The influence of risk perception, risk tolerance, overconfidence, and loss aversion towards investment decision making

Nadya Septi Nur Ainia*, Lutfi Lutfi

STIE Perbanas Surabaya, Jl. Nginden Semolo No. 34-36, Surabaya 60118

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ABSTRACT

This study aims to examine the effect of risk perception, risk tolerance, overconfidence, and loss aversion on investment decision making. The sample in this study were workers in Surabaya and Jombang, East Java. There were 400 respondents taken using a questionnaire through the survey method. This study used PLS-SEM (Partial Least Square-Structural Equation Model) as a data analysis technique. The results showed that risk perception has a significant and negative effect on investment decision making, risk tolerance and overconfidence have a significant and positive effect on investment decision making, while loss aversion has no effect on investment decision making. This research is expected to provide an overview of how to deal with risk in investment and how to avoid behavioral biases in investment decisions making.

ABSTRAK

Penelitian ini bertujuan untuk menguji pengaruh persepsi risiko, toleransi risiko, overconfidence and loss aversion pada pengambilan keputusan investasi. Sampel dalam penelitian ini adalah pekerja di Surabaya dan Jombang. Terdapat 400 responden yang diambil menggunakan kuesioner melalui metode survei. Penelitian ini menggunakan PLS-SEM (Partial Least Square-Structural Equation Model) sebagai teknik analisis data. Hasil penelitian ini menunjukkan bahwa persepsi risiko memiliki pengaruh negatif yang signifikan terhadap pengambilan keputusan investasi, toleransi risiko dan overconfidence memiliki efek positif yang signifikan terhadap pengambilan keputusan investasi, sedangkan loss aversion tidak berpengaruh pada pengambilan keputusan investasi. Penelitian ini diharapkan dapat memberikan gambaran tentang bagaimana menghadapi risiko dalam investasi dan bagaimana cara menghindari bias perilaku dalam pengambilan keputusan investasi.

1. INTRODUCTION

The rapid development of technology currently affects the economy and has an impact on the industrial sector. There are so many products offered online that a buyer can get easily and quickly without having to go to the store supplying the products. This results in increasing human unlimited needs and desires. The increased desire, due to technological advances, may cause a person's income to be no longer able to cover the expences. In order to be able to overcome this problem, it is important for people to manage their fianance well. One of the effotrs that can be done is by meeting their needs and desires, other than their fixed income that is by investment. Investment decision is a process of fund allocation for having a low risk assets such as savings and deposits, and high risk assets such as real estate and gold (Ariani et al., 2016) or stocks (Barber & Odean, 2001; Keller & Siegrist, 2006).

In reality, one's investment decision is not always based on rational considerations, but can also be irrational aspects that are related to his psychology or often known as financial behavior. Financial behavior is divided into two main groups, namely cognitive psychology and limit of atbirase (Ritter, 2003). Cognitive psychology deals with how one thinks. There is a variety of evidence that shows that cognitive bias causes inappropriate decisions (Busenitz & Barney, 1997; Hilbert, 2012). Cognitive

bias may lead to a person to overestimate risk (Simon, Houghton, & Aquino, 2000).

When making an investment decision, every investor is faced with a trade off between expected return and risk. Therefore, an investor's perspective on risk can influence his investment decisions (Nofsinger, 2017; Pompian, 2012). One bias that affects investment decisions is the perception of risk. Someone with a high risk perception may consider a low risk investment alternative to have a higher risk, while someone with a low risk perception may deem a high rsk asset to have a lower risk. For that reason, an investor with a high risk perception tends to choose fund allocation in low risk assets, while someone with a low risk perception tends to be more willing to allocate funds to high-risk assets (Broihanne, Merli, & Roger, 2014; Weber & Milliman, 1997).

An investor's investment decisions can also be influenced by the level of tolerance to risk. Risk tolerance is an attitude shown by investors when assessing a risk. Risks in this case relate to uncertainty over the investment returns. Investors who are willing to accept or tolerate risk tend to be brave in allocating funds to high-risk assets, and vice versa (Corter & Chen, 2006). Overconfidence is another behavioral bias factor that can influence decision making. Overconfidence is a belief in judgment, cognitive ability, rational reasoning and intellectuality in which a person exaggerates his ability to predict and accuarcy of information owned (Pompian, 2012).

An overconfidence investor tend to underestimate risk and this may lead to sub-optimal asset allocation (Dittrich, Güth, & Maciejovsky, 2005). Therefore, this investor will tend allocate funds to high risk assets such as property and stocks, while a less overconfidence investor will allocate more of his funds in low risk assets. The last behavioral bias factor that can influence investment decision making is loss aversion. Loss aversion is a feeling of being more confident to be able to avoid a loss than to get some gains. Loss aversion affects the level of risk of one's risk (Thaler, Tversky, Kahneman, & Schwartz, 1997). Someone tends to reject the accessive loss so that he also tends to focus on avoiding the loss but getting the profit (Pompian, 2012). Someone tends to overreact losses, so in terms of investing he is more focused on avoiding losses than looking for profits.

This research was conducted in two regions in East Java, Indonesia, namely Surabaya and Jombang. The city of Surabaya is known as a representation of the Metropolitan City with a modern soci-

ety, while Jombang Regency is a representation of a suburban city, known as the City that still largely adheres to traditional culture. Looking at these two cities, and based on the phenomena that occur in the community, the researchers decided to examine the effect of risk perception, risk tolerance, overconfidence and loss aversion on investment decision making.

