Forecasts	30,357
Realized	83,21

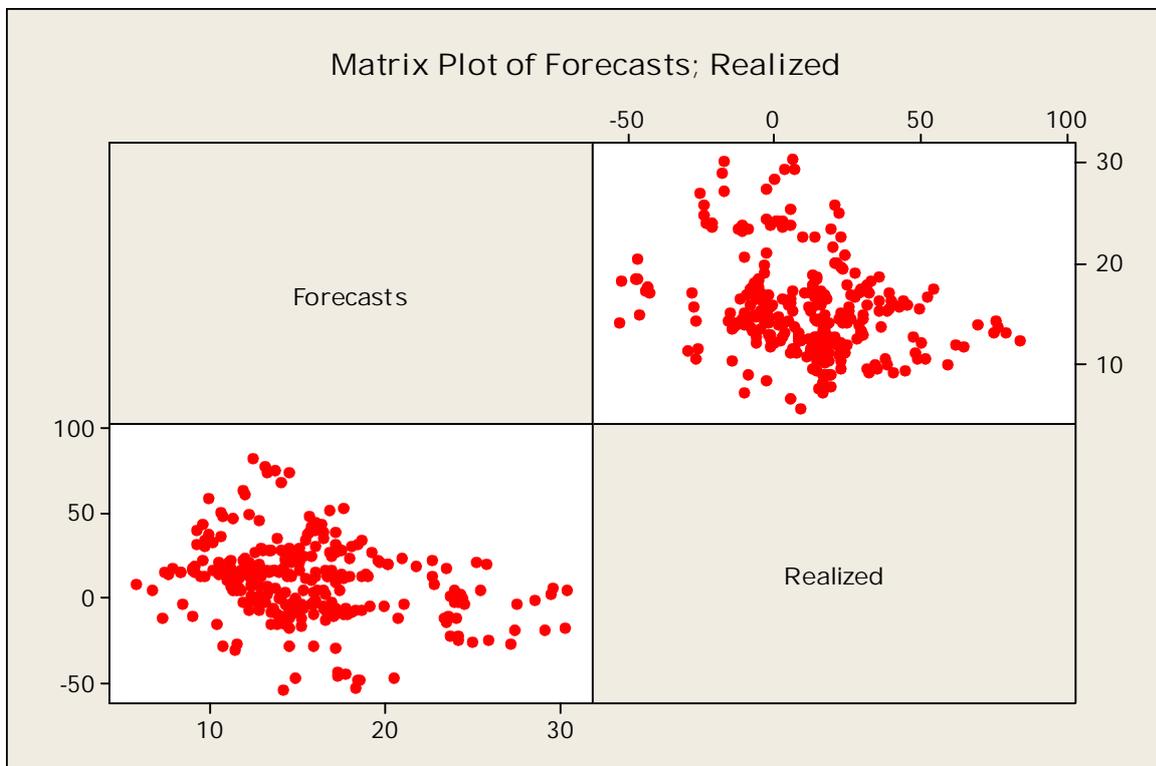


### 11.1.12 Appendix 12: Correlation between forecasts and realized

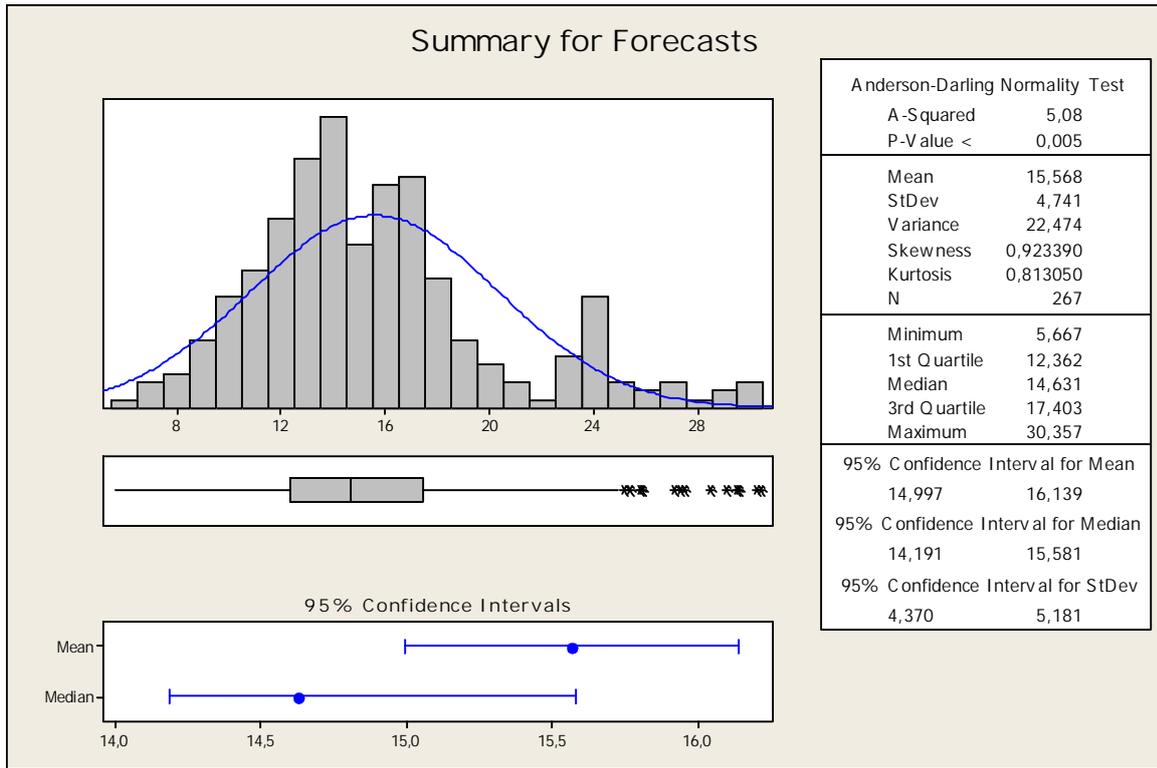
A negative correlation is shown in the graph. The variables are missing correlation.  $RSq=7,9\%$  prove this as well. Only 7,9% of the variation in realized explains by the regression. This is not much and the rest 92,1% are explained by other factors, such as uncertainty.



