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OVERCONFIDENCE BIAS IN INVESTMENT DECISIONS ON INDONESIAN STOCK MARKET

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ABSTRACT

The investor's growth on the Indonesian Stock Exchange for the period 2020 to January 2023 is quite significant. However, this growth was accompanied by a tendency towards overconfident bias. This behavior's increase errors in investment decision making: increasing risk and reducing returns. The aim of this research is to verify the relationship between neuroticism, conscientiousness, and openness traits on the overconfidence behavioral bias to stock investors using The Big Five Personality approach. The research uses primary data on stock investors in Indonesia with total 483 respondent. Data analysis method used the SEM-PLS version 4.0. The research results prove that neuroticism and conscientiousness traits have a positive effect on overconfidence bias. Other evidence shows, that openness has a negative effect on overconfidence bias. This evidence applies to both male and female investors.

Keywords: *Personality traits, Overconfidence, Gender, The big five personality theory.*

1. INTRODUCTION

Post Covid-19 pandemic, Indonesia's economic conditions are experienced recovery. This is reflected by the capital market growth in Indonesia which reached 270% (compared to 2020) or more than 10 million investors in January 2023 as stated in the KSEI statistical report, January 2023, it showed on Figure 1.

Figure 1. SID Growth
Source: KSEI, 2023

Majority investors are male at 62.53%, with the age group under 30 years being 58.55%, 32.46% having private, government, teacher jobs, and senior high school education background 63.16%, also annual income between 10-100 million rupiah 48.55%, that spread across the island of Java, including DKI Jakarta with 69.01% of investors (KSEI, 2023). Investors with a senior high school education and aged <30 years dominate the demographic growth of individual investors in Indonesia, this age is known as Gen Z (Kompas, 2023). This generation has unique ability to adapt with technology, way of thinking, behaving and investment goals compared to other generations. It is suspected, this could trigger an overconfident bias in investment decisions. The phenomenon

is interesting for further research, how personality can influence investor behavior in making investment decisions.

A good understanding of how a person's unique and different personality can influence investor behavior while making investment decisions. In addition, the ability to diagnose irrational behavior can minimize errors in making investment decisions and increase opportunities to obtain optimal profits and achieve financial goals (Pompian, 2012).

Behavioral Finance showed how psychological factors can influence the individual investors behavioral biases in decision making, with bounded rationality reinforcing irrational thinking due to the limitations of human brain in processing information. This causes inconsistencies in decision making because it is based on emotions or encouragement from other parties.

Investor Behavior showed different behavioral biases between each individual, one of them is overconfidence bias: behavior occurs when an investor tends to have an overestimated view of his own accuracy and abilities, and believes that he is better than other; and tendency of investors' think that the profits entirely come from their intelligence and skills, while their failures come from external factors: luck and market conditions (Odean, 1998). This overconfident behavior can increase errors in making investment decisions, increasing risk and reducing returns.

The aim of this research is to verify the relationship between neuroticism, conscientiousness, and openness traits on overconfidence bias through Bounded Rationality Theory and Psychology approach, with gender as a moderating variable. The object of this research focuses only on stock investors who are officially registered on the Indonesia Stock Exchange, whether they transact directly or through investment applications.

Psychology Theory

This theory was put forward by Sigmund Freud, who indicated that human behavior is often driven by desires and memories in the subconscious, a person's personality will be formed in the early stages of the growth phase when they are still children. Adequate achievement in each growth phase will form and develop a healthy personality, conversely if problems occur during the growth phase, it can form psychological disorders in adulthood (Main, 2023).

Psychological theory continues to develop with reference to personality being formed in the early stages of its growth phase. Albert Bandura (1977) in social learning theory states that an individual learns behavior based on observing or modeling / modeling the behavior of other people. This modeling process can influence an individual in their gender identity phase, for example: women tend to look at the social image around them to form their personality and perception of how they see themselves (Tadayon Nabavi & Bijandi, 2012).

Gender Schema Theory proposed by Sandra L. Bem (1981), a psychological approach related to how a child can develop their understanding of gender and identify themselves as male or female, as well as internalize gender roles in the formation of behavior and self-identity them (Bem, 1981). She explained that gender factors will provide different results in developing understanding to identify the same thing, this also has an impact on their ability to form behavior and self-identity.

