

Earnings Estimation: Cognitive Psychology and Investor Reaction

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ABSTRACT : *The purpose of this study is to examine the heuristic factors that cause investors to over / under react to earnings information. This research uses a full factorial within-subject 2 x 2 laboratory experimental design. Participants in this study were 25 accounting and financial management students who had attended capital market schools (Sekolah Pasar Modal – SPM) on the Indonesia Stock Exchange. the results showed that representativeness heuristic is the role of psychology in overreaction behavior exhibited by investors, whereas under reaction behavior is due to the anchoring-adjustment heuristic experienced by investors.*

KEYWORDS – *Overreaction, Underreaction, Heuristic, Representativeness, Anchoring-adjustment.*

I. INTRODUCTION

Earnings estimation is important for investors because it can be used as a basis for investment decision making. error in predicting future earnings means investors are wrong in predicting the company's financial performance in the future. This allows investors to wrongly predict the company's stock price, thereby affecting the decision to buy or sell the shares owned. In estimating the company's future earnings, investors need accounting information, at least in the form of earnings information. Disclosure of accounting information made by the company certainly contributes to the analysis and decisions taken by investors. Comprehensive information disclosure is considered more effective because it can provide clear information both quantitatively and qualitatively (Wahyuni, Hartono and Nahartyo, 2016).

Generally, companies include past information on current earnings announcements, profit is then the benchmark used by investors in evaluating performance. However, in addition to past information, future information such as performance forecasting and economic conditions are considered important to be taken into consideration in making a business decision. This form of comprehensive information is known as the multiple benchmark information disclosure form (Schrard and Walther, 2000; Krische, 2005; Han and Tan, 2007; Wahyuni, Hartono and Nahartyo, 2016). This disclosure strategy includes an explanation of the usefulness of accounting information that is mandatory and voluntary, internal and external information, past and future information, as well as quantitative and qualitative information. This form of multiple benchmark information is then used in this study as a form of accounting information presented to investors to be a reference in estimating the company's future earnings.

Accounting information presented by the company certainly raises the perception bias of each investor. this is due to the occurrence of a pattern of information that affects decisions taken by information users such as investors, creditors, the government and the general public. this perception bias then creates anomalies in the capital market. The anomaly that is commonly known in the capital market is the phenomenon of an overreaction (De Bondt and Thaler, 1987). capital market inefficiency is caused by the excessive reaction shown by investors to information. investors tend to set prices too high on information that is considered good (good news), on the contrary investors tend to apply prices too low if they obtain new information that is considered bad news (De Bondt and Thaler, 1987; Praditha *et al.*, 2019).

Over / under reaction behaviour related to investor behaviour towards earnings information. Investors are influenced by the pattern of information presented and depend on prior earnings information in determining future earnings estimates (Bloomfield, Libby and Nelson, 2003). This anomaly can be explained by psychology as said by Tversky and Kahneman (1973) investors tend to predict intuitively by combining predictability and the distribution of impressions. Investor's over / under reaction behaviour towards accounting information can be explained by cognitive heuristics. Habbe (2017) examines the representativeness heuristic and anchoring-adjustment on investor over / underreaction behavior. The results showed that investors overreacted to new information because of using heuristic representativeness, otherwise investors tended to underreact to new information because investors were conservative where predictions made were close to the average initial belief.

Investors with representativeness heuristics can get more expected returns from misvaluations (made by noise traders) than rational investors, thus making investors tend to use representativeness approaches in making decisions (Lo, 1989). Besides, many investors' decisions are influenced by initial beliefs (past earnings).

This behavior is due to investors experiencing anchoring-adjustment heuristics, where investors use past information as initial beliefs and make adjustments to new information received (Habbe, 2017; Sundari and Habbe, 2018; Praditha, 2019). The higher the investor's alignment with the initial value (anchor), the more biased the decisions made to enable improper decision making (Musthofa and Ancok, 2005). This anchoring-adjustment is assumed to be the basis of many intuitive judgments (Gilovich and Epley, 2006).