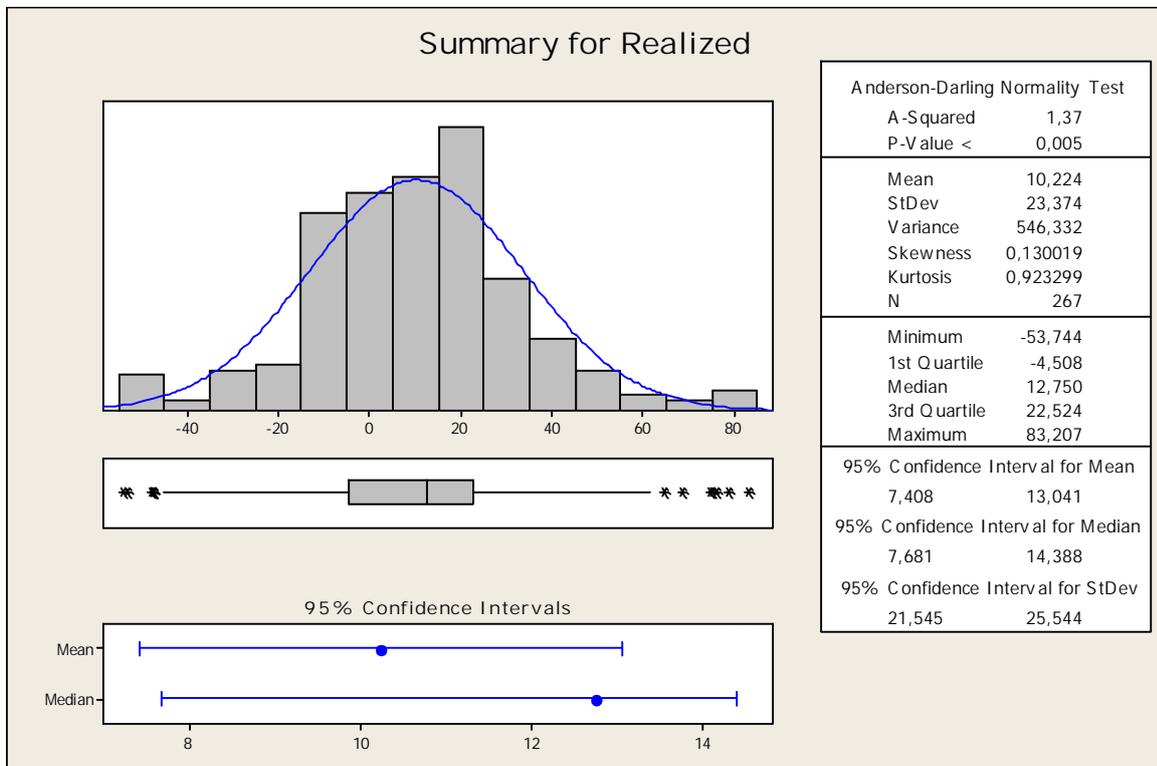
**11.1.13 Appendix 13: Matrix plot of forecasts and realized**



