THE FINANCIAL BEHAVIOR OF INVESTORS USING DISCRIMINANT ANALYSIS APPROACH

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Abstract

Behavioral finance is a recent line of research that is attracting the attention of the investor. Behavioral finance has an important role in decision-making process of investors. The purpose of this study is to examine whether there are any differences in the decision of investors in terms of demographic variables, such as marital status, gender, education level, and then it will be examined how the different criterias on financial behavioral factors include: herding, heuristics, and behavioral factors are associated with the financial markets. This research is descriptive quantitative. The sample in this study consists of 120 stock investors in Medan. Data were collected through questionnaires, interviews, and documentation studies. This research applies statistical technique of discriminant analysis, using the three groups of variables: marital status, sex, and educational level. The results of this study showed significant differences with an alpha of 5% on financial behavioral factors in the decision of investors in terms of marital status groups. Meanwhile, there was no difference in the decision of investors if in terms of other demographic variables, which consist of sex and level of education.

Abstrak

Keuangan perilaku cabang keilmuan yang menarik perhatian investor. Perilaku keuangan memiliki peran penting dalam proses pengambilan keputusan investor. Tujuan dari penelitian ini adalah untuk menguji apakah ada perbedaan dalam keputusan investor dalam hal variabel demografis, seperti status perkawinan, jenis kelamin, tingkat pendidikan, dan kemudian akan meneliti bagaimana kriteria yang berbeda pada faktor perilaku keuangan meliputi: herding, heuristik, dan faktor perilaku yang terkait dengan pasar keuangan. Sampel dalam penelitian ini terdiri dari 120 investor saham di Medan. Data dikumpulkan melalui kuesioner, wawancara, dan studi dokumentasi. Penelitian ini menggunakan teknik statistik analisis diskriminan, dengan menggunakan tiga kelompok variabel: status perkawinan, jenis kelamin, dan tingkat pendidikan. Hasil penelitian ini menunjukkan perbedaan yang signifikan dengan alpha 5% pada faktor-faktor perilaku keuangan dalam keputusan investor dalam hal kelompok status perkawinan. Sementara itu, tidak ada perbedaan dalam keputusan investor pada variabel demografis lainnya, yang terdiri dari jenis kelamin dan tingkat pendidikan.

Keywords : Behavioral Finance, Investors Decision, Stock

JEL Classification: G02, G11

1. Research Background

Behavioral finance is a good theory for understanding and explaining feelings and cognitive errors which affect investment in decision making (Waweru et al. 2008). The investor's decision on stock market plays an important role in defining the market trend, which then influences the economy. Researchers believe that human flaws are consistent, predictable, and can be exploited for profit. Recognition of human biases and accompanying irrationality warrants greater investigation, so the past mistakes will not happen again. As Jolliffe (2005) explains, "for investors who bought technology funds during the internet boom, only to see their value halve when the bubble burst, studying behavioral finance, the analysis of irrational investor behavior, could pay big dividends".

The investment decisions of investors influenced by demographic factors which consist of: gender, age, income level, and education level (Lewellen et al. 1977). Previous research conducted by Jain and Mandot (2012) on the Impact of Demographic Factors on Investment Decision of Investors in Rajasthan, examines the effect of demographic factors on the investors' decision. Research shows there is a positive correlation between the variables of the city, the level of income and knowledge. The results of this study also obtained a negative correlation between marital status, sex, age, education level and occupation. Lee et al., (2009) recently analyzed The Investment Behavior, Decision Factors and Their Effects toward Investment Performance in the Taiwan Stock Market, this study found that there were indeed existed significant differences on investor decision-making and market selection according to their assets. On the other hand, other variables, such as gender, age, marital status, education, career and job lever income, and average amount for quarterly investment appeared not to have significant differences.

This study aims to examines whether there are any differences in the decision of investors in terms of demographic variables such as marital status, gender, and education level, and then it will be examined the different criteria's on financial behavioral factors include: herding, heuristics, and a market. In other word, the formulation of the problem in this study is discussing the way financial behavior patterns make up the difference in the decision of a group of investors from standpoint of marital status, sex and education level.

Discriminant analysis is the appropriate statistical technique that can be used in situations where the total sample can be divided into a group or groups based on variables known characteristics of some cases, in order to know the differences between the groups (Hair et al. 1995). Statistical models were generated with a discriminant analysis of a grouping function, to predict and classify whether included in the group or not. The result of the grouping patterns of financial behavior is expected to be used as a material consideration when making useful feedback or suggestions on the decision of investors in each different group. Thereby, the decision from three different demographic groups, with different characteristics of behavior patterns, expectable to produce a decision in accordance with the return expectations of investors.