2. THEORETICAL FRAMEWORK AND HYPOTHESIS

Investment Decision

Investment is a commitment to placing funds or other resources for a certain period of time in the hope of obtaining benefits in the future. Investments are related to investing funds in various alternative of assets, both real assets and financial assets (Bodie, Kane, & Marcus, 2018). The form of real assets that can be used as the purpose of placement of funds are land, buildings, machinery, and even commodities such as gold. The form of investment in financial assets are bank accounts (savings and deposits), bonds, mutual funds, and shares. In the case of Indonesia, the most preferred financial asset investment is the placement of funds in the bank account, which is 63.6 percent in 2016 (Finanial Service Authority). This figure is far higher than investment in the capital market in the form of shares, mutual funds, and bonds, which are 1.2 percent, 0.2 percent and 0.1 percent respectively, and gold which is 0.5 percent for the same year.

Almost all types of investments have uncertainty or risk. There is a positive relationship between the level of expected return and risk. When someone expects a high level of return, he must be willing to bear a high level of return uncertainty. Bank placements in the form of savings and deposits are relatively safe investments because it is unlikely that the bank cannot provide interest or profit sharing as promised as well as principal repayment, and if the bank goes bankrupt the Deposit Insurance Corporation will bear the refund for deposits up to Rp.2 billion. Investment in stocks is a form of investment that has the highest risk but also provides the highest level of expected return (Keller & Siegrist, 2006). Investments in bonds and real estate have medium risk based on the standard deviation of return on investment (Eichholtz, 1996).

Knowing that the risks and profit levels of investments vary, it is important for investors to see the factors in investment, related to asset allocation. Asset allocation is related to the decision process on how to allocate funds to various asset classes. An asset class has the same characteristics, attributes,

and relationships between risk and return level (Reilly & Brown, 2011). The asset allocation strategy depends on investment objectives, investment constraints, and the investor's attitude to risk. Therefore, making investment decisions effectively can be done by choosing an investment instrument that is suitable for the objectives associated with the level of expected benefits, time period, and risks that exist.

Risk Perception and Investment Decision

Perception is an aspect of the mind process through the senses such as seeing, hearing, and feeling, influenced by information, and then these senses influence judgment. Someone who receives information can use it to develops a picture of the results of that information (Rogers, 2017). Risk perception is a way for someone to interpret risks that are different from estimates or thoughts and reality. Risk perception is a part of cognitive bias. The higher the bias in a person's behavior, the lower the person's perception of risk (Simon et al., 2000). Perception of risk plays an important role in human behavior, especially related to decision making in uncertain circumstances (Forlani & Mullins, 2000). Someone tends to define a situation to be risky if he experiences a loss due to a bad decision made, especially if the loss has an impact on its financial condition. Therefore, risk perception is a person's judgment on a risky condition that is highly dependent on the psychological characteristics and condition of the person (Wulandari & Iramani, 2014).

Perception of risk influences investment decisions (Antonides & Van Der Sar, 1990; Hoffmann, Post, & Pennings, 2015; Nguyen, Gallery, & Newton, 2016; Weber, Siebenmorgen, & Weber, 2005). The higher a person's perception of risk, the more the person avoid allocating funds to high-risk assets and prefer low risk assets (Hariharan, Chapman, & Domian, 2000). Investors with a lower risk perception tend to choose to invest in high-risk stocks, compared to deposits with low risk (Aren & Zengin, 2016; Keller & Siegrist, 2006).
Hypothesis 1: The higher the risk perception, the smaller the proportion of funds invested in high-risk assets.

Risk Tolarance and Investment Decision

Risk tolerance is the level of one's willingness to accept risks from investments. It also means the way a person responds to and takes action regarding risks in an investment. It is possible for investors to like risk, avoid risk, or do not even care about the risk (Wulandari & Iramani, 2014). Ac-

cording ro risk tolerance level, a person can be grouped into risk-seeker, neutral to risk, and risk averter.

Risk tolerance can help a person to understand the level of risk from investment and help someone to be able to tolerate and harmonize existing risks to suit the investment objectives so that the risk that someone has been willing to accept will be in accordance with the rate of return that will be received in the future. Risk tolerance influences investors' decisions in choosing investment alternatives (Pak & Mahmood, 2015; Snelbecker, Roszkowski, & Cutler, 1990). Someone with high risk tolerance tends to be brave to invest in high-risk assets, while someone with low risk tolerance has a tendency to avoid high-risk assets (Corter & Chen, 2006; Nguyen et al., 2016; Pompian, 2012). However, a person with high risk tolerance approaching retirement does not reduce investment in low-risk assets, such as bonds, to be transferred to high-risk assets such as stocks (Hariharan et al., 2000).
Hypothesis 2: The higher the risk tolerance, the greater the proportion of funds invested in high-risk assets

Overconfidence and Investment Decision

One aspect of behavioral bias that has received the most attention from researchers in the financial sector is overconfidence (Barber & Odean, 2001; Dittrich et al., 2005; Gervais, Heaton, & Odean, 2011; Glaser & Weber, 2007; Malmendier & Tate, 2005). Overconfidence is an unreasonable belief based on heart prompting, self-assessment, and excessive cognitive ability. Overconfidence makes someone feel smarter and has better information so that when the person predicts an event that he thinks is certain, often the reality is less than expected (Pompian, 2012).

