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ELŻBIETA WROŃSKA-BUKALSKA
Maria Curie-Skłodowska University, Poland

OVERCONFIDENCE OF STUDENTS AND MANAGERS - COMPARATIVE ANALYSIS

Abstract:

Overconfidence is one of the biases and fallacies that affect cognitive process. But overconfidence is one that is most pervasive. The concept of overconfidence comes from cognitive psychology and is widely applied in behavioral finances. But so far the adoption of overconfidence effect is present when explaining the investors' decisions. There are still few attempts that aim to explain managers' behavior with cognitive biases and fallacies. Existing research show that there is relation between manager's overconfidence and financial decisions. The main problem of all these research is that each one of them applies different overconfidence measures.
This paper is to identify the overconfidence phenomena and compare it between the group of managers and the group of managers-to-be (students of finance and accounting). To conduct it, the original tool and measure is proposed and later on verified in order to make it possible for common use of it (not only in psychology or only in finance).
The main research hypothesis assumes that the frequency and the level of managers' overconfidence is the same as frequency and the level of students' (managers-to-be) overconfidence. The main method applied was to construct the tool to identify and measure the overconfidence. After having identified overconfidence, the U Mann Whitney significance test was applied to compare the overconfidence between the two groups.
The result shows that there is statistically significant difference between overconfidence of the managers and students. But the main reason of this difference is the structure of the groups that were the subject of the analysis. Among the students the majority are women, while among the managers the majority are men. This supports the results of previous research showing that the men's overconfidence is higher than women's. At the same time it proves that the applied tool and measure of overconfidence is proper and might be used for different groups.
After verifying the tool of overconfidence and identifying the overconfidence it might be reasonable to try to find relation between overconfidence and results of human activity (learning results or financial results of running business). Understanding the relation between managers' overconfidence and financial results allows to apply proper methods of recruitments and supervising.
Originality of the paper lies in the applied tool of identifying and measuring overconfidence. The subject and the findings of this paper are important for theory and practice: it helps to shed light on financial management by understanding the managers' behavior.

Keywords:

behavioral finance, overconfidence,

JEL Classification: G02, G39, L26

1. Introduction

The aim of the paper is to identify and compare the overconfidence between two groups: managers and students (managers-to-be). When we get to know the overconfidence among students and impact of overconfidence of financial decisions and situation of a company it is possible to design the learning process to mitigate the negative aspects of overconfidence in students' future career as a manager.

Overconfidence is one of the biases and fallacies that affects a cognitive process. But overconfidence is one that is most pervasive. The concept of overconfidence comes from cognitive psychology and overconfidence is not just an outcome of psychological experiments but seems present in many real life situations. Research in cognitive psychology establishes that people are usually overconfident. 'No problem in judgment and decision making is more prevalent and more potentially catastrophic than overconfidence' (Plous, 1993, p. 217). 'Perhaps the most robust finding in the psychology of judgment is that people are overconfident' (De Bondt & Thaler, 1995, p. 389).

Eventually, overconfidence was identified as a complex phenomenon. Moore and Healy (2008) identified three dimensions of overconfidence: (1) overestimation of one's actual performance relative to objective standard, (2) overplacement of one's performance relative to others, and (3) overoptimism in one's beliefs. Overestimation is diagnosed if people's expectations of their own performance exceed their actual performance (Lichtenstein et al, 1982; Moore & Healy, 2008). Overplacement often occurs when people try to evaluate their competence in a certain domain relative to others. Typically, most people rate themselves above average, which is why this effect is also called better-than-average effect (Alicke & Govorun, 2005). Overoptimism is having more confidence in your beliefs and abilities than is justified. The confidence in own belief has also impact on perceiving future. Being overoptimistic means that you overestimate your future success and underestimate the probability of failure. (Alpert & Raiffa, 1982; Russo & Schoemaker, 1992).

Overconfidence can have some serious consequences. Researchers have offered overconfidence as an explanation for medical misdiagnosis, mistaken court judgement based on overconfident witnesses' statements, road accidents, politicians' decisions (Johnson, 2004). Overconfidence has been confirmed also among epidemiologists, public health experts, ecologists, and biologists (Speirs-Bridge et al., 2010).

