



**ORIGINAL ARTICLE**

## **Impact of Personality Traits on The Investor Sentiment**

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### **ABSTRACT**

In making investment decisions on the Indonesian Stock Exchange, this study evaluates the relationship between personality traits and individual investor activity bias. This research uses a questionnaire obtained from Indonesia's 205 individual investors. Modelling of structural equations (SEM) is used to analyse the impact of personality characteristics on component behaviour bias. This finding indicates that the traits of neuroticism, extraversion, and openness are strongly related to the different biased behaviours of individual investors on the Indonesian Stock Exchange. This analysis offers evidence that a relationship exists.

**Keywords:** Personality Traits, Psychology, Investment, Finance, Individual Investors

**DOI :** <https://doi.org/10.30596/ijbe.v2i1.5724>

**JEL Classification :** G4, G11, G23, M12



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### **Cite this article as:**

Hidayah, T, N., & Kustina, L. . (2020). Impact of Personality Traits on The Investor Sentiment. *International Journal of Business Economics (IJBE)*, 2(1), 60-75.

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## INTRODUCTION

The efficient market hypothesis (EMH) develops from investors behave rationally in determining financial assets' prices. Financial assets' prices are a reflection of all available information inefficient market (Kumar & Goyal, 2015). The rationality theory believes that humans in determining their financial decisions are rational creatures. Another theorist (Kahneman & Tversky, 1979) opposes this approach by arguing that investors sometimes behave in irrational ways when investing in financial assets. Investors show irrational behavior in the market when they trade excessively. Buy stocks regardless of their fundamental value, buy stocks that their friends buy, base their decisions on past performance and sell profitable stocks early and hold down stocks for longer (Shah, Ahmad, & Mahmood, 2017). Financial behavior explains the causes of anomalies that occur in the market and tries to answer questions such as why price bubbles occur in the market and explain prices that do not reflect their book value by investigating various emotional, social, and psychological behaviors among investors in making financial decisions. When making investment decisions, individuals tend to be influenced by potential outcomes and emotional outcomes (Zahera & Bansal, 2018). These factors can make irrational decisions that cause the market to be inefficient. Sarwar & Afaf (2016) examined the relationship between psychological and economic factors on investment decisions and finding evidence that psychological factors have a more significant impact than economic factors. The traditional financial theory believes that investors behave rationally when making investment decisions. However, in practice, the theory fails to explain the causes of anomalies in the market. Using the approach of psychological and economic factors, researchers in the field of behaviour try to answer these anomalies by arguing that the individual is not entirely a rational being.

Prospect Theory Kahneman & Tversky (1979) that individuals assess advantages and disadvantages through different points of view. The Prospect Theory explains that individuals tend to be afraid of experiencing losses rather than thinking about their profits. This compatible with the disposition effect hypothesis, where individuals tend to sell profitable assets earlier and hold detrimental assets longer (Kumar & Goyal, 2015). The disposition bias behavior occurs because individuals tend to want to realize profits rather than accept the reality of losses immediately. Another factor that plays a significant role in determining investor behavior is personality traits. According to Baker, Kumar, & Goyal (2019), personality traits are significant psychological antecedents related to behavioral bias. Fung & Durand (2014) describes personality traits into five things: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience.

The contribution of this research is to provide evidence of a relationship between personality traits and behavioral bias of individual investors when making investment decisions on the Indonesia Stock Exchange. Currently, the literature on the relationship of personality traits to individual investors' financial behavior is more focused on overseas research (Baker et al., 2019; Durand, Newby, & Sanghani, 2008; Kumari, Chandra, & Pattanayak, 2019; Muñoz-Murillo, Álvarez, -Franco, & Restrepo-Tobón, 2019). The research results by Lin (2011) indicate that individual investors' investment bias is significantly affected by four personality traits and several demographics. Meanwhile, the research results conducted by Baker & Goyal (2018) show a significant relationship between the nature of neuroticism, extroversion and awareness, and bias of individual investor behavior. Openness had a significant relationship only with mental accounting, and the nature of conformity had nothing to do with the behavioral bias examined. There are still differences in research results between Lin (2011)

and Baker & Goyal (2018) that make authors interested in re-examining using research samples in Indonesian investors.

Indonesia is a unique market. Sharma, S., Narayan, P. K., Thuraiamy, K., & Laila, N. (2019) stated that Indonesia's stock market's financial system is different from other emerging and regional markets. In his research results, Indonesia is comparable to several well-established developing markets, such as Russia and Brazil, while Indonesia's return during the 2008-2017 period was 7.9%, beating all major emerging markets (India, China, Russia, Brazil, and South Africa). Indonesia's market growth also increased, surpassing Singapore (4.6%) and Malaysia (3.9%), and was only beaten by the Philippines (8.5%) and Thailand (10.5%). The market's growth phase in the turnover volume data where Indonesia is in the top ranks of Brazil and South Africa and among the major emerging markets and is far ahead of Malaysia, Philippines, Singapore, Vietnam, and India. Besides, a population of more than 260 million has the largest Muslim population, giving rise to an increasing demand to invest according to Islamic sharia, affecting market behavior.