Overconfidence is also considered an overestimation of one's abilities, performance and chances of success. Overconfidence as a belief of better judgment than others (overplacement), as well as excessive certainty regarding the accuracy of one's beliefs (overprecision) (Moore and Healy, 2008). Someone who is overconfident will tend to override the information obtained because he is too confident in his own beliefs, too confident, and trusting in his views and knowledge so that other information that is actually related is important to be ignored. The negative impact of overconfidence is to make someone make a more extreme decision than they should do (Pikulina, Renneboog, & Tobler, 2017; Zacharakis & Shepherd, 2001). Over-

confidence investors believe that they will get a high level of profit and low risk when investing, even though this cannot be guaranteed and does not necessarily happen.

Empirical evidence shows that investors who overconfidence make too many stock transactions (Chu, Im, & Jang, 2012; Glaser & Weber, 2007; Palomino & Sadrieh, 2011; Statman, Thorley, & Vorkink, 2006) and this has a negative impact on the level of returns obtained (Barber & Odean, 2000, 2001). Overconfidence encourages someone to prefer risk (McCannon, Asaad, & Wilson, 2016). Someone with a high degree of overconfidence tends to be more courageous in making investment decisions and allocating funds to high risk assets because of the very supportive level of confidence

(Breuer, Riesener, & Salzmann, 2014; Dittrich et al., 2005), although the end the results of the investment is less than expected. Overconfidence investors tend to realize profits too quickly and to retain stocks that suffer losses because acknowledging losses is a shame (Chen, Kim, Nofsinger, & Rui, 2007; Chu et al., 2012). Overconfidence has a positive effect on participation in stock investments that have high risk characteristics (Xia, Wang, & Li, 2014). Someone who overconfidence invests more in Real Estate Investment Trusts (Eichholtz & Yönder, 2015)

Hypothesis 3: *The higher the overconfidence, the greater the proportion of funds invested in high-risk assets.*
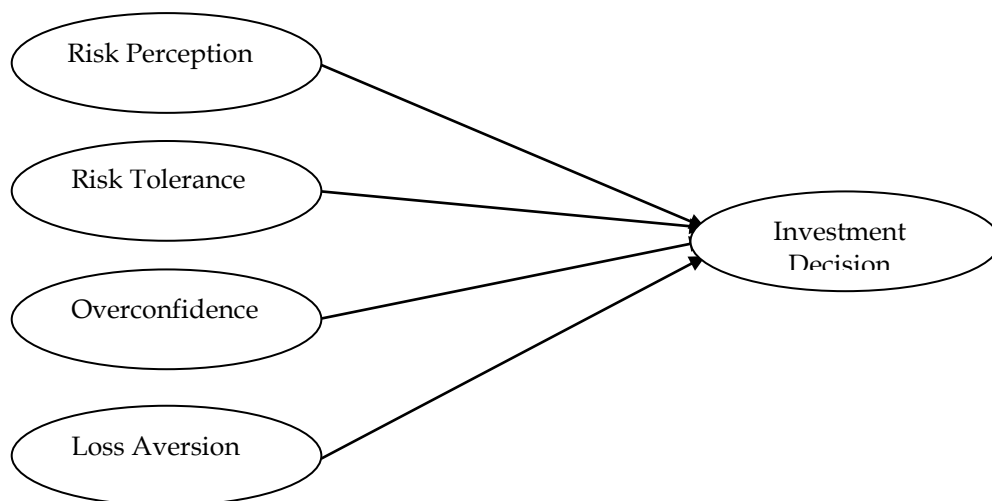

Figure 1
Research Framework

3. RESEARCH METHODOLOGY
Sample and Sampling Technique

The research sample was the residents of Surabaya and Jombang. The sampling technique in this study was convenience sampling and purposive sampling. Convenience sampling is a sampling method where research objects are easily accessible. Purposive sampling is a sampling method based on criteria that are related to the research objectives. The criteria for the sample used are residents who live in Surabaya and Jombang, East Java, Indonesia, for a minimum of 3 years and have worked in there. There were 400 respondents of this study, devided proportionally between the two regions.

This study used primary data, taken using questionnaires obtained directly through field surveys. This study aims to explain the relationship of cause and effect of the variables studied and shows the direction of the relationship between independent

variables and dependent variables.

Research Variables and Measurement

The variables used in this study are investment decision making as the dependent variable and risk perception, risk tolerance, overconfidence, and loss aversion as the independent variables.

1. *Investment Decision Making.* Investment decision making is a process of determining one's choice through setting goals, finding and evaluating information related to several alternative investment instruments. Investment decision making is measured using the proportion of fund allocation in low risk assets and high risk assets. Low risk assets is a type of investment instrument that has a low risk with a low rate of return, while high risk assets is a type of investment instrument that has a high risk with a high rate of return. The indicators used in measuring investment

decision variables are the percentage of investment in low risk assets such as savings, deposits and the percentage of investment in high risk assets such as housing, land, gold (Ariani et al., 2016). Measurement of variables uses a nominal scale with a code number (1) if the percentage of low risk assets is greater than high risk assets, and numbers (2) if the percentage of high risk assets is greater than low risk assets.

2. *Risk perception*. Risk perception is a person's views or thoughts on risk, even though the risk is not certain and can also be different from the reality. The indicator used in measuring risk perception variables is the right investment and will perform well, future investment is of significant value, and investment has excellent results (Nguyen et al., 2016). The risk perception variable was measured using a Likert scale from statements that showed perceptions of risk with five response categories starting from a scale of 1 to 5, namely (5) Strongly Disagree (SD), (4) Disagree (D), (3) Neutral (N), (2) Agree (A), and (1) Strongly Agree (SA).