The overconfidence is also widespread among managers and students. Based on previous studies it is possible to assume that the same level and frequency of overconfidence occurrence is the same in both groups. While these two groups present behavior specific for their occupation (learning and managing), in both cases their behavior might be explained by overconfidence. Students with greater overconfidence were associated with lower levels of retention of newly acquired knowledge (Dunlosky & Rawson, 2012). Students exhibiting overconfidence overestimate their knowledge and they study less. As a result students with higher

overconfidence have lower grades (Nowell & Alston, 2007). Making overconfident decisions have also been observed in financial decisions when managing company. Being an overconfident manager leads to a higher probability of failure for newly-established companies (Camarer & Lovallo, 1999, Russo & Schoemaker 1992, Cooper et al, 1988), overinvestment – even in negative NPV projects (Gervais et al, 2003; Malmendier & Tate, 2005), and excessive use of debt – overconfident manager underestimate the risk connected with excessive debt (Ben David et al, 2006).

When comparing students and managers, the problem of identifying overconfidence arises. Most previous studies referred to homogenous groups coming from one profession. Rarely did the studies examine people from different professional groups in one research. It is quite challenging to prepare a consistent and universal tool to identify the overconfidence of people in different occupations. This becomes especially evident problem when one of the group is a group of managers because the managers' overconfidence is identified by using specific measures based on behavior or on perception of others. Usually, in cognitive psychology overconfidence is identified when surveying people. Surveying allows to identify their beliefs and track the rationale for a specific behavior.

To measure overestimation, subjects are suggested to answer a series of questions and state their confidence for each question that their answer was correct. For example, Fischhoff et al (1977) asked their participants general-knowledge questions such as: 'is absinthe (a) a liqueur or (b) a precious stone'. Participants were then asked to estimate the probability (from 50 to 100%) that they had answered the question correctly. When asking question alternative can be given for an answer, or multiple answer choices, or judgement task requires a subject to generate their own answer. But each time a subject is to evaluate their confidence that the answer is true (Gigerenzer et al, 1991, p. 506). Overestimation is expressed through bias score (miscalibration). The bias score is calculated as the difference between the average confidence level across all questions and the proportion of correct answers.

The simplest way to identify overplacement is to ask people to judge whether they believe themselves to be above average (or median) in a certain domain, as for example in the famous account on driving ability by Svenson (1981). More advanced designs ask participants to specify the percentile of a distribution they believe themselves to belong to (e.g. Dunning et al, 1989, Merkle & Weber, 2011, Larrick et al, 2007). In one survey people were instructed to use a Likert scale to rate each attribute according to how well it 'describes you', another part of this survey instructed them to indicate how well each attribute describes 'most other people' (Brown, 2012). Benoît and Dubra (2011) propose using a stronger requirement to test overplacement. Based on their proof that maximally 2 * x% can rate themselves rationally among the top x% of the population, they suggest using this hurdle for future experiments.

Being overoptimistic means that you overestimate your future success and underestimate the probability of failure. That is why asking people to point the expected future value and set confidence intervals usually 90% confidence intervals

contain the correct answer less than 50% of the time. People choose overly narrow confidence intervals when asked for a range that is supposed to contain a true value with a certain probability and the hit rate is low (Alpert & Raiffa, 1982; Russo & Schoemaker, 1992).

But when referring to managers, other ways of identifying overconfidence were developed. By far the most influential proxies for managerial overconfidence have been constructed by Malmendier and Tate (2005), whose proxies and dataset have been used in many other studies into overconfidence: based on options (longholder, holder 67), shares (net buyer), and based on press.

When a manager holds an option of 5years, if the option is more than 67% in-the-money at some point in year 5 but he does not exercise, he is regarded as overconfident. Additionally, if a manager holds an option until the last year of its duration, he is regarded as overconfident. It is typically optimal for risk-averse executives to exercise their own-firm stock options early if the option is sufficiently in the money. Overconfidence leads managers to believe their firm will do better than can be expected in reality, which induces a belief that the stock price of the firm will increase. To benefit from the increase in the stock price, the overconfident CEO postpones exercising stock options and buys additional company stock.

