Beliefs in Differences Between Professional and Naïve Stock Investors’ Proneness to Judgmental Biases

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Abstract
Drawing on research demonstrating judgmental biases in stock investments, a questionnaire was constructed to measure whether professional investors are believed to differ from naïve investors in making more rational and less biased judgments. Study 1 showed that both economics undergraduates (n = 118) and psychology undergraduates (n = 72) believe that professional investors are more rational and overconfident than naïve investors are, but less optimistically biased, less influenced by affective factors, and less influenced by others. Similar results were obtained in Study 2 comparing a random population-based sample (n = 178) to an undergraduate sample (n = 186). The finding that professional investors are believed to be both rational and overconfident may reflect an intuitive association between overconfidence and decisiveness believed to benefit stock investments.

Key words: belief, judgment, bias, stock investment
An important issue in behavioral finance is whether investors are prone to judgmental biases and the degree to which these biases are possible to correct. If not corrected such biases are potential threats to an efficient market (Fama, 1970; Shiller, 2003). Its theoretical relevance has motivated research trying to show that judgmental biases are less frequent among professional investors than among lay people investing in stock markets or people (e.g. students) who are not investors (Menkhoff, Schmeling, & Schmidt, 2013). Another motive for this research may be a strong belief among finance researchers that professional investors owing to their expertise should be less prone to biases than lay investors are (Dufwenberg, Lindquist, & Moore, 2005; Fama, 1998). Such a belief may be generalized from knowledge that in general experts perform better than lay people (Ericsson et al., 2006). However, it has been argued for a long time that in contrast to other types of expertise being a professional investor plays little role for judgmental biases (Camerer & Johnson, 1991; Hirshleifer, 2001). Believing that professional investors are less prone to judgmental biases than lay investors may therefore in itself constitute a bias.

In the research reported here we investigate people’s beliefs about differences in judgmental biases between professional and lay investors in stock markets. In current times of instability of financial markets and negative publicity in the mass media, believing that stock investors are prone to judgmental biases is another source of mistrust in financial institutions that may contribute further to the turmoil. Several judgmental biases have been demonstrated among stock investors (e.g. Gärling et al., 2009; Glaser, Nöth, & Weber, 2008), including overconfidence, optimism bias, affective influences, and social influences. We expect that these known judgmental biases are consistent with people’s naïve theories (Wegener & Petty, 1997) such that they infer their existence in lay investors. At the same time we expect that owing to trust in expertise, people do not believe that the judgmental biases exist to the same degree in professional investors.

In the next section we briefly review the evidence for judgmental biases among stock investors. On the basis of this evidence a questionnaire is developed and used in two studies to measure beliefs about differences between professional and naïve stock investors’ proneness to judgmental biases.

Investor Biases

Shiller (2003) among others have noted that stock prices are more volatile than they should be according to the efficient market hypothesis (Fama, 1970). Such deviations from rationality are in part ascribed to investors’ cognitive judgmental biases augmented by affective influences and that investors influence each other. We focus here on overconfidence, optimism bias, affective influences, and social influences.

One definition of overconfidence implies that investors are more confident in the information they have than objectively justified (referred to as miscalibration of probabilities) leading to excessive trading in stock markets (Odean, 1998, 1999). Another definition (Gervais & Odean, 2001; Menkhoff, Schmeling, & Schmidt, 2013) implies that investors fail to discount the role of luck for their performance and instead attribute success to their own skill. In an experiment in which participants traded stock shares, Kirchler and Maciejovski (2002) did not find that participants (students) consistently misestimated probability. Glaser and Weber (2007) conducted a web survey of private investors measuring different facets of overconfidence including overestimates of probability, the “better-than-average” effect, illusion of control, and optimism bias. Correlations with trading volume were only found for the measure of “better-than-average”, thus suggesting that those investors who trade more believe that they are more skilled than others. Evidence for that an optimism bias (overestimation of probabilities of success) also plays a role in stock investments was obtained by Moore, Kurzberg, Fox, and Bazerman (1999) in a study of MBA students making
simulated stock investments. The students were consistently more optimistic about future portfolio returns than justified, and they also showed a positivity bias in how they remember past returns.