3. *Risk tolerance*. Risk tolerance is the level at which someone is willing to accept and tolerate the risks that exist. A higher level of risk tolerance means giving greater tolerance to the risks that cause losses, making someone more courageous and willing to accept the risk. Lower risk tolerance level means giving less tolerance to risk so that someone chooses to avoid risk. The indicators used in the measurement of risk tolerance variables are the probability of profits and losses, investment preferences and investment situations (Grable & Lytton, 1999). The risk tolerance variable is measured using a ratio scale in the form of four scores on the available answer choices, namely score 1 for answer a, score 2 for answer b, score 3 for answer c, and score 4 for answer d.

4. *Overconfidence.* Overconfidence is a feeling where someone is too confident, optimistic and confident about something. A higher degree of overconfidence means that the knowledge and abilities possessed are better than others. The indicators used in the measurement of overconfidence variables are better possessed, able to control investment returns, and confidence in past successes (Chitra & Jayashree, 2014; Pan & Statman, 2012). The variable overconfidence is measured using a

Likert scale from the statement that shows overconfidence with five response categories that start on a scale of 1 to 5, namely (1) Strongly Disagree (SD), (2) Disagree (D), (3) Neutral (N), (4) Agree (A), and (5) Strongly Agree (SA).

5. *Loss Aversion.* Loss aversion is a condition where a person is very risk-averse because he is reluctant to accept losses. Loss aversion is also a deviant behavior that is based on fear of loss which encourages excessive rejection of risks that can cause harm. The indicators used in measuring loss aversion variables are investment with definite losses, caution against losses, and investments with good performance history (Khan, 2017). The loss aversion variable is measured by a Likert scale from a statement that shows loss aversion with five response categories that start on a scale of 1 to 5, namely (1) Strongly Disagree (SD), (2) Disagree (D), (3) Neutral (N), (4) Agree (A), and (5) Strongly Agree (SA).

Data Analysis Technique
The statistical analysis used in this study was Partial Least Square (PLS) analysis using the Structural Equation Model (SEM) method and the WarpPLS 6.0 program. The PLS statistical test was done using the Structural Equation Model (SEM) method that is used to test the relationship between latent constructs in linear and nonlinear relationships with various forms of indicators.

4. RESULTS AND DISCUSSION
Descriptive Analysis
Table 1 presents an overview of the research response. Based on Table 1 in the domicile section, it can be explained that the number of the respondents domiciled in Surabaya is 200 people while the number of those living in Jombang is 200 people. This proportion shows a balanced number that is 50% between respondents domiciled in Surabaya and Jombang. Table 1 also shows that the number of male respondents are 208, while those of female are 192 people. This shows that male respondents are more than women, namely male are 52 percent and female are 48 percent.

Based on the age, the respondents aged ≤ 25 years are 52 people with a percentage of 13 percent, respondents aged > 25-40 years are 76 people with a percentage of 19 percent, while respondents aged > 40-55 years are 180 people with a percentage of 45 percent and respondents aged > 55-64 years are 92 people with a percentage of 23 percent. This pro-

portion shows that the highest respondents of 45% are in the aged > 55-64 years.

Based on their accupation, the respondents who are professionals (lawyers, doctors, company executives, entrepreneurs) are 32 people with a percentage of 8 percent. Respondents who are civil servants (government employees, policeman, and army) are 50 people with a percentage of 12 percent. Respondents who are private employees are 100 people with a percentage of 25 percent, while respondents who are state owned enterprise employees are 6 people with a percentage of 2 percent and respondents who are farmers or traders are 212 people with a percentage of 53 percent. This result is not surprising because most of Jombang residents are farmers and many Surabaya residents are traders.

Table 1
Respondent Characteristics

No.	Domicile	No. of Resopondent	(%)
1	Surabaya	200	50
2	Jombang	200	50
No.	**Gender**	**No. of Resopondent**	**(%)**
1	Male	208	48
2	Female	192	52
No.	**Age**	**No. of Resopondent**	**(%)**
1	≤ 25 year	52	13
2	>25–40 year	76	19
3	>40–55 year	180	45
4	>55–64 year	92	23
No.	**Occupation**	**No. of Resopondent**	**(%)**
1	Professionals (Lawyer, Doctor, Executive, Entrepreneurs)	32	8
2	Civil Servant	50	12
3	Private Company Employee	100	25
4	Satate Owned Company Employee	6	2
5	Other (Farmer, Trader)	212	53

Table 2 shows the categories of investment decisions of respondents. The data in this table shows that as many as 292 respondents chose to invest in high risk assets and 108 respondents chose to invest in low risk assets. Therefore, most of the respondents chose to invest in high risk assets such as property, land, and gold, with a percentage of 73 percent

Table 3 shows that the respondent's response to the risk tolerance statement on average is neutral on the statements. This means that most respondents have moderate level of perception, namely having a perception of risks that are considered not so risky. They believe that assets they are selected to have good returns and performance. They believe that the value of assets will increases in the future. Table 3 shows that most respondents agree that investments that have a good history of past performance will get good results in the future. Respondents also agree that the assets they choose will experience price increases and have promising returns both in the medium and long term.

