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Model Behavior of Individual Investors Based on DISC-Personality and Demographics in Indonesia Stock Market

Elizabeth Lucky Maretha Sitinjak, Kristiana Haryanti, and Wisnu Djati Sasmito

Abstract—The financial behavior bias is influenced by the personality and individual investor demographics. Method of subject block within random experimentation design is done in this study. The pretest and posttest were first done in Semarang, then outside of Java, i.e. North Sumatra and North Sulawesi, to represent the number of individual investors outside of Java. The purpose of this study is to create a model of the behavior of individual investors in Indonesia. A model of decision making to buy or sell stocks is based on personality and demography.

The results of this research is a portfolio of assets which is a combination of 2 or 3 shares. With the outcome of the research we expect to know the optimum stock development. The dominant personality of investors in this study tend to be peace maker and precisionist, as the result of the combination between the Dominance (self-confident, self-reliant, assertive, direct, active, dynamic, capable of leading, adventurous, supportive or innovative), Steadiness (friendly, patient, sociable, quiet, sympathetic, outgoing and friendly), and Compliance (faithful, diligent, resourceful, realistic, serious, sensitive).

Index Terms—Individual investors, portfolio, DISC, demographics.

I. INTRODUCTION

Young investors in Indonesia in the study are likely to have overreacting and regretful behavior when conducting a transaction of buying and selling stocks. In addition, there is a behavior of tending to keep stocks for too long when the stock price declines. This study looked at two major theories that have different basic ideas. Three of the theoretical approaches are the portfolio [1], Efficient Market approach [2], and Behavioral Finance approach [3].

Efficient Market Approach explains that prices in the stock market reflect market information, where the information can take the form of historical information, present information and private information [2]. Information in the form of historical financial statement and information in the form of ratios are often used by young investors to determine stocks they are going to buy. Present and future information often sought by most young investors is about dividend distribution and other information about corporate action (acquisition, merger, stock split, reverse stock split, etc.). The birth of

Efficient Market approach cannot be separated from the establishment of an efficient portfolio. There are two phases of the process of selection of stock turned into asset in the portfolio [1], [2] i.e. observation and calculation of the performance of shares to be purchased. The role of the investors in the first phase aims at calculating the maximum profit expectations. Meanwhile, in the second phase, the role concerns with beliefs relevant to performance in the future. At this stage, investors end up picking stocks or assets included in the financial portfolio and expect to get the maximum profit. These two stages has an emphasis on the relevant beliefs in forming the selection of assets that will create in a financial portfolio [1], [3]. That is, approaches toward the efficient market and efficient portfolio cannot be separated from the cognitive of young investors. From the information obtained to the formation of relevant beliefs are financial preferences and the psychology of the investors itself.

As of the background of this research, the first is that it attempts to look at the behavior of individual investors in making the decision to invest in stock (buy, sell, hold) from their personality (DISC Personality) and demography. Portfolios formed by individual investors from the stock transaction (buy-sell-hold) will be grouped into winner portfolios (positive portfolio returns) and looser portfolios (negative portfolio returns). Both groups will be divided as well into the classification of personality and demographics in order to set up the cut off model decision making to buy-sell-hold in order to obtain optimum yields. The results of the first phase of this study to better understand the behavior of individual investors, because individual investors are part of members of the organization where he works.

II. METHODOLOGY

A. Method of Collecting Data

The object of this study is individual and institutional investors in the Indonesia Stock Market. The research locations are Medan, Manado, and Semarang. This type of research is mapping and experiment to identify the personality and demographics of individual investors in the Indonesia Stock Market, as well as to find out the bias of the current behavior of individual investors in making investment decisions in the stock market. The population in this study is all individual investors and institutional investors. Samples were taken randomly in three major cities in Indonesia. The data are primary data to obtain the data base of DISC personality and demographic data. Experimental data were used to see if the treatment used successfully

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reduced the effects of bias behavior of individual investors [6].

Data during 1 year and 3 months of transaction, from January 1, 2015 to March 31, 2016, were made into the first 15 minutes for the month of January 2015 until July 2015, and 15 minutes later for the month of August 1, 2015 to March 31, 2016. Data collected during fifteen months were in the form of Composite data of stock Price Index (CSPI), the closing price of the eight stocks selected (ITMG, INTP, ADRO, PTBA, PGN, ASRI, BMTR, TLKM, BBRI, BMRI, BSDE), systematic risk and expected returns on each kind of stock. Specific data from 11 shares were coded as A-1 for ITMG, B-2 for INTP, C-3 for ADRO, D-4 for PTBA, E-5 for PGN, F-6 for ASRI, G-7 for BMTR, H-8 for TLKM, I-9 for BBRI, J-10 for BMRI, and K-11 for BSDE. This is to eliminate the bias of the investors in knowing the stocks.

