

The Perception of Control and the Level of Overconfidence: Evidence from Analyst Earnings Estimates and Price Targets

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The majority of analysts failed to predict the recent stock market downturn at all, or, if they did, then not to its full extent. Apart from the well-known conflicts of interest, forecasts can be distorted by psychological factors. On average, financial analysts forecast earnings and prices with a positive bias. This study examines why financial analysts are overconfident, i.e., why they overestimate their abilities to forecast earnings and prices. Our empirical findings support the hypothesis that overconfidence intensifies with an increasing perception of control.

The Quality of Analyst Decisions

Financial market research is particularly interested in the quality of analyst forecasts and recommendations. There are two main sources of analyst bias: conflict of interest, and psychological distortion of judgment.

Since the most recent stock market downturn, analysts have come under increasing fire over conflicts of interest. Analysts are accused of things like overrating company positions. This is particularly relevant for sell-side analysts whose employers may be interested in earning additional commissions and fees. Such a goal may clash with the publishing of independent well-founded analyst reports. The resulting tendency toward optimistic reporting has been empirically proven many times (Francis and Philbrick [1993], Rajan and Servaes [1997], Carleton, Chen, and Steiner [1998], Dunbar, Hwang, and Shastri [1999], Michaely and Womack [1999]). Thus, we do not address it further.

We focus on psychological distortion of judgment here. General psychological phenomena that have been researched in the field of behavioral finance are 1) overreaction toward salient news, 2) underreaction toward less salient news, 3) anchoring, 4) loss aversion, 5) mental accounting, 6) herding, and 7) the overconfidence phenomenon (Hirshleifer [2001]). As a rule, the examination of these phenomena is linked to the investor side (e.g., Odean [1998, 1999] and Barber and Odean [2000, 2001]). But analysts have also demon-

strated underreaction, overreaction, and anchoring (see DeBondt and Thaler [1990], Abarbanell and Bernard [1992], Amir and Ganzach [1998], Easterwood and Nutt [1999]).

However, the phenomenon of overconfidence has not been investigated in any great detail. Our primary focus here is on the reasons and the extent to which analysts are overconfident about the quality of their earnings and price forecasts.

Overconfidence is a robust phenomenon seen in many different situations (see Cooper, Woo, and Dunkelberg [1988]). It is observed in a variety of human decision-making areas and in various professions (see Dittrich, Güth, and Maciejovsky [2001] for a literature overview). Therefore, we can *a priori* anticipate that analysts are also overconfident. However, we do not focus on the *level* of overconfidence, which can be seen from the results of the existing study, but on the *reasons* behind it. We argue that the level of overconfidence depends on the perception of control in the respective forecasting situation. In this context, “perception of control” means the perceived ability to correctly judge all the relevant influencing factors and uncertainties in a particular situation. We investigate the extent of analyst overconfidence when forecasting prices and earnings. We argue that the perception of control is more pronounced when predicting earnings than prices, thus the level of overconfidence is greater for earnings forecasting than for price forecasting. This hypothesis is examined here and significantly confirmed.

The paper is organized as follows: The second section represents the types of overconfidence, discusses the central problems of proving overconfidence in forecasting, and outlines links to the perception of control. These result in the above-mentioned hypothesis. The third section describes the empirical design, and the fourth section presents the results. The final section concludes with a discussion of the practical consequences.

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Theoretical and Empirical Findings on the Overconfidence Phenomenon

Types of Overconfidence in Empirical Research

Empirical research has identified two different types of overconfidence (Griffin and Vary [1996]): Overconfidence in one's own knowledge, and overconfidence in one's own abilities.

Overconfidence in one's own knowledge can be proven experimentally by giving test subjects general knowledge questions and subsequently asking them how confident they are in their answers. Such experiments have shown that this type of overconfidence comes to light systematically, particularly with regard to average and difficult questions. Experiments conducted by Lichtenstein, Fischhoff, and Phillips [1982] and Griffin and Tversky [1992] demonstrate that subjects were 100% (!) convinced of having given the correct answers, even though only 80% had actually done so. For 90% conviction, studies showed that only 60%-70% had given the correct answers.