Nofsinger (2005) noted that rising or falling stock prices in the market or events influencing the global economy give rise to anticipatory affects of hope, fear or even despair that influence stock investments. Other affect influences are also documented. For instance, it has been shown that factors that are likely to influence people’s mood such as sunny or cloudy weather, temperature, changes of season, or time of day correlate with stock returns in the expected direction (Dowling & Lucey, 2005). MacGregor et al. (2000) showed in an experiment that undergraduates taking a course in investment banking were strongly influenced by positive affect images associated with different industries (e.g. information technology) when purchasing stocks. Expected financial performances of the purchased stocks were furthermore rated to be better than analyses of market data showed they were. Affect images may still play a limited role for professional investors spending time on acquiring knowledge of the stocks they buy. In indirect support Finucane et al. (2000) demonstrated in another experiment a negative correlation between judgments of benefits and risk performed under time pressure. The correlation is generally expected to be positive, that is that expected benefits increase with increasing risk. When participants had more time to access relevant information, the negative correlation was reduced.

If some investors start to buy stocks in a given company or industry sector, other investors may follow them and buy the same stocks – a phenomenon referred to as herding (Hirshleifer & Teoh, 2003; Sias, 2004) or social influence (Andersson, Hedesström, & Gärling, in press). Although implied that herding is equivalent to that some investors directly influence other investors, four types of indirect influence have been proposed: common knowledge, fads, common investment strategies, and similar compensation schemes. Common knowledge has an influence when investors, independently of each other, use the same information (Froot, Scharfstein, & Stein, 1992; Grinblatt, Titman, & Wermers, 1995). Evidence of fads is that investors buy the same popular stocks (Sias, 2004). Many investors also systematically follow the same investment strategy, for instance momentum (Wermers, 2000). Investment firms frequently compensate their employees’ performance relative to that of others, and therefore deviations from a market index would result in personal costs (Rajan, 1994). Direct influence or imitation is believed to occur when investors reduce uncertainty by using information about choices made by others preceding them to make the same choice (Anderson & Holt, 1996; Bikchandani, Hirshleifer, & Welch, 1992) or reputational herding which refers to that the same choice is made because investors would otherwise incur the cost of an impaired reputation (Scharfstein & Stein, 1990).

Törngren and Montgomery (2004) observed that professional investors failed to make better forecasts of stock prices than students who had little knowledge of the stock market. DeBond (1991) showed that expert forecasters overreacted to changes in stock prices and that their predictions were strongly mean-reverting. Suggesting that professional investors are also prone to judgmental biases, it is known that actively managed mutual funds do not in general beat the stock market index (Carhart, 1997). Yet, more recent research suggests that experience, knowledge, and intelligence reduce but do not eliminate judgmental biases among professional investors. Bailey, Kumar, and Ng (2011) used factor analysis to classify investors from more to less sophisticated. They showed that the more sophisticated investors performed better than the less sophisticated investors. In other research investor literacy (Dhar & Zhu, 2006) and sophistication and trading experience (Feng & Seashoes, 2005) were found to correlate negatively with the degree of bias in decisions to buy and sell stocks. Grinblatt, Keloharju, and Linna (2012) observed that among professional investors, those with a higher IQ were less prone to different judgmental biases. In a similar vein Hon-Snir et al.
Belief (2012) found that experience but not that the investors are professionals reduced influences of judgmental biases. In an on-line experiment investigating overconfidence, Menkhoff, Schmeling, and Schmidt (2013) found that professional advisors were more overconfident than lay investors who in turn were more overconfident than institutional investors. They also found less miscalibration of probability but more unrealistic positive self-evaluations among more experienced compared to less experienced professional investors.