This research is interesting because it focused on Indonesia so that it can increase the diversity of literature. To the best of the authors' knowledge, no previous study has examined the impact of the Big Five model of personality traits on various biased behavior of Indonesian individual investors. Based on the research background, The research questions: 1) Whether there is a significant effect of the neuroticism on, disposition effect (a), herding (b). and overconfidence bias (c)? 2). Whether there is a significant effect of the extraversion on, disposition (a), herding (b). and overconfidence bias (c)? 3). Whether there is a significant effect of the openness on, disposition (a), herding (b). and overconfidence bias (c)? 4). Whether there is a significant effect of the Agreeableness on, disposition (a), herding (b). and overconfidence bias (c)? 5). Whether there is a significant effect of the Conscientiousness on, disposition (a), herding (b). and overconfidence bias (c)?

## Disposition Effect

The disposition effect is investors' tendency to sell profitable stock investments earlier and hold the losing ones for longer. Its fundamental aim is to maximize returns while delaying losses (Zahera & Bansal, 2019). The disposition effect in the stock market was first identified empirically by Shefrin & Statman (1985) with a broader development of the approaching model adopted by Kahneman and Tversky regarding the reluctance to realize losses under uncertainty. Shefrin & Statman (1985) extend prospect theory into a theoretical framework regarding the general tendency to sell profitable stocks too early and hold losses too long. The elements in the framework include; mental accounting, regret aversion, self-control, and tax considerations. The results of his research revealed that investors focused their loss realization in December due to tax motivation. Another evidence that shows is that this disposition effect appears in financial markets.

Tommy (2017) investigates the effect of the disposition effect on stock price movement using the literature review method and finds conditions where the disposition effect affects the duration of up and down price trends. This consequence changes over time due to changes in the balance between the number of buyers and sellers. The disposition effect's role can also be observed in the stock market when price movements occur for fundamental reasons. If the upward trend is significant and persistent so that shareholders who are susceptible to the effect of a disposition offer their shares for sale, then a sufficient amount of buyer momentum will amplify the upward price movement. Besides, when the market up, more investors who are vulnerable to the disposition effect can be attracted to buy shares, thereby increasing the

disposition effect on stock prices. When the upward price trend eventually turns into a downward trend, it will initially be attenuated by shareholders who are vulnerable to the disposition effect not offering their shares for sale, then possibly triggering an explosion when they start selling and buying less.

### **Herding**

Herd Behavior is a condition in which rational people start to behave irrationally by imitating other people's judgments when making decisions (Kumar & Goyal, 2015). Herding behavior describes as an act wherein an investor decides to buy based on the recommendation of another person.

Zuee (2015) investigated herding behavior in Pakistan's stock market. This study determines market players' herding behavior through the return of specific securities using the cross-sectional standard deviation (CSSD) and cross-sectional absolute deviation (CSAD) methods. The data of this research consist of daily and monthly closing prices and the trading volume of the KSE-100 index constituents in the Pakistani market from 2002-2007. Empirical results show that during periods of extreme price movements, the dispersion of equity returns tends to increase rather than decrease. The literature study results revealed that due to the asymmetry of information, investors in emerging markets are more likely to show herding behavior. The results of his research refute herding behavior due to market asymmetry. However, during the liquidity crisis of March 2005, Pakistan's stock market exhibited herding behavior due to information asymmetry among investors.

Different results are shown by Ju (2019) by investigating the phenomenon of herding behavior on the Shanghai Stock Exchange and the Shenzhen Stock Exchange. The study compared the Shanghai Stock Exchange and the Shenzhen Stock Exchange in various financial crises. This study uses the cross-sectional absolute deviation method to obtain an asymmetric effect of market returns. The results of his investigation found that the herding phenomenon was prevalent for all sample periods on the Shanghai Stock Exchange and the Shenzhen Stock Exchange.

Kumar & Goyal (2015) argue that excessive belief is a strong bias and makes people overly confident about their knowledge and skills and ignore the risks associated with investing. Metawa et al., (2019) conducted a study to investigate the relationship between demographic characteristics of investors (age, gender, level of education and experience) and their investment decisions through behavioral factors (sentiment, excessive trust, overreaction and underreaction, and group behavior) as a mediating variable in the Egyptian stock market. The study found evidence that the majority of investors having excessive confidence in investment decision making.

Overconfidence can also be interpreted as a condition when a person is more confident in his abilities in various situations (Sarwar & Afaf, 2016). Meanwhile, Zahera & Bansal (2018) argue that overconfidence is a condition where investors overestimate their abilities in various circumstances. The overly confident investor relies on the information he collects rather than the information generated in the market.