Similarly, a systematic distortion can also be identified for judging confidence in one's own abilities. For example, if car drivers are questioned about their driving abilities, studies implemented internationally have shown that between 60% and 90% judge their own driving as better than average (see Svenson [1981], McCormick, Walkey, and Green [1986], and Delhomme [1991]). Of course, realistically, only 50% can actually be better than average drivers.

It is not always possible to differentiate between overconfidence in one's own knowledge and overconfidence in one's own abilities. This is particularly true for financial markets, where forecasts play such a large part. For example, does a forecast describe one's own knowledge, or an ability to predict price developments? For this reason, we do not differentiate between these two types of overconfidence.

Overconfidence and the Illusion of Control

Human beings have a strong need to feel in control of their own situation (White [1959], deCharms [1968]). This need is so strong that any deficiency in the perception of control can have physiological consequences. This has been proven in various experiments (e.g., see Glass and Singer [1972], Schulz and Aderman [1973], Sklar and Anisman [1981]).

Since individuals are considerably happier when they feel in control, they are prepared to go to great lengths to obtain an adequate perception of control. And individuals tend to imagine they are in control, even if they are not in reality. We refer to this as the "il-

lusion of control," and it is quite common. A classic demonstration is given by Langer [1975]. He conducted an experiment with two groups of test subjects involving lottery tickets. He allowed one group to draw their own tickets, and handed tickets out to the other group. He then asked the subjects how much they would resell their tickets for, and found that the first group demanded a much higher price than the second group. The first group appeared to believe they had a better chance of winning because they drew their tickets themselves, an illusion of control.

Perception of control within the scope of the financial markets can be observed in several different forms (Thompson [1981]). The strongest form is considered unrealistic: when a person believes he can significantly influence market events. In this case, there is hardly any illusion of control. A very weak perception of control exists, however, when a market participant believes he can explain why something happened after the fact. Empirical findings show that human beings in this context systematically overestimate the correctness of their judgment (Fischhoff [1975]).

However, we are interested in the perception of control geared to the forecasting ability of market participants. The perception of control here corresponds exactly to the overconfidence phenomenon. Because of the close link between overconfidence and the perception of control in a situation, we posit the following: Overconfidence should be particularly noticeable when a situation allows a person to have a stronger perception of control. In other words, the stronger the perception of control, the more overconfidence should be observed.

Hilary and Menzly [2000] confirm this hypothesis. They document that analysts with past above-average forecasting results (an increasing perception of control) tended to give forecasts afterward that deviated extremely from the consensus. The quality of these extreme estimates was shown to be below average, which shows that these extreme forecasts were due to overconfidence.

The Perception of Control when Forecasting Earnings and Prices

In this section, we account for why analysts have a stronger perception of control when providing earnings forecasts than price forecasts. It may be useful first to describe the formal relationship between prices and earnings. Generally recognized standards of valuation define a stock price as the current value of all future cash flows to the stockholder. Disregarding share buybacks, the cash flows equal the dividends. Today's price, then, corresponds to the sum of all dividends discounted with a risk-adjusted discount rate k . Let E_t be

the currently expected earnings for period t , and let q_t be the expected payout ratio for period t :

$$price = \sum_{t=1}^{\infty} \frac{q_t \cdot E_t}{(1+k)^t} \quad (1)$$

Equation (1) shows the relationship between earnings and prices (see Damodaran [1996]). In order to estimate a price, analysts must forecast much more than the earnings for the next period. They must also predict earnings and the payout ratio over the long term, while also retaining a well-founded conception of an appropriate discount rate.

The discount rate can be divided into a risk-free part and a risk premium. The interest on risk-free investments is known to the market and thus does not influence an analyst's perception of control. However, the risk premium must be estimated. Theoretically, the risk premium depends on the (fundamental) risk of the company concerned: The more the earnings fluctuate, the higher the risk premium. In reality, however, a second significant factor influences its value: the whole population of market participants with their subjective perceptions and pricing of risk. This factor is non-transparent for analysts and other market participants alike, which leads to a diminishing of the perception of control.