Behavioral Finance and Bounded Rationality Theory

Behavioral Finance Theory is a framework of thought that combines psychological and economic concepts to explain how psychological factors such as emotions, risk perception and a person's

biased behavior can influence them in making financial decisions and investing in stock market. The limitations of the human brain, such as limited capacity in memory, ability to manage and process information, this limits their ability to do several things simultaneously, so that in making decisions they tend to eliminate several alternative options and not think rationally and not based on benefits and risks, but based on alternatives that meet their desired characteristics (Tversky, 1972). Financial theory assumes investors with rational minds cannot explain irrational market conditions. Behavioral finance theory provides an alternative way to answer this, and considered more realistic in explaining this problem (Prosad et al., 2015).

Bounded Rationality Theory explains that the human brain's limitations in processing information as a whole and its limited memory capacity often cause it to make decisions that are not or less than rational. In certain situations, the limitations of the human brain and the influence of emotions can make it less or less rational in behaving or making decisions, and the biased behavior shown can vary between each individual (Simon, 2000). The quality of a decision taken in terms of finance, business or investment can be influenced by bounded rationality due to a lack of solid information (Ortega & Hernández, 2018).

Overconfidence Bias

Referring to Schaefer et al. (2004), overconfidence behavioral bias is described as an error in assessing one's own abilities and accuracy which means they feel better than other people, or it can be interpreted that someone has confidence and believes more in their own abilities than in the accuracy of existing data and facts, and tends to feel that they are better than other investors. Overconfidence bias is the behavior of someone who feels too confident in their abilities and knowledge, especially in predicting risks and investment returns. This bias tends to be one of causes of inappropriate decision making, resulting in poor investment results or less than optimal (Barber & Odean, 2001). Such behavior triggers an increase in trading volume in the market which is caused by an investor's internal drive to gain greater profits without considering current market conditions (Statman et al., 2006), a picture of past success becomes the basis for making investment decisions.

Theorical framework and hypothesis

Baker et al. (2021), Dole & Schroeder (2001) stated, personality traits are characteristics, feelings, behavior and motivation that can influence an individual in determining or making complex decisions in their life, including when making investment decisions. This will have quite a broad effect on the financial behavior of an individual investor, how to respond to market changes, respond to risks and achieve their financial goals (Fung & Durand, 2014). In several previous studies, the NEO-Five Factor Inventory model has been widely used as a measuring tool which is considered capable of providing a comprehensive picture of personality, and simplified into five major personality dimensions: extraversion, agreeableness, conscientiousness, neuroticism, and openness traits (McCrae & Costa, 2004). This research will observe 3 dimensions of personality: neuroticism, conscientiousness and openness.

Neuroticism traits reflect individuals who are less stable, fearful, angry, anxious and have other negative emotions (Durand et al., 2008). In bounded rationality theory, someone in a situation of stress, anxiety or depression tends to be less accurate in predicting things. Pressure from within results in irrational perceptions/thoughts, this triggers the emergence of an overconfident behavioral bias in investing (Dunning & Story, 1991). Supported by Sanjaya et al. (2020), who found that the neuroticism personality had a significant positive effect on overconfidence behavior bias, investors with this personality tended to be pessimistic about their investment results and

believed that bad things would happen, irrational thoughts regarding excessive negative things were also said to be able to trigger the emergence of an overconfidence behavior bias.
H1a: Neuroticism traits have a significant positive influence on individual investors' overconfidence bias.

Conscientiousness traits reflect individuals who are organized, thorough, confident and responsible for the actions and decisions they take (Baker et al., 2021). A person's personality has a significant relationship with their behavioral bias in investing in the stock market (Fung & Durand, 2014). Referring to behavioral finance theory, positive attitude, thoroughness and self-confidence in the conscientiousness personality make investment decisions no longer based on solid data but based on alternatives that meet the characteristics they desire (Tversky, 1972). Other evidence shows, conscientiousness traits have a significant positive effect on almost all behavioral biases: including overconfidence bias behavior (Baker et al., 2021; Jency, 2017; Zaidi & Tauni, 2012).
H1b: Conscientiousness traits have a significant positive influence on individual investors' overconfidence bias.

Openness traits reflect individuals who are open to new experiences, have creativity and are interested in various ideas and cultures (Durand et al., 2008). Openness is the only trait that has a positive correlation with intellectual performance in terms of memory and cognitive processes control (Deyoung & Gray, 2009). In behavioral finance theory, human brain abilities are different, the intellectual intelligence possessed by this personality can be exposed to overconfident behavioral bias. A high attitude of openness, individuals who are open to new experiences are easily influenced by inaccurate information, this triggers the emergence of an overconfident behavioral bias in their investment decisions. The research results of Jency (2017), Kubilay & Bayrakdaroglu (2016), Sadi et al. (2011) stated, overconfidence bias can be influenced by openness traits.
H1c: Openness traits have a significant positive influence on individual investors' overconfidence bias.