Based on the phenomenon of over / under reaction and the role of cognitive psychology that bases it, this study aims to re-examine the role of heuristic representativeness and anchoring-adjustment psychology in estimating the company's future earnings by using the form of multiple benchmark information. In the first section, the phenomena, problems, and objectives of this study are presented. Furthermore, the second part will describe the theories that underlie the development of hypotheses from this research. In the third part will be explained about the research methods used. Then, the fourth part will describe the results and discussion of this study. In the last section, conclusions, limitations, and implications related to the results of this study will be given.

II. LITERATURE REVIEW

3.1 Cognitive Psychology

Individual investors in assessing a company's future earnings performance are often influenced by cognitive psychological factors. Biased and heuristic behavior is a representation of the psychological condition of the individual. From the perspective of cognitive psychology, they are produced from cognitive errors. However, each individual has different cognitive abilities. People with higher cognitive abilities can provide different choices from those who have relatively low cognitive abilities when they face the same problem (An, Shi and Nordvall, 2012). Cognitive psychology itself is a psychological approach in understanding a mental process in decision making or problem-solving. In the world of finance and investment, there is a mental accounting that influences the psychology of an investor is considering an investment decision (Nofsinger, 2016).

Cognitive psychology deals with internal processes, such as attention, perception, language, memory, thinking, decisions, judgment, and reasoning. Cognitive psychology deals with internal processes, such as attention, perception, language, memory, thinking, decisions, judgment, and reasoning (An, Shi and Nordvall, 2012). In this case, cognitive psychology that generally influences individual judgment is heuristic. Heuristics is a Practical action in making a decision Heuristics used in this study are representativeness and anchoring-adjustment. Some previous research results show that the two heuristics are proven to influence the decisions taken by investors (Bloomfield, Libby and Nelson, 2003; Habbe, 2017; Richie and Josephson, 2017; Sundari and Habbe, 2018; Praditha, 2019).

2.1.1 Heuristics Representativeness

Heuristic representativeness is a psychological bias that explains that in conditions of uncertainty, an investor tends to believe in history over the similarity of a company's performance results in general (Boussaidi, 2013). Heuristic representativeness says that humans often make predictions or assessments of values using representations or based on similarities (Tversky and Kahneman, 1973). Thus, in forecasting the company's future performance, investors will likely see patterns from the previous performance. If the company's performance is consistently positive from time to time, then investors will tend to predict positively on the company's future performance. The consequence of investors using heuristic representativeness is the possibility of errors in making future predictions.

Investors who use representativeness heuristics in making investment decisions believe that they can see patterns that are a random process (Laih, 2016). This representativeness heuristic is widely used because it is considered to be very effective in everyday life. This heuristic can help in identifying patterns in a complex event, where someone will be able to get results that make sense at least in appearance, besides using representativeness heuristics can also save time in making judgments. However, representativeness heuristics can lead people astray, making irrational choices, and even result in losses for investors (An, Shi and Nordvall, 2012)

2.1.2 Heuristic Anchoring-adjustment

The anchoring-adjustment heuristic describes a phenomenon where one single information influences a decision, especially information found at the beginning of a particular situation (Richie and Josephson, 2017). One strategy for estimating an unknown amount is to start from known information and then make adjustments until an acceptable value is obtained (Tversky and Kahneman, 1973 ; Gilovich and Epley, 2006). The anchoring-adjustment model explains that in many situations, individuals make estimates by departing from the initial value (anchor) which then makes adjustments (adjustments) with the results of the final answer. The initial value can be based on past period earnings (Wahyuni, Hartono and Nahartyo, 2016).