Therefore, it is not surprising that when Welch [2000] asked financial experts to estimate the market risk premium, he got a very wide range of fluctuations

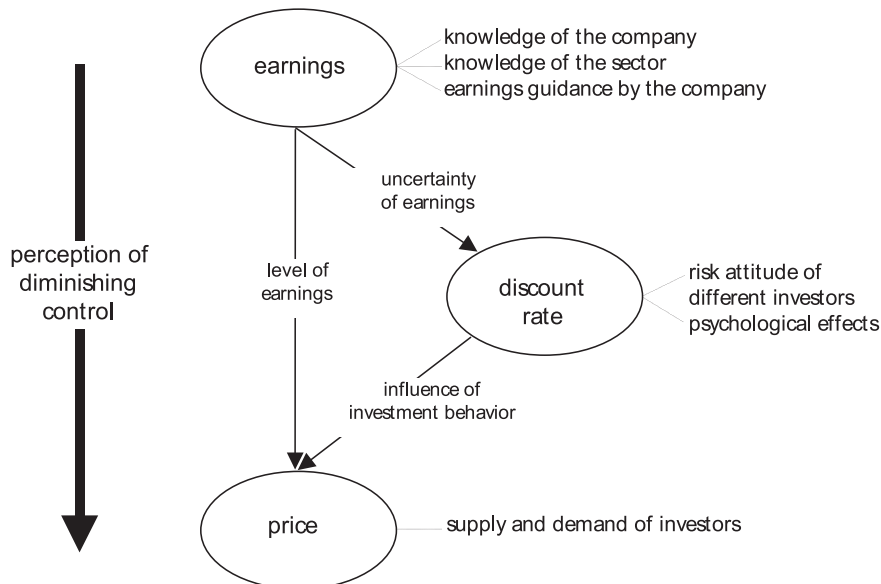
between 1.5% and 15%. The unobservability of the discount factor and its complex impact factors (risk-taking and psychological effects) clearly demonstrate how little control analysts have over prices.

However, when earnings forecasts are made, there are grounds for a perception of increased control. As a rule, analysts know a company very well. They have close contact with the managing board, investor relations managers, and other representatives, as well as a small selection of people within the company. This close contact can lead to a perception of control ("I know the company well, so I can successfully estimate earnings").

Apart from knowing a company well, though, knowledge of the sector is also important. Since analysts usually analyze companies within the same sector simultaneously, the perception of control spreads from an individual company to the sector as a whole. Additionally, the companies themselves guide the analysts in their earnings assessments. This so-called "guidance," or forecasting aid, also serves to inflate the perception of control.

Figure 1 shows three factors that describe an analyst's forecasting situation: earnings, discount rates, and prices. Earnings are driven by the company's success. They influence prices by their expected size and they influence the discount factor by their uncertainty. Prices and the discount factor itself are additionally influenced by investor *behavior*. Thus, prices are substantially more complex and perceived as harder to forecast than earnings. Therefore, analysts should have

FIGURE 1
Influence Factors in the Process of Forecasting Earnings and Forecasting Prices and the Relationships Between Them



a stronger perception of control when forecasting earnings than prices.

We can now create an empirical test to examine overconfidence for prices and earnings separately, and to draw conclusions about the perception of control from a comparison.

Methodology and Hypothesis

Methodology

Analyst overconfidence can be examined in two ways. The first is geared to the individual analyst and compares the forecast directly with the outcome. However, this approach harbors substantial disadvantages. Since forecasts are always linked to uncertainty, the analyst must define 1) a forecasting interval for earnings or prices, and 2) the probability of the forecasting interval. If, for example, an analyst predicts the earnings per share or the share price in one year's time, the time period for getting a data point for the testing of the forecast quality would be one year. Obtaining ten independent data points would necessitate a time period of ten years. Since an analyst's working environment is dynamic, this would not be meaningful or practical.

For this reason, we use the second method, where analysts are directly questioned about their personal judgments regarding the quality of their forecasts in comparison with those of their colleagues. We define overconfidence as when more than half the analysts we question define themselves as better than average in comparison with their colleagues. A realistic self-assessment would be when half the analysts regard themselves as better, and half as worse.