### 11.1.14 Appendix 14: Summary of forecasts



### 11.1.15 Appendix 15: Summary of realized



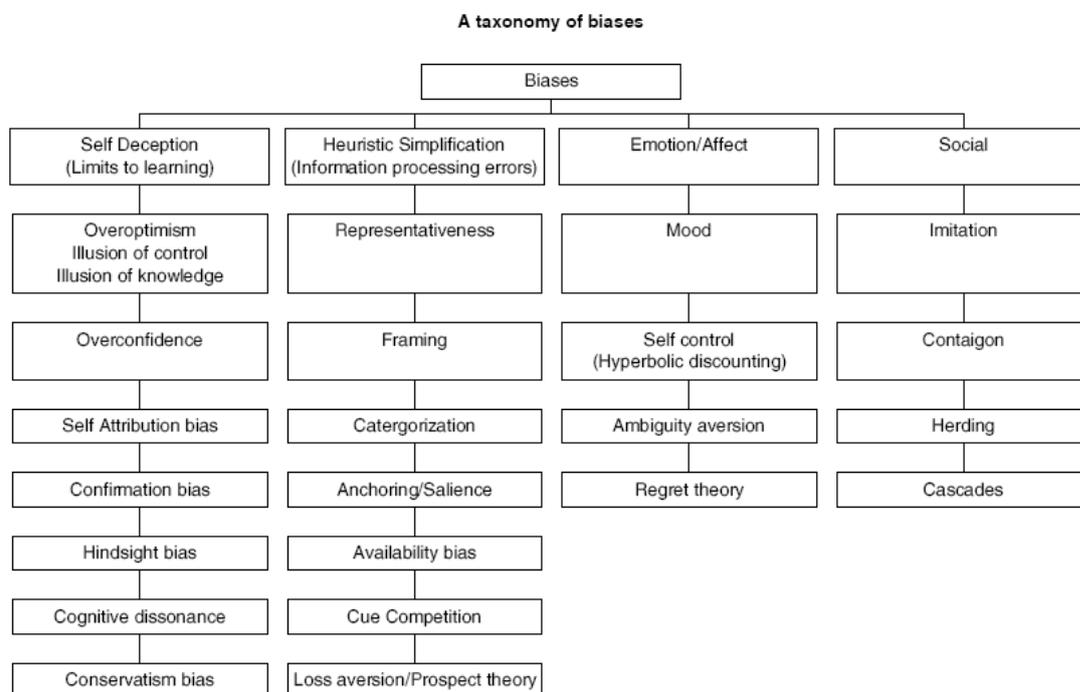
### 11.1.16 Appendix 16: Table X: C-G Gyllenram's table

*Ten important rules for successful trading:*

1. Accept that it takes a lot of work to become a successful trader.
2. It takes time to get rich.
3. Workout an analyst model that suits your personality.
4. Do not overestimate your abilities to forecast the market.
5. Be disciplined and do not the emotions handle your actions.
6. Take responsibilities for your own mistakes and do not blame others.
7. Make out a thoroughly way of handle risk, and do not take on too big positions. Do not be afraid of selling a lost.
8. Do not care about to always be right, care about to make money.
9. The trend is your friend. Sell your lost early and let your gains grow.
10. Make a plan of action, which means a well thought-out investment strategy. That personally suits your risk profile and a clear ambition for your trading.

### 11.1.17 Appendix 17: Summary of most common biases

*The table outlines a summary of the most common of the various biases that have been found, and also tries to highlight only those with direct implications for investment. Behavioural finance compendium (2004), pp. 16.*

