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Belief Adjustment Model in the Revision of Beliefs: An Experimental Study of the Role of Order Effect and Cognitive Style

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ABSTRACT

This research is an experimental study that aims to examine the role of order effect, cognitive style and information disclosure on investor behavior in decision making. An experimental study was conducted to analyze whether there were differences in investment decisions between participants who were given a series of information on good news followed by bad news (Scenario A) and bad news followed by good news (Scenario B), and to test the interaction between cognitive style and information order. Furthermore, it also analyzes whether there are differences in investment decisions between participants with an analytical versus intuitive cognitive. Participants are 165 undergraduate students majoring in accounting. The result shows that there are differences in investment decisions between participants who receive information either good news followed by bad news or bad news followed by good news in the step-by-step presentation pattern in the long information series. Meanwhile, there was no difference in investment decisions between participants with an analytical and intuitive cognitive style. Thus, cognitive style does not moderate the relationship between the order of evidence and revision of beliefs in investment decision making.

Keyword: belief adjustment model, cognitive style, order effect, decision making

INTRODUCTION

The empirical studies regarding the effect of order on investor confidence are based on the belief-revision theoretical model developed by Hogarth and Einhorn (1986, 1987) with the latest version known as the belief-adjustment model. This model assumes that individuals who process information sequentially will use anchoring and adjustment strategies to incorporate new evidence into evaluation tasks. The belief-adjustment model identifies task variables as factors influencing judgment, whereas in psychological studies, judgment is closely related to individual psychological differences consisting of two dimensions, namely personality and cognitive style (Prat, 1980; Gul, 1984).

In carrying out the process of revising beliefs on a decision, individuals often do not consider the essence or substance of the evidence, but what is considered is the order (order effect) of the evidence. This is one of the biases due to consideration and is referred to as the order effect as part of the heuristic bias. This is shown in a study conducted by Almilia (2010) which concluded that when a short series of information is consistently positive (negative) which is disclosed sequentially compared to simultaneous disclosure, the revision of confidence in stock price decisions is significantly greater in sequential conditions.

The effect of the order effect, especially the recency effect, will often appear if the disclosure pattern is sequential or step by step (SBS). Study Almilia (2010) show that recency effects do not occur in this pattern. Kusumawardhani and Almilia (2015) examined irrational patterns of information presentation and investor decisions, showing that there was no difference between the decisions of investment participants who were told good news followed by bad news from participants who were told bad news followed by good news. Gunawan and Yusuf (2012) examined this the same but get different results that there are differences between decision making that is influenced by the order effect. The difference in the results of previous studies motivates research to re-examine the effect of information presentation patterns on investor decisions in decision making.

Another factor that influences individuals in the decision-making process is cognitive style. This cognitive style is one dimension that distinguishes individuals in processing information (Pratt, 1980). Ausburn and Ausburn (1978) define cognitive style as a psychological dimension that represents individual consistency in gathering and processing information. This cognitive style tends to be consistent throughout a person's lifespan. Allison and Hayes (1996) developed a cognitive style measurement instrument called the Cognitive Style Index (CSI). Based on the empirical studies of Allinson and Hayes using CSI, it confirms the generic dimensions of cognitive style, namely intuition and analysis. Intuitive cognitive style relies more on the right hemisphere of the brain which has intuitive, integrative characteristics, non-linear ways of thinking, considerations based on feelings, and broad perspectives. Meanwhile, the analytical cognitive style relies more on the function of the left hemisphere of the brain which has logical analytical characteristics, sequential information processing, consideration based on reasoning and a focus on details. This cognitive difference can cause the same information (evidence) obtained by individuals to be interpreted differently. This is associated with the characteristics of different cognitive styles. Individuals with an analytical cognitive style will tend to experience a smaller reviewer effect than individuals with an intuitive cognitive style.