However, this method also has its disadvantages. It is not possible to examine whether an individual analyst's self-assessment is too positive or too negative. Analysts who regard themselves as above average may be just that. But more than half cannot be better. Consequently, we cannot make a statement about an individual, but we can comment on the average level of overconfidence within the sample.

We assume that analysts do not give honest answers when directly questioned, because nobody will willingly admit to being below average. This may be why more than half the analysts regarded themselves as above-average. However, this study neutralizes such a distortion of answers, because we are principally interested in examining the effect of the perception of control on overconfidence. The reliability of the results is further improved by interviewing a population of analysts who are well acquainted with each other. We only interviewed analysts from nine well-known banks, and we asked the interviewees to

compare themselves with this personally acquainted population.

Limiting the examination in this way has an additional advantage. If this limitation were not made, it could be argued that only the weaker analysts are overconfident, while the better ones judge their abilities more realistically. If one assumes that the well-known banks tend to employ the best analysts, we can disprove this point and show that overconfidence (also) affects more competent analysts. We regard this as an important aspect, since it demonstrates that investors cannot avoid the phenomenon of overconfidence simply by trying to choose the "best" analyst.

Hypothesis

The actual questionnaire is formulated as follows (for details, see Appendix A): "Rank your skills with regard to your earnings estimates (or prices) in comparison to other sell-side analysts (from the top nine banks). Consider how many analysts produce work that is inferior to yours, and how many produce superior work." By naming the banks, the analysts are made aware to whom they should compare themselves.

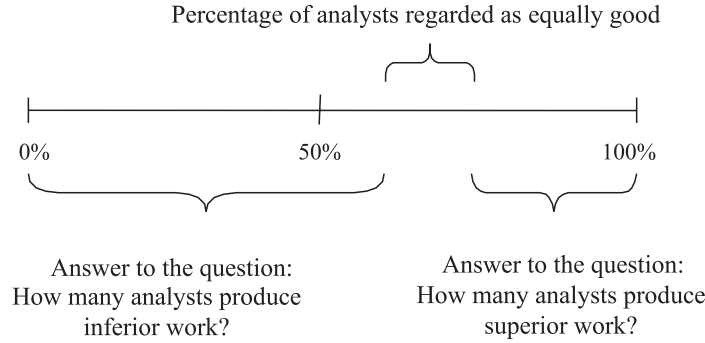
Half the analysts were then asked "What percentage of analysts produce work that is *superior* to yours?" The other half was asked "What percentage of analysts produce work that is *inferior* to yours?" An analyst's response i is then denoted as the overconfidence coefficient for earnings $OCE(i, +)$ (question: "superior") or $OCE(i, -)$ (question "inferior"). We ask for both directions because analysts consider a third group of analysts who they feel produces work of the same quality. Thus, if an analyst believes that 60% of the other analysts produce inferior work, s/he will not necessarily claim that 40% produce superior work (Klayman et al. [1999]). A figure of, say, 35% could actually be expected should the analyst regard the others as being equally good. Figure 2 shows this relationship.

The answers are averaged by calculating a weighted average over all the analyst-specific $OCE(i, -)$ or $100\% - OCE(i, +)$. The average $\overline{OCE}$ is then calculated according to

$$\overline{OCE} = \frac{1}{2} \left(\frac{1}{N_1} \sum_{i \in \text{inferior}} OCE(i, -) + \frac{1}{N_2} \sum_{i \in \text{superior}} [100\% - OCE(i, +)] \right) \quad (2)$$

where N_1 is the number of answers to how many analysts produce "inferior" work, and N_2 to "superior" work. OCP (overconfidence in price targets) is calculated analogously.

FIGURE 2
How Overconfidence Depends on the Formulation of the Questions



Previously we argued that the perception of control should be stronger for earnings estimates than for price forecasts. Empirically, this can be seen by the difference between the overconfidence coefficient for earnings (*OCE*) and prices (*OCP*). The average difference over all the analysts for whom there is an *OCE* and an *OCP* is denoted by *DOC* and calculated as follows:

$$DOC = \frac{1}{2} \left(\frac{1}{N_3} \sum_{i \in \text{inferior}} [OCE(i, -) - OCP(i, -)] - \frac{1}{N_4} \sum_{i \in \text{superior}} [OCP(i, +) - OCE(i, +)] \right)$$

Here, N_3 is the number of analysts who answer both questions 3 and 4 with “inferior.” N_4 is the number of analysts who answer both questions with “superior.” Our thesis of whether the perception of control influences the level of overconfidence is verified by the following hypothesis:

Overconfidence regarding the quality of earnings forecasts is greater than for price forecasts ($DOC > 0$).