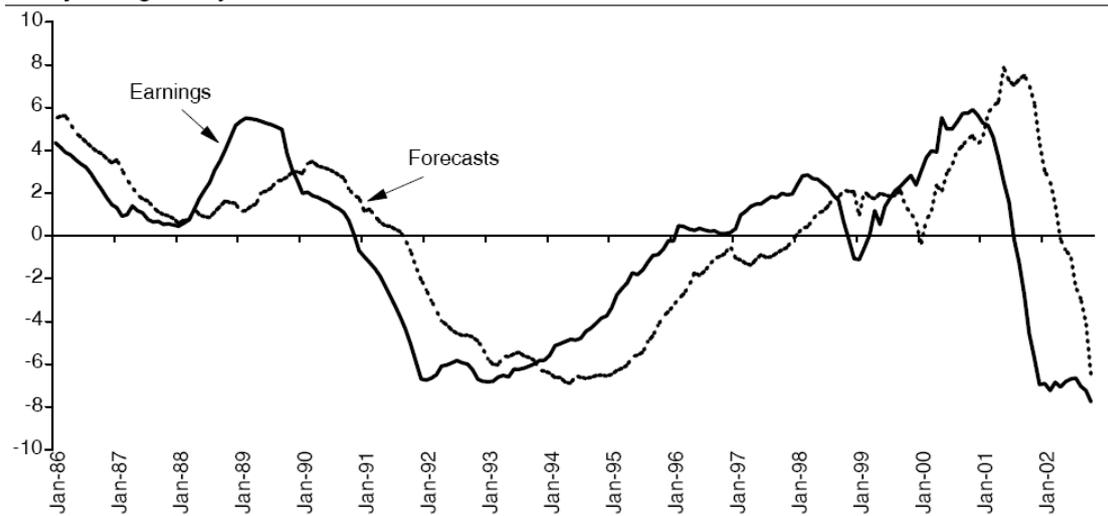


*Figure 1: A summary of the most common biases in behavioural finance.*

### 11.1.18 Appendix 18: Analysts forecast of earnings

*Analysts forecast of companies earnings. Showing conservatism in analysts' forecasts and how they lagging behind reality, Behavioural finance compendium (2004), pp. 19.*

### Analysts lag reality



Source: DrKW

### 11.1.19 Appendix 19: Table of X- and C-system

Summary of how psychologists divide our brains way of thinking in X- and C-system.

*Behavioural finance compendium, pp. 25-28.*

#### Two systems of reasoning

System One/X-system/Reflexive/Intuitive	System Two/C-system/Reflective
Holistic	Analytic
Affective (what feels good)	Logical
Associative - judgements based on similarity and temporal contiguity	Deductive
Rapid parallel processing	Slow, serial processing
Concrete images	Abstract images
Slower to change	Changes with speed of thought
Crudely differentiated - broad generalisation	More highly differentiated
Crudely integrated - context specific processing	More high integrated- cross context processing
Experienced passively and preconsciously	Experienced actively and consciously
Automatic and effortless	Controlled and effortful
Self-evidently valid: "Experiencing is believing" or perhaps wishing is believing	Require justification via logic and evidence

Source: Modified from Epstein (1991)

### **11.1.20 Appendix 20: Top ten list for avoiding investment pitfalls**

*Summary of top ten list for avoiding the most common investment mental pitfalls. Can be added as a solution tool for investors to follow. To diminish the risk of being fooled by our emotions and human biases. Behavioural finance compendium (2004), pp. 15.*

1. You know less than you think you do.
2. Be less certain in your views, aim for timid forecasts and bold choices.
3. Don't get hung up on one technique, tool, approach or view – flexibility and pragmatism are the order of the day.
4. Listen to those who don't agree with you.
5. You didn't know it all along, you just think you did.
6. Forget relative valuation, forget market price, work out what the stock is worth (use reverse DCFs).
7. Don't take information at face value, think carefully about how it was presented to you.
8. Don't confuse good firms with good investments, or good earnings growth with good returns.
9. Vivid, easy to recall events are less likely than you think they are, Subtle causes are underestimated.
10. Sell your losers and ride your winners.

### 11.1.21 Appendix 21: Table of confusion

The table is made by Nassim Nicholas Taleb, the well known formal option trader on NYSE. He has devoted his life into studying problems of luck, uncertainty, probability and knowledge. Today he is more widely known as the Dean's professor in the science of uncertainty at the University of Massachusetts at Amherst. The left column in the table represents a high level of randomness and the right column represents a low level of randomness. What this table wants to show is that people very often tend to mix these sides together even though there have completely different meanings.

	<u>General</u>	
<i>Luck</i>		<i>Skills</i>
<i>Randomness</i>		<i>Determinism</i>
<i>Probability</i>		<i>Certainty</i>
<i>Belief</i>		<i>Knowledge</i>
<i>Theory</i>		<i>Reality</i>
<i>Anecdote, Coincident</i>		<i>Casualty, law</i>
<i>Forecast</i>		<i>Prophecy</i>
	<u>Market performance</u>	
<i>Lucky idiot</i>		<i>Skilled investor</i>
<i>Survivorship bias</i>		<i>Market out performance</i>
	<u>Finance</u>	
<i>Volatility</i>		<i>Return</i>
<i>Stochastic variable</i>		<i>Deterministic variable</i>
	<u>Physics and engineering</u>	
<i>Noise</i>		<i>Signal</i>
	<u>Literary criticism</u>	
<i>None</i>		<i>Symbol</i>
	<u>Philosophy of science</u>	
<i>Epistemic probability</i>		<i>Physical probability</i>
<i>Induction</i>		<i>Deduction</i>
<i>Synthetic proposition</i>		<i>Analytic proposition</i>
	<u>General philosophy</u>	
<i>Contingent</i>		<i>Certain</i>
<i>Contingent</i>		<i>Necessary</i>
<i>Contingent</i>		<i>True in all possible worlds</i>