In gender schema theory, it is stated that identification of gender through the observation process can shape the person's own gender identity and behavior based on their observation of people behavior around them (Barber & Odean, 2001; Bem, 1981). Men tend to prefer taking risks in invest more than women (Glaser & Weber, 2010), and women are more risk averse when making decisions compared to men. Financial behavior has a significant influence on retirement planning and investment decisions, but this influence has varying results for men and women (Arifin, 2019). Estes & Hosseini (1988), Graham et al. (2002) stated, female investors tend to be less risk tolerant than male investors. Other evidence, Lin (2011) found the personality of male investors tends to show an overconfident behavioral bias in investing compared to women.
H2: Gender can moderate the influence of personality traits (neuroticism, conscientiousness, openness) on individual investors' overconfidence bias.

2. RESEARCH METHOD

This research uses non-probability sampling method, with the population of individual stock investors in Indonesia, and using primary data collection & purposive sampling technique. Data was collected using an online questionnaire by Google Forms and distributed by WhatsApp Groups, Telegram, Facebook, Instagram and Twitter. The questionnaire consists of questions aimed at obtaining respondent profile data, as well as questions to measure independent variables:

personality traits, and the dependent variable overconfidence bias. Respondents targeted to participate are individual investors who already have Single Investor Identification (SID) on the Indonesian stock market.

The statistical analysis in this study used Structural Equation Modeling (SEM) with the Partial Least Squares (SEM-PLS) technique. This analysis uses 3 stages: outer model, inner model, and hypothesis testing (Hair et al., 2019). Outer Model evaluation is measured by conducting validity and reliability tests. The convergent validity test meets the criteria if it has an average variance extracted (AVE) > 0.50 and a loading factor > 0.70 (Hair et al., 2019). Meanwhile, the discriminant validity test is measured through cross-loading criteria which are usually more flexible and capable of evaluating at the indicator level, provided that the indicators in each construct are higher than the other cross-loading constructs. The reliability test can be measured in two ways, Composite Reliability (CR) meet reliability with a value > 0.70, while Cronbach's α with a value > 0.60 (Hair et al., 2021).

Inner Model evaluation consists of testing R square, Q square, and Goodness of Fit. R square is divided into 3 sizes of the coefficient of determination: substantial (0.75), moderate (0.50) and weak (0.25) with range effect from 0 to 1, and the larger the R square value is closer to 1 shows the better the research model used (Hair et al., 2021). Q square (predictive relevance) uses a blindfolding procedure with criteria > 0 depicting small accuracy, a value > 0.25 illustrating moderate accuracy, and a value > 0.50 illustrating large accuracy (Hair et al., 2019). Goodness of Fit is seen from the NFI value, with the value that can define small (0.10), medium (0.25) and large (0.36), and if the resulting value is > than 0.36, then the research model can be said to be appropriate and will get better if the value tested is close to 1 (Hair et al., 2021). Hypothesis testing uses t-statistic test with the criterion value of the t-statistic being greater than 1.96, then the hypothesis constructed can be said to be significant and accepted, while less than 1.96 the hypothesis is rejected (Hair et al., 2019).

3. RESULTS AND DISCUSSIONS

The research sample obtained and valid to use was 483 respondents, who were stock investors in the Indonesian stock market and had Single Investor Identification (SID). The majority of respondents were spread across the Greater Jakarta area at 74.5%, male at 53.6%, age range 21 – 30 years at 49.9%, with a Bachelor's educational background as much as 65.6%, with private/government employee amount to 55.9%, and investment duration for 1-3 years as much as 39.8%, and making investment income as the main income 52.2%. The indicators for the variables neuroticism (NEU), openness (OPE), conscientiousness (CON), and overconfidence (OC) are presented in the form of questions to respondents, which can be seen in table 1 (Baker et al., 2021; Sachdeva & Lehal, 2023).

Evaluation of the outer model is measured by conducting convergent validity, discriminant validity and reliability tests. Convergent validity with criteria of AVE value >0.50 and loading factor >0.70 (Hair et al., 2019). Figure 2 shows, all indicators obtained loading factor values >0.70 with variable indicators having the lowest numbers: NEU2 (0.793), OPE1 (0.860), CON1 (0.703) and OC3 (0.900). The AVE test results for all variables obtained a value of > 0.50, as follows: conscientiousness 0.679, neuroticism 0.709, openness 0.769, and overconfidence 0.840, so it can be stated that all types of measurement items are valid and meet the requirement for good convergent validity.

