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HEURISTIC, HERDING AND DISPOSITION EFFECT IN INVESTOR'S RISK-TAKING BEHAVIOR

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Abstract

There have been many empirical findings proving that individual investors do not behave completely rationally. This irrationality seems to appear in the process of non-sterile decision-making and in inconsistencies for maximizing utility. Financial behavioural theory through the concept of heuristic may explain such phenomena. The most iconic and heavily scrutinized phenomena found in investor's behavior are herding behaviour and disposition effect. These behaviours are suspected to cause why mispricing frequently occurs in stock markets, as well as the lesson why investors' stock portfolios are often in a deteriorating position. Their decisions in managing portfolios are often the reflection of risk-taking behaviour by themselves. Therefore, the aims of this study is to prove the correlations between heuristic, herding behaviour, disposition effect, and risk-taking behaviour in stock investors. The analysis of the data by using a statistical methods, that is Structural Equation Modelling (SEM). Empirical results suggest that the increase in heuristic intensity in stock investors encourages herding behaviour and disposition effect. Furthermore, the increase in herding behaviour and disposition effect intensity, in fact, leads to more aggressive risk-taking behaviour.

Keywords: risk-taking behaviour, heuristic, herding behaviour, disposition effect

1. Introduction

1.1 Introduce the Problem

A heuristic is defined as a simple rule requiring only a short amount of time for collecting and processing information (Kahneman, Daniel. Slovic, Paul. Tversky, 1982). Analogous to this definition, a heuristic can also be construed as a shortcut used by an individual to reduce the complexity of the problems faced (Bloomfield & Bloomfield, 2006). Meanwhile, (N. C. Barberis, 2013b) states that heuristic is the practical rule to ease decision-making processes in complex and uncertain situations. From these various definitions of heuristic, the key phrases "shortcut" and "practical rule" imply that an individual simplifies their process and line of thought, as well as reduces the variables considered when making a decision. The multitude of effort-reductions during the evaluation process for making decisions as put forward by (Shah & Oppenheimer, 2008) encourages behavioural bias.

Behavioural bias in investors as a result of heuristic can drive investors to adhere to the information flow within the market without any confirmation using standard analysis prior to

Vol. 5, No.12; 2021

ISSN: 2456-7760

making stock investment decisions. The act of solely complying with the market's information flow is also described as "herding behaviour". Herding behaviour in stock investors leads to the possibility of the market's failure in determining fair prices. In addition, behavioural bias is also apparent in an investor's decision to maximize utility. According to the theory of expected utility, investment decision-making is based on the investor's rational expectation for their portfolio in situations dealing with risks. When investors' acts are based on rationality, the same response will be produced in the same situation.

However, empirical findings proved that the individual responses among investors vary depending on the context of gains and losses based according to their perspective. Several studies regarding investors' risk-taking behaviours in the stock market discover similarities in their response pattern when facing changes in stock asset value. A principal finding, which has been the basis of theory developments, is that an investor is more inclined to keep their stocks that experience a decrease in value and to sell those that experience an increase in value (N. Barberis & Xiong, 2009), (Barber & Odean, 2011), (Henderson, 2012). Said behaviours are defined as the disposition effect.

With many empirical studies pointing out incongruence between the economic variables and the outcomes taking place in the stock market, an unexplained phenomenon then emerges, namely market anomalies. Built on the fact that stock investors' behaviours are not entirely rational, along with the importance of understanding their behaviours as the micro-foundation for interpreting market phenomena, this study aims to confirm the effect of heuristic on herding behaviour, the disposition effect, and the risk-taking behaviours in stock investors.

1.2 Explore Importance of the Problem

The finding that states that an individual tends to simplify, reduce, take shortcuts when processing information is posited as the law of small numbers. This concept explains how individual behaviours that overestimate the probability distribution of an event in a small group as a resemblance of the probability distribution of an event for the population. The heuristic that exaggerates the representation of a sample in a given population causes a systematic error regarded as representativeness bias.

Further study on heuristic is then based on reducing the investors' efforts to seek procedure alternatives, process and integrate information. Individual investors only utilize the available information and resources. Moreover, they tend to overstate the possibilities of recent observations and experiences due to them still being richly imprinted in their mind (Brooks, 2008). Meanwhile, (Montier, 2002) referred to the practical rules used by decision-makers to evaluate the class frequency or possibility of an event based on the most memorable/easiest to recall as the availability heuristic. Availability heuristic entails bias because the individuals ignore the long-term average and only focus on the temporary, actual condition.