Shah et al. (2017) investigate the heuristic mechanism that affects each investor's investment decisions and found that overconfidence has a significant negative effect on individual investor decisions. Psychologically, this means that overconfidence bias prevents investors from making better investment decisions. Overly confident investors are more likely to make inappropriate or risky investments, and they can trade excessively, which has a significant and negative effect on their returns. The overconfidence heuristic also has a

significant negative effect on perceived market efficiency. It means market efficiency deteriorates due to overconfidence.

### **Neuroticism**

Individuals who have neuroticism traits are more susceptible to psychological stress, including negative effectiveness such as anger and pessimism. (Fung & Durand, 2014). Neuroticism is also associated with emotional instability, depression and egoism. Highly neurotic individuals tend to overestimate risks when markets are falling and may underestimate profits when markets are profitable. This is due to a lack of effective cognitive skills, weak analytical skills and poor conceptual understanding and critical thinking (Pak & Mahmood, 2015). Investors with neuroticism are emotionally unstable and tend to experience depression, anxiety and have a higher risk tolerance (Baker et al., 2019). When investors are neurotic, they will be anxious, emotionally unstable and nervous. Therefore, they always sell productive stocks too early but do not sell them when the price continues to fall, and they follow the advice of friends and professional investors about investing which will also lead to overturning investment decisions (Lin, 2011).

In the neurobiological field, neuroticism is related to brain activity associated with withdrawal behavior, risk aversion, and adverse effects (Fung & Durand, 2014). Lin (2011) found evidence that there is a significant positive relationship between neuroticism and the effects of disposition and behavior accompaniment. Neuroticism also has a significant negative relationship with emotional intelligence (Dehghanan et al., 2014). It means that individuals with high neuroticism tend to have low levels of emotional intelligence.

### **Extraversion**

Extraversion is used to describe people who have the characteristics of enthusiasm, accessibility, optimism, and volubility (Lin, 2011). Someone who is high in extraversion tends to be more sociable, active, optimistic, fun, and talkative, while someone who is low in extraversion tends to be alone, and quiet (Fung & Durand, 2014) because the optimistic character of an investor with this characteristic is dominant so that it can overestimate profits and underestimate losses (Pak & Mahmood, 2015).

Extraversion and neuroticism are the Big Five's most studied traits of neuropsychological research. Extraversion is related to the dopamine pathway in the brain, the mesolimbic pathway, which regulates "approach" behaviors such as attention, motivation, pursuit, positive emotions, and sensitivity to reward (Fung & Durand, 2014). Because of this dopamine, individuals with these characteristics have a tendency to seek appreciation and pleasure. Dopamine can cause feelings of joy which can reinforce behavior. (Nga & Ken Yien, 2013) in their research found evidence that there was an insignificant negative relationship between extraversion and neuroticism on risk avoidance. This is because the nature of extraversion is associated with risk-taking behavior due to the influence of dopamine on sensation seeking and reward / benefit seeking by taking risks (Fung & Durand, 2014)

According to Lin (2011), the nature of extraversion prefers to access according to the opinion or investment experience of more people and to follow other investors' information when they have involved in the stock market. This opinion comes from the findings in his research that there is a significant positive relationship between extraversion and herding and overconfidence. Dehghanan et al. (2014) found evidence of a significant positive relationship between extraversion and emotional intelligence. Akhtar, Thyagaraj, & Das (2018) Find evidence that extraversion investors have high investment performance. This opinion follows the findings of Durand et al. (2008) that more extra individuals have a higher preference for

innovation and achieve superior portfolio performance, but these individuals tend to have a low level of trading.

## **Openness**

According to Fung & Durand (2014) a person who is high in openness is someone who is imaginative, curious, open to unconventional ideas and values. On the other hand, those who are low in openness tend to be conventional and dogmatic in beliefs and attitudes, as well as emotionally unresponsive. Investors with high openness to experience (openness) show a strong preference for sensation, novelty and complexity (Pak & Mahmood, 2015). this person will quickly receive market information and may frequently change the investment portfolio with changing market situations. This is due to their nature which refers to an active search and appreciation for experiences for their own benefit (Fung & Durand, 2014).

Pak & Mahmood (2015) found evidence that openness has a significant positive effect on risk tolerance levels. Since the nature of openness involves an active search for experiences for their own benefit, the positive association with risk-taking behavior is not surprising. Openness also has a significant positive relationship with herding behavior and overconfidence (Lin, 2011). This indicates that investors with openness properties prefer to seek out new investment information, such as advice from newspapers or institutional investors, which can eventually result in influencing behavior. Dehghanan et al (2014) also found evidence that there is a significant positive relationship between openness and emotional intelligence. Due to the high tendency of individuals in openness to experience to engage in reflective and intellectual activities and to seek opportunities in learning in various fields, it is only natural that openness is positively associated with intelligence.