Overview of Studies

A questionnaire was constructed to measure beliefs in that stock investors are overconfident, optimistically biased, influenced by affect, and influenced by others (herding or social influence). The measures of beliefs were obtained by averaging the degree of expressed agreement to statements about professional and lay stock investors, respectively. Statements are also included to measure beliefs in that professional stock investors are more rational than lay investors. Our general hypothesis is that people believe that professional investors differ from lay investors in being more rational and less overconfident, less optimistically biased, less influenced by affect, and less influenced by others.

In Study 1 the questionnaire was administered to undergraduates taking courses in financial economics or psychology. We expect that economics undergraduates due to their theoretical knowledge of stock markets (in addition to a general trust in expertise) would believe that professional investors are more rational and less biased than lay investors are. In contrast, we expect that the psychology undergraduates, being exposed to text-book descriptions of judgmental biases (e.g., Bazerman & Moore, 2008), would believe that professional stock investors are equally biased as naïve investors are.

The results of Study 1 suggested that with the exception for overconfidence, both economics and psychology undergraduates believe that professional investors are less prone to judgmental biases than naïve investors are. To investigate whether this is also true for the general public, in Study 2 the questionnaire was administered to a random population-based sample. We have no rationale to expect otherwise than that the general public to the same degree as the students would believe that professional stock investors are more rational and less biased than naïve stock investors are.

Study 1

Method

Participants. Seventy-two psychology undergraduates (61.1% women, age ranging from 20 to 41 with a mean of 24.4 years) and 118 economics undergraduates (44.1% women, age ranging from 19 to 47 with a mean of 24.8 years) at University of Gothenburg, Göteborg, Sweden provided usable questionnaire data. They were recruited during lectures and were compensated with a lottery ticket worth the equivalent of USD 5. The economics undergraduates had all taken courses in financial economics. The psychology undergraduates had taken courses with reading materials describing psychological research demonstrating judgmental biases.

Questionnaire and Procedure. The questionnaire was answered by participants after the lectures while being supervised by two research assistants. In the questionnaire three modules followed a preface describing the general purpose of the research, the funding agency (a private foundation of economic research), and the names of the principal investigators. One of the modules consisted of the statements about investors’ biases to be reported here. On the last page of the questionnaire, information was obtained about sex, age, and what courses the undergraduates were taking and had previously taken. The full questionnaire was answered in about 15 minutes.
Table 1 shows that there were five statements pertaining to each of overconfidence, optimism bias, affective influence, and social influence. Another five statements were added pertaining to rationality. These statements were constructed based on the tenet that when investing in stocks, it is rational to collect and use information about stock companies as well as information about development in different industry sectors, buy undervalued stocks, and take risk into account when predicting future stock returns.

Participants rated how much they would agree to each statement on a seven-point scale ranging from 1 (do not agree) to 7 (agree completely). The statements were presented in counterbalanced orders on two pages, one pertaining to investors employed by fund companies (professional investors) mandated to buy and sell stocks for clients and the other pertaining to lay people buying and selling stocks for themselves (lay investors). The order between these two pages was counterbalanced.

Results

Five indexes were constructed by averaging the ratings of the belief statements about rationality, overconfidence, optimism bias, affective influence, and social influence pertaining to professional and lay investors, respectively. The results are shown in Table 2 for the ratings by economics and psychology undergraduates. Cronbach’s α reported in the main diagonals suggest that the reliability was satisfactory (>.70) with the exception for the economics undergraduates’ ratings of overconfidence. Single-factor principal component analyses indicated that each of the indexes were unidimensional accounting for between 41% and 64% of the variance. As also shown in the table, the indexes were slightly correlated. In particular overconfidence, optimism bias, and affective influence share common variance. As expected, rationality tends to be negatively correlated with the other indexes.