Table 2
Respondents Response towards Investment Decisions

	No. of Respondents	Percentage
High Risk Asset	292	73
Low Risk Asset	108	27
Total	400	100%

Table 3
Respondents Response towards Risk Perception

Item	Statement	Respondent Reponse (%)					*Mean*	Meaning
		SA	A	N	D	SD		
RP1	The investment that I choose is definitely right and will perform well	6.5	27.5	41.5	24.5	0.0	2.84	*Moderate Risk Perception*
RP2	The investment I choose has good performance and convincing results	11.0	24.0	42.5	22.5	0.0	2.77	*Moderate Risk Perception*
RP3	The investment that I choose will have a significant value increase in the future	15.0	25.5	41.0	18.5	0.0	2.63	*Moderate Risk Perception*
RP4	The investment I choose will perform well in line with my goals	13.0	32.5	39.5	15.0	0.0	2.57	*Low Risk Tolerance*
RP5	The investment that I choose will have a very good rate of return in the medium and long term	12.0	25.0	47.0	16.0	0.0	2.67	*Moderate Risk Perception*
	Average Score of Risk Perception						2.69	*Moderate Risk Perception e*

Table 4 presents the responses of respondents to risk tolerance. This table shows that there are 218 respondents who have very low risk tolerance, then there are 130 respondents who have low risk tolerance, there are 50 respondents who have high risk tolerance and 2 respondents who have very high risk tolerance. Table 4 also shows that most respondents have low risk tolerance. This means that respondents are more afraid of risk so that they tend to choose low risk assets. Respondents' responses were dominated by those who have very low risk tolerance, namely 54.5 percent.

Table 5 shows that the respondent's response to the statement of overconfidence is neutral. This means that the majority of respondents believe that their abilities and skills are similar to those of others. Respondents in general also feet that success in the allocation of funds in the past was not entirely due to special skills that they have are better than others. Respondents also feet that they are not fully able to control the decisions they have made. However, the majority of respondents believe in their allocation decisions and still have confidence of the investment performance in the future.

Table 6 shows that the respondent's response to the loss aversion statement. Most respondents feel very reluctant to accept losses, so they were very careful when allocating funds and avoiding assets that could potentially cause losses. Table 6 also shows that the more to the right, the greater the total percentage of respondents' answers, which means the higher the level of reluctance of respondents to losses. Respondents were increasingly afraid of losses. Most respondents were very careful about changes in market prices of an asset because they feel they really don't want to suffer losses.

Table 7 presents the results of structural model evaluations. This table explains that the R-Squared effect of risk perception, risk tolerance, overconfidence and loss aversion on investment decision making is equal to 0.76. This means that 76 percent of the variations that occur in investment decision making are influenced simultaneously by risk perception, risk tolerance, overconfidence and loss aversion, and the remaining 24 percent can be influenced by variables outside the model estimated by the researchers. Based on the results of R-Squared ($R2$) that is equal to 76 percent, it shows a good model because it has the value of R-Squared ($R2$) above 0.7.

Table 8 is the result of hypothesis testing using Partial Least Squares Structural Equation Modeling (PLS-SEM) with the WarpPLS 6.0 program. This table shows the relationship of each variable which includes investment decisions, risk perception, risk tolerance, overconfidence, and loss aversion.

Influence of Risk Perception towards Investment Decision
The estimation results of the model on risk perception show that the first hypothesis is accepted. This

can be proven by the β coefficient value indicated by the risk perception variable, which is negative with a significance level smaller than 0.01. This means that risk perception has a significant nega- tive effect on investment decision making.This im- plies that if the higher the level of risk perception, the proportion of investment in high-risk assets will be lower.

Table 4
Respondents Response towards Risk Tolerance

Total Score	Total Respondent	Percent of Respondent	Risk Tolerance
5 – 8	218	54.50	Risk Tolerance Sangat Rendah
9 – 12	130	32.50	Risk Tolerance Rendah
13 – 16	50	12.50	Risk Tolerance Tinggi
17 – 20	2	0.50	Risk Tolerance Sangat Tinggi
Total	400	100.00	

Table 5
Respondents Response towards *Overconfidence*

Item	Statement	Respondent Reponse (%)					Mean	Meaning
		SD	D	N	A	SA		
OC1	I am sure that my ability is better than that of others to choose investment assets	0	24.5	40.5	31.5	3.5	3.14	Moderate Overconfidence
OC2	I am able to fully control the results of my investment decisions	0	14.0	46.5	33.5	6.0	3.32	Moderate Overconfidence
OC3	The success of my investment in the past was due to the unique expertise I have	0	11.5	50.0	31.0	7.5	3.35	Moderate Overconfidence
OC4	I am sure of the investment performance I make	0	1.0	25.0	43.0	31.0	4.04	High Overconfidence
	Average Score of Overconfidence						3.46	High Overconfidence

Table 6
Respondents Response towards Loss Aversion

Item	Statement	Respondent Reponse (%)					Mean	Meaning
		SD	D	N	A	SA		
LA1	I am careful about losses caused by changes in market prices	0.0	0.0	8.0	51.5	40.5	4.33	Very High Loss Aversion
LA2*	I am willing invest in an asset that shows a definite loss	15.5	38.0	18.0	24.5	4.0	2.64	Neutral Loss Aversion
LA3	I often invest in assets that have performed well in the past	0.0	0.0	8.0	50.5	41.5	4.34	Very High Loss Aversion
LA4*	I hope to benefit from an investment that has shown a loss	7.0	20.0	22.0	39.0	12.0	3.29	Neutral Loss Aversion
	Average Score of Loss Aversion						3.65	High Loss Aversion

* The scores are inverted due to negative statements

Table 7
Model Evaluation

R-Squared (R²)	Meaning
0.76	Good Model

Table 8

Model Estimation Results

Hypothesis	Description	Coefficient β	*P-Values*	Decision
H1	RP → ID	-0.39	P < 0.01	Accepted
H2	RT → ID	0.35	P < 0.01	Accepted
H3	OC → ID	0.20	P < 0.01	Accepted
H4	LA → ID	-0.08	P = 0.11	Rejected

Notes: ID is investmen decision, RP is risk perception, RT is risk tolerance, OC is overconfidence, and LA is loss eversion.