## **Agreeableness**

Similar to extraversion, agreeableness is also an interpersonal dimension. According to Fung & Durand (2014), an individual who is high in agreeableness tends to be trusting, altruistic, kind, empathic, and helpful. However, low in agreeableness tends to be cynical, rude, suspicious, uncooperative, irritable, and even manipulative, vengeful, and cruel. Investors with agreeableness are synonymous with simplicity, tolerance, and friendliness (Lin, 2011). Individuals high on the agreeableness scale tend to be sympathetic, value and respect the beliefs of others who are ready to help and are fundamentally altruistic (Durand et al., 2008)

Dehghanan et al. (2014) found evidence of a significant positive relationship between agreeableness and emotional intelligence. Meanwhile, Pak & Mahmood (2015) found evidence of a significant negative effect of agreeableness on risk tolerance levels. In terms of stock holding, agreeableness has a significant negative effect (Zarri, 2017). Meanwhile, Akhtar et al. (2018) examined social influence as a moderating variable, finding evidence that agreeableness has a significant relationship with perceived investment performance, moderated by social influence.

## **Conscientiousness**

According to Fung & Durand (2014), conscientiousness reflects the stability of individual motivation, the ability to make and carry out plans in an organized and diligent manner, and delay immediate gratification for long-term goals. A low in conscientiousness tend to be lazy, aimless, hedonistic, weak, and careless. Investors with a conscientious nature will be severe and superior. This type of investor believes that their performance in investing is better than other investors (Lin, 2011). Conscientiousness is deeply rooted in biology and genetics-based, so this trait tends to last a long time (Fung & Durand, 2014)

Conscientiousness has a positive relationship with the effect of disposition and overconfidence (Lin, 2011). It means that investors with conscientiousness tend to show

overconfidence behavior and will be early in selling stocks rising in price. Dehghanan et al. (2014) found evidence of a significant positive relationship between conscientiousness and emotional intelligence. Meanwhile, in terms of risk tolerance, this personality trait negatively affects (Pak & Mahmood, 2015). The negative impact on this risk tolerance is because investors tend to have a certain level of trust and are careful, analytical, methodological, and self-disciplined and have clear investment objectives. Meanwhile, Baker et al. (2019) found evidence that conscientiousness has a statistically significant positive relationship with over-trust bias but not with herding bias. This finding makes sense as these investors tend to be more organized, efficient, and reliable and rate themselves as having more considerable investment skills than others.

The hypothesis in this study are: H1. There is a significant effect of the neuroticism on, disposition effect (a), herding (b). and overconfidence bias (c)? H2. There is a significant effect of the extraversion on, disposition (a), herding (b). and overconfidence bias (c)? H3. There is a significant effect of the openness on, disposition (a), herding (b). and overconfidence bias (c)? H4. There is a significant effect of the Agreeableness on, disposition (a), herding (b). and overconfidence bias (c)? H5. There is a significant effect of the Conscientiousness on, disposition (a), herding (b). and overconfidence bias (c)?

## METHODS

The variables in this study consisted of five independent variables which adapted from research conducted by Baker et al., (2019; Lin, (2011); Mayfield, Perdue, & Wooten, (2008); Pak & Mahmood, (2015). Closed questions were asked to prospective respondents by asking 35 questions. The Likert scale 1-5 (1 = "Strongly Disagree," 2= "Disagree," 3= "Neutral," 4= "Agree," 5 = "Strongly Agree") is used to assess the answers of respondents. The questionnaire consists of three parts. Section A collects the demographics of the respondents. Part B focuses on questions related to the respondent's behavior when trading stocks. And the last, C, describes the personality characteristics of the respondent.

The population in this study is individual investors on the Indonesia Stock Exchange. Contact information for individual investors obtained through the WhatsApp Group Beginner Stock Investor Community in Banten (Tangerang), Jakarta, West Java (Cikarang, Bekasi, Bandung), Central Java (Kudus, Pekalongan) and East Java (Surabaya, Malang, Probolinggo) which -The city included in the province with the most significant number of individual investors in Indonesia (<https://akses.ksei.co.id/pusatinformasi>). After sending a questionnaire to 1,000 investors, each respondent received a google form address as an online survey. A total of 205 (20.5%) individual investors responded to the questionnaire, and 61 data were declared abnormal. After the skewness-kurtosis normality assumption tested, it had to be eliminated and resulted in a final sample of 144 respondents.

The Econometric Model with structural equation model:  $\eta = \alpha\eta + B\eta + T\xi + \zeta$

The structural model equation can be explained as follows;  $\eta$  is an endogenous latent variable,  $\xi$  is an exogenous latent variable, and  $\zeta$  is a structural error between exogenous and endogenous variables; B is the coefficient of measuring the relationship between endogenous latent variables and T is the coefficient that connects exogenous latent variables with endogenous latent variables.