There were no significant differences between the economics and psychology undergraduates. A 2 (undergraduate group: economics versus psychology) by 2 (investor expertise: professional versus lay investor) by 5 (index: rationality versus overconfidence versus optimism bias versus affective influence versus social influence) analysis of variance (ANOVA) with repeated measures on the last two factors showed that the main effect of undergraduate group did not reach significance, $F(1, 188) < 1$, and neither did any interaction involving undergraduate group ($ps>.09$). Investor expertise, index, and their interaction all had significant effects at $p < .05$, $F(1, 752) = 19.36$, $p<.001$, $F(4, 752) = 47.06$, $p<.001$, and $F(4, 752) = 116.85$, $p<.001$.

Significant differences in Bonferonni-adjusted post hoc t-tests indicated that the professional investors were rated higher than lay investors on rationality ($M = 5.5$ versus $4.1$) and lower on optimism bias ($M = 3.9$ versus $4.7$), affective influence ($M = 3.6$ versus $4.6$), and social influence ($M = 4.1$ versus $4.8$). The reverse difference in overconfidence between professional and lay investors ($M = 4.8$ versus $4.6$) marginally failed to reach significance in these tests.

Discussion

The results showed that the undergraduates believe that professional investors compared to lay investors are more rational, less optimistically biased, less influenced by affective factors, and less influenced by others. This was true for both undergraduates in economics and psychology. On average both groups also believe that professional investors are more overconfident than lay investors, although this difference failed to reach statistical significance.

We had expected that the undergraduate groups would differ due to their educational differences. Economics undergraduates were expected to have the beliefs we observed. In contrast, psychology undergraduates with knowledge of research demonstrating judgmental
 biases were expected to believe that both professional and lay investors would show judgmental biases to the same degree. Since we did not observe this, we may have overestimated the psychology undergraduates’ knowledge of judgmental biases or they did not generalize this knowledge to stock investments. Supporting the latter interpretation, the research reported in the text-books read by the undergraduates usually use naïve participants (undergraduates). The reported results in the text-books would thus not necessarily refute a trust in expertise the psychology undergraduates may have.

Study 2

Method

Participants. A random sample of 178 participants (53.9 % women, age ranging from 20 to 71 with a mean of 52.5 years) was obtained from the Swedish tax payer register. The response rate was 17.8%. In a pilot study another sample of 186 undergraduates (60.0 % women, age ranging from 18 to 57 with a mean of 23.7 years) enrolled in different social science programs at University of Gothenburg was recruited. The data from this sample were also analysed.

Questionnaire and Procedure. A revised questionnaire was administered to the undergraduate sample after lectures. All of them were compensated with a lottery ticket worth approximately USD 10. The same questionnaire was mailed to the random sample including a reply envelope with pre-paid postage fee. Fifty participants who mailed back the first usable questionnaires were as promised compensated with a lottery ticket worth approximately USD 10. A reminder letter was sent out to the full sample within a week after the first mailing and another reminder letter including a new copy of the questionnaire to those who had not mailed back their questionnaires after two weeks.

With the aim of decreasing response load, in the revised questionnaire the number of statements was reduced to three for each of rationality, overconfidence, optimism bias, affective influence, and social influence (see Table 1). Statements were selected that had the highest statement-index correlations in Study 1 and that were not judged to be too similar in content. They were presented in counterbalanced orders on two pages, one pertaining to investors employed by fund companies (professional investors) mandated to trading stocks for clients and the other pertaining to lay people trading stocks for themselves (lay investors). The order between these two pages was counterbalanced across participants. Ratings were made of each statement on seven-point scales ranging from 0 (definitely not true) to 6 (completely true).

Other modules with questions not analyzed here followed the statements measuring beliefs. Questions about socio-demographic factors (age and sex) were asked last in the questionnaire. The undergraduates were also asked to report in which major study program they are enrolled and for how long they had been enrolled in this program.

Results and Discussion

The results are shown in Table 3 for the five indexes constructed by averaging the ratings of the statements about rationality, overconfidence, optimism bias, affective influence, and social influence pertaining to professional and lay investors, respectively. Fewer statements per index made Cronbach’s α slightly lower than in Study 1. A majority of αs (reported in the main diagonals) still suggested that the reliability was satisfactory (> .70). Single-factor principal component analyses indicated that each of the indexes were unidimensional accounting for between 53% and 75% of the variance. The indexes were slightly correlated. In particular overconfidence, optimism bias, and affective influence shared common variance. As expected, rationality tended to be negatively correlated with the other indexes.