Risk perception is a way for someone to interpret the risks that differ between estimates or thoughts and the reality that occurs. Perception has an important role on the risks that exist in each investment instrument related to human behavior when making decisions because perception is the first stage related to the reaction to risk. When knowing about the existence of a risk to an asset, of course what someone does is perceive or think about the level of risk. Based on the results of testing one hypothesis, it shows that risk perception has a significant negative effect on investment decision making. This means that if someone has a perception and thinks that the risk to an investment asset is dangerous or has a high risk, the person tends to avoid allocating funds to the asset and prefer to invest in low risk assets, such as savings and deposits. Conversely, if someone has a perception and thinks that the risk of an asset that is actually at high risk has a lower risk then that person will prefer to allocate funds to higher risk assets, such as investments in property and gold. The results of the study are in line with the research conducted by Nguyen et al. (2016), Aren and Zengin (2016), and Keller and Siegrist (2006) which shows that risk perception has a significant negative effect on the allocation of risk assets and (Hariharan et al., 2000) which provides evidence that positively influences the placement of funds in low risk assets.

Influence of Risk Tolerance towards Investment Decision
The results of the model estimation in Table 8 for risk tolerance indicate that the second hypothesis is accepted. This can be proven by the β coefficient value shown by the risk tolerance variable, which is positive with a significance level smaller than 0.01. This means that risk tolerance has a significant positive effect on investment decision making. The higher the level of risk tolerance, the higher the level of investment decision making in high-risk assets.

Risk tolerance is the level of willingness to accept or tolerate risks. Risk tolerance is the second stage when dealing with risk, which is related to the way a person responds or acts to risk. This can be done by understanding the size of the risk in an asset to be selected, then someone will be able to decide on the risk opportunities that have been accepted so that they will be in accordance with the level of expected return in the future. Based on the results of testing the second hypothesis shows that risk tolerance has a significant positive effect on investment decision making. This means that the higher a person's level of tolerance for risk, the higher the possibility of allocating funds to assets at a higher risk.

Investors who have high risk tolerance are more willing to bear the risk of loss from an investment as long as the investment provides an opportunity to provide a higher level of profit. If an investor is afraid of risk, the investor might try as much as possible to minimize risk so that he would prefer to allocate funds to assets that are low in risk. Investors will align the form of investment chosen based on the investor's tolerance for risk. The results of this study are in accordance with the research conducted by Corter and Chen (2006) and Nguyen et al. (2016) which shows that risk tolerance has a significant positive effect on the allocation of risk assets.

Influence of Overconfidence towards Investment Decision
The model estimation results for overconfidence indicate that the third hypothesis is accepted. This can be proven by the value of the β coefficient shown by the overconfidence variable which is positive with a significance level smaller than 0.01. This means that overconfidence has a significant positive influence on investment decision making. The higher the level of overconfidence, the higher the level of investment decision making on high-risk assets.

Overconfidence is a feeling where someone is too confident, optimistic and confident about the knowledge or information possessed.

Overconfidence causes a person to potentially receive a greater risk in making investment decisions because they tend to view the risk as low and

the excessive belief in his choice without further consideration. Based on the results of testing the third hypothesis shows that overconfidence has a significant positive effect on investment decision making. This means that the higher the level of confidence and confidence in a person, the higher the opportunity for the allocation of funds to high-risk assets, and vice versa.

An investor with a degree of self-confidence and excessive confidence may ignore information about an asset from another person and feel that whatever he has decided or done must be true based on his own abilities. The results of this study are in line with the previous research which shows that overconfidence encourages someone to participate in stock investment (Xia et al., 2014) and investment in real estate (Eichholtz & Yönder, 2015), where both types of assets have a greater risk than the placement of funds on a bank account.

Influence of Loss Aversion towards Investment Decision

The results of model estimation for loss aversion indicate that the fourth hypothesis is rejected. This can be seen from the β coefficient value indicated by the loss aversion variable, which is negative with a significance level of 0.11. This means that loss aversion has a non-significant negative influence on investment decision making. This means that a person's high and low loss aversion cannot influence someone regarding investment decisions to allocate funds to high-risk assets and low-risk assets.

The results of this study are not in accordance with previous research which shows that loss aversion has a significant negative effect in making investment decisions on high-risk assets (Arano et al., 2010; Berkelaar et al., 2004) and encourage investment in lower risk assets (Dimmock & Kouwenberg, 2010). This not significant effect of loss aversion can be caused by this study not analyzing by gender. Previous research shows that women have a higher level of loss aversion than men (Charness & Gneezy, 2012; Schmidt & Traub, 2002) and things cause women to invest less in high-risk assets (Charness & Gneezy, 2012; Olsen & Cox, 2001). In this study, the proportion of male and female respondents was relatively balanced, namely 48 percent and 52 percent, respectively. The inclusion of gender influences in the research model might explain insignificant results on the effect of risk aversion on investment decisions.

5. CONCLUSION, IMPLICATION, SUGGESTIONS, AND LIMITATIONS

Based on the results of the research, it can be concluded that risk perception has a significant and negative effect on investment decision making. This means that the higher the level of perception of a person's risk, the lower the opportunity for the person to allocate funds to high risk assets. This study shows that risk tolerance has a significant and positive effect on investment decision making. The higher a person's risk tolerance level, the higher the person's opportunity to allocate funds to high risk assets. This study also shows that overconfidence has a significant and positive effect on investment decision making. This means that the higher the level of confidence in a person, the higher the opportunity for the person to allocate funds to high risk assets. However, this study did not obtain sufficient evidence that loss aversion has an effect on investment decision making.