The measurement model:

$$y = \alpha y + A\eta + \varepsilon$$

$$x = \alpha x + A\xi + \delta.$$

The measurement model equation can be explained as follows;  $y$  and  $x$  are observable variables which are respectively influenced by  $\zeta$  and  $\xi$  contained in  $\varepsilon$  and  $\delta$ ;  $A_y$  and  $A_x$  are coefficients relating the latent variable to the observed indicator variable (factor loading)

Indicator scales for all endogenous and exogenous latent variables are placed in  $y_1$  and  $x_1$

$$\eta = y_1 - \varepsilon_1$$

$$\xi = x_1 - \delta_1$$

Then the equation is substituted for the structural equation and the measurement becomes

$$y_1 = \alpha\eta + \beta y_1 + \tau x_1 + \varepsilon_1 - \beta\varepsilon_1 - \tau\delta_1 + \zeta$$

$$y_2 = \alpha y_2 + \tau y_2 y_1 - \tau y_2 \varepsilon_1 + \varepsilon_2$$

$$x_2 = \alpha x + \tau x_2 x_1 - \tau x_2 \delta_1 + \delta_2.$$

## RESULT AND DISCUSSION

Following the research of Joseph F, Black, Barry J, & Rolph E, (2010), this study uses AMOS 26 as a structural equation modeling (SEM) software to analyze the relationship between personality traits and behavioral bias, while other statistical tools used such as SPSS 25. SEM is a multivariate statistical analysis that combines factor analysis and multiple regression analysis to examine structural relationships between measured variables and latent constructs (Baker et al., 2019). According to Crockett (2012), SEM analysis consists of five sequential steps: model specifications, model identification, model estimation, model testing, and model modification.

Table 1 summarizes the demographic characteristics for the 144 respondents. Of the 144 respondents, 91 (63%) were male. The age group 18-30 years is 127 (88%), and 31-45 is 17 (12%). Most of the respondents were unmarried 120 (83%) and still in college (students). The respondents with S1 graduates 41 (28%). Respondents' occupations are generally not included in the four job categories (i.e., others) 71 (49%) followed by respondents who work in the private sector by 60 (42%) with the most income levels ranging from IDR 1,000,000 - IDR 5,000,000 with a percentage of 43 (62%) followed by an income level below IDR 1,000,000 of 49 (34%). Most respondents had less than 2 years of investment experience 104 (72%) followed by 36 (25%) respondents with 2-5 years of experience.

**Table 1.** Demographic Characteristics of Respondents

Profile	Group	Frequency	%
Gender	Male	91	63%
	Female	53	37%
Age	18-30	127	88%
	31-45	17	12%
	46-60	0	0%
	>60	0	0%
	Merried Status	Merried	24
	Unmerried	120	83%
Education	Students	77	53%
	S1	41	28%
	S2	13	9%
	S3	0	0%
	Others	13	9%



Profile	Group	Frequency	%
Job	Private Employee	60	42%
	Government Employee	6	4%
	Entrepreneur	7	5%
	Retired	0	0%
	Others	71	49%
Income	< Rp 1000.000	49	34%
	Rp 1.000.000 - Rp 5.000.000	62	43%
	Rp 5.000.000 - Rp 10.000.000	26	18%
	Rp 10.000.000 - Rp 15.000.000	6	4%
	Rp 15.000.000 - Rp 20.000.000	1	1%
	> Rp 20.000.000	0	0%
Investment Experience	< 2 years	104	72%
	2-5 years	36	25%
	5-10 years	4	3%
	> 10 years	0	0%

Before conducting a multivariate analysis, the first test is the skewness-kurtosis value test to determine the normality of the data. According to Joseph F et al. (2010), the skewness-kurtosis value's normal range is + 2.58 -2.58. As shown in Table 2, all variables are in the normal range.

**Table 2.** The Skewness-Kurtosis Value Test

Variable	min	max	skew	c.r.	kurtosis	c.r.
OV6	1.000	5.000	-.282	-1.322	-.316	-.741
OV5	1.000	5.000	-.190	-.890	-.168	-.393
OV4	1.000	5.000	-.252	-1.184	.024	.057
OV3	2.000	5.000	-.480	-2.253	.069	.163
OV2	1.000	5.000	.055	.258	-.170	-.398
OV1	1.000	5.000	-.129	-.605	-.016	-.038
HE5	1.000	5.000	-.148	-.696	-.429	-1.006
HE4	1.000	5.000	-.136	-.639	-.431	-1.011
HE3	1.000	5.000	-.078	-.367	-.187	-.439
HE2	1.000	5.000	-.095	-.444	-.014	-.034
HE1	1.000	5.000	-.350	-1.644	-.565	-1.326
DE3	1.000	5.000	-.148	-.695	-.117	-.274
DE2	1.000	5.000	.016	.075	.306	.717
DE1	1.000	5.000	-.318	-1.491	-.404	-.948
CON1	2.000	5.000	.052	.243	-.859	-2.015
CON2	2.000	5.000	-.209	-.979	-.320	-.750
CON3	1.000	5.000	-.333	-1.564	-.280	-.657
CON4	1.000	5.000	.551	2.584	.253	.594
CON5	1.000	5.000	-.428	-2.008	.069	.163
AG1	1.000	5.000	-.162	-.760	-.194	-.454
AG2	1.000	5.000	-.111	-.521	-.527	-1.235
AG3	1.000	5.000	.208	.976	-.106	-.248
OP2	1.000	5.000	.064	.299	-.172	-.404
OP3	1.000	5.000	-.087	-.410	-.423	-.992
OP4	3.000	5.000	-.244	-1.145	-1.034	-2.426
OP5	1.000	5.000	-.263	-1.235	.071	.167