1.1. Behavioral finance

Behavioral finance is based on psychology which suggests that human decision processes are subject to several cognitive illusions (Ritter 2003). This illusion caused by heuristics decisions process and the others as well as herding and market factors also presented as the folowing (Luong and Ha 2011).

a. Heuristics, as rules of thumb, make decision making easier (Ritter 2003). But, heuristics sometimes lead to biases, especially when things change, and these can lead to suboptimal investment decisions (Singh 2012). Five components of heuristics: representativeness, availability bias, anchoring, gambler's fallacy and overconfidence (Luong dan Ha 2011).

b. Representativeness refers to the degree of similarity that an event has with its parent population (Debondt and Thaler 1985) or the tendency of decision makers to make decisions based on stereotypes to see patterns where perhaps none exists (Singh 2012).

c. Overconfidence. People are overconfident about their abilities. Illusions caused by overconfidence lead investors to overestimate their predictive ability and to attempt to 'time' the market by buying or selling share in advance of an anticipated share movement, one side effect of this can be to cause excessive trading or leading to increased trading cost (Singh 2012).

d. Anchoring arises when a value scale is fixed or anchored by recent observations (Singh 2012). As an example, take a company whose stock is trading at $15 a share, and then the company announces a 200% earning increase, but its stock price increases only to, say, $17 a share. The small rise occurs because investors are 'anchored' to the $15 price.

e. Gambler's fallacy. Occurs when investors inappropriately predicts that a trade will reverse. As an example, a gambler playing a fair roulette table who seen seven black outcomes in a row may think that next spin 'must' produce a red outcome. This illusion may encourage the purchase or sale of a share on the grounds that the recent bad or good luck of the firm must be about to change.

f. Availability bias arises when people make use of easily information excessively. These bias manifests itself through the preference of investing in local companies which investors are familiar with obtain information.

g. Herding effect is identified as the tendency of investor's behavior to follow the others' actions. This effect on stock price changes can influence the attributes of risk and return models and this has impacts on the viewpoints of asset pricing theories (Tan et al. 2008).

h. Financial behaviors associated with market. Waweru et al. (2008) identifies the factors of market that have impact on investors' decision making: price changes, market information, past trends of stocks, customer preference, over reaction to price changes, and fundamentals of underlying stocks. Changes in market information; fundamentals of underlying stocks; stock price, normally, can cause over/under reaction to price changes. Researchers convince that over reaction (DeBondt dan Thaler 1985) or under reaction (Lai 2001) to news may result in different trading strategies by investors and hence influence their investment decision.

Market factors influence the behavioral finance of investors (as mentioned above) and rational investors in different ways. So, that it is not adequate if market factors are not listed when considering the behavioral factors impacting the investment decisions. This research treats the market factors fairly as behavioral factors influencing the decisions of investors in the stock market.

1.2. Decision of Investor's

There is several investment decision related to stock trading, such as: selling, buying choice of stock, length of time to hold stock, and volume of stock to trade. This study only discussed about two important stock trading decisions: selling and buying. Selling and buying are focused because they have connection to the other decision.

a. The selling decision. Studies report that investors decrease the selling decision of asset that get a loss in comparison to the initial purchasing price, a trend called the disposition effect by Shefrin and Statman (1985). Investors who sell their assets at the price less than original purchase price usually expect the selling price is more than other sellers' asking price (Genesove and Mayer 2001). It is not only the expectation of the sellers, but also the correction of market decides the selling price: investors encountering a loss

often do the transaction at the relatively higher price than others. Investor prefers selling a stock that has helped them to gain capital.

b. The buying decision. Buying decisions are related to both prior winning and losing stocks. Odean states that the buying decisions may be a result of an attention effect. People may not find a good stock to buy when making a decision of stock purchase. Normally, they buy a stock having caught their interest and maybe the greatest source for attention is from the tremendous past performance, even good or bad.

The selling decisions are less determined by attention than buying decisions in case of individual investors (Barber and Odean 2002). To give this conclusion, they create the menu of attention-grasping stock with several criteria: unusually high trading volume stocks, abnormally high or low return stock, and stocks including news announcements.