There are several limitations in this study. First, it did not include alternative investment options such as stocks, bonds and mutual funds. Second, this study did not separate the research model for each district, namely the Surabaya and Jombang, so that to in order to be able to analyze it, the researchers need also to analyze the specific characteristics of each district. Third, this study did not examines the effect of gender on investment decisions.

The community should pay attention to the possibility of behavioral bias to avoid and minimize irrational decision making. Therefore, it needs to be reconsidered when choosing investment assets. For investment advisors, it is expected that they can help to find out the characteristics of customers, especially related to risk, to know the possibility of behavioral bias that can be experienced by their customers, so that they can direct the customers properly when allocating their own funds. For future studies, the researchers should separate the research model based on region from gender because of the possibility of each group having different characteristics and adding alternative investment options other than savings, deposits, housing, land and gold.

REFERENCES

Antonides, G., & Van Der Sar, N. L. (1990). Individual expectations, risk perception and preferences in relation to investment decision making. *Journal of Economic Psychology, 11*(2), 227-245.

Arano, K., Parker, C., & Terry, R. (2010). Gender-based risk aversion and retirement asset allocation. *Economic Inquiry, 48*(1), 147-155.

Aren, S., & Zengin, A. N. (2016). Influence of financial literacy and risk perception on choice of investment. *Procedia-Social and Behavioral Sciences, 235*, 656-663.

Ariani, S., Rahmah, P. A. A. A., Putri, Y. R., Rohmah, M., Budiningrum, A., & Lutfi, L. (2016). Pengaruh literasi keuangan, locus of control, dan etnis terhadap pengambilan keputusan investasi. *Journal of Business & Banking, 5*(2), 257-270.

Barber, B. M., & Odean, T. (2000). Trading is hazardous to your wealth: The common stock investment performance of individual investors. *The Journal of Finance, 55*(2), 773-806.

Barber, B. M., & Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *The quarterly journal of economics, 116*(1), 261-292.

Berkelaar, A. B., Kouwenberg, R., & Post, T. (2004). Optimal portfolio choice under loss aversion. *Review of Economics and Statistics, 86*(4), 973-987.

Bodie, Z., Kane, A., & Marcus, A. J. (2018). *Investments (SIE)*: McGraw-Hill Education.

Breuer, W., Riesener, M., & Salzmann, A. J. (2014). Risk aversion vs. individualism: what drives risk taking in household finance? *The European Journal of Finance, 20*(5), 446-462.

Broihanne, M.-H., Merli, M., & Roger, P. (2014). Overconfidence, risk perception and the risk-taking behavior of finance professionals. *Finance Research Letters, 11*(2), 64-73.

Busenitz, L. W., & Barney, J. B. (1997). Differences between entrepreneurs and managers in large organizations: Biases and heuristics in strategic decision-making. *Journal of business venturing, 12*(1), 9-30.

Charness, G., & Gneezy, U. (2012). Strong evidence for gender differences in risk taking. *Journal of Economic Behavior & Organization, 83*(1), 50-58.

Chen, G., Kim, K. A., Nofsinger, J. R., & Rui, O. M. (2007). Trading performance, disposition effect, overconfidence, representativeness bias, and experience of emerging market investors. *Journal of Behavioral Decision Making, 20*(4), 425-451.

Chitra, K., & Jayashree, T. (2014). Does Demographic Profile Create a Difference in the Investor Behavior? *The International Journal of Business & Management, 2*(7), 24.

Christelis, D., Jappelli, T., & Padula, M. (2010). Cognitive abilities and portfolio choice. *European Economic Review, 54*(1), 18-38.

Chu, W., Im, M., & Jang, H. (2012). Overconfidence and emotion regulation failure: How overconfidence leads to the disposition effect in consumer investment behaviour. *Journal of Financial Services Marketing, 17*(1), 96-116.

Corter, J. E., & Chen, Y.-J. (2006). Do investment risk tolerance attitudes predict portfolio risk? *Journal of Business and Psychology, 20*(3), 369.

Dimmock, S. G., & Kouwenberg, R. (2010). Loss-aversion and household portfolio choice. *Journal of Empirical Finance, 17*(3), 441-459.

Dittrich, D. A., Güth, W., & Maciejovsky, B. (2005). Overconfidence in investment decisions: An experimental approach. *The European Journal of Finance, 11*(6), 471-491.

Eichholtz, P. (1996). Does international diversification work better for real estate than for stocks and bonds? *Financial analysts journal, 52*(1), 56-62.

Eichholtz, P., & Yönder, E. (2015). CEO overconfidence, REIT investment activity and performance. *Real Estate Economics, 43*(1), 139-162.

Forlani, D., & Mullins, J. W. (2000). Perceived risks and choices in entrepreneurs' new venture decisions. *Journal of business venturing, 15*(4), 305-322.

Gervais, S., Heaton, J. B., & Odean, T. (2011). Overconfidence, compensation contracts, and capital budgeting. *The Journal of Finance, 66*(5), 1735-1777.

Glaser, M., & Weber, M. (2007). Overconfidence and trading volume. *The Geneva Risk and Insurance Review, 32*(1), 1-36.

Grable, J., & Lytton, R. H. (1999). Financial risk tolerance revisited: the development of a risk assessment instrument☆. *Financial Services Review, 8*(3), 163-181.