Sample

The hypothesis that *DOC* is greater than zero was tested on randomly selected analysts working for the following investment banks: Credit Suisse First Boston, Deutsche Bank, Goldman Sachs, J.P. Morgan, Lehman Brothers, Merrill Lynch, Morgan Stanley, Schröder Salomon Smith Barney, and UBS Warburg. Analysts were located in New York, London, and Frankfurt. The selection was made by the database of themarkets.com, a worldwide data service for institutional investors.

In all, 147 analysts were interviewed by phone between March 12, 2002, and April 26, 2002. The ques-

tion/answer ratio was high. Only 35 of the 147 analysts refused to take part at all, and this refusal was categorical, i.e., they refused to take part in any telephone surveys. Of the 112 analysts who answered at least one question, 29 (36) abstained from answering how they view the quality of their earnings forecasts (target prices) (see Appendix A for the exact answering behavior).

It could be assumed that the analysts who abstained from answering a question systematically bias the survey upward if, for example, they regard themselves as below average (and perhaps abstain from answering for this reason). However, this assumption is weakened by the analysts' frequent explanations that a judgment of the quality of their work is usually undertaken by their customers (i.e., institutional investors). Those analysts who received very positive results from customer surveys also gave this explanation. Thus, we assume a general upward bias is unlikely.

Results

Summary Statistics

The results show overconfidence in analysts with regard to earnings and prices. The coefficient *OCE* as a measure of the average analyst's overconfidence with regard to earnings is 68.44%. On average, analysts judge the quality of their earnings forecasts in such a way that more than two-thirds of their colleagues produce worse results. The coefficient *OCP* as a measure of the average overconfidence with regard to price forecasts is 61.49%, somewhat lower. But this also points toward the phenomenon of overconfidence. Since both values are significantly greater than 50% ($p < 0.001$), we could conclude that analysts are overconfident with regard to both their earnings and price forecasts.

Although this conclusion may seem likely, however, we should avoid it, because what appears to be overconfidence could be an understandable form of self-protection. It is more important to take a closer look at the difference between the *OCE* and the *OCP*.

Difference between Overconfidence Regarding Earnings and Target Prices

The hypothesis in the third section is intended to test whether overconfidence is more pronounced for earnings forecasts than price forecasts. The results confirm this assumption: Overconfidence with regard to earnings is significantly more pronounced than with regard to prices. The *DOC* is 6.91% ($p < 0.001$), significantly greater than zero.

On average, analysts believe that their earnings forecasts are even better than their price forecasts when compared with those of their colleagues. In this respect, the reasons given by the analysts support those aspects we formulated earlier. A portion of the analysts argued that prices sometimes “happen by chance,” are the result of “irrational investors,” and that successful price forecasts have something to do with “luck.” Future prices are, according to analyst perception, additionally dictated by “general market movements.” On the other hand, better earnings forecasts are based on “detailed knowledge of the company and the sector.” “Experience” and “hard work” are basic to good quality in earnings forecasts. These answers confirm the assumption that the more intense form of overconfidence with regard to earnings is the result of the perception of increased control.

Conclusion and Implications

This study has shown that analyst overconfidence is more pronounced with regard to earnings forecasts than with regard to price forecasts. Because analysts have a stronger perception of control when forecasting prices than predicting future prices, these results support the hypothesis that the perception of control significantly influences the level of overconfidence. A stronger perception of control results in a higher level of overconfidence.

In general, the level of overconfidence seems to be high. Between 60% and 70% of analysts regard the quality of their research as above average. However, this high level of overconfidence can also be the result of biased answers, which we can justify as a form of self-protection.

Various practical implications can be derived from our theoretical findings. Conflicts of interest are not the only thing that seem to distort the quality of research. Investors should also be wary of analyst fore-

casts and recommendations, since overconfidence is not conducive to analysts continuing to learn and comprehend the extremely complex process of forecasting. This may mean there is little hope for analysts to improve the quality of their forecasts over time.