B. Nuisance Variable

Nuisance variable is another variable influencing the dependent variable and it causes measurement error in experiment research. This can reduce internal and external validation of the experiments. Therefore, to reduce nuisance variables in this study, the researcher conducted elimination in the following manner:

- Effects of heuristics or previous experience of certain stock transactions. Stocks of blue chip or second liner expected to provide the initial perception chosen to be transacted during simulation can be eliminated. The elimination of the influence of heuristics is done by giving the code on selected stocks that are running in a simulated transaction, such as code of A-1 for ITMG, B-2 for INTP, C-3 for ADRO, D-4 for PTBA, E- 5 for PGAS, F-6 for ASRI, the G-7 for BMTR, H-8 for TLKM, I-9 for BBRI, J-10 for BMRI, and K-11 for BSDE. This influences the fundamental and technical knowledge of analysts in making a decision to buy or sell particular stocks.

- The influence of the length of transactions of stock purchased or sold in order to get 'done' status (matching between the purchase prices and selling prices) for the simulation of 30 minutes. The movement of trading in stock (usually done in queues at the bid or ask, matching between the purchase price and selling price) can take more than 30 minutes when there are not many purchased stocks to order. Therefore by using Hi-Fu Stock Simulation System, it was designed that one click is for 5 days of movement of stocks in the Indonesia Stock Exchange. The transaction was carried out during 15 months for 30-45 minutes, by fulfilling identity form and personality DISC.

- The influence of environmental condition, temperature, size of the space, as well as different places were controlled so that the environment was comfortable.

- The influence of other factors that may emerge as a nuisance variable in the experiment, such as a sense of mood and fatigue. This can be avoided by providing prizes for winners in each experiment in the form of cash or a flash drive of 8 GB, and a cash prize of 1,000,000.00 was awarded to for generating trading portfolio to the biggest gainer of the three cities.

C. Participant Demographics

This study uses a 2x4x2 Randomized Block ANOVA and ANCOVA within subject experimental design, so there are 16 cells. Based on the previous discussion, each cell contains 5-6 subject participants and has a total of 86 people. Four time pre-tests were done in Semarang. HIFU Stock Software used in this experiment was initially very difficult to be activated to know the transaction behavior of individual investor. But after we tried to fix the HIFU stock simulation system for five times, we could do an experiment in accordance with the needs of this study.

The dominant age of the subjects of the experiment ranged from 18-25 years. It indicates that there are many young investors now on college campuses. In line with the policy of the Indonesia Stock Exchange in 2015, each Investment Gallery is in collaboration with the academics on campuses. PT Securities XXX, for example, cooperates with universities.

III. Math

A. Hypothesis Test

Hypothesis test was done using Blocking Within-Subject analysis of variance (ANOVA) test. The independent variables of quasi experimental are Portfolio Winner and Loser DISC-personality variables. The dependent variable tested was decision making to invest in the stock market. The chosen hypothesis test is Blocking Within-Subject analysis of variance (ANOVA) test. The first step of this the study is to calculate Winner Portfolio and Looser Portfolio by using the following formula [4], [5]:

Realized Gain + Potential Winner Portfolio = Winner Portfolio .... (1)

Realized Loss + Potential Loss Portfolio = Looser Portfolio ……. (2)

Explanation:
Realized Gains = gain realized by selling stocks
Realized Losses = losses realized by selling stocks
Potential Gains = the potential of gains for not yet selling their stock
Potential Loss = the potential of loss for not selling their stock

B. Data Quality Test

Tests on causality of data consists of reliability and validity tests with SPSS. Reliability tests were performed by the statistical test of Cronbach alpha (α). The value of Cronbach alpha> 0.70. Reliability test provides the consistency of the subjects' response to a given instrument. Mean while the validity test measures the validity of the instrument in this study [7], [8].