Hariharan, G., Chapman, K. S., & Domian, D. L. (2000). Risk tolerance and asset allocation for investors nearing retirement. *Financial Services Review, 9*(2), 159-170.

Hilbert, M. (2012). Toward a synthesis of cognitive biases: How noisy information processing can bias human decision making. *Psychological bulletin, 138*(2), 211.

Hoffmann, A. O., Post, T., & Pennings, J. M. (2015). How investor perceptions drive actual trading and risk-taking behavior. *Journal of Behavioral Finance, 16*(1), 94-103.

Keller, C., & Siegrist, M. (2006). Investing in stocks: The influence of financial risk attitude and values-related money and stock market attitudes. *Journal of Economic Psychology, 27*(2), 285-303.

Khan, M. Z. U. (2017). Impact of Availability bias and loss aversion bias on investment decision making, moderating role of risk perception. *Management & Administration (IMPACT: JMDGMA), 1*(1), 17-28.

Malmendier, U., & Tate, G. (2005). Does overconfidence affect corporate investment? CEO overconfidence measures revisited. *European financial management, 11*(5), 649-659.

McCannon, B. C., Asaad, C. T., & Wilson, M. (2016). Financial competence, overconfidence, and trusting investments: Results from an experiment. *Journal of Economics and Finance, 40*(3), 590-606.

Nguyen, L., Gallery, G., & Newton, C. (2016). The influence of financial risk tolerance on investment decision-making in a financial advice context. *Australasian Accounting, Business and Finance Journal, 10*(3), 3-22.

Nofsinger, J. R. (2017). *The psychology of investing*: Routledge 6th edn. New York, NY.

Olsen, R. A., & Cox, C. M. (2001). The influence of gender on the perception and response to investment risk: The case of professional investors. *The journal of psychology and financial markets, 2*(1), 29-36.

Pak, O., & Mahmood, M. (2015). Impact of personality on risk tolerance and investment decisions: A study on potential investors of Kazakhstan. *International Journal of Commerce and Management, 25*(4), 370-384.

Palomino, F., & Sadrieh, A. (2011). Overconfidence and delegated portfolio management. *Journal of Financial Intermediation, 20*(2), 159-177.

Pan, C. H., & Statman, M. (2012). Questionnaires of risk tolerance, regret, overconfidence, and other investor propensities. *Journal of Investment Consulting, 13*(1), 54-63.

Paravisini, D., Rappoport, V., & Ravina, E. (2016). Risk aversion and wealth: Evidence from person-to-person lending portfolios. *Management science, 63*(2), 279-297.

Pikulina, E., Renneboog, L., & Tobler, P. N. (2017). Overconfidence and investment: An experimental approach. *Journal of Corporate Finance, 43*, 175-192.

Pompian, M. M. (2012). *Behavioral finance and investor types: managing behavior to make better investment decisions*: John Wiley & Sons.

Reilly, F. K., & Brown, K. C. (2011). *Investment analysis and portfolio management*: Cengage Learning.

Ritter, J. R. (2003). Behavioral finance. *Pacific-Basin finance journal, 11*(4), 429-437.

Rogers, B. (2017). *Perception: A very short introduction*: Oxford University Press.

Schmidt, U., & Traub, S. (2002). An experimental test of loss aversion. *Journal of risk and Uncertainty, 25*(3), 233-249.

Simon, M., Houghton, S. M., & Aquino, K. (2000). Cognitive biases, risk perception, and venture formation: How individuals decide to start companies. *Journal of business venturing, 15*(2), 113-134.

Snelbecker, G. E., Roszkowski, M. J., & Cutler, N. E. (1990). Investors' risk tolerance and return aspirations, and financial advisors' interpretations: A conceptual model and exploratory data. *Journal of Behavioral Economics, 19*(4), 377-393.

Statman, M., Thorley, S., & Vorkink, K. (2006). Investor overconfidence and trading volume. *The Review of Financial Studies, 19*(4), 1531-1565.

Sutter, M. (2007). Are teams prone to myopic loss aversion? An experimental study on individual versus team investment behavior. *Economics Letters, 97*(2), 128-132.

Thaler, R. H., Tversky, A., Kahneman, D., & Schwartz, A. (1997). The effect of myopia and loss aversion on risk taking: An experimental test. *The quarterly journal of economics, 112*(2), 647-661.

Tripathy, C. K. (2014). Role of Psychological Biases in the Cognitive Decision Making Process of Individual Investors. *Orissa Journal of Commerce, 34*(1), 69-80.

Weber, E. U., & Milliman, R. A. (1997). Perceived risk attitudes: Relating risk perception to risky choice. *Management science, 43*(2), 123-144.

Weber, E. U., Siebenmorgen, N., & Weber, M. (2005). Communicating asset risk: how name recognition and the format of historic volatility information affect risk perception and investment decisions. *Risk Analysis: An International Journal, 25*(3), 597-609.

Wulandari, D. A., & Iramani, R. (2014). Studi Experienced Regret, Risk Tolerance, Overconfidance dan Risk Perception Pada Pengambilan Keputusan Investasi. *Journal of Business & Banking, 4*(1), 55-66.

Xia, T., Wang, Z., & Li, K. (2014). Financial literacy overconfidence and stock market participation. *Social Indicators Research, 119*(3), 1233-1245.

Zacharakis, A. L., & Shepherd, D. A. (2001). The nature of information and overconfidence on venture capitalists' decision making. *Journal of business venturing, 16*(4), 311-332.