Adjustments are usually inadequate because they end after reaching an acceptable value for an estimate. This inadequate adjustment is only possible if the anchor value is outside the acceptable value distribution. This might be due to extreme, or wrong anchor values (Bahnik, English and Strack, 2016). However, the anchoring effect does not always occur because of inadequate adjustments. The study of (Gilovich and Epley, 2006) who observed the anchoring paradigm found that the anchoring effect occurs due to an increase in the accessibility of information that is consistent with the anchor, not an inadequate adjustment.

3.2 Overreaction Hypothesis

Market Efficiency Hypothesis is one of the most widely researched themes by researchers in finance. The phenomenon of overreaction usually occurs in the shares of winners and losers, this is because price reversals only occur in loser or winner shares (Rosenberg, Kenneth Reid and Lanstein, 1985). The reversal of the average stock price that occurs is the reversal of the loser shares into winning shares or vice versa. It means that there is a quick correction on the loser stock of the winning stock. This phenomenon shows that investors quickly decide to buy or sell shares.

The market reaction comes from psychological research conducted by Kahneman and Tversky (1979) who found that individuals can show excessive reactions to an event that is considered dramatic. An event contains information which is then absorbed by the market and used by investors in making investment decisions. De Bondt and Thaler (1987) suggest that basically, hypotheses about market overreaction are related to market participants who estimate stock prices are too high for information that is considered as good news. The stock portfolio is divided into two groups such as the winner portfolio and the loser portfolio. Overreaction occurs because of the information asymmetry received by investors that will influence investors in making investment decisions to be taken. Investors who obtain information will make rational decisions, while investors who do not receive information will make irrational investments.

3.3 Hypothesis Development

Decision making allows bias caused by investor heuristic behavior. Two underlying heuristic biases are heuristic representativeness and anchoring-adjustment. Representativeness says that investors make predictions using a representation or similarity approach (Tversky and Kahneman, 1973), so that in predicting future earnings tend to follow earnings patterns from available information. while anchoring-adjustment allows investors to make estimates based on past earnings information which is then adjusted to current earnings information. Previous earnings information can be an anchor for investors when they want to predict future earnings probabilities of the company (Habbe, 2017). A positive anchor will affect investors' future earnings predictions to be positive, conversely, a negative anchor allows investors to have a negative prediction of the company's future earnings.

Consistently positive (negative) earnings patterns will represent positive (negative) future performance as well so that investors will overestimate (underestimate) future earnings. However, if the profit pattern changes to the extreme along with the arrival of new information, investors will make past information as an initial belief (anchor) and make adjustments (adjustment) on the new information (Habbe, 2017). Heuristic representativeness explains that investors will depend on profit patterns. When information on past earnings and current earnings is low (high), investors will estimate future earnings to be underestimated. Thus, investors will tend to overestimate (underestimate) the pattern of positive (negative) earnings (Habbe, 2017; Sundari and Habbe, 2018; Praditha, 2019). These results indicate that investors show excessive behavior (overreact) to the earnings information presented. Based on this explanation, the following hypothesis is formulated.

H1: Investors will overreact to the pattern of earnings performance that does not change (positive-positive) and overestimate the performance of future earnings.

H2: Investors will overreact to the pattern of earnings performance that does not change (negative-negative) and underestimate the performance of future earnings.

Cognitive psychology says that humans tend to stick to the starting point in assessing an event that is likely to occur later. This tendency is what causes bias in decision making. This bias is caused by the anchoring-adjustment heuristic that explains that investors are pegged to the initial information obtained (initial belief) and then make adjustments based on new information received (Tversky and Kahneman, 1973). The belief adjustment theory explains that high (low) anchors will decrease (increase) when faced with negative (positive) information when compared to low (high) anchors (Hartono, 2004; Habbe and Mande, 2016). Investors tend to overestimate (underestimate) information on positive (negative) initial earnings. Investors will estimate profit more positively (profitable) if they consider positive past information, and vice versa (Wahyuni, Hartono and Nahartyo, 2016). The implication of the anchor will lead to underreaction behavior towards the current profit level and changes in the different earnings patterns so that the following hypothesis is formulated.