1.3.Investors Demographic Factors

The investment decisions of investors influenced by demographic factors which consist of: gender, age, income level, and education level (Lewellen et al. 1977). Previous research, conducted by Jain and Mandot (2012) on the Impact of Demographic Factors on Investment Decision of Investors in Rajasthan , which test whether there was the effect of demographic factors on the decision of investors, showed that there was a positive correlation between the variables of the city, the level of income and knowledge. The results of this study also obtained a negative correlation between marital status, sex, age, education level and occupation.

1.4.Previous Research

Lee et al. (2009) recently analyzed The Investment Behavior, Decision Factors and Their Effects toward Investment Performance in the Taiwan Stock Market. The research targets were randomly selected Taiwan stock market investors. By examining the frequency distribution tables and one-way ANOVA, background variables of investors were explored in an examination of how these variables affected the investment behavior and decision factors towards performance on the Taiwan stock market. In order to analyze further about the correlations among variables, this study implemented Pearson Product-moment Correlation Coefficient, which included verification of significant effects on investor behaviors and decision factors. CATREG (regression with optimal scaling) was adopted to predict effects on investment behavior and decision factors towards performance on the Taiwan stock market, and to explain correlation among variables.

This study found that there was indeed the significant difference existing on investor decision-making in market selection according to their assets. The study hypothesized that there was no significant differences between investment behavior and decision factors with the investor's background variable. However, this study result concluded that there was indeed significant differences existed on investor decision-making in market selection according to their assets. On the other hand, other variables, such as gender, age, marital status, education, career and job income, and average amount for quarterly investment appeared not to have significant differences. Furthermore, among the variables, the most significant influential factors on the performance on the Taiwan stock market were macroeconomic forces followed by market selection, and finally investor expectations.

Previous research conducted by Jain and Mandot (2012) on the Impact of Demographic Factors on Investment Decision of Investors in Rajasthan tested the effect of demographic factors on the decision of investors. The study population consisted of 200 investors that were spread throughout the city in the time limit Rajhastan April 2011 until January 2012. This study uses Chi - Square and correlation analysis. Research showed there was a positive correlation between the variables of the city, the level of income and

knowledge. The results of this study also obtained a negative correlation between marital status, sex, age, education level and occupation.

2. Research Methods

This research is quantitative descriptive research that is explanatory. This study will be conducted virtually by dividing the questionnaire via e-mail, which has ± 4000 members, to all investors online trading in some securities firms that exist in Medan. Determination of the minimum number of samples population is based on table determination by Bartlett et al. (2001). The study population is amounted to ± 4000 people and using the alpha 5%, thereby the sample are 119 respondentsts of stock investors in Medan, based on table determination by Bartlett et al. (2001). Study documentation, interview and questionnaire are used for collecting data. Analytical tool in this study uses discriminant analysis.

This study is to examine whether there are any differences in the decision of investors in terms of demographic variables such as marital status, gender, education level, and then it will be examined the way the different criteria on financial behavioral factors include: herding, heuristics, and behavioral factors associated with the financial markets.

Test instruments have done through validity and reliability. A test of the accuracy of the pretest questionnaire will be conducted on 30 online trading service users respondents through mailing lists. Validity indicates the accuracy of a measuring device or questionnaire capable of measuring what is being measured. Validity test is used to measure a valid or invalid questionnaires (Ghozali 2011). Significant test has done by comparing the value of r count and r table, degree of freedom (df) = n - 2, n identify with the number of samples. On SPSS output display in the column Corrected Item - Total Correlation, if r count greater than r table and have positive value, thereby the item of questions or the indicator have declared valid.

Reliability test is conducted to determine the consistency or confidence in the results of careful measuring. According Ghozali (2011) the way to measure the validity is to perform correlation between the scores of the questions with a total score of constructs or variables. Questionnaires or indicator variables, is considered reliable if the respondents answers to questions consistent or stable over time. To test the reliability, the statistical test used Cronbach's Alpha (α). Ghozali (2011) provide a variable restriction reliable if the Cronbach's Alpha > 0.6. Thus, to obtain the number Cronbach Alpha, the data processing is performed with SPSS.

Discriminant analysis is trying to classify each object into two or more groups based on a number of criteria independent variables. Discriminant analysis in this study uses the enter method used to create a model of the relationship between the dependent variable category data with several independent variables (predictors). Discriminant analysis also classifies each object into two or more groups based on a number of criteria independent variables.