Validity test is done by using bivariate correlation between the respective indicator scores with the total score of the construct. Indicator of instrument is said to be valid when each of the indicators shows a significant result [8]. Additional test is done by measuring the item-total statistic of r count and r table or t arithmetic and t table. When r count is larger than r table and has a positive value, it can be said to be valid, and vice versa when the r count is smaller than r table, it is said to be invalid. With the magnitude of r table, with N (case) 120, the alpha of 0.05 with DF (n-2) 118, the obtained r table is 0.1509. The same principle applies to t count. When t count is greater than t table and has a positive value, it can be said to be valid, otherwise if t is smaller than t table, it can be

said to be invalid.

C. Internal and External Validity

Internal Validity. Using quasi-experimental method, internal validity is intended to measure how far the variation in the dependent variable is really attributable or caused by variation in the independent variable.But the internal validation is not fully controlled; therefore the observation of dependent variable is natural [8].

According to [7], [8] there are seven threats to internal validity in quasi-experimental study, namely:

- History. In this study, history threats can be minimized by means of a comfortable room for a gathering place for the individual investors. The room was in the form of a meeting room which was quite spacious and air-conditioned. In addition, there were workshops on technical analysis by researchers for 30 to 45 minutes. This was done to equalize the knowledge of technical analysis they would use in a quasi-experiment.

- Maturation. It is a threatwhen respondents' socio - economic or unit causes change as a function of time, such as growth, fatigue, boredom and experience. This can be overcome by giving them gift and cash prizes as well as certificates following workshops and simulation systems of HIFU Stocks.

- Testing. It is a threat when the first test influences the second test scores. It is also a threat when the publication of social or economic indicators has significant influence before the reading the indicator. In this study, testing was only done once before entering into a quasi-experiment; the time used was about 3 to 5 minutes to try Stock of HIFU system simulation program with 2 options.Testing was only used as an introduction to be able to run programs that they would use in quasi-experiment.

- Instrumentation. It is a threat when a not equivalent size is considered to be equivalent, when measurement of instrument calibration changes or changes of self-observation that result in changes in the measurement. [7] state that the threat of instrumentation occurs when there is a change in the measuring instruments for each time interval. Therefore,there are two parts in this study (simulation of the chosen 11 stock), namely the stock simulation and filling out a questionnaire.

- Statistical Regression. It is a threat when an apparent shift occurs when a person or treatment unit has been selected based on the score to the extreme. In this research, because it is random research and group selection is based on the number of transactions from the highest to the lowest during the 5 times of quasi-experiment, the average before and after the treatment should not be too extreme.

- Selection. It is a threat when the bias arising from differences in the selection of the comparing group causes differences in the level of the average value. This research can minimize the selection threatbecause it used a quasi-experiment because within a subject.For the comparing group, it was the subject itself who was compared after the treatment.The interaction between researchers and the subjects of the experiment was minimal, and they did not know that they were doing a quasi-experimental study. This was done so that this study could be viewed as a natural behavior of individual investors in making decision to invest in stock.

- Experimental Mortality. It is a threat when there are differences in the level of maturity or autonomic changes. In this study, the procedure was made simple, consisting of three stages, i.e. program testing, simulation of 11 stocks selected, and filling out the shared instrument questions. It took 45 minutes to perform the whole stages.It was not too long.

External Validity. In research with quasi-experimental methods, the external validity illustrates how far the results can be used to generalize on other samples [8]. Usually the internal validity of a true experiment is higher than the external validity, but this study used a quasi-experiment; therefore the external validity is higher than that of a true experiment.

IV. PARTICIPANT DEMOGRAPHICS

This study uses a 2x4x2 Randomized Block ANOVA and ANCOVA within subject experimental design, so there are 16 cells. Based on the previous discussion, each cell contains 5-6 subject participants and has a total of 86 people.Four time pre-testswere done in Semarang. HIFU Stock Software used in this experiment was initially very difficult to be activatedto know the transaction behavior of individual investor. But after we tried to fix theHIFU stock simulation system for five times, we could do an experiment in accordance with the needs of this study.

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V. DISCUSSION

A. Portfolio Combination and Efficient Frontier Figure

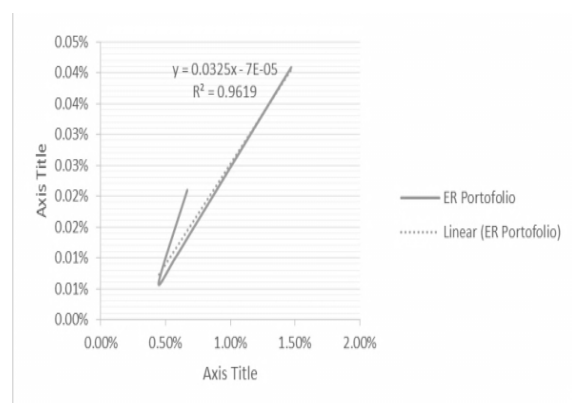
Fig. 1. Proportion of portfolio with 3 assets.