This study will examine the effect of cognitive style and sequence of evidence in disclosing information on investor behavior in decision making. The cognitive style in this study consists of analytical and intuitive styles, while the order effect in this study is related to the pattern of presenting information in the form of a series of good news information followed by bad news information and vice versa. This research will use the experimental method, in this case the sample of investors will be proxied with students.

THEORY AND REVIEW LITERATURE

The Belief Adjustment Model from Hogarth and Einhorn (1992) predicts that information that is evaluated sequentially (sequential) will produce different judgments from the same

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information but is evaluated simultaneously (simultaneous). There are two forms of Hogarth and Einhorn's (1992) model. Sequentially evaluated evidence is modeled as a process of incremental anchoring and adjustment in which the revision of beliefs is functionally related to the strength of one's beliefs after the pieces of evidence that preceded the evidence (anchor or prior beliefs).

Apart from the direction, strength and type of evidence, Hogarth and Einhorn (1992) also consider sequence (positive after negative, positive negative or a mixture of positive and negative) and manner, format, mode (delivery of information sequentially/sequentially or simultaneously) in presenting evidence. This theory pays close attention to information presentation patterns, such as step by step (SbS), end of sequence (EoS) and debiaser self-review. The different effects of revisions to belief adjustment theory are caused by differences in the type, order and time of presentation of evidence. The recency effect explains how an investor reacts to sequentially combined evidence (++-- or --++) that the last information received has a greater effect than the first information in revising investor confidence. Based on the belief adjustment theory, the factor that causes the recency effect is the anchor.

An order effect occurs when individuals make different decisions after receiving evidence in a different order. In the order of the evidence, the nature of the evidence is mixed (mixed) between confirming (positive) and disconfirming (negative) information. The empirical research results of Ashton and Ashton (1988) show that the reviewer effect is not found if the evidence obtained provides consistent information, either consistent conformation or disconfirmation. Conversely, the reviewer effect occurs when the evidence being evaluated has mixed information that is both confirmatory and disconfirming. If the initial information in the sequence has the greatest influence on individual beliefs, then the sequence effect is called the primacy effect. Conversely, if the last information has the greatest influence, this is called the recency effect.

Ashton and Ashton (1988) show that it is easy for subjects to revise their beliefs when receiving new evidence, while the decision theory literature states that individuals generally tend to avoid new evidence. Furthermore, this study also provides evidence that subjects who revise their beliefs are greater when they receive evidence that contradicts their current beliefs, while the literature states that individuals in general will be greatly influenced by evidence that is consistent with individual beliefs.

Bamber et al. (1997), provides strong support for the validity of the description of the belief adjustment model. The confidence-adjusted model was used to predict the effect of order on all cases of the SbS or EoS response model, task complexity and length of information. Hogarth and Einhorn's model, (1992) predicts that decisions given after each piece of evidence is obtained, known as the response model (SbS), tend to have the influence of the reviewer (Suartana and Kartana, 2007). The phenomenon of the recency effect is also supported in research conducted by Messier (1992), which provides evidence that auditor staff who receive evidence that is complex and diverse (negative and positive information) with a sequential disclosure pattern, the recency effect will occur.

Research conducted by Asare (1992) provides similar evidence, namely the emergence of a recency effect on managers and audit partners related to judgment going concern when the pattern of disclosure of evidence is sequentially SbS. The same thing was also shown by Tubbs et al. (1993), shows that there is a recency effect when individuals receive inconsistent evidence, even though individuals have been given training to understand the task and provide a better assessment of evidence, the recency effect is still found in these conditions.

Hogarth and Einhorn's (1992) predicts that decisions given after each piece of evidence is obtained, known as the SbS response model, tend to be found to have the effect of the reviewer, while decisions are given only once after all evidence is received, known as the EoS response model. did not produce a review effect. EoS can reduce the reviewer because the opposite effect that arises from the information presented can be gradually eliminated by combining the effects of positive and negative evidence, thereby eliminating the individual effect of negative and positive evidence.