Variable	min	max	skew	c.r.	kurtosis	c.r.
EV1	2.000	5.000	-.288	-1.352	-.476	-1.115
EV2	2.000	5.000	-.145	-.682	-.523	-1.226
EV3	2.000	5.000	-.327	-1.534	-.559	-1.312
EV4	2.000	5.000	.049	.229	-.596	-1.398
NEU1	1.000	5.000	.016	.076	-.757	-1.775
NEU2	1.000	5.000	.507	2.379	-.410	-.961
NEU3	1.000	5.000	.268	1.258	-.499	-1.171
NEU4	1.000	5.000	.375	1.757	-.828	-1.943
NEU5	1.000	4.000	.508	2.385	-.469	-1.099
Multivariate					37.766	4.263

Factor analysis examines the measurement items' structure according to the personality traits and investor sentiment variables. In particular, this study uses principal component analysis (PCA) as an extraction method with Varimax rotation. The Kaiser-Meyer-Olkin measures of sample adequacy were 0.807 and 0.766, respectively, which means they meet the exploratory factor analysis (Barbara A & Kaiser, 1977). Three components related to the investor sentiment variable appear with eigenvalues > 1 and explain 71.21% of the total variance. Similarly, five components of personality traits appeared with eigenvalues > 1 and explained 62.54% of the total variance. Most of the items have an average factor loading value of 0.773 > 0.5 as the threshold according to the recommendations (Joseph F et al., 2010).

Cronbach's  $\alpha$  coefficient method determines to test the reliability of the variables. Cronbach's  $\alpha$  determines to measure the inter-item reliability of the scale produced by several items. According to Sekaran & Bougie (2011), reliability values, less than 0.60, are considered not good, while those in the range of 0.70 are acceptable, and those above 0.80 are considered good. As Table 3 shows, all the items within each component are highly correlated. Cronbach's  $\alpha$  value for each construct is higher than the recommended value of 0.7; this means that it shows a close relationship for all items in each construct (Joseph F et al., 2010)

**Table 3.** Factor analysis and reliability assessment

Item	Statements	Factor Loading	Cronbach's $\alpha$
X12	When I am under much pressure, sometimes I feel like I'm going to break	0,839	0,883
X13	I often feel tense and restless	0,813	
X14	Sometimes I feel worthless	0,846	
X15	Often when there are problems, I get discouraged and feel like giving up	0,862	
X21	I enjoy talking with other people	0,800	
X22	I often feel as if I am full of energy	0,794	0,775
X23	I am a cheerful, high spirited person	0,848	
X24	I am a very active person	0,772	
X32	I often try new and foreign foods	0,762	
X34	I have a high intellectual curiosity	0,757	
X35	I often enjoy playing with abstract theories or ideas	0,848	
X41	I keep my things neat and clean	0,622	
X42	I am good enough and consistent to get work done on time	0,615	
X43	I wasted much time before starting work *	0,795	
X45	I seem to have a hard time getting organized *	0,595	
X51	I often argue with my family and co-workers *	0,717	0,805

Item	Statements	Factor Loading	Cronbach's $\alpha$
X52	Some people think I'm selfish *	0,872	
X53	Some people think I'm cold and calculating *	0,864	
Y11	I do not have a quick response to good or bad news and tend to sell my profitable stocks too early and sell potential losses for longer.	0,840	0,761
Y12	Often I am reluctant to realize the loss.	0,808	
Y13	I sold the profitable stock because I was afraid the stock price would fall again	0,769	
Y22	Other investors' decisions to buy and sell stocks influence my investment decisions	0,807	0,879
Y23	I usually react quickly to changes in other investors' decisions and follow their reactions to the stock market.	0,872	
Y24	I consult with other people (family, friends, or colleagues) before making a stock purchase/sale	0,818	
Y25	I followed social blogs/forums before making stock purchases/sales	0,867	
Y31	I am an experienced investor	0,674	0,788
Y32	I feel that, on average, my investment is performing better than the stock market.	0,666	
Y33	When I buy the gain investment, I feel that my actions and knowledge influence the outcome.	0,733	
Y34	I feel more confident in my own investment opinion than the opinion of a financial analyst	0,639	
Y35	My past investments were profitable, mainly because of my specific investing skills.	0,824	
Y36	I believe that my skills and knowledge of the stock market can help me outperform the market.	0,638	