Three proportions of stock have abeter yield rate than the 4-11 proportion of shares or assets. The results are shown in Fig. 1, efficient fontier with proportions of 3 assets. The figure shows that a combination of three of these assets is not

too risky. This is due to more investors can monitor the progress of these three stocks andthe development ofstock industry market because of the given fundamentalanalysis.They can also monitor the movement of stocks which is more centralized. The combination of 3 stocks, comprising of BBRI, J-10 for BMRI, and K-11 for BSDE, can create better efficient frontier than the combination of the previous assets 11 to 4.

In Fig. 1, the combination is visible for all the stocks on expectations of positive returns with risk levels that are still rather high. At the time of the experimentation of the data obtained, each young investor tends to hold as many as 3 assets.
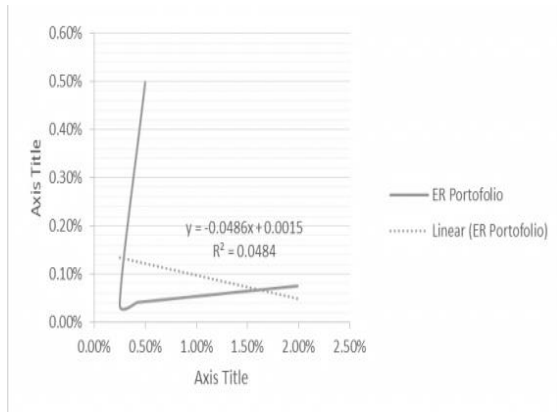

Fig. 2. Proportion of portfolio with 2 assets.

Fig. 2 shows efficient frontier with proportion of 2 assets. The figure shows that a combination of two of these assets is not too risky. Yields formed were almost the same as the combination of the three previous assets. This shows the combination of 2-3 assets to form a portfolio; investors are able to more easily monitor the movement of its shares with both fundamental analysis and technical analysis. We can also see the pattern of behavior of individual investors who choose the assets that are in the cycle of maturity (assets that have been growing and developing as well as dividends on a regular basis), in which they do not know the real identity of the assets purchased, sold, or held (because we, the researchers, disguised the identity of the stock).

B. Experiment Result

This is a quasi-experiment because the personality and demographics cannot be given treatments that have changes before and after treatments. This experiment uses HIFU Simulation Software with scenarios that have been discussed previously. The selection of stocks traded and dividend announcements have already been set in such a way that the validation of these experiments was ensured. As for the demographics, the researchers could not give treatments concerning with gender and personalities because these two are inherent in each of the individual investors. In Table 1, the age range is between 18-42 years. Investors have started the on-line trading (OLT) for 1 to 4 years. Originally, they are from 3 major cities in Indonesia, i.e. Medan, Manado and Semarang. They are young investors on campuses. The investment strategy consists of active and passive strategies. Portfolio transaction, buy-sell-hold, range from 1 stock up to a maximum of 7 stocks. Personality, according to Merton (DISC), produces 17 types of personalities.

TABLE I: DESCRIPTIVE STATISTICS IN FREQUENCY

		Frequency	Valid Percent
Age	18-25	83	97
	26-35	1	1
	More than 36	2	2
Gender	Man	35	41
	Women	51	59
Experience of Trading	Less than 1 year	1	1.4
	1-2 year	57	80.3
	More than 2 year	13	18.3
Region of Trading	Medan	35	41%
	Manado	31	36%
	Semarang	20	23%

Resource: Statistical data processed for this study (2016)

Table I shows the results of a difference in making decisions based on the area of origin. There are significant differences when making the decision to buy the stocks, but for the decision to sell and hold these stocks based geographic region (Medan, Manado and Semarang) decision-making is not different.

TABLE II: RESULT OF ANOVA INVESTOR DECISION MAKING

		Sum of Squares	df	Mean Square	F	Sig.
DM_BUY	Between Groups	4.980	1	4.980	62.061	.000
	Within Groups	6.741	84	.080		
	Total	11.721	85			
DM_SELL	Between Groups	.040	1	.040	.382	.538
	Within Groups	8.797	84	.105		
	Total	8.837	85			
DM_HOLD	Between Groups	.189	1	.189	.747	.390
	Within Groups	21.264	84	.253		
	Total	21.453	85			

Resource: Statistical data processed for this study (2016)

Table II shows the differences in making decisions based on the area of origin. There are significant differences at the time of the dividend announcement (corporate action), so that the emotion at the time of the decision to buy the stock looks different from the emotion to sell or hold the stocks in transaction.