H3: Investors will underreact to changing earnings performance patterns (positive-negative) and overestimate future earnings performance.

H4: Investors will underreact to changing earnings performance patterns (negative-positive) and underestimate future earnings performance.

III. RESEARCH METHODS

3.1 Research Design

This research is a full factorial 2x2 within subject laboratory experimental study. The design of this study involves a variation of the faculty of two or more treatments (explanatory variables) so that we can see the separation of influences on variables as well as the potential for interactive influence between explanatory variables. The design of this study was used to determine whether the subject experienced heuristic representativeness and anchoring-adjustment in doing estimates of the company's future earnings based on the pattern of earnings information provided. The profit pattern used is past earnings (positive and negative), and current earnings (positive and negative) and the experimental design is shown in the table below:

Table 3.1. Experimental design 2x2 full factorial

Variabel		Current Earnings	
		Positive	Negative
Past Earnings	Positive	Overestimate	Overestimate
		(Overreaction)	(Underreaction)
	Negative	Underestimate	Underestimate
		(Underestimate)	(Overreaction)

3.2 Participant

Participants in this study were 25 final year students majoring in accounting and financial management of STIE Tri Dharma Nusantara, Makassar, Indonesia. The Students have attended capital market schools (Sekolah Pasar Modal – SPM) on the Indonesia stock exchange. Students are proxied as investors with the assumption that students are well educated but poor experience investors, where new investing experience is limited to training obtained from SPM.

3.3 Manipulation Check

Manipulation checks are carried out to measure the effectiveness of the experimental treatment and ensure the subject understands the assignment [9]. Manipulation checks are carried out on the experimental subject (investor) by giving three questions in the form of a binary questionnaire (true or false).

3.4 Analyst Methods

The analysis technique used is quantitative descriptive to see the demographics of subjects in research such as gender and age. Hypothesis testing uses Repeated Measures ANOVA where the mean value will be compared with the target earning value obtained from the Maximum Likelihood Estimation (MLE) equation.

IV. RESULT AND DISCUSSION

4.1 Participant Characteristics

Articipants numbered 25 students consisting of 11 men and 14 women. Of the 25 students who participated, it was found that 11 people were 21 years old, 11 people were 22 years old, and 3 people were 23 years old.

Table 4.1 Participant Characteristics

		Frequency	Percent
Age	21 y.o	11	44%
	22 y.o	11	44%
	23 y.o	3	12%
Gender	Male	11	44%
	Female	14	56%

4.2 Hypothesis Testing

Based on the results of testing the hypothesis using ANOVA within the subject, we get a result of 6.460 earnings estimation errors shown by investors when presented with positive-positive earnings information, which means investors overestimate the company's future earnings where investors estimate profits greater than profits. target. Conversely, investors underestimate the company's future earnings when earnings information is presented with a negative-negative pattern. this result is shown at -3,910 which means that investors estimate future earnings smaller than the target profit. Both of these results indicate that investors behave in an overreact to earnings information presented. Based on these findings, it can be concluded that hypotheses 1 and 2 can be accepted.

Table 4.2.1 shows that investors presented information with a changing pattern (positive-negative) overestimating information on future earnings. This result can be seen from the statistical results of a mean of 72,650 which means investors estimate future earnings greater than target earnings. The same result is also shown by investors when obtaining information on earnings changes (negative-positive) in which investors estimate future earnings smaller than the target profit. The underestimate investor is -35,670 to future earnings. Both of these results indicate that the investor in estimating is influenced by past earnings so that the underreaction of current earnings information does not confirm the value of past earnings. This result means that hypotheses 3 and 4 can be proven.