The results largely replicated the results of Study 1 except that the difference in overconfidence between professional and lay investors now reached significance. Both
participants in the population-based sample and the undergraduate sample thus believed that professional investors are more rational and overconfident than lay investors, less optimistically biased, less influenced by affect, and less influenced by others. In a 2 (group: population-based sample versus undergraduate sample) by 2 (investor expertise: professional versus lay investor) by 5 (index: rationality versus overconfidence versus optimism bias versus affective influence versus social influence) ANOVA with repeated measures on the last two factors, investor expertise, index, and their interaction all had significant effects at \( p < .05, F(1, 362) = 33.28, p < .001, F(4, 1448) = 77.37, p < .001, \) and \( F(4, 1448) = 186.82, p < .001 \). Bonferroni-adjusted post hoc \( t \)-tests yielded significant differences due to that the professional investors were rated higher than lay investors on rationality (\( M = 4.0 \) versus 2.9) and overconfidence (\( M = 4.0 \) versus 3.6) but lower on optimism bias (\( M = 3.4 \) versus 3.9), affective influence (\( M = 2.5 \) versus 3.5), and social influence (\( M = 2.6 \) versus 3.6).

In conclusion, on average the general public does not seem to differ from the economics, psychology and other undergraduates in believing that professional investors differ from lay investors. This conclusion is not changed by the fact that significant group differences suggested more fine-grained differences. A significant main effect of group, \( F(1, 362) = 9.11, p = .003 \), was due to a tendency for the population-based sample to give overall higher ratings than the undergraduate sample did. There was also a significant interaction between group and investor expertise, \( F(1, 362) = 23.65, p < .001 \), due to higher ratings of professional investors by the population-based sample than the undergraduate sample, and a significant interaction between group and index, \( F(4, 1448) = 6.94, p < .001 \), due to lower ratings of rationality and higher ratings of overconfidence, optimism bias, and affective influence by the population-based sample than the undergraduate sample.

**General Discussion**

In two studies we investigated whether lay people believe that professional stock investors make less biased judgments than lay investors. The results showed that in all groups investigated, economic undergraduates with knowledge of finance, psychology undergraduates with knowledge of judgmental biases, other undergraduates in social science, and the general public, participants believed that professional stock investors employed by fund managers differ from lay people investing in stocks in being less optimistically biased, less influenced by affect, and less influenced by others. The professional investors were also believed to be more rational but equally or more overconfident in their own skill. Since recent research findings appear to show that factors related to ability and experience reduce the frequency of judgmental biases among stock investors (e.g. Bailey et al., 2011), these beliefs are not necessarily incorrect. However, with the possible exception for the economics undergraduates, we question that the belief in that professional investors are less biased than lay investors are grounded in accurate knowledge.

Our key finding is that lay people believe that some types of judgmental biases exist in stock markets unless being a professional investor. Affective and social influences are probably phenomenon lay people observe in others in everyday life as well as occasionally in themselves. Thus, they may be elements of their naïve theories. The same may be true for overconfidence and optimism bias (Ludwig & Nafzinger, 2011). Although not conclusive, the results of Study 1 suggest that specific knowledge has little impact.

The observation that participants believe that professional stock investors are less prone to the judgmental biases we examined is consistent with that people have trust in expertise, being ignorant of the fact that experts does not necessarily make less biased judgments than lay people do (Camerer & Johnson, 1991; Hirshleifer, 2001). Yet, mass media coverage conveying an image of professional investors being skilled may strengthen this belief. At the same time the current mass media coverage is also likely to undermine trust in professional
investors. This is however possibly due to induced skepticism about whether professional investors and their institutions act in the interest of their clients (Guiso, Sapienza, & Zingales, 2008).