The approach based on the perception of a manager by outsiders requires to search for press articles referring to CEO in The New York Times, Business Week, Financial Times, The Economist and The Wall Street Journal. For each CEO and sample year, it is necessary to identify the number of articles containing the words ‘confident’ or ‘confidence;’ the number of articles containing the words ‘optimistic’ or ‘optimism;’ and the number of articles containing the words ‘reliable’, ‘cautious’, ‘conservative’, ‘practical’, ‘frugal’, or ‘steady’.

Another method of identifying CEO overconfidence was first proposed by Lin et al. (2005). They argued that overconfident managers were apt to make upward-biased earnings forecasts. If there are more upward-biases than those downward-biases, the managers are regarded as overconfident. The method based on frequency of M&A made by managers was proposed first by Doukas and Petmezas (2007). They argued that the more confident the manager, the higher frequency of the M&A. They regarded a manager as overconfident if he made at least five M&A during the study period. The method based on CEOs’ relative compensations was proposed first by Hayward and Hambrick (1997). They argued that the higher the CEO’s relative compensation to other managers, the more important the CEO’s position, and consequently they would be apt to be overconfident. They used ‘CEO cash compensation divided by the second-highest-paid officer’ in their measurement.

The methods referring to CEO’s overconfidence do not require to survey managers. All necessary information might be collected from analyzing annual reports or financial press. The first problem is that these methods allow to evaluate the overconfidence by behavior not by beliefs. And human behavior might sometimes result from the strategy

implemented by the company not from managers' beliefs (e.g. frequency of M&A). Additionally, those measures might be applied to specific companies that pay with stock options, that release forecasts, or information about CEO's compensation – these are usually listed companies. That is one reason that these methods can't be implemented for every company. What is more, those measures can't be implemented to identify the overconfidence among other professional groups (and students).

In this paper, I show that it is possible to design a consistent and universal tool to identify, measure and compare overconfidence between different group (especially between the group of managers and students).

The remainder of this paper is structured as follows: In the next section, I present the tool to identify the overconfidence. The tool is possible to apply for different groups and occupations. Then I present the surveyed groups, the surveying process and the results of the survey. The next section contains the description of idea of how to measure and compare overconfidence. To compare the groups I applied the statistical significance tests (U Mann Whitney). I conclude by showing practical and theoretical implication and recommendations for future research.

2. Methodology

2.1. Designing the tool of identifying overconfidence

As requested to detect the beliefs (attitude, perception) it is important to survey people, so I designed the survey. Because the overconfidence is a complex phenomenon consisting of overestimation, overplacement and overoptimism I included three parts of survey to detect all elements of overconfidence. To detect overestimation I asked six questions on specific (in this case economics) knowledge. The questions required to give answers 'yes' or 'no' (e.g. Is it legal to call the police if you believe that an employee is under the influence of alcohol?). Additionally, the participants were to point the confidence that they answered the question correctly by providing probability in the range between 50% and 100%. To detect overplacement I asked two questions how participants perceive a) themselves now and b) their future in comparison to others. The possible answers were: better than 20%, better than 50% and better than 80%. To detect overoptimism I asked a question about outcomes (e.g. 'my results are usually better than I expect'), attributing successes and failures (e.g. 'my success is due to me'), planning fallacy (e.g. 'I always implement my plans no matter what happens'), betting on own abilities in random events (e.g. 'I bet the results according to my knowledge'). For each question there was an opposite one ('my results are worse than I expect', 'my success is due to a good luck', 'while implementing plans I always monitor the environment whether it is still worth implementing', 'I bet the result at random') to check consistency of the response. Participants were asked to use a 5-point Likert's scale ranging from 1 (I strongly do not agree) to 5 (I strongly agree). The questions detecting overconfidence are the following: 1, 2, 3, 4 and 10, while the opposite questions (detecting consistency of

response) are the following: 6, 7, 8, 9 and 5 (respectively). Before surveying, to detect internal consistency of the questionnaire, Cronbach's alpha was calculated. I got Cronbach alpha higher than 0.7 (0.739).