Table 1. Variable Operationalization

Code	Indicators	Code	Indicators
NEU1	I am feeling inferior compared to other people in investing	CON1	I follow the correct stock investment procedures
NEU2	When in under pressure condition, I can't think about investing	CON2	I am capable of making stock investment decisions independently
NEU3	I can't control my emotions when investing	CON3	I am able to make investment decisions (buy/sell) shares at the right time
NEU4	I am feeling nervous when I want to make an investment	CON4	I am personally reliable in making stock investment decisions
NEUS	I am feeling insecure when making investment decisions	CON5	I am able to organize time and money for stock investment appropriately
NEU6	When conditions don't happen according to my expectations, then I want to stop investing	OC1	I am an experienced stock investor
OPE1	I am interested in investment analysis techniques	OC2	I feel like on average my stock investments are performing better than other investors
OPE2	I like to try investing in new stocks	OC3	When my stock investment makes a profit, I feel that this result comes from my abilities
OPE3	I have interest in speculating in investment	OC4	I believe that my opinion is better than other investors
OPE4	I am scientifically curious about how to invest	OC5	I feel that the profits from investing in shares in the past came from the investment skills I had
OPE5	I like to think about abstract ideas for investing	OC6	I believe that my skills in the stock market can help my investment performance to be above market performance

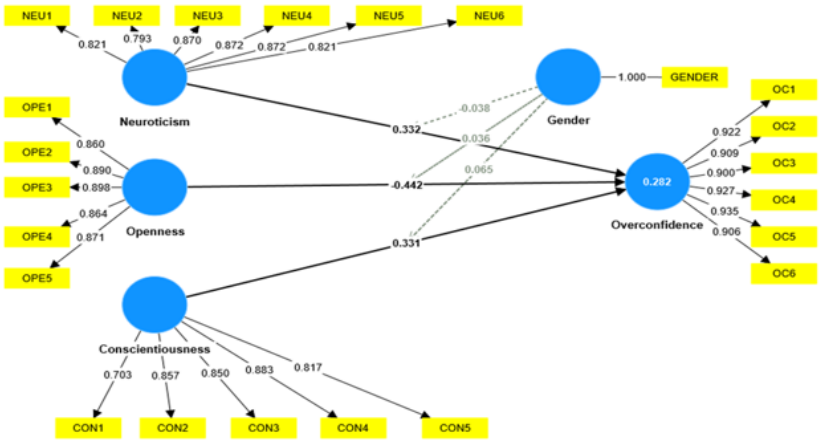

Figure 2. Loading Factor Test
Source: Smart PLS 4.0

The reliability test uses two approaches, composite reliability with a criteria value of >0.70 and Cronbach's α value of >0.60, so the research model is declared reliable (Hair et al., 2021). The results, composite reliability test for all variables obtained a value of >0.70, as follows: conscientiousness 0.912, neuroticism 0.931, openness 0.926, and overconfidence 0.962, while Cronbach's α values obtained > 0.60, as follows: conscientiousness 0.882, neuroticism 0.918, openness 0.925, and overconfidence 0.962, so it can be stated that all variables are reliable for this research.

Turning to inner model, testing involves the coefficient of determination (R^2), predictive relevance (Q^2), and goodness of fit. The coefficient of determination (R^2) produces a value of 0.282 (weak), which means overconfidence variable can be explained by neuroticism, conscientiousness and openness only 28.2% and the remainder are influenced by other factors. In terms of predictive

relevance (Q^2), Hair et al. (2019) grouped small influence > 0.00, medium influence > 0.25, and large influence > 0.50. The research results show a value 0.253, the model have moderate or moderate prediction accuracy. Finally, the Goodness of Fit test, obtained 0.849 (> 0.36) and close to 1, so it could be concluded that this research model was declared fit.

Hypothesis analysis is carried out by checking the significance value in the coefficient table. The research hypothesis is accepted if the t-statistical test results show a value > 1.96 with an alpha (α) of 5% (Hair et al., 2019). The test results are shown in Table 2.