That professional investors are overconfident at the same time as they are rational warrants further discussion. Believing in such a positive relationship is probably not accurate although overconfidence is frequently observed among professional investors (Menkhoff, Schmeling, & Schmidt, 2013). Yet, overconfidence (as well as optimism bias) may sometimes serve people well (Johnson & Fowler, 2011) by making them decisive. The finding that professional investors are believed to be both rational and overconfident may reflect an intuitive association between overconfidence and decisiveness believed to benefit stock investments.

It seems plausible to assume that professional investors similarly to lay people believe that lay investors are less rational and more biased than they themselves are. If so, are they able to arbitrage away mispriced stocks due to lay investors’ trading? The results of a questionnaire study by Menkhoff and Nikiforow (2009) do not seem to provide support for this since they found that professional investors believing in the existence of various judgmental biases among other investors were blind to their own judgmental biases.

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References


Beliefs in 10


Table 1. Statements about investor judgmental biases (Study 1).

_Rationality_
They take into account profit forecasts
They purchase stock shares that are currently undervalued
They analyze reports from corporate companies
They take risk into account when investing in stocks
They study and rate the forecasts of various industrial sectors

_Overconfidence_
They overestimate their ability to make good investments
They are confused about their true competence and the influence of chance
They consider their own decision base to be better than it actually is
They believe they can predict the development in the stock market better than what is actually possible
They regard their own competence to be superior to what it actually is

_Optimism bias_
They are too optimistic about the development of the stock market
They underestimate the probability of a decline in the stock market
Their perception about the development of the stock market is overly optimistic
They are guided by wishful thinking
Their expectations are too high about the increase of the stock market

_Affective influence_
They are influenced by their current mood
They get carried away by the economic climate
They make bad investments due to the strong influence from their emotions
They let their feelings guide their decisions to a large extent
They trust their feelings too much

_Social influence_
Given the same information they act similar to others
They do not want to differ from others
They only purchase popular shares
They purchase and sell the same shares as they believe the majority does
They disregard their own information and follow the majority

_Note_. Statements marked with asterisks were used in Study 2.
Belief in Stock Investor Skill

Wording in Swedish

Rationality
Tar hänsyn till vinstprognoser
Köper aktier som bedöms vara tillfälligt undervärderade
* Analyserar aktiebolagens resultat
* Tar hänsyn till risken vid aktieinvesteringar
* Tar del av och värderar prognoser inom olika industrisektorer

Overconfidence
Överskattar sin förmåga att göra bra investeringar
Förväxlar slumpens inverkan med egen förmåga
* Anser att deras egna beslutsunderlag är bättre än vad de faktiskt är
* Tror sig kunna förutsäga aktiers värdeökning bättre än vad som är möjligt
* Anser sig vara skickligare än vad de faktiskt är

Optimism bias
Är alltför optimistiska om aktieutvecklingen
Underskattar sannolikheten för en negativ värdeutveckling
* Har alltför optimistiska uppfattningar om aktiemarknadens utveckling
* Vägleds av önsketänkande
* Har alltför höga förväntningar på aktiers värdeökning

Affective influence
Påverkas av hur de känner sig för dagen
Rycks med av det ekonomiska klimatet
* Gör dåliga investeringar på grund av för stort inflytande från sina känslor
* Låter sina känslor i alltför hög grad vara utslagsgivande
* Förlitar sig alltför mycket på sina känslor

Social influence
Agerar likartat som andra på samma information
Vill inte avvika från andra
* Köper endast populära aktier
* Köper och säljer samma aktier som de tror att majoriteten gör
* Bortser från den information som de själva har och följer istället majoriteten
Table 2. Means (M), standard deviations (SD) and inter-correlations between indexes of beliefs in professional and lay investors’ judgmental biases averaged across ratings on scales from 1 to 7 obtained from economics and psychology undergraduates. Cronbach’s αs for each index are given in the main diagonal.

