

KNOWLEDGE VS. KNOWLEDGE PERCEPTION:
IMPLICATIONS FOR FINANCIAL PROFESSIONALS

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ABSTRACT

There is a meaningful distinction between what one knows and what one thinks one knows. The reality is that most of us know less than we think, which means we are overconfident. Such a tendency can be particularly dangerous for individual investors since it can lead to such mistakes as under-diversification and excessive trading. Moreover investors often believe that they are capable of picking winning stocks or funds, a belief which the preponderance of academic research calls into question. Financial professionals are well advised to be on the lookout for such tendencies in their clients.

Introduction

Before beginning the article proper, we ask the reader to spend a few minutes doing the following short test. The test consists of 10 questions, of which the first five concern the economy and finance, while the second five are in the category of general knowledge. These questions all have numerical answers. Some of these questions are rather difficult and very few people would know the answers precisely. Still, try your best to come up with a good guess. Additionally, we would also like to know how confident you are in your answer. Therefore, in addition to your best guess, we also ask that you provide for each answer a 90% confidence range. That is, come up with a lower bound and an upper bound for your answer, such that you are 90% sure that the correct answer will lie between the two bounds.¹ Write down your answers as you go along.

1. What was the level of the S&P 500 at the end of 2003?
2. What was the level of the U.S. Current Account deficit (in billions of dollars) for the second quarter of 2004?
3. What was the U.S. national unemployment rate (in percent) in August 2004?
4. What is the required decline (in percent) in the stock market from a peak in order for people to use the term bear market?
5. What was the compounded average annual rate of return (in percent) for U.S. Treasury bills during the 1980s?
6. In percentage terms, what was worldwide population growth over the 10-year period from 1990 to 2000 (not annualized rate)?
7. What was the number of medals that Greece won at the first Olympic Summer Games in 1896?
8. What was the year in which Bell patented the telephone?
9. What is the percentage of the total area in the world covered by water?
10. What is the height (in feet) of the Sears Tower in Chicago?

Now that you are done, you can go to the first endnote where we have concealed the answers.² You can see how close you came to the correct answers. It would be straightforward to rank a group of people on the basis of the accuracy of their answers (in the economics/finance and general knowledge categories.) More importantly for our purposes though, also keep track of the number of times that the correct answer was between your lower and upper bounds. Remember that the two bounds constitute your 90% confidence ranges. Therefore, if you are properly "calibrated," that is, if you know how much you know, nine of the ten correct answers (subject to sampling error) should lie within your confidence ranges.

Generally, very few people will have nine, eight or even seven right. Much more common is four, five or six. If you are in this neighborhood, do

not despair. You, like most people (including the authors of this article), are overconfident. Your perception of your knowledge exceeds your actual knowledge.

The purpose of this article is to touch upon some of the recent work in the relatively new field of behavioral finance that highlights the impact of overconfidence on investor behavior and market outcomes. In a nutshell, behavioral finance is the application of psychology to finance.³ Investors, and other financial decision-makers, often fall prey to bias or perform ill-advised actions because of certain psychological tendencies. Problems arise in three main ways:

1. *Cognitive biases*: These occur because individuals use rules-of-thumb (or heuristics) in order to guide choice, and often such rules-of-thumb systematically push people in the wrong direction.
2. *Emotion*: Falling prey to emotion can lead the decision-maker to make choices without a firm analytical basis.
3. *Overconfidence*: Thinking that you know more than you do can, as will be discussed, lead to such mistakes as under-diversification and excessive trading.

It is this final issue, overconfidence, along with its implications for financial professionals, which will concern us in this article. In the next section, we discuss how overconfidence can be detected and measured, and review some of the psychological and financial literature pertaining to overconfidence. In section three, we turn to a discussion of the impact of overconfidence on investor behavior and market performance. In section four we briefly report the results of an experiment conducted by two of the authors on how overconfidence affects investor trading behavior. Finally, in the last section, we conclude by discussing why overconfidence matters for financial planners, and how they might be able to use the insights here presented.

Overconfidence: Measurement, Existence, Demographics and Dynamics

Overconfidence is the tendency for people to overestimate their knowledge, abilities and the precision of their information. That most people are overconfident is well-documented by researchers in both the psychology and financial economics literatures.⁶ In a research setting, overconfidence can be detected and even measured in several ways. Some studies have asked people to rate themselves relative to average on certain positive personal attributes such as athletic skill or driving ability. Too often people rate themselves above average on those attributes. For example, Svenson (1981) surveyed a sample of U.S. students reporting that 82% of them rated themselves in the top 30% of their group on driving safety. This is the so-called *better-than average* effect.