Oftentimes, investors solely anchor purchasing value as the initial value used as the basis for making estimations. Historic pricing and prices recommended by experts act as an "anchor" that underlies the process of evaluation (Redhead, 2008). However, it is ideal to make a market price estimation of an investment using long historical data in order to better cover the price

Vol. 5, No.12; 2021

ISSN: 2456-7760

behaviour. Anchoring heuristic causes investors to determine the stock price range only based on historical trends despite the possibility of changes beyond their expectations. As a consequence, this behaviour results in a bias, which is the underreaction towards unanticipated changes (Ngoc, 2013).

1.3 Describe Relevant Scholarship

1.3.1 Manifestation of Investors' Irrationality: Herding Behaviour and Disposition Effect

Empirical findings regarding an investor's behaviour to mimic another's decision or market movement, as well as their inclination to hold stocks that experience a drop in value, encouraging studies regarding such phenomenon by inducing the concept of psychology on economic argumentation. By acknowledging that economic agents are individuals who cannot be separated from their "feeling" when making decisions, then the assumption that these individuals are not completely rational serves as the foundation to peer into the aforementioned findings: the herding behaviour and disposition effect observed in stock investors.

In the stock market, herding is identified as an investor's tendency to follow other investors' actions (stock trading) (Ngoc, 2013). This decision of imitating another is due to the lack of confidence (Scharfstein & Stein, 1990). An investor losing their confidence in making investment decisions for their portfolio will conform to market "noise". Facts indicate that investors are likely to trust collective information than private information.

In a market stress situation, which may be the result of currency depreciation or extraordinary events that have a negative impact, escalates uncertainty. This, in turn, creates less credible and exaggerated information flow to the point that the market price formed is inefficient (Hwang & Salmon, 2004). The situation marked by chaotic information, named herd, will drive investors who aren't completely rational to "mimic" investment instrument decisions. This mimicking behaviour is then defined as "herding".

The disposition effect is a condition in which individual investors are inclined to sell their stocks that have increased in value since purchase than those that have decreased (N. Barberis & Xiong, 2009). Naturally, any individual has an instinct for loss aversion, which is the perception that a loss is more sensitively felt than an equivalent gain (N. C. Barberis, 2013b). This high sensitivity towards loss aversion is manifested by holding a losing stock, because that way, the loss experienced will not actually be felt, i.e., not yet realized. Furthermore, the higher sensitivity towards losses causes an individual to treat gains and losses differently. An individual is likely to be risk-averse when dealing with gains and risk-taker in losses (Levy & Levy, 2008). Therefore, when an investor realizes that their stock experiences gains, risk-averse behaviour takes place, immediately bringing this gain to fruition. Conversely, when there is a decline in stock price, investors will display risk-seeking behaviour by holding their stock that experiences a loss.

1.3.2 Risk-Taking Behaviour in Investor

Investment theories assume that an investor rationally makes a logical trade-off between expected return and investment portfolio risk. In spite of this, investors are essentially human being, thus allowing emotions as a part of human nature to play a role. This is in agreement with

Vol. 5, No.12; 2021

ISSN: 2456-7760

an argument by (Slovic, 1980) stating that individual perception and attitude towards risks are not only determined by tabulated unidimensional statistics, but also by various quantitative and qualitative characteristics of each individual. Research findings concerning risk perception by (Klos, Weber, & Weber, 2005) also suggests the weak correlation between an investor's risk perception and standard deviation estimates (as risk estimated based on quantitative analysis). This proves that an investor's perception of and preference for investment risks are multidimensional (as opposed to only quantitative in nature).

Individual risk preferences in stock investment can be distinguished in two ways, which are risk capacity and risk-averse (Klement, 2017). Risk capacity relies on objective economic conditions, such as an investor's investment horizon, liquidity needs, income, wealth, tax rate, and other factors. Meanwhile, risk aversion is the combination of the psychological dimension and emotional response that determines an investor's willingness to bear financial risks and psychological or emotional load when faced with financial losses. An individual investor will only prefer a particular type of investment if its risk is within the individual's risk capacity and risk-averse threshold. In a number of studies, risk-averse is described as risk tolerance, despite having the same definition. Risk tolerance plays a role in forming individual risk-taking behaviour. Generally, risk tolerance can be conceptualized as an individual's willingness to be involved in actions/behaviours in which the desired purpose contains uncertainty and possible losses. (Grable, 2016). Risk aversion/risk tolerance illustrating an investor's behaviour towards risks may be marked by selected portfolio asset allocation and owned cash allocation. (Cavezzali & Rigoni, 2012). In agreement with the concept of portfolio selection by Markowitz, risks are minimized and risk-averse level is increased when the owned portfolio is more diversified.