TABLE III: RESULT OF DECISION MAKING BUY-SELL-HOLD OF THE INVESTOR PERSONALITY TYPE (DISC)

		DM_BUY		DM_SELL		DM_HOLD	
		Risiko Rendah	Risiko Tinggi	Imbal Hasil Rendah	Imbal Hasil Tinggi	Winner	Losser
		Count	Count	Count	Count	Count	Count
KEPRIBADIAN	Logical Thinker	5	4	1	8	4	5
	Peace Maker	16	3	3	16	7	12
	Precisionist	15	1	2	14	8	8
	Contemplator	3	0	0	3	2	1
	Attainer	5	2	1	6	3	4
	Technician	9	0	0	9	2	7
	Motivator	1	1	1	1	2	0
	Concluder	2	0	1	1	2	0
	Advisor	4	1	0	5	3	2
	Designer	3	1	1	3	3	1
	Assessor	1	0	0	1	1	0
	Advocate	1	0	0	1	0	1
	Challenger	2	0	0	2	2	0
	Communicator	1	1	0	2	1	1
	Persuader	1	0	0	1	0	1
	Governor	2	0	0	2	0	2
	Mediator	1	0	0	1	1	0

Resource: Statistical data processed for this study (2016)

Table III shows personality types (results of DISC) against the decision to buy, sell, and hold the stocks. They seem to be

peace makers and precisionists. It is this type of a decision which produces more decision makings to sell and hold than thatof DISC personality types.Peace maker personality type tends to be cautious. They thinkvery seriously if there is no information was obtained. However, they are possessive and sensitive, providing gradual changes and a bit slow, but it can be predicted for the better.They do not like to argue and put more personal feelings. Meanwhile, precisionist type is the type of personality that tends to careful, thinks hard and seriously, but it is also possessive and sensitive. People having this kind of personality make changes gradually and use strategies to survive the conflict by accomodating anyone's ideas [9].

In Table IV, test of different types of personalities in buying, selling, and holding based on the place of origin of the transaction (Medan, Manado, and Semarang) has significantly different outcomes on the decision to buy and sell stocks. That is, the three regions have different decisions to buy and sell based on the different areas of origin.

TABLE IV: RESULT OF ANOVA SUBJECT EFFECT

		Region					
		MEDAN		MANADO		SEMARANG	
		Emotion		Emotion		Emotion	
		Low	High	Low	High	Low	High
		Count	Count	Count	Count	Count	Count
DM_HOLD	Winner	5	11	2	16	2	5
	Losser	8	11	5	8	3	10
DM_SELL	Low Return	1	9	1	1	1	1
	High Return	12	13	7	24	5	15
DM_BUY	Low Risk	7	15	7	24	5	14
	High Risk	6	7	1	1	1	1

Resource: Statistical data processed for this study (2016)

VI. CONCLUSION

The created portfoliois a combination of 2 or 3 stocks from which we can see the development of the stock optimally. The dominant personality investors in this study tended to have the type of peace maker and precisionist, with the result of the combination of Dominance mode (self-confident, independent, assertive, direct,active, dynamic, capable of leading, adventurous, supportive or innovative), Steadiness mode (friendly, patient, sociable, quiet, sympathetic, friendly), and Compliance (faithful, diligent, thoughtful, realistic, serious, sensitive). The decision to buy and sell is based on the transaction site have differences. This is due to a different time with a transaction (Jakarta Stock Exchange) and also related to theInternet connection facilities that are much less optimal in the area.

For furhter studies,a transaction based onthe individual

decisions has uniqueness in the respective individuals, personality, gender, and the place of origin of the transaction. Not much has been done in this area, in which each individual sees the projectionin the future (toward a clearer direction in the long-term). Individuals' decision will be different from those of the institutions. Therefore, further research needs tofocus more on the institution as an organizational decision, not an individual decision.

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Lucky Maretha, Haryanti and Sasmito are team in the fundamental grant from Indonesia Ristek-Dikti. Haryanti helps in DISC-Personality. Sasmito was making stock systems in this experiment study.

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