Another strain of overconfidence is called *illusion (~)control*. The point is to investigate whether people think they have more control over events than objectively can be true. For example, people have been asked how likely it is that certain events (good or bad) will occur to them - such as winning the lottery or dying of cancer. The evidence indicates that most people overestimate the likelihood of good outcomes, while underestimating the likelihood of bad outcomes. For instance, Fischhoff, Siovic, and Lichtenstein (1977) report that events that individuals believe are certain to occur actually occur only about 80% of the time, while events that they consider impossible occur about 20% of the time.

Recall the brief quiz that we pushed you to take at the beginning of this article. This "calibration test" is another way to investigate the presence of overconfidence. Generally, studies using calibration tests find that the confidence intervals that individuals provide are too narrow, resulting in correct answers lying within the confidence ranges less often than an accurate sense of one's limitations would imply.⁷

While it may be natural to be unsure of your knowledge in the case of general knowledge, studies have also shown that people can be quite overconfident in their fields of expertise. While this has been shown for such occupations as investment bankers, business managers, lawyers and medical professionals, we would not be surprised if you were just as overconfident in your finance/economics questions as you were in your general knowledge questions.⁸ In other words, there is no reason to believe that financial professionals in their realm of expertise are immune.

There is evidence that the extent of overconfidence may be a function of demographics. For example, in a survey of defined contribution pension plan members, Bhandari and Deaves (2004) find that educated people are not only more *confident* than uneducated people (which is natural enough), but they are also more *overconfident*, which means that the gap between their knowledge perception and actual knowledge is greater.⁹

Some work also suggests that there is a difference in the degree of overconfidence between men and women: specifically, it appears that men tend to be more overconfident than women.¹⁰ Interestingly, the magnitude of the difference depends to a great extent on the tasks that they are asked to perform. The difference is greater for tasks that are perceived to be "masculine."¹¹ It is argued that financial matters fall under this rubric, with men tending to feel more competent than women in this regard.¹² In 15 surveys (each with approximately 1,000 respondents) conducted between 1998 and 2000 by the *Gallup Organization* for *UBS Paine Webber*; respondents were asked what they expected the rates of return on the stock market and on their portfolios to be in the following 12 months.¹³ On average, both men and women expected their portfolios to outperform the market. Nevertheless men expected their portfolios to outperform by a higher margin than did women.

Researchers have tried to explain why overconfidence is so prevalent among people, and, more puzzlingly, why people fail to learn from past mistakes. It is believed that many people possess certain behavioral biases that contribute to the longevity of overconfidence. One such bias is *self-attribution bias*. People tend to attribute successes or good outcomes to their own abilities, while blaming failures on circumstances beyond their control, or plain bad luck.¹⁴ As it were, people *learn* to be overconfident.¹⁵ For example, a lot of people think highly of their investing ability. They believe they can time the market or pick the next hot stock. When the market is rising, most stocks will do well, including those that they pick, and most people will take that as a confirmation of their acumen. On the other hand, when their stocks drop in price, they will generally blame it on circumstances over which they had no control - such as the general condition of the market or the economy.

Closely related to self-attribution bias is *hindsight bias*. This pushes people into thinking that "they knew it all along."¹⁶ For example, Professor Robert J. Shiller reported that at the peak of the Japanese stock market, 14% of Japanese investors expected a crash. After the crash, however, the percentage of investors who said they expected the crash was 32%. Such hindsight bias leads people to believe in illusory predictive power and to be too confident in predicting the future.¹⁷

Overconfidence: Impact on Investor Behavior and Market Performance

Overconfidence can affect investors' decisions in several ways. First, it can lead to what researchers call the "planning fallacy" or the inability to complete tasks on schedule. Because people are overconfident, they tend to think they are more prepared financially than they really are. For example, in a recent survey of around 3,000 Germans conducted by the financial firm *Allianz AG*, an overwhelming majority (around 90%) recognized the need to plan their finances and believed they had their finances under control. Yet, only 30% of them had a long-term (10 years or more) plan.¹⁸

Second, overconfidence may cause investors to be underdiversified. It would be wise to be somewhat undiversified if you could identify a few hot stocks. But how many of us are really capable of doing this on a consistent basis? We know of three finance professors who are not so capable. The problem is that investors believe they have more stock picking skills than they really do possess, and as a result may concentrate their portfolio in a small number of companies with which they are *presumably* familiar.¹⁹ Overestimating one's knowledge of certain stocks (especially those familiar to them), one has the tendency to overweight these stocks in his/her portfolios. In addition, overconfident investors generally underestimate the risk of their

portfolios and trading strategies, causing them to ignore possible hedging techniques and to take on more risk than they can (or should) bear.