Test for normality in this study performed using the Kolmogorov-Smirnov (KS). If significant numbers in the table > alpha 5%, then the data is met the test for normality (Ghozali 2006). Multicollinearity test aims to test whether the data found a correlation among the independent variables. Homogeneity test is shown in Table Test Result Box 's M, with sig box 's > 0.05 indicates a homogeneous variance (Yamin and Heri 2011).

The discriminant Z scores of any discriminant function can be calculated for each observation by the following formula:

$Zscore = a + W_1X_1 + W_2X_2 + W_3X_3$

where :

$Zscore$ = discriminant Z score of discriminant function

a   =   intercept
W_1, W_2, W_3 =   discriminant coefficient for independent variable
X_1 =   independent variable, herding behavior
X_2 =   independent variable, heuristics behavior
X_3 =   independent variable, financial behaviors associated with market

The independent variables consist of :
X_1 =   herding behavior
X_2 =   heuristics behavior
X_3 =   financial behaviors associated with market

A discriminant score is a weighted linear combination (sum) of the discriminating variables. This score provides a direct means of comparing observations on each function.

The dependent variables consist of:
a. Investor decisions based on marital status is distinguished by the code :
Code 1 = married
Code 2 = status other than married
b. Investor decisions based on gender differentiated by code :
Code 1 = male
Code 2 = female
c. Investor decisions based on level of education distinguished by the code :
Code 1 = S1
Code 2 = other than S1

3. Results and Discussion
3.1. Result
3.1.1. Test Instruments
The statement in the questionnaire is considered valid if r count (as shown in column Corrected Total Item Correlation, Item - Total Statistics table) ≥ r table. R table value is 0.31, thus r count of each item in the questionnaire statement must be ≥ 0.31. The test results through SPSS found that all of the items remaining statements in the questionnaire were valid (as shown in the attachment), furthermore it can be used in this research.

The statement in the questionnaire stated reliable when the value of Cronbach 's Alpha > 0.6 . Reliability testing found that the value of Cronbach 's Alpha > 0.6 which means that the instrument of research variables was reliable.

3.1.2. Assumptions of Discriminant Analysis
Assumptions in discriminant analysis are met if each independent variable follows a normal distribution function; absence of multicollinearity between the independent variables; homogeneity of variance between groups of data (Yamin and Heri, 2011). The results of the Kolmogorov-Smirnov test has a significance value above 0.05 with Asymp.Sig value (2-tailed) is 0.610, which shows the data of this study are normally distributed.

The results of multicollinearity test shows that both independent variables have no symptoms of multicollinearity. This is evidence from the test results that shows the tolerance value above 0.1 and VIF values below 10. Homogeneity is shown in Table test Result Box's M (see table in appendix) , with sig box 's > 0.05 indicates a homogeneous variance.

3.1.3. Discriminant analysis
a. Investor decisions based on marital status

Table Test of Equality of Group Means (see table in appendix) identified factors that significantly differentiate between the two groups, which is proven through statistical tests with the F test. F test results indicate that the herding behavior and heuristic variable has p-value of each ie 0.074 and 0.917 > 0.05, indicating married status groups and status other than marriage have the same relative valuation of the herding and heuristics. Whereas the behavioral variables related to the market p-value 0,03 < 0,05, which means the group status is married and has a status other than married different assessment of the behavioral variables related to the market.

Homogeneity test is shown in Table Test Result Box 's M. (see table in appendix), with sig box 0,121 > 0,05 indicating a homogeneous variance between groups of married status, and status than marriage. Canonical Correlation value is commonly used to measure the degree of association between result of the discriminant scores and group, or to measure the amount of variability that is able to be explained by the independent variables on the dependent variable. Canonical Correlation values in Table Eigen Value 0.264, with quadrate value 6,97 % (0,264 x 0,264 = 0,0697 = 6,97%), which means that the variance of the dependent variable (groups based on marital status) can be explained using the discriminant model formed.

Table Wilks ' Lamda (see table in appendix) indicates statistical significance chi square value is 0,038 < 0,05 means there is a significant difference on the decision of investor's at the group of married status and status than marriage in the discriminant model. The Structure Matrix Table (see table in appendix) shows the sequence of the most distinguishing characteristics of the two groups. Table Structure Matrix (see table in appendix) proves that the behavior of the variables associated with the market becoming the most distinguishing characteristics of the group of married