One potential solution would be to broaden analyst training. This would involve the integration of a basic understanding of psychology—such as that provided by behavioral finance—together with an understanding of modern valuation methods and their complex influence factors. Thus, learning processes could be initiated with long-term orientation. If, for example, analysts were to keep “forecast diaries” in which all forecasts were listed against the influence factors, they would gain more realistic insights into their own forecasting situations.

This study illustrates that analysts should consciously confront the overconfidence phenomenon and the reasons behind it, and take the necessary steps toward improving the quality of their own forecasts more realistically. In all, it would behoove analysts to learn to be more critical of themselves and their abilities, and to become more analytical—which is, after all, what the name “analyst” stands for. They need to become more confident without becoming overconfident.

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Appendix A

Questionnaire

- How many years have you worked as an analyst?
- Do you believe that the quality of earnings estimates and target prices changes over an increasing number of years of professional experience? If so, does it improve or deteriorate?
- Please rate your abilities regarding earnings estimates compared to those of other sell-side analysts (the top nine brokers). Think about how many of these analysts produce work that is inferior to yours, and how many produce superior work.
 - What percentage of analysts *produce work that is superior* to yours?
 - What percentage of analysts *produce work that is inferior* to yours?
- Apply question 3 to the quality of your price targets.
 - What percentage of analysts *produce work that is superior* to yours?
 - What percentage of analysts *produce work that is inferior* to yours?
- Give reasons for how you assess your abilities.

The questionnaire is structured as follows: the answer to Question 1 serves to categorize. Apart from the number of professional years, there are other categories that do not need to be ascertained, such as sex (male/female). Question 2 examines how analysts judge their own quality depending on their professional experience, which is often deemed a characteristic sign of good quality. Questions 3 and 4 examine the analysts' assessments of their own abilities. Question 3 asks what percentage of analysts in the peer group (top nine brokers) produce superior work (Question 3a) or inferior work (Question 3b) with regard to their earnings forecasts. Question 4 deals with the estimation of analyst abilities with regard to the quality of their target prices. The different form of question (whether the analysts believe their work to be superior or inferior) serves to categorize, and examines whether the results depend on the way the questions are formulated. Klayman et al. [1999] documented the fact that overconfidence is dependent on the formulation of the questions. The answers to Question 5 serve to provide possible explanations for the results.

In total, we interviewed 147 analysts, 112 of which gave at least one answer to one of the questions. Thirty-five analysts categorically refused to answer without knowing the subject of the survey. The exact number of answers to the individual questions is in Table A.1.

Table A1. *Analysts' Answering Behavior*

Analysts Questioned:	147
Answers (to at least one of the questions):	112
Answers to Question 1:	112
Answers to Question 2:	112
Answers to Question 3:	83, of which a) 37 and b) 46
Answers to Question 4:	76, of which a) 35 and b) 41
Answers to Question 5:	79

Appendix B

Detailed Statistical Results

Table B1. *Do Analysts Judge the Quality of Their Earnings Forecasts to Be Above-Average?*

$\overline{OCE}$	95% Confidence Interval	$t(\overline{OCE} = 50\%)$	p-value
68.4427%	(64.9160%; 71.9694%)	10.4067	< 0.001

Note: Overconfidence with regard to earnings estimates: $\overline{OCE} > 50\%$.

Table B2. *Do Analysts Judge the Quality of Their Price Forecasts to Be Above-Average?*

$\overline{OCP}$	95% Confidence Interval	$t(\overline{OCP} = 50\%)$	p-value
61.4885%	(58.2338%; 64.7432%)	7.0243	< 0.001

Note: Overconfidence with regard to price forecasts: $\overline{OCP} > 50\%$.

Table B3. *Results for the Main Hypothesis: Overconfidence Regarding the Quality of Earnings Forecasts is Greater than for Price Forecasts: $DOC > 0$*

DOC	95% Confidence Interval	$t(DOC = 0\%)$	p-value
6.9120%	(3.3826%; 10.4413%)	3.9051	< 0.001

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