Finally, and perhaps most importantly, overconfident investors, in overestimating their ability to locate winners, likely trade too often. Barber and Odean (2000) conducted a comprehensive study of the trading histories of over 60,000 U.S. discount brokerage investors between 1991 and 1996. They found that on average, investors turn over 75% of their portfolios annually. As a result of frequent trading, the net risk-adjusted annual return (after taking into account transaction costs, bid-ask spreads and differential risk) that an average investor received was below the market return by as much as 3.70%. Further, the top 20% of investors who traded the most underperformed the market (again on a net risk-adjusted basis) by about 1W/rJ. Interestingly, they found very little difference in the gross return between those who traded frequently and those who traded infrequently. In other words, portfolio choices were not really the reason for the poor performance. Rather, it was the cost of trading and the frequency of trading.

In a follow-up study using the same dataset, Barber and Odean (2001) explored the role of gender in this context. They reported that, on average, men traded 45% more than did women, and thus men incurred more trading costs. In addition, because men also took on more risk, their net risk-adjusted returns were similar to those of women.

Investor mistakes may be mapped onto the market. Indeed some models have been developed that show this.²⁰ For example, by trading too frequently, overconfident investors will increase overall market trading volume. Furthermore, if trading is often done at wrong prices because of overconfidence, the result might be that the market becomes overly volatile.

An Experimental Test of the Impact of Overconfidence

The problem with the work by Barber and Odean (2000, 2001) cited above which purports to link overconfidence and excessive trade is that the latter linkage is purely conjectural. How can we be sure that traders who trade a great deal are typically overconfident? Of course there is no way of saying whether particular individuals in a sample of discount brokerage accounts are overconfident or underconfident just by looking at their trading behavior.

For this reason researchers have of late turned to experimental finance. In such research, asset market simulations are conducted. One major benefit of simulations is that they enable researchers to control factors whose effects they are not interested in, while the effect of the factor of interest (here overconfidence) can be isolated.

Research conducted by Deaves, LUDers and Luo (2004) is unique in establishing a correlation between overconfidence and trading not only at the level of the individual but also at the level of the market. To describe the

methodology in a nutshell, a group of students were gathered together and a calibration test along the lines of the one that was presented at the beginning of this article was conducted.²¹ Then the students were invited to participate in asset market simulations. In these simulations the student traders were endowed with a certain amount of cash and shares of a security which paid an end-of-period dividend with a known probability distribution. Additionally, every participant was given some private information on the asset. Specifically this information consisted of a noisy signal on the eventual dividend. Then investors were allowed to trade using a computerized trading simulation program specifically adapted for the experiment. As time passed, students could post bids and asks, accept those posted by others and observe transaction prices. Put yourself in the place of one of these traders. Your estimate of the stock's value is a function of three things: first, the mean of the dividend distribution (which is known to all); second, your private signal; and, third, your observation of the evolution of market prices.

In real markets private signals are self-generated. An investor studies a stock and decides on an estimate of value. Overconfident people will put too much weight on their own private signal and not enough weight on things beyond their control (in this context the mean of the dividend distribution and the evolution of transaction prices). The hard part was to convince overconfident people that their signal really was worth trading on. After all it was not self-generated in any normal sense. Fortunately, a technique suggested itself. In contrast to previous studies, the accuracy of the private information was based on how well the participant performed in the questionnaire in terms of answer accuracy (or knowledge). The better they performed relative to others the more accurate was the assigned information. Since the authors neither revealed the correct answers to the questionnaire nor told the participants their scores, every participant had to guess whether they had performed better than the others in the room. The belief of the researchers was that more overconfident students would believe that they had received better information because they felt themselves to be smarter.

How did the participants perform? Indeed it was found that overconfidence did impact trading activity. People with a higher degree of overconfidence tended to trade more.²¹ Also, markets with a concentration of very overconfident traders witnessed greater volume than markets with less overconfident traders.