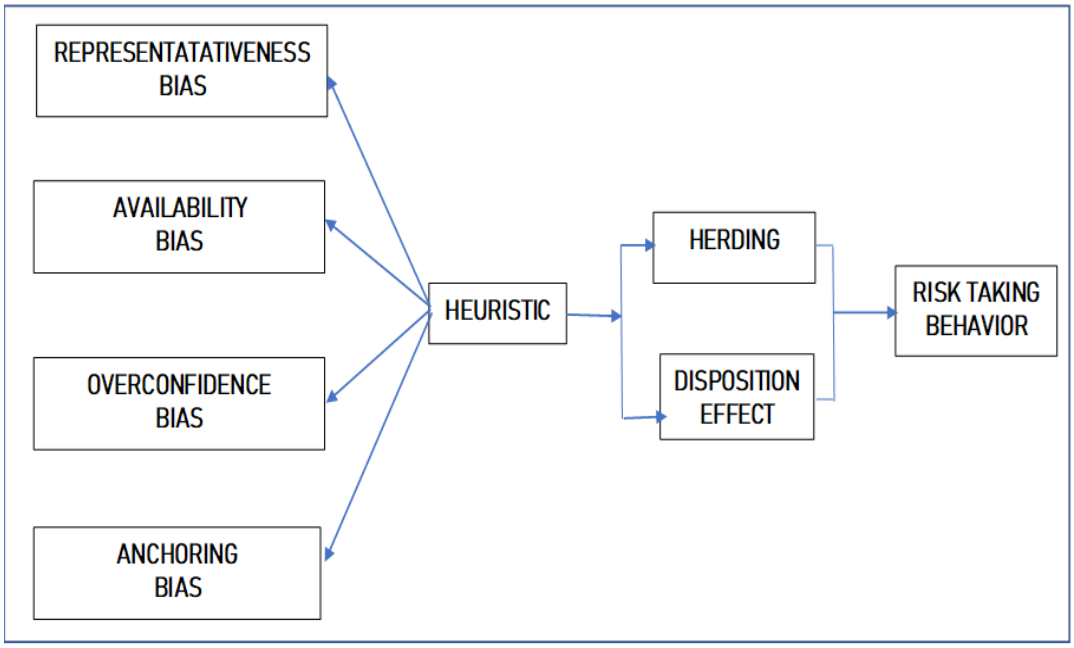
Built on the fact that individual investors are the decision-maker regarding the extent to which investment risks can be tolerated, all quantitative risk calculations will become a part of forming said investors' perception of and preference for risks. After the perception of and preference for risks have been formed, the subsequent phase is the actions or behaviours related to the investment activity selected. Individual acts or behaviours that bring consequence at a significant risk level are described as risk-taking behaviour (Injodey & Alex, 2011). Risk-taking behaviours by individuals—in this case, investors—are illustrated by their decisions in dictating the proportion and types of assets in portfolio investment, portfolio turnover, average trading value, and asset change dynamics.

1.4 State Hypotheses and Their Correspondence to Research Design

The hypothesis in this study was built based on the conceptual framework shown in the figure below, which states that (i) heuristics affect herding and disposition effects and (ii) both herding and disposition effects influence risk's behavior investors.

Vol. 5, No.12; 2021

ISSN: 2456-7760



2. Methods

2.1 Data Types, Population, and Sample

The data required in this study is primary data collected using the survey method with the help of questionnaires. These questionnaires aim to obtain data related to the heuristic, herding behaviour, disposition behaviour, and risk-taking behaviour variables observed in individual stock investors.

On the other hand, this study also employed the purposive sampling method, with the criteria as follows: the investors are individual actors with an investment fund of less than 1 billion Indonesian Rupiahs, having been an investor for more than three years, and actively undertaking transactions.

2.2 Analysis Methods

The method adopted to analyse the data are the structural equation model (SEM). The use of SEM is based on the forms of correlations among the researched variables and the nature of the research variables. As depicted in the conceptual framework, there are four variables, which are heuristic, herding, disposition effect, and risk-taking behavior—each variable is regarded as one construct. Therefore, there are four constructs within the SEM model in this study.