Table 4.2.1 Error Estimation

	CE positive	CE negative
PE positive	6,460	72,650
PE negative	-35,670	-3,910
Note: PE is past earning (t-1 and t-2), CE is current earning (t0)		

In the repeated measures ANOVA test within the subject, the criteria that must be met is the amount of P-value for Greenhouse-Geisse must be less than 0.05 or 5%. The results shown in table 4.2.2 are a significance level of 0.00 <5% so that it can be concluded that there are differences in estimation errors made by investors based on the pattern of earnings information presented.

Table. 4.2.2 Repeated Measures ANOVA

	Sum of Squares	df	Mean Squares	F	Sig.
Greenhouse-Geisser	155418,397	1,447	107437,586	4273,062	0,000

4.3 Heuristic Representativeness and Overreaction

Investor overreaction behavior towards earnings information presented is caused by psychological heuristic factors experienced. The intended heuristic is the representativeness heuristic. Heuristic representativeness explains the behavior of investors in making decisions based on similarity or suitability (Tversky and Kahneman, 1973). With heuristic representativeness, investors will show an overreaction to earnings information with the same pattern. In other words, investors will overreact to new information if the new information has a similar pattern to the previous information (anchor).

Both research results have shown the prediction bias that occurs as a result of the representativeness heuristic experienced by investors in assessing the future earnings performance of a company. Investors overestimate future earnings if the information obtained shows a positive value or has increased, otherwise investors tend to underestimate future earnings if the information obtained shows a negative or declining value. This finding supports the results of Habbe (2017), Boussaidi (2013), Sundari and Habbe (2018, Praditha (2019) which shows that investors make mistakes in predicting future earnings because they experience heuristic representativeness bias. This psychological bias explains that under conditions of uncertainty, an investor tends to believe in the similarity of the performance results of a company in general so that it makes predictions that tend to be of the same pattern (Boussaidi, 2013).

4.4 Heuristic Anchoring-adjustment and Underreaction

Underreaction behavior occurs when investors obtain new information that has nothing in common with the initial information. This condition makes investors use psychology heuristics, namely anchoring-adjustment heuristics in conducting assessments. An anchoring-adjustment heuristic is where investors tend to make judgments based on past information (anchors) and then adjust to the new information obtained (Tversky and Kahneman, 1973). Investors will be pegged by the amount of anchor value that is used as an initial belief (initial belief), then make adjustments (adjustments) to new information received. both of these results are in

line with Wahyuni and Hartono (2012) Boussaid (2013), Habbe (2017), Sundari and Habbe (2018) which show that the anchor has a strong influence on the estimated future earnings of investors. Strong anchor effects can last long enough even after making irrational decisions. The anchoring effect can also occur even if the anchor value is considered not informative or unreasonable (Bahnik, Englich and Strack, 2016). Besides being strong, anchors also have many implications in every decision-making process (Furnham and Boo, 2011).

V. CONCLUSION

The phenomenon of over / underreaction can be explained psychologically reinforced by the results of this study, where it can be proven that investors generally make intuitive assessments so that they are either consciously or not influenced by heuristic psychology. The tendency of investors to experience heuristics is shown from the results of research that found that investors will overestimate future earnings if the earnings information shows a positive movement. Conversely, investors will underestimate the company's future earnings if past earnings information shows a negative movement. presenting information in such a pattern makes investors estimate with heuristic representativeness because investors tend to show an overreaction to that information.

Conversely, investors show underreact behavior towards information that has a different movement pattern. Investors who are given information that has positive-negative movements have an overestimate tendency, whereas if information that is positively-negative patterned is presented, investors tend to underestimate the target earnings. These results indicate the role of the anchor as the initial belief in which the investor estimates future earnings that have a pattern almost equal to the initial value.

This study used a laboratory experimental design with 25 students who were proxied as investors. Future studies are expected to test the design of the field experiments using real investors as participants. Besides, this research only examines two heuristics namely representativeness and anchoring-adjustment, further research might be able to consider other heuristic biases such as availability and others. Furthermore, this research only tests the estimated earnings, so it is hoped that further research can test up to the estimated share price and the decision to buy or sell shares.

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