2.2. Surveying process

I conducted the survey among students of the Economics Faculty of Maria Curie University in Lublin and among businessmen. Participation for students was compulsory, as they performed the task in class during regular class hours. Participation for businessmen was voluntary. In total, 206 students and 145 managers completed questionnaire. The participants were instructed to answer all questions without help from others and were informed that the questionnaires would be treated anonymously. The duration of the survey was approximately 30 minutes. All materials used were written in Polish. The students were app. 21-23 years old. While the group of managers is more age diversified – the average age is 55 (median is 55). The youngest manager is 28 years old, and the oldest is 78. The students study Economics, and/or Accountancy and Finance. While the managers have different educational background. Only 16 managers did not graduate from university; 86 graduated from technical studies; 31 has graduated from economics studies; 12 managers have graduated from humanities (law, history, pedagogics) and other social sciences (sociology, political science). The groups were also sex diversified – in the group of students there were 80% girls, while in the group of managers there were only 7% women.

2.3. Survey results

To evaluate the overestimation, it is necessary to calculate bias score (miscalibration) for each participant. Miscalibration is the difference between the average probability (certainty) and average fraction of questions answered correctly (accuracy). The basic descriptive statistics are in table 1.

Table 1. The statistics for individual miscalibration

	average	median	min	max	SD
The group of students	22.2	21.7	-33.3	66.7	17.0 (0.8)
The group of managers	33.7	33.3	1.7	83.3	16.8 (0.5)

Source: author's own work.

Among students, 12 show higher accuracy (correctness) than certainty (probability). They showed underconfidence. Among managers, no one was underconfident. All of the managers showed higher certainty (probability) than accuracy (correctness). I applied a non-parametric statistical hypothesis test – the U Mann-Whitney test. The null hypothesis states that the distribution of miscalibration for these two samples are the same. The U Mann-Whitney test statistics is -5.724, and p-value I got (0.00) is lower than 0.05, so the data allow to reject the null hypothesis. There are statistically significant differences between the miscalibration of the students and the managers.

So it is possible to conclude that the managers show higher miscalibration and at the same time there is higher level and frequency of overestimation among managers.

The distribution of the answers in overplacement dimension of overconfidence is presented in the table 2.

Table 2. The distribution of the answers in overplacement dimension of overconfidence

	The group of students		The group of managers	
	now	future	now	future
average	49.1	50.0	53.9	52.9
A percentage of participants that pointed 20%	18.5%	20.0%	13.1%	12.4%
A percentage of participants that pointed 50%	66.0%	60.0%	60.7%	65.5%
A percentage of participants that pointed 80%	15.5%	20.0%	26.2%	22.1%
Standard deviation (coefficient of variation)	17.5 (0.36)	19.0 (0.38)	18.5 (0.34)	17.4 (0.33)

Source: author's own work.

To compare two samples, I applied a non-parametric statistical hypothesis test – the U Mann-Whitney test. The null hypothesis states that the distribution of these two samples are the same. The U Mann-Whitney test statistics is: -2.472 (now) and -1.431 (future) respectively, and p-value is: 0.013 and 0.152 respectively. For the question referring to the future p-value is higher than chosen alpha level (0.05), so the data do not allow to reject the null hypothesis. There are no statistically significant differences between the students and the managers as for the perception of the future. But as far as the feeling of being better 'now' is concerned, p-value is lower than 0.05, so the data allow to reject the null hypothesis. There are statistically significant differences between this feeling of the students and the managers. The managers have (statistically significant) higher opinion of themselves than the students.

Based on Likert scale, the descriptive statistics for the questions referring to overoptimism dimension of overconfidence was calculated for the questions 1, 2, 3, 4 and 10 that were to detect overconfidence. The basic descriptive statistics are presented in the table 3.

Table 3. The statistics for overoptimism dimension of overconfidence

No of question	The group of students	Standard deviation (coefficient of variation)	The group of managers	Standard deviation (coefficient of variation)	U Mann Whitney test statistics	p-value
1	3.5	1.2 (0.34)	3.4	1.7 (0.50)	-0.391	0.696
2	3.4	1.3 (0.38)	3.5	1.5 (0.43)	-1.322	0.186
3	1.7	1.3 (0.76)	2.7	1.8 (0.67)	-5.171	0.000
4	2.9	0.9 (0.31)	3.7	1.5 (0.41)	-6.059	0.000
10	2.3	1.4 (0.61)	3.4	1.5 (0.44)	-6.682	0.000

Source: author's own work.