Referring to the nature of the research variables, where each variable cannot be directly measured through a single indicator, but by means of several indicators, then the use of SEM as the method for data analysis is deemed suitable.

Vol. 5, No.12; 2021

ISSN: 2456-7760

2.3 Variable Definitions

Variable	Definition
Heuristic	An investor's behaviour when making the decision to purchase or sell certain stocks without undertaking company fundamental analysis nor proper technical analysis.
Representativeness bias	An investor's behaviour when evaluating a stock is based on similarities to other stocks, while only relying on recent conditions/experiences and neglecting long-term average conditions. The items taken into account comprise a stock's similarities based on quality, a stock's similarities based on types of the industrial sector, a stock's similarities based on issuer's economic scale, and latest condition of stock prices.
Availability Bias	An investor's behaviour when evaluating a stock based on the most recent observations and experiences (the easiest to remember), while employing only the available knowledge and procedures without seeking alternatives. The items taken into account comprise evaluation procedures, knowledge on analysis techniques, available information, and latest experiences.
Anchoring Bias	An investor's behaviour that always refers to the initial value when making analyses or assessments on a stock's selling price. The initial value can be obtained from the previous price or the price recommended by individuals considered to be an expert (broker, investment manager, and so on). The items taken into account comprise initial value based on historical data, initial value based on recommendations, and underreaction to behavioral changes.
Herding Behavior	An investor's behaviour that mimics another's investor and/or market "noise" in determining which stock to sell or purchase. The indicators of herding behavior comprise a decline in confidence, references from parties regarded as more competent, and reference from market movements.
Disposition Behavior	An investor's behavior that tends to hold losing stocks and to immediately sell stocks that earn capital gains. The items taken into account comprise portfolio condition, loss aversion, taking a profit.
Risk-taking Behavior	An investor's behavior when allocating risks in the owned stock portfolio. Risk-taking behavior is measured using these indicators: stock diversification in the portfolio, average transaction values, investment time horizon, fund allocation.

3. Results

With the help of statistical analysis, a direct effect among variables can be seen according to the SEM, as depicted in the following table

Vol. 5, No.12; 2021

ISSN: 2456-7760

Table 1. SEM: Direct Effect

No	Relationship	Coefficient	P-value	Conclusion
1.	Heuristic (Y1) on Herding (Y2)	0.464*	0.000	Significant
2.	Heuristic (Y1) on Disposition Effect (Y3)	0.303*	0.008	Significant
3.	Herding (Y2) on Risk-Taking Behaviour (Y4)	0.317*	0.001	Significant
4.	Disposition Effect (Y3) on Risk-Taking Behaviour (Y4)	0.232*	0.021	Significant

Source: Analysed Primary Data, 2020

Note : * Significant, ^{ns} Not significant

Meanwhile, the indirect effect of the heuristic variable on the risk-taking variable is also confirmed using statistical tests

Table 2: Structural Model Table of SEM Results: Indirect Effects (Mediation Effect)

Indirect Effect	Direct Effect Coefficient		Indirect Effect Coefficient	Note
Y1 → Y2 → Y4	Y1 → Y2 = 0.464*	Y2 → Y4 = 0.317*	0.147*	Sig.
Y1 → Y3 → Y4	Y1 → Y3 = 0.303*	Y3 → Y4 = 0.232*	0.070*	Sig.

Note : * Significant, ^{ns} Not significant

4. Discussion

4.1 Heuristic and Herding Behaviour on Investors

The statistical test findings suggest that individual investor heuristic in the stock market may encourage other investors to follow other investors' stock transactions and/or market noise described as herding. In this study, the heuristic undertaken by an investor is reflected by 3 behavioural biases, which are: representativeness, availability, and anchoring. There are two manifestations of an individual investor's herding behaviour, which are: first, complying with the information cascade present in the market; second, imitating other investors deemed more competent.

The mechanism that explains the effect of heuristic on herding behaviours occurs through representativeness bias dan availability bias. **First**, from the representativeness bias aspect, the latest condition indicator explains that an investor emphasize the current stock price condition and neglects the long-term average of said stock price. This behaviour is in line with an investor's behaviour to go along with the market noise, reflected on the investor's response towards the herding indicator, which is the reference from market movement. This correlation between the investor's response towards the representativeness bias indicator and the investor's response that reflects herding behaviour can be proven as shown in Table 3 below.