<table>
<thead>
<tr>
<th>Index</th>
<th>Economics undergraduates (n=118)</th>
<th>Psychology undergraduates (n=72)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>Rect</td>
</tr>
<tr>
<td>Professional investors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationality (Rat)</td>
<td>5.5 (0.9)</td>
<td>.82</td>
</tr>
<tr>
<td>Overconfidence (Over)</td>
<td>4.7 (1.0)</td>
<td>.37***.59</td>
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<tr>
<td>Optimism bias (Opt)</td>
<td>3.8 (1.0)</td>
<td>-.04 .62***.74</td>
</tr>
<tr>
<td>Affective influence (Aff)</td>
<td>3.5 (1.1)</td>
<td>-.12 .51***.73***.77</td>
</tr>
<tr>
<td>Social influence (Soc)</td>
<td>4.1 (1.0)</td>
<td>.01 .37***.53***.42***.73</td>
</tr>
<tr>
<td>Communality</td>
<td>.29 .56 .66 .56 .28</td>
<td></td>
</tr>
<tr>
<td>Lay investors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationality (Rat)</td>
<td>4.4 1.1</td>
<td>.75</td>
</tr>
<tr>
<td>Overconfidence (Over)</td>
<td>4.6 .9</td>
<td>-.03 .64</td>
</tr>
<tr>
<td>Optimism bias (Opt)</td>
<td>4.6 1.1</td>
<td>-.33***.57***.80</td>
</tr>
<tr>
<td>Affective influence (Aff)</td>
<td>4.4 1.1</td>
<td>-.31***.48***.58***.77</td>
</tr>
<tr>
<td>Social influence (Soc)</td>
<td>4.9 0.9</td>
<td>-.15*.25**.47***.47***.76</td>
</tr>
<tr>
<td>Communality</td>
<td>.19 .41 .54 .44 .28</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Communality for each index is the squared multiple correlation from the linear regression of the index on the other indexes.
Table 3. Means (M), standard deviations (SD) and inter-correlations between beliefs in professional and lay investors’ judgmental biases averaged across ratings on scales from 0 to 6 obtained from undergraduate and population-based samples. Cronbach’s αs for each index are given in the main diagonal.

<table>
<thead>
<tr>
<th></th>
<th>Undergraduates (n=186)</th>
<th>Population-based sample (n=178)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>Rat Over Opt Aff Soc</td>
</tr>
<tr>
<td>Professional investors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rationality (Rat)</td>
<td>3.9 (1.0)</td>
<td>.64</td>
</tr>
<tr>
<td>Overconfidence (Over)</td>
<td>3.8 (1.1)</td>
<td>-.02</td>
</tr>
<tr>
<td>Optimism bias (Opt)</td>
<td>3.1 (1.1)</td>
<td>-.19*** .53*** .78</td>
</tr>
<tr>
<td>Affective influence (Aff)</td>
<td>2.2 (1.2)</td>
<td>-.22*** .33*** .38*** .85</td>
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<tr>
<td>Social influence (Soc)</td>
<td>2.4 (1.0)</td>
<td>-.31*** .25*** .30*** .41*** .56</td>
</tr>
<tr>
<td>Communality</td>
<td>.16</td>
<td>.32 .35 .27 .25</td>
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<tr>
<td>Lay investors</td>
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<td></td>
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<tr>
<td>Rationality (Rat)</td>
<td>3.1 (1.1)</td>
<td>.60</td>
</tr>
<tr>
<td>Overconfidence (Over)</td>
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<td>-.09</td>
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<td>Optimism bias (Opt)</td>
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<td>.02</td>
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<td>Affective influence (Aff)</td>
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<tr>
<td>Social influence (Soc)</td>
<td>3.7 (1.0)</td>
<td>.02</td>
</tr>
<tr>
<td>Communality</td>
<td>.02</td>
<td>.28 .43 .41 .17</td>
</tr>
</tbody>
</table>

*Note.* Communality for each index is the squared multiple correlation from the linear regression of the index on the other indexes.