The higher indications than the middle of the Likert's scale (3.0) mean overconfidence. The group of the managers indicate higher average score for 4 out of 5 question detecting overoptimism (1, 2, 4 and 10). So it is possible to assume that the managers show higher overoptimism. To compare two samples, I applied a non-parametric statistical hypothesis test – the U Mann-Whitney test. The null hypothesis states that the distribution of these two samples are the same. The U Mann-Whitney test statistics are presented in table, and p-value is lower than 0.05 for 3 questions (3, 4 and 10), so the data allow to reject the null hypothesis. There are statistically significant differences between the students and the managers. The managers have (statistically significant) different attitude than the students. The managers are more prone to think that their failures result from unpredictable events, while students take responsibility for the failures. The managers show higher expectations towards future profits than students towards notes. The managers are more prone (than students) to bet on their knowledge and experience in random events.

Generally, the managers show overconfidence in every aspect of overconfidence, comparing with the students. The managers overestimate their knowledge, they think they are better than others, they attribute success to their own abilities and failures to others. They rely too much on their abilities in random events. And they are overoptimistic while expecting future results.

3. The measure of overconfidence

For better assessment of overconfidence, the problem to design one confidence measure arises. Overconfidence cannot be measured directly. Overconfidence is a latent hidden variable, and might be measured only by observable variables (overestimation, overplacement, overoptimism). So the overconfidence measure should be kind of indice, comprising all dimensions of overconfidence. The challenge is to create a synthetic measure of overconfidence (SMOC). Synthetic measure groups units with different characteristics (miscalibration, overplacement, overoptimism) and assigns a single (aggregate) measure (level of overconfidence).

While creating SMOC other alternative methods were applied to compare the results and choose the best measure of overconfidence. The most popular taxonomic methods of ordering elements are as following: Hellwig's measure (pattern synthetic measure), method of rank sum, k-means method, Ward's cluster analysis, non-pattern synthetic measure, pattern synthetic measure, factor analysis, Czekanowski's distance tables. Because of the character of data I decided to apply pattern synthetic measure (PSMOC), non-pattern synthetic measure (NPSMOC) and my own author's proposal of synthetic measure (ASMOC).

The first measure is calculated as a synthetic indicator of taxonomic distance of the object from the theoretical pattern. The second one is calculated as a synthetic indicator of taxonomic distance of the object from the relative pattern. The pattern synthetic measure needs: to decide which variable is stimulant which one is

destimulant; all the variables (miscalibration, overplacement, overprecision) are stimulants because the higher their level the higher overconfidence, to unify the variables (standardization), to create pattern – to create abstract object for every variables, to determine the distance from the pattern for each *Pi* object, to calculate the synthetic measure for each objects (according to Hellwig formula). The PSMOC takes values from the interval (0, 1). The closer object is to 1, the higher overconfidence.

The non-pattern synthetic measure needs: to decide which variable is stimulant which one is destimulant; to unify the variables (e.g. standardization); to calculate synthetic measure as a mean of the standardized variables. The higher level of the synthetic measure, the higher overconfidence.

Both, pattern and non-pattern synthetic measure depend strongly on the characteristic (mean, standard deviation, maximum value) of the sample. The application of these measures for different groups can give a quite different ordering.

To construct my own proposal of ASMOC I appointed notes (-1, 0 or 1) depending on the results in every dimension for each person in the sample. The rules of assigning the notes are presented in table 4.

Table 4. The rules of assigning the notes (-1, 0, 1) to the survey results in every dimension of overconfindence

	-1	0	1
overestimation	If the results is lower than -10%	If the result is 0 and +/- 10% (from 10% to 10%)	If the result is higher than 10%
overplacement	Average is lower than 50%	50%	Average is higher than 50%
overoptimism	If the result is lower than 2.7	If the result is 3 and +/- 10% (from 2.7 to 3.3)	If the result is higher than 3.3

Source: author's own work.