Vol. 5, No.12; 2021

ISSN: 2456-7760

Table 3: Correlation Result between Heuristic Indicator and Herding Indicator

Heuristic Indicator	**Questionnaire Result**	**Herding Indicator**	**Questionnaire Result**
Representativeness Bias Item: most recent condition	The investor emphasizes the current stock price condition and ignores the long-term average of said stock price	Reference from the market movement	The investor follows market trends by referencing the IHSG movements when making stock purchase decisions

Source: Analysed Data

When an investor is trapped by representativeness bias, thus disregarding the long-term average stock price—reflected by the technical analyses conducted, or lack thereof—then the behaviour shown is following the market noise, i.e., market price trend. The depth in which the respondents are in informational cascade can be seen from the majority of answers stating that the investor's purchase decisions are in line with the market price trend. Whereas, the basic concept of stock investment states that the most optimal time to purchase is when the price approaches the bottom (in a declining trend) to allow the potential of the highest capital gain. **Second**, in line with the indicator of the availability bias—which is the available information—an investor's reaction to purchase/sell their stocks, in fact, is more dominantly affected by the "availability" of intense information/news regarding the escalation of particular stocks, rather than the efforts to integrate market information with information on stock fundamentals. This availability bias drives investors to comply with the information flow in the market for making their investment decisions. The fact an investor is more likely to place confidence in collective information available in the market, as opposed to private information, can be construed that said investor is subjected to information cascade. In agreement with the argument by (Hirshleifer & Hong Teoh, 2003), one trait that marks herding behaviour is investors heeding the information cascade happening in the market.

Table 4 below shows the correlation between the suitability of investors' responses with information availability, which leads the investors to availability bias, thereby resulting in the investment decisions conforming to the information flow in the market.

Table 4. Correlation Result between Heuristic Indicator and Herding Indicator

Heuristic Indicator	**Questionnaire Result**	**Herding Indicator**	**Questionnaire Result**
Availability Bias Item: available information	The investor's decision to Purchase/ sell stocks is more dominantly influenced by the "availability" of intense information regarding the escalation of certain stock prices	Reference from the market movement	The investor follows market trends by referencing the IHSG movements when making stock purchase decisions

Source: Analysed Data

Vol. 5, No.12; 2021

ISSN: 2456-7760

4.2 Herding Behaviour Increases Risk-Taking Behaviours on Stock Investors

The manifestation of herding behaviour in investors that is the decision to purchase/sell stocks complying with the current trends in the market—described as following market noise—and/or imitating other investors' investment decisions can essentially be understood as a response to the risk faced. Investment theories assume that an investor rationally makes a logical trade-off between expected return and investment portfolio risk. Although, an investor's rationalities can also be influenced by psychological matters that form their perception and attitude to risks. This is in agreement with an argument by (Slovic, 1980) stating that individual perception and attitude towards risks are not only determined by tabulated unidimensional statistics, but also by various quantitative and qualitative characteristics of each individual. Empirical findings regarding risk perception by (Klos et al., 2005) also pointed out the weak correlation between an investor's risk perception and standard deviation estimates (as risk estimated based on quantitative analysis). This proves that an investor's perception of and preference for investment risks are multidimensional (as opposed to only quantitative in nature).

When an investor finds uncertainty in matters concerning a considerable amount of investment, they will perceive an increase in the risk faced. The lack of confidence regarding which information is relevant to the basis for making decisions prevent an investor from making rational judgments from the expected values. This condition is in accordance with a statement by Keynes that an individual under the given situation will develop an animal instinct of spontaneous action, rather than being idle, and not as the result of a weighted average of quantitative benefits multiplied by quantitative probabilities (Keynes, 2003). With this condition, the actions taken by an investor stem from an animal instinct. The term animal instinct here is tantamount to the definition of herd instinct, which is the inability of an individual (in this context, individual investors), to provide rational justifications. As put forth by Freud that the characteristics of herd behaviour is when an individual loses their power of criticism and allows themselves to be led by the things affecting them. These "things" may be interpreted as other individuals considered to be better, termed as an instinct for emulation (Day & Veblen, 1901). Therefore, within the context of stock investment, these "other individuals" are other "better" investors. Furthermore, this instinct for emulation perceived in investors will lead to a contagion process, which are able to drive the market (Raafat, Chater, & Frith, 2009). This process also engenders an information cascade occurring in the stock market. Thus, investors under profound uncertainties will feel more "secure" by following the information flow (information cascade) happening around them. This is also comparable to a statement by (Hirshleifer & Hong Teoh, 2003) where a feature that marks herding behaviour is when investors follow the information cascade happening in the market.