In the measurement model based on Table 4, construct validity is assessed using convergent and discriminant validity. The convergent validity is necessary to check the item loading coefficient. Most of the item loadings in the confirmatory factor analysis were statistically significant and exceeded 0.7 after removing multiple items from the construct. Furthermore, examine the composite reliability (CR) and average variance extracted (AVE). Based on Table 3 show that Most of the CR and AVE values were above the recommended levels of 0.7 and 0.5, respectively (Joseph F et al., 2010). Most of the CR and AVE values were above recommended levels of 0.7, and 0.5, respectively (Joseph F et al., 2010) CR values (ranging from 0.682 to 0.889) and Cronbach values (ranging from 0.761 to 0.883) exceeding the generally accepted value, namely 0.70; AVE values (range 0.50 to 0.88) exceed the generally accepted value of 0.5. Therefore, convergent validity is accepted.

**Table 4.** Measurement model

	CR	AVE	DE	HE	OV	NEU	EV	OP	AG	CON
<b>DE</b>	0.8	0.6	0.8							
<b>HE</b>	0.8	0.5	0.2	0.7						
<b>OV</b>	0.7	0.5	0.2	0.2	0.7					
<b>NEU</b>	0.9	0.7	0.2	0.2	-0.1	0.8				
<b>EV</b>	0.9	0.6	0.2	0.1	0.4	-0.3	0.8			

	CR	AVE	DE	HE	OV	NEU	EV	OP	AG	CON
<b>OP</b>	0.8	0.6	0.2	0.3	0.4	0.1	0.4	0.8		
<b>AG</b>	0.8	0.7	-0.1	-0.1	0.0	-0.4	0.1	-0.3	0.8	
<b>CON</b>	0.7	0.5	0.0	0.1	0.4	-0.2	0.5	0.4	0.1	0.7

SEM is used to examine the relationship between personality traits and investor sentiment. Table 5 shows that all Goodness of Fit Indexes (GOF) of the measurement model and the structured model, as recommended by (Joseph F et al., 2010), fall into the satisfactory category. Some of the fit index measures following this recommended level are chi-square ( $\chi^2$ ) exogenous variable (138.048), endogenous variable (37.694), structural model (334.316), showing results  $\chi^2 / df < 3$ ; comparative fit index (CFI) for exogenous variables (0.961), endogenous variables (0.961), structural models (0.945), with a recommended value of more than 0.90; normed fit index (NFI) for exogenous variables (0.888), endogenous variables (0.904), structural models (0.818) with a recommended value of less than 0.90; goodness-of-fit (GFI) exogenous variables (0.898), endogenous variables (0.947), structural models (0.847), with a recommended value of more than 0.80; tucker Lewis index (TLI) for exogenous variables (0.950), endogenous variables (0.942) structural model (0.934) with a recommended value of more than (0.90); adjusted goodness of fit index (AGFI) exogenous variables (0.853), endogenous variables (0.901), structural models (0.802), with a recommended value of more than (0.80); and root mean square error of approximation (RMSEA) for exogenous variables (0.057), endogenous variables (0.063), and structural models (0.049), with a recommended value of less than 0.05 (good fit).

**Table 5.** Structural Model

Fit Indicators	Recommended Levels	Exogenous Variables	Endogenous Variables	Structural Model
$\chi^2$		138,048	37,694	334,316
<b>df</b>		94	24	250
$\chi^2/df$	<3	1,46	1,57	1,34
<b>RMSEA</b>	<0.05 (good fit) <0.08 (fair fit)	0,057	0,063	0,049
<b>TLI</b>	>0.90	0,950	0,942	0,934
<b>CFI</b>	>0.90	0,961	0,961	0,945
<b>NFI</b>	<0.90	0,888	0,904	0,818
<b>GFI</b>	>0.80 (accepted)	0,898	0,947	0,847
<b>AGFI</b>	>0.80	0,853	0,901	0,802

Table 5 shows the results of the hypothesis testing. The model contains three endogenous variables (DE, HERD OV). Evidence shows that Neuroticism has a significant positive relationship with Disposition and Herding behavioral bias but has an insignificant negative relationship with Overconfidence behavior bias. Thus the supported hypotheses are H1a and H1b.