The reasons for the adopted rules are as follows:

1) the middle of the scale was adopted for every dimension, for the middle of the scale is objective point and shows perfectly confident person;
2) the deviation was adopted as plus/minus 10%, because when coefficient of variation (a relation of standard deviation to the mean) is lower that 10% it means that the objects are similar, they show no difference (O'Connor & Keane, 2011, p. 66-67).

Assigned numbers in every variable were summed up for every surveyed person. The minimum possible to get was – (minus) 3 (strong underconfidence), and the maximum was + (plus) 3 (strong overconfidence). Table 5 presents the distribution of the samples with three synthetic measures taken into account.

Table 5. The distribution of the overconfidence synthetic measures (PSMOC, NPSMOC, ASMOC)

PSMOC values	0	0,01-0,2	0,21-0,40	0,41-0,60	0,61-0,80	0,81-0,99	1
Percentage of students (%)	0.5	4.4	14.1	31.1	41.7	8.2	0.0
Percentage of managers (%)	1,4	4,1	21,4	33,7	29,7	8,3	1,4
NPSMOC values	-2,1 - -1,5	-1,49 - -0,9	-0,89 - -0,3	-0,29 – 0,3	0,31-0,9	0,91-1,5	1,51-2,1
Percentage of students (%)	1.5	6.8	22.8	42.2	18.4	7.8	0.5
Percentage of managers (%)	0.0	6.2	31.7	35.2	14.5	4.8	7.6
ASMOC values	-3	-2	-1	0	1	2	3
Percentage of students (%)	0.5	6.3	19.4	27.7	29.6	11.2	5.3
Percentage of managers (%)	0	0	11,0	18,0	24,8	25,5	20,7

Source: author's own work.

The distribution of PSMOC and NPSMOC is normal (the same number of under- and overconfident in every group) because these measures depend heavily on the characteristics of subjects in the sample (mean, standard deviation). It is difficult to apply these measures in other samples. So these measure are not universal. More objective and possible for other applications is ASMOC proposed by me. This is supported by coefficient correlation (table 6).

Table 6. Matrix of coefficient correlation

	For students			For managers		
	PSMOC	NPSMOC	ASMOC	PSMOC	NPSMOC	ASMOC
PSMOC	1			1		
NPSMOC	0.956	1		0.948	1	
ASMOC	0.159	0.176	1	0.774	0.789	1

Source: author's own work.

All coefficient correlation are significant at the level of 0.01. Coefficient correlation between PSMOC and NPSMOC is high for both groups (students and managers). This is natural, since both these two measures depend on the characteristics of the surveyed groups. But the correlation with ASMOC is different for these two groups. The correlation is higher for the group of managers than students. It is consistent with partial research results for every dimension that showed higher managers' overconfidence. To be sure about the results I compare two samples applying a non-parametric statistical hypothesis test – the U Mann-Whitney test. The null hypothesis states that the distribution of these two samples are the same. The U Mann-Whitney test statistics is -6.038 and p-value (0.00) is lower than chosen alpha level (0.05). It means that the data allow to reject the null hypothesis. There are statistically significant differences between the students and managers with managers showing overconfidence.

4. Conclusions

Overall, managers display higher overconfidence than students – also in every dimension (overestimation, overplacement and overoptimism) with statistical significance. Although I expected to get comparative overconfidence in each group, a statistically significant difference emerged between groups. Therefore, the hypothesis was not confirmed. But this difference confirms the reliability of the tool and the measure of overconfidence (especially ASMOC).

What is more, the difference between the level of overconfidence might be explained by the results of previous research and the characteristics of subjects in the samples. Because there were more women in students group it is justified to have lower confidence in students group. This is in line with the earlier findings that females generally exhibit lower confidence levels (Barber & Odean, 2001; Bengtsson et al, 2004). Another reason for lower overconfidence among students is that the group of student comes from the Economics Faculty where all students are taught to follow conservatism rule as a basic accounting concept, while among managers, there were only 21% managers that graduated from economics studies.

The results call for further investigation regarding the influence of overconfidence on the behavior. Because overconfidence seems to be of high importance and practical implications in business and education context. It is necessary to find the answer to the question whether the overconfidence should be eliminated or it has some positive results, whether we should avoid strongly overconfident people or they have some positive contribution.

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