Underlining the meaning of "security" felt by investors when herding can be reviewed from the investors' psychological perspective and rationality perspective. First, based on a psychological perspective, an investor following other investors' decisions (reflected by stock price movements) will feel safer under the impression of having abided by the majority of investors' power to move the market, which is defined as information cascade. This feeling of security will improve an individual's tolerance to the risks faced, therefore more aggressive risk-taking behaviours. Second, based on the rationality perspective, Keynes stated that an individual will

Vol. 5, No.12; 2021

ISSN: 2456-7760

act according to their animal instinct when incapable of making rational calculations based on the expected value (Keynes, 2003). As a consequence, these actions that are not based on rational calculations will then be considered irrational actions. In the context of investment, an investor's actions are regarded irrational when their investment decisions are made without information processing led by calculations, and only mimicking other investors' decision that is deemed better or that of the majority of investors reflected by the information cascade. Whereas, if examined from the investor's perspective, this herding decision is a part of their rationality when faced with a condition in which the received information at that time is not relevant for analysis. By adhering to the direction of the market, an investor will feel safer because the risk is shared with the majority of market actors. In addition, because their decision is identical to the market trends, should the market price change, signals are easier to identify. This sense of safety increases the investor's risk tolerance for their investment, thus more aggressive risk-taking behaviours.

The findings in this study prove that when an investor is herding, their tolerance to risks heightens, shown by their increased risk-taking behaviour. This increase is believed to be valid based on the stock diversification, investment horizon, and fund allocation indicators in the Table 5 below.

Table 5. Risk-Taking Behaviour Indicators Result

Risk-Taking Behaviour Indicators	**Questions**	**% in Agreement**	**% in Disagreement**
Stock Diversification	I prioritize earning high returns more than minimize risks.	39.8	31.7
	I tend to choose stocks that provide high expected returns, even though the risks faced are also high.	57.8	16.5
Investment Horizon	I only purchase stocks as a short-term investment (with a holding period of less than one year).	49	29.6
	Upon selling stocks, I wait for the highest price despite the higher uncertainties.	50	33.7
Fund Allocation	The proportion of stock investments in my portfolio is not equally shared but concentrated on stocks providing the highest expected returns.	73	9.5

Source: Analysed Data

According to the facts observed in the stock diversification indicator, the majority of investors do not minimize their portfolio risks, but instead, prioritize high returns despite knowing the consequence of higher risks. This is also applicable to the investment horizon and fund allocation indicators, all of which suggest that most of the investors emphasize more on high expected returns with the logical trade-off that the risks faced are also increase. When the investors agree to high returns in spite of the accompanying high risk, wait until the highest price regardless of

Vol. 5, No.12; 2021

ISSN: 2456-7760

the increasing uncertainties, and concentrate their funds on stocks promising high expected returns, they exemplify high risk tolerance and aggressive risk-taking behaviours.

4.3 Heuristic Drives Stock Investors to Disposition Effect

As indicated by the statistical result, individual investors display heuristic and the disposition effect. Statistical tests also reveal that heuristic takes place prior to the disposition effect, or as the cause of the disposition effect. In the paragraphs below, several arguments will be elaborated regarding the mechanism of heuristic, which results in the disposition effect.

Conforming to the statistical test results and the concepts from literature reviews, heuristic, which leads to anchoring bias and availability bias, is the reason for the disposition effect in investors. This disposition effect is defined as the tendency of individual investors to sell stocks that have increased in value since purchase than to sell stocks experiencing a decrease (cut-loss). (N. Barberis & Xiong, 2009). This disposition effect becomes interesting to peer into, especially the behaviour to let their stock portfolio slumps by holding stocks that experience market price drop.

In the stock portfolio investment mechanism, when an investor has acquired capital gains, then it is only normal to bring it to fruition by selling their stocks. On the other hand, oftentimes investors keep on holding stocks that experience a decline in market price, and establish the purchase price as the initial value, regardless of whether there have been changes in trend pattern on the said stock price. The investors make the decision to avoid cutting losses and be adamant to wait for the market price to, at least, reach the purchase price, indicating their delayed reaction to adjusting their investment's expected value. This reaction delay is due to the investors' anchoring the initial value on historical data, which is the initial purchase price (Redhead, 2008).