More important from a financial professional's perspective is that higher overconfidence does not only lead to more trading but also diminishes trading success. Since in the experiment, traders did not face any transaction costs, the highly overconfident traders would have even done worse in real markets where such costs exist. Further, the results suggest that trading activity tends to increase with trading experience. Hence, those who are very overconfident and in addition have a lot of trading experience are the worst

performers. But who are the best investors? According to the experiment, older people with a sound financial education and relatively little trading experience trade less and perform better.²!

Concluding Remarks: How Financial Professionals Can Use This Research

While all individuals are susceptible to overconfidence, it seems that individual investors are especially at risk. For example, one researcher tracked a group of individual investors over a period of time and found that they were much more optimistic about their own portfolios than they were about the DowY. How realistic is this when there is abundant evidence that the average money manager cannot consistently outperform their risk-adjusted benchmark.¹²¹>

How can financial professionals combat such overconfident tendencies? By being conscious of how overconfidence manifests itself (e.g., beliefs that markets can be timed, hot stocks can be identified and the future is less uncertain than it really is), you can steer your clients away from common overconfidence pitfalls, such as being underdiversified, overtrading and irrationally taking on more risk than is necessary. One could even say that financial professionals need to know as much about psychology as finance: they must act not just as financial advisors, but also as behavioral consultants.

Finally, this article would not be complete if we did not state the obvious. *Even financial professionals, being human, may be subject to overconfidence!* Recall one byproduct of overconfidence is the tendency to act too quickly based on limited information. Similarly, overconfidence in one's knowledge might lead a financial advisor to make recommendations based on insufficient knowledge of a client's circumstances and the investment environment. Indeed, financial professionals as well as clients are well advised to operate on both sides of the knowledge vs. knowledge inequality. To bridge the gap one should try to increase the former and decrease the latter.

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¹ Say you are asked to provide a 90% confidence interval for John Doe's weight. Your best guess is 150 pounds, but of course you are unsure. What would a 90% interval look like? It would be trivial to construct a ridiculously wide interval (say, 50 to 250 pounds) such that you are virtually sure (100%) that you are right. Or you could construct a ridiculously narrow interval (say, 149.99-150.01 pounds) such that you are almost certain to be wrong. The trick is to come up with the interval somewhere in the middle- such that you feel 90% sure that are right.

² The answers are: 1112, 166,5.4,20,8.9, 13,47, 1876,71, 1450.

³ For comprehensive review articles of behavioral finance, see Hirshleifer (2001) and Barberis and Thaler (2002).

⁴ For a discussion of cognitive biases, see Charupat and Deaves (2004).

⁵ For a discussion of the role of emotion, see Ackert, Church and Deaves (2003).

⁶ See Lichtenstein, Fischhoff and Phillips (1982).

⁷ Again, see Lichtenstein, Fischhoff and Phillips (1982).

[~] Overconfidence has been observed in people of various backgrounds and occupations such as investment bankers (Stael von Holstein (1972)), managers (Russo and Schoemaker (1992)), lawyers (Wagenaar and Keren (1986)) and physicians and nurses (Baumann, Deber and Thompson (1991)).

[~] Respondents were asked to tick off one of three boxes: high school or less; some college; or graduated from college.

¹⁰ See, for example Lundeberg, Fox and Pun~ochaa (1994).

¹¹ See, for example, Beyer and Bowden (1997).

¹² See Prince (1993).

¹³ This story is recounted in Barber and Odean (2001).

¹⁴ See, for example, Langer and Roth (1975).

¹⁵ See Gervais and Odean (2001) and Deaves, Uiders and Schroeder (2004).

¹⁶ See Hawkins and Hastie (1990).

¹⁷ See Shiller (2000).

^{1K} See "Aim of Life . People in Germany" at www.allianzgroup.com.

^{1~} See Heath and Tversky (1991).

²⁰ See, for example, Odean (1998).

²¹ Deaves, LUders and Luo recruited among business students at McMaster University in Hamilton, Ontario, Canada and at the University of Konstanz in Konstanz, Germany.

²² An example of a noisy signal might be to say that a particular book has between 450 and 550 pages. We have some information but it is imprecise. The study in question created noisy dividend signals as follows: say the true dividend was 40. Then signals equal to 40 plus a random zero-mean error term were given to each participant.

²¹ For example, an increase in overconfidence of 10% typically led to five additional trades per session (where the average number of trades per session was 45).

²⁴ This experiment failed to find substantive gender differences, attributing this to the fact that female business students were more overconfident than the general population of females.

²³ See DeBondt (1998).

²⁶ See Deaves (2004).

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