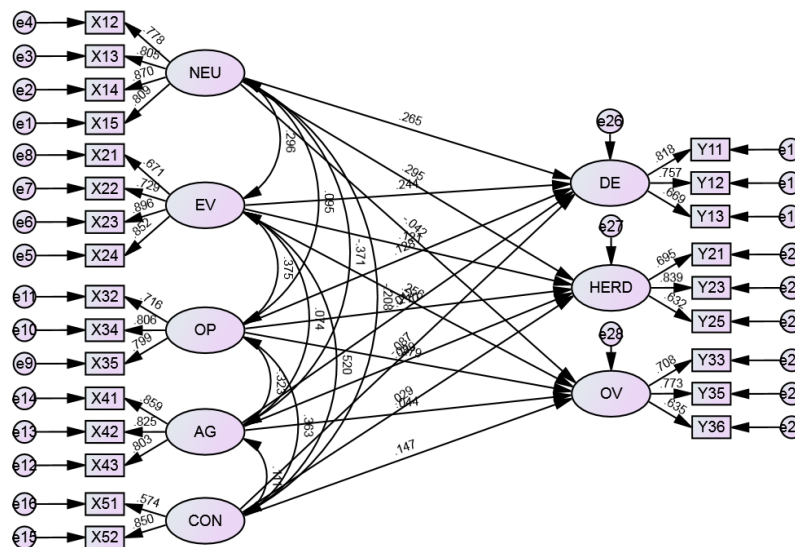
Extraversion has a positive and insignificant relationship with the behavioral bias of Disposition, Herding, but has a significant positive relationship with the endogenous variable Overconfidence at the level of 0.49. So, the hypothesis that is supported is H2c. Although Openness was significantly associated with Overconfidence at the 0.029 level, it did not have

a significant relationship with Disposition and Herding. So, the results only support the H3c hypothesis.

Agreeableness does not have a significant relationship with all the behavioral biases studied so that the hypotheses H4a, H4b, and H4c rejected. This study also found that Conscientiousness had no significant negative relationship with Disposition Herding and Overconfidence. Thus, the hypotheses H5a, H5b, H5c rejected.

**Table 6. Path analysis**

			Hypothesis	Path Coefficient	t-value	P	Information
Disposition	<---	Neuroticism	H1a	0,265	2,361	0,018*	Accepted
Herding	<---	Neuroticism	H1b	0,246	2,547	0,011*	Accepted
Overconfidence	<---	Neuroticism	H1c	-0,030	-0,395	0,693	Rejected
Disposition	<---	Extraversion	H2a	0,273	1,864	0,062	Rejected
Herding	<---	Extraversion	H2b	0,113	0,945	0,345	Rejected
Overconfidence	<---	Extraversion	H2c	0,202	1,972	0,049*	Accepted
Disposition	<---	Openess	H3a	0,151	0,984	0,325	Rejected
Herding	<---	Openess	H3b	0,206	1,502	0,133	Rejected
Overconfidence	<---	Openess	H3c	0,231	2,181	0,029*	Accepted
Disposition	<---	Agreeableness	H4a	-0,012	-0,102	0,919	Rejected
Herding	<---	Agreeableness	H4b	0,072	0,740	0,459	Rejected
Overconfidence	<---	Agreeableness	H4c	0,030	0,393	0,695	Rejected
Disposition	<---	Conscientiouness	H5a	-0,106	-0,635	0,525	Rejected
Herding	<---	Conscientiouness	H5b	0,030	0,214	0,831	Rejected
Overconfidence	<---	Conscientiouness	H5c	0,126	1,112	0,266	Rejected



**Figure 1. Structural Model (Data Analysis)**

**CONCLUSION**

The results showed that three personality traits significantly influence the four behavioral biases in investing. Based on these findings, the authors conclude that investors with more influential neuroticism personalities should strive for point profit targets and cut-loss targets to avoid losses resulting from the disposition and herding effect bias. Meanwhile, investors with stronger extraversion and openness personalities should be able to investigate further and

follow the available market information carefully to avoid overconfidence bias. Individuals who can recognize and adjust their behavior that it is inappropriate or unacceptable can make efforts to avoid becoming victims of their shortcomings.

## IMPLICATION

In addition to individual investors, this research can also help financial advisors and policymakers provide advice and education to their clients. First, financial advisors can advise clients who have neuroticism in nature always to remind and emphasize information on profit targets and cut-loss points to avoid losses due to client emotional instability. Second, for policymakers, they can provide education about the importance of setting profit targets and cut-loss points when trading. Third, for clients who have high extraversion and openness, financial advisors can provide as much relevant and reliable information as possible on market developments that can reduce excess confidence bias. Fourth, policymakers can provide education that can add to their skills in trading in the market. In the future, research can expand by examining other behavioral factors such as Loss Aversion, Overoptimism, Representativeness, Availability, Anchoring, and Mental Accounting. Research can also expand the demographic range of individual investors to the sample size or respondents' age diversity. Taking these factors into account can help create a deeper understanding of the financial behavior of individual investors.

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## **International Journal of Business Economics (IJBE)**

Vol, 2 Issue 1, pp 60-75, Sept 2020

<http://jurnal.umsu.ac.id/index.php/ijbe>

eISSN 2686-472X

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