When investors only regard purchase prices as the basis for estimation, then it can be said that such investors display an anchoring heuristic. Instead of employing extensive historical data to better convey the price behaviour for estimations, these investors "merely" associate the purchase price as the initial value. The word "merely" represents the investor's actions to reduce efforts in processing information, which is the essence of heuristic behaviour. Anchoring heuristic causes investors to determine stock price approximations only based on historical trends that is the purchase price, despite the possibility of any unexpected changes. The decision to anchor the initial value on the purchase price in the beginning is the most common decision and does not violate rationality. However, this anchoring based on historical price becomes biased and irrational when this act prompts delayed reactions in investors in anticipating market condition changes. This reaction delay of not reassessing stock following changes in the market condition leads to the investors holding their losing stocks and waiting for them to return to the point of the purchase price. The combination of realizing capital gain and holding losing stocks results in poor stock portfolio condition because the prospective stocks are already sold, while declining stocks are kept. Table 6 displays the correlation between the investors' response for the anchoring bias indicator with that of the disposition effect indicator, which is the portfolio condition.

Vol. 5, No.12; 2021

ISSN: 2456-7760

Table 6. Correlation…

Table 6. Correlation Result between Heuristic Indicator and Disposition Effect Indicator

Heuristic Indicator	**Questionnaire Result**	**Disposition Effect Indicator**	**Questionnaire Result**
Anchoring Bias Item: historical data-based initial value	The investors only sell stocks upon market price increase or at least at a point equal to the purchase price (historical price)	Portfolio Condition	There is always a losing stock in the investors' portfolio. The investors hold a losing stock for more than 2 months.

Source: Analysed Data

Table 6 above may prove that investors exhibiting anchoring bias may show disposition effect by holding losing stocks and immediately selling stocks providing a capital gain. When the anchoring bias grows more profound, the stock portfolio only leaves stocks that have passed the momentum to produce capital gain. Hence, it can be concluded clearly that the more pronounced the anchoring bias in investors, the more apparent the behaviours displaying disposition effect, marked by the worsening condition of their stock portfolio.

Next on the heuristic indicators is the availability bias, by which an investor attempts to reduce efforts in integrating information. This reduction occurs when an investor only stresses information about the losing stock and not evaluating the total asset net value position in the stock portfolio. How this availability bias affects the disposition effect of investors is based on how they perceive these gains and losses. The gains and losses felt by the investors are measured relative to a particular reference value, treated and "sensed" separately from the accumulated wealth owned by the investors. Stock investors usually employ a stock's purchase price as a reference value, thus positioning themselves on the rationale of whether there are gains or losses based on the purchase value, and not on the total asset net value position in the owned stock portfolio. By behaving this way, the investors are likely to perceive loss more intensely, thus triggering a natural response of loss aversion. One manifestation of loss aversion is to keep losing stocks.

Several findings from primary data serve as the foundation for the effect of heuristic on disposition effect, which are: the investors are displaying anchoring bias and availability bias; the investors "only" sell their gaining stocks; the investors hold their losing stocks for more than two months; the majority of investors have losing stocks in their portfolio; the investors immediately realize their gains by selling stocks that increased in their market value. Based on these findings that are in line with the concept of delayed reaction and risk aversion, it can be concluded that heuristic shown by the investors results in disposition effect, thereby not making the stock portfolio prospective.

Vol. 5, No.12; 2021

ISSN: 2456-7760

4.4 Disposition Effect Increases Risk-taking Behaviours in Stock Investors

The presence of disposition behaviour in investors is based on the investor's definition of risk and return. Investors are more sensitive to losses than to gains/returns despite being equal in value. Higher sensitivity to a loss emerges because of an investor's utility only deriving from the gain and loss condition of each stock, separate from the accumulated wealth belonging to the investors. By behaving this way, the probability of investors "feeling" a loss increases because, despite the stock portfolio value increase, there is always the possibility that a portion of the stock portfolio experiences a decline. This frequent situation of "feeling" losses results in the psychological condition of loss aversion to be greater than the desire to achieve gains.