Table 2. t-statistic Test
Source: Smart PLS 4.0

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
NEU → OC	0,332	0,335	0,044	7,616	0,000
CON → OC	0,331	0,334	0,048	6,930	0,000
OPE → OC	-0,442	-0,444	0,044	10,148	0,000
NEU*GEN → OC	-0,038	-0,038	0,040	0,943	0,346
CON*GEN → OC	0,065	0,063	0,041	1,589	0,112
OPE*GEN → OC	0,036	0,036	0,042	0,853	0,394

Hypothesis 1a states neuroticism traits have a significant positive influence on individual investors' overconfidence bias, is accepted with P-value 0.000 and the t-statistic 7.616 (>1.96). Hypothesis 1b states, conscientiousness traits have a significant positive influence on individual investors' overconfidence bias is accepted. The t-statistic 6.930 and significance level 0.000. Continuing hypothesis 1c states, openness traits have a significant positive influence on individual investors' overconfidence bias is rejected, with the results are significant but the negative direction, p-value 0.000 and t-statistic 10.148. Hypothesis 2 predicts moderating role of gender on personality traits (neuroticism, conscientiousness, openness traits) on individual investor' overconfidence bias, is rejected, with t-statistics less than 1.96 and the p-value exceeding 0.05.

This research results are showing positive relationship between neuroticism traits and overconfidence bias, it means, the less anxious, fearful and temperamental a person is in investing, the more their excessive self-confidence tends to decrease. Reducing overconfidence bias, conducive environmental conditions are needed (NEU4) and enriching oneself with information related to the latest market conditions (NEU5). This research is in line with research by Zaidi & Tauni (2012), but contrast with Baker et al. (2021), Jency (2017) research, which states neuroticism traits have no influence on overconfidence bias in the Indian stock market.

The relationship between conscientiousness traits and overconfidence bias shows a significant positive effect, which means the higher of self-confidence and confidence in one's analytical abilities in investing, so the higher bias for excessive self-confidence behavior. The research shows the need of reducing self-confidence in one's own abilities (CON4) by enriching investment-related information, focusing on rational risk management and considering portfolio diversification, in order to reduce overconfidence bias potential (Baker et al., 2021; Jency, 2017; Lin, 2011; Schaefer et al., 2004).

Furthermore, a significant negative effect on the relationship of openness traits and overconfidence bias, it shows a higher imagination, high curiosity and likes new challenges in investing, the lower the overconfidence bias will be. The intellectual level of openness shows evidence that when interest in speculating in investment (OPE3) is carried out correctly it can reduce overconfidence

bias, an attitude of openness accompanied by high curiosity shows more balanced and realistic behavior. The results are contra with Jency's (2017) research which suggests a significant positive relationship between openness traits and overconfidence bias, and (Baker et al. (2021), Schaefer et al. (2004) which did not find any influence from the openness trait on overconfidence bias.

In addition, this research showed the same effect for both men and women in moderating effect on personality traits (neuroticism, conscientiousness, openness) with overconfidence bias, it means, when men and women are under pressure, it can trigger their brains to think irrationally, so they tend to have an overconfidence bias when making investment decisions (Arifin, 2019; Sachdeva & Lehal, 2023).

In general, the results of this research are in line with behavioral finance theory, psychologically it can be explained, there are limitations in the human brain when processing complex financial information and analysis. And it strengthens the bounded irrational theory that an individual in stress will tend to show biased behavior. This is caused by the human brain does not always have sufficient cognitive resources to be able to make rational decisions. Apart from that, this research is also supported by gender schema theory which states gender identity is formed based on modeling the behavior of people around them and forming a personality based on that image. It is shown that modern developments have made women have equality in education, work, investment with men.

4. CONCLUSIONS AND SUGGESTIONS

Based on the conclusion, an investor's attitude in determining investment decisions is significantly influenced by personality traits (neuroticism dan conscientiousness) which can lead to the emergence of an overconfidence bias, and this applies equally to both men and women with the same influence on the behavioral bias. Meanwhile, investors with an openness personality show a significant influence in a negative direction. It means that the higher of curiosity on new experiences, the more their overconfident behavior decreases because their openness makes them more balanced and realistic about market conditions. Pressure or stressful conditions can affect the cognitive and emotional functions of an individual, so in these conditions the individual has a tendency to show biased behavior. However, the effects of stress levels and the human brain's ability to accept and control them will vary, so the impact of biased behavior will not be the same for each individual.

However, this research limitation is focused on individual behavior in making investment decisions in the Indonesian stock market. The results obtained may be different if it takes more types of investments that are widely used by investors in Indonesia. Therefore, for future research, it is recommended to combine more types of investments to be able to see the spread of individual behavior in determining investments and involve a larger sample size to draw more general conclusions.

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