Kennedy (1993) found evidence that accountability reduces reviewers in decisions about the possibility of business failure, whereas in research conducted by Cushing and Ahlawat (1996), it provides evidence that reviews can be reduced when the auditor requires documentation of going concern decisions. Research conducted by Butler (1985), Heiman (1990) and Koonce (1992), also shows that the debiasing method is the most effective method for reducing the influence of the reviewer compared to accountability and data documentation.

In the context of decision making made by investors as stated by Pinsker (2007), it indicates that the adjustment of beliefs is getting bigger for disclosing information that is presented one by one compared to disclosing information that is presented simultaneously (simultaneous) either after the first series of information. consistent (short series of information) and after the second series of information that has the opposite direction (long series of information), while in the research of Trotman and Wright (1996), provides evidence showing that the recency effect appears in participants with a response model SbS compared to the EoS response model.

This study uses a simple type of information, the information series used is a long series, with a step-by-step presentation pattern with the order in which information is presented to investors in the form of information order + + - - (good news followed by bad news) or information order - - ++ (bad news followed by good news). The results of Gunawan and Yusuf (2012) are consistent with the model expressed by Hogarth and Einhorn (1992). In the theory of Hogarth and Einhorn's belief adjustment model (1992) that the recency effect will occur if the pattern of presenting information is sequential, both if the type of information is simple and complex in short information series. Hogarth and Einhorn's belief adjustment theory (1992) states that the primacy effect occurs when the information presented has simple information characteristics in long information series while the recency effect occurs when the information presented has simple information characteristics in short information series.

The research results of Almilia et. al. (2013) showed that there is an order effect in making investment decisions if information is presented sequentially (step by step) in short information series. The recency effect occurs when the last evidence received by participants

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is considered more than the first evidence received. Conversely, the primacy effect will occur if the latest evidence received is less considered than the first evidence received.

The study of Almilia and Supriyadi (2013) shows that there are differences in the results of decisions with participants who receive a sequence of bad news information followed by good news for presenting step by step information. This is consistent with the belief adjustment model proposed by Hogart and Einhorn (1992), that when an investor receives sequential evidence (SBS) in the order of presenting information + + - - then the investor will give a negative assessment, but when the investor receives sequential evidence (SBS) with the order of presentation of information - - + + then the investor will give a positive assessment.

In accordance with the research implications of Almilia and Supriyadi (2013) that disclosure practices are carried out by companies when disclosures are made part by part in stages, there will be a novelty effect, namely investors as users of financial information will respond to the latest information they receive. This has an impact on biased investment decisions such as those made by investors, because they will use the latest information they receive. Thus, the proposed research hypothesis is:

H1: There are differences in investment decisions between participants who receive information on good news followed by bad news compared to participants who receive information on bad news followed by good news in a step-by-step presentation pattern in long information series.

This cognitive style is one dimension that distinguishes individuals in processing information (Pratt, 1980). Ausburn and Ausburn (1978) define cognitive style as a psychological dimension that represents individual consistency in gathering and processing information. This cognitive style tends to be consistent throughout a person's lifespan. Allison and Hayes (1996) developed a cognitive style measurement instrument called the Cognitive Style Index (CSI). Based on the empirical studies of Allinson and Hayes using CSI, it confirms the generic dimensions of cognitive style, namely intuition and analysis. Intuitive cognitive style relies more on the right hemisphere of the brain which has intuitive, integrative characteristics, non-linear ways of thinking, considerations based on feelings, and broad perspectives. Meanwhile, the analytical cognitive style relies more on the function of the left hemisphere of the brain which has logical analytical characteristics, sequential information processing, consideration based on reasoning and a focus on details. Thus, the authors propose the following hypothesis:

H2: There are differences in investment decisions between participants with an analytical cognitive style compared to an intuitive cognitive style in the step-by-step presentation pattern of long information series.

This cognitive style difference can cause the same information (evidence) obtained by individuals to be interpreted differently. This is associated with the characteristics of different cognitive styles. Individuals with an analytical cognitive style will tend to experience a smaller reviewer effect than individuals with an intuitive cognitive style. The hypothesis that is built is as follows:

H3: The order of evidence and cognitive style will interact to influence the judgment (revision of beliefs) taken by investors. Investors with an analytical cognitive style will revise beliefs less than those with an intuitive style.

METHODS

This study used an experimental design with simple information types. The information series used is a long series, with a step-by-step presentation pattern in the order in which information is presented to investors in the form of information order + + - - (good news followed by bad news) or information order - - ++ (bad news followed by good news). In the theory of the belief adjustment model, the recency effect will occur if the pattern of presenting information is sequential, both if the types of information are simple and complex in short information series. Hogarth and Einhorn's belief adjustment theory (1992). Participants were students undergraduate accounting major who already had experience in investing but had knowledge related to investing in the capital market.

Participants/experimental subjects will fill in randomly. The first step that must be taken by the participants is to fill in the cognitive style index (ICS) formula which can measure the participant's cognitive style whether it is analytical or intuitive. Furthermore, participants were given research instruments by obtaining one of the two scenarios described by the researcher. Scenario A is where participants are given information series of information with a step-by-step pattern and the sequence of evidence is good news followed by bad news. While Scenario B is where participants are given information series information with a step-by-step pattern and the sequence of evidence is bad news followed by good news. Participants will randomly fill in one of the two scenarios A and B.

Furthermore, participants were asked to provide a scale for the information provided, namely the disclosure of company financial statements with multiples of -500 for very bad information (very bad news) and +500 for very good information (very good news). The information provided to the participants in this experiment was a long series of information with a step-by-step presentation pattern, and the order in which the information was presented (+ + - - and - - + +). This study uses eighteen (18) information obtained from the company's financial statements, which are grouped into nine (9) information that has a positive direction and nine (9) information that has a negative direction.

After understanding and responding to each of the information disclosures presented, participants filled out manipulation check questions, and questions to measure participants' abilities in the areas of capital market investment and financial statement analysis. The final task of the participants is to be given a debriefing. Debriefing is the process of returning the subject to the condition before participating in the assignment in the experiment and allowing research subjects to provide honest comments about the implementation of the experiment (Christensen, 1988).

The data normality test was carried out to test whether the data has a normal distribution or not. To test the research hypothesis, the Independent Sample t-test technique was used for normally distributed data and the Mann-Whitney U test was used if the data was not normally distributed.

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RESULT AND DISCUSSION

165 students participated in the experiment. All completed the entire experimental procedure. A total of 25(32,05%) participants did not pass the scenario A manipulation check. A total of 28(32,18%) participants did not pass the scenario B manipulation check. The final number of samples to be analyzed in this study were 112 people divided into 53(47.32%) in scenario A and in scenario B as much as 59(52.67%). Most of the respondents in this study were women, 39(73,6%) participants scenario A and 45(76.3%) in scenario B. Most of the participants in this study were 20 years old, 38 participants or 71.7% in scenario A and 25 respondents or 42.4% in the scenario group B.

Table 1 presents descriptive statistics for the dependent and independent variables. This is to determine whether the subject is included in the category of intuitive or analytical cognitive style. This is consistent with previous studies using this variable (Gul 1984, 1986; Allinson and Hayes 1996).

Table 1 Descriptive Statistics

Variable	Minimum	Maksimum	Median	Deviasi Standar
Belief revision	-78	43	-3,1	28,14
Cognitive Style	27	63	39	7,93

Table 2. presents the number of subjects who fall into the category of evidence order ++-- or --++ or intuitive or analytical cognitive style.

Table 2 Participant Category Descriptive Statistics

Evidence order		Cognitive Style	
++--	53	Intuitive	45
--++	59	Analitic	67
Total	112	Total	112

This study aims to empirically examine the phenomenon of investment decisions between participants who receive information on good news followed by bad news compared to participants who receive information on bad news followed by good news in a step-by-step presentation pattern in a long information series. The statistical test tool used to test whether there is a significant comparison or difference is the ANOVA test. The results of the ANOVA test in this study are shown in table 3.

Table 3 ANOVA Test Results for Hypothesis Testing

Source	Sum of Squares	df	Rata-rata Squares	F	Sig
Evidence order (EO)	315637,829	1	63671,327	78,923	0,002
Cognitive Style (CS)	728,199	1	673,281	0,927	0,549
CO x CS	625,142	1	625,142	1,374	0,219

Hypothesis 1 is tested by seeing whether there is a difference in the average investor's final decision for the group of participants who receive a sequence of positive information evidence followed by negative information (step by step ++--) with investors who receive a sequence of negative evidence followed by positive information (step by step --++), with an F value of 78.923 and a significance value of 0.002 (p value < than 0.05). Based on the results of the significance value, H1 is supported. Hypothesis 2 was tested by seeing whether there was a difference in the average final investor decision for the group of participants with an analytical cognitive style compared to participants with an intuitive cognitive style, with an F value of 0.927 and a significance value of 0.549 (p value > of 0.05). Based on the results of the significance value, H2 is not supported. Hypothesis 3 was tested by seeing whether there was a difference in the average final investor decision for the interaction group between the sequence of evidence (step by step ++-- vs --++) and cognitive style (analytical vs intuitive), with an F value of 1.374 and a value significance is 0.219 (p value > than 0.05). Based on the results of the significance value, H3 is not supported.

Table 4 Mean revised belief interaction between order of evidence and cognitive style

Order	Cognitive Style	
	Intuitive	**Analitic**
++--	9	9,47
--++	-15,76	-22,56
Mean	6,71	7,25

Research results show support for the study Ashton and Ashton (1988), Asare (1993), Kennedy (1993), Chan (1995), and other researchers. it shows that when investors are faced with the task of evaluating an investment sequentially and the evidence has a mixed nature of the order of presentation and not based on the substance of the evidence which has a mixed nature of disconfirmation and confirmation, the auditor will make a judgment based on the order of presentation and not based on the substance of the evidence. This will cause the evaluation of decisions implemented to run in an ineffective and efficient manner. Further proves that, investors have a greater sensitivity to disconfirmative (negative) evidence than to confirmative (positive) evidence. This can be seen from the average experimental group that gets an order of evidence --++, which is smaller than the group with an order of ++--

The results show that disconfirmative evidence is considered more important than confirmatory evidence, thus ignoring the strength of other evidence. These results corroborate the findings of Ashton and Ashton (1988) which state that auditors are more sensitive to disconfirmative evidence. This research is unable to show support for the proof of the hypothesis that cognitive style moderates the relationship between item order and belief revision. These results do not support the results of research conducted by Chan (1995) which proves the existence of an interaction or moderating effect between the order of evidence and cognitive style.

CONCLUSION

The results of this study indicate that there are differences in investment decisions between participants who receive information on good news followed by bad news compared to

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participants who receive information on bad news followed by good news in the step-by-step presentation pattern in the long information series. Furthermore, there is no difference in investment decisions between participants with an analytical cognitive style compared to participants with an intuitive cognitive style. The results also show that cognitive style does not moderate the relationship between the order of evidence and revision of beliefs in investment decision making. In this study there were several limitations that could not be avoided by researchers, including the external validity of the study because of the experimental method used. Another obstacle faced by researchers in carrying out experiments is the limited time and the condition of participants who may be tired when carrying out experimental tasks. Meanwhile, cases and scenarios of research instruments are complex enough to require deep concentration and thought from the participants. Thus suggestions for further research are expected to use a sample of students who have practiced direct stock investment. Furthermore, investors or practitioners should carefully consider any information obtained in the decision-making process.

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