The concept of loss aversion is underlined when an individual experiences losses or gains with an equal amount, but the dislike of experiencing a loss far exceeds the joy of reaping gains. As a result, investors who experience losses will be reluctant to realize their losing stocks by holding them, because then they will perceive said losses as unreal (and is still on paper). This behaviour of loss aversion can explicitly be observed in the investor respondents' response as seen in Table 7 below.

Table 7. The Results of the Disposition Effect Indicator: Aversion to Realized Losses

Disposition Effect Indicator	**Questions**	**% in Agreement**	**% in Disagreement**
Aversion to realizing losses	When the stocks I purchased experienced a loss, I will keep said stocks until their price returns to the initial purchase price.	64	23
	I prefer more to wait for the losing stocks to rebound than to cut my losses	58	22

Source: Analysed Data

In the Table 7 above, it is proven that the majority of investors choose to avoid their losses by holding their declining stocks to the point that they reach their original market price according to the initial purchase price as their reference. This loss aversion is actually "false" at heart because the condition of said stock assets in terms of the actual market value has been losing. The investors' willingness to be exposed to losses beyond limitations when there is an option to minimize the losses is an irrational behavioural tendency. There are two reasons why the disposition effect is not considered rational. **First**, the investor's inconsistency on their definition of a loss. On one hand, an investor avoids losses by holding a losing stock, but in fact, the investor just opens up the possibility of experiencing a much higher loss. **Second**, the investor does not full-fill the assumption of decision consistency and preference stability condition to maximize utility. The investor's behaviour of maximizing utility is related to the allocation of choices between the expected return and the level of risk on the investment choice. Therefore, when an investor is categorized as risk-averse, then their decision should remain consistent in avoiding risks, both within the loss domain and the gain domain. In reality, an investor is more sensitive to losses than to gain, despite being equal and minuscule in amount, as first put forth by Kahneman and Tversky (N. C. Barberis, 2013a). Since the finding, there have been many

Vol. 5, No.12; 2021

ISSN: 2456-7760

experiments involving loss-averse behaviours in investors (N. Barberis, Huang, & Santos, 2001), while (Barber, Lee, Liu, & Odean, 2007) further support the loss-averse concept, including this study.

The Table 8 below displays the investor respondents' behaviours when their stocks experience gains. Upon earning capital gain, the investors are risk-averse by immediately taking profit their stocks' capital gain lest they bear a greater risk despite also a greater return.

Table 8. The Results of the Disposition Effect Indicator: Realizing Gains

Disposition Effect Indicator	**Questions**	**% in Agreement**	**% in Disagreement**
Taking profit time	When the stocks I purchased experience an increase in price, thus a capital gain, then I immediately sell these stocks.	63	18
	When I have gaining stocks, I **do not** wait for the highest price based on technical analysis for selling this stock.	56.6	18.2

Source: Analysed Data

The combination of an investor's behaviour when dealing with losses with the behaviour when achieving gains, defined as disposition effect, can be understood from the perspective of risk-taking behaviours. At the time of losses, an investor avoids realized loss by holding stocks experiencing a decrease in market value, while in fact this very action basically increases the risk in their stock portfolio. The investor becomes more speculative by holding the stocks suffering from capital loss and expects their market value to, at least, return to the point at which the stocks were initially purchased. This speculative behaviour indicates that the investors are willing to endure a greater risk by exposing themselves to even more losses, simultaneously marking an increase in their risk tolerance. With the increase in risk tolerance, an investor is becoming bolder to take risks. Thus, it can be concluded that the investor's risk-taking behaviour escalates when indicative of disposition effect. In contrast, when faced with a gaining position, an investor is more inclined to be risk-averse by immediately realizing their gains without waiting for the stock price to reach its peak based on technical and fundamental analyses.

Disposition effect and risk-taking behaviours have a directly proportionate relationship. A higher intensity of disposition effect will lead to higher exposure to risks, though this is not accompanied by an increase in return due to the gaining stocks that have been sold already. A real marker for the increase in risk-taking behaviours is the worsening performance condition of the stock portfolio. This increase in risk-taking behaviours caused by the disposition effect impairs a portfolio's performance if it is not in tandem with a rational trade-off between the expected return and investment risks.

5. Conclusion

Heuristic behaviour found in individual stock investors leads to herding behaviour and the intensity of a heuristic, the more profound the herding behaviour and the disposition effect.

Vol. 5, No.12; 2021

ISSN: 2456-7760

Moreover, the increase in herding behaviour and disposition effect is proven to drive a more aggressive risk-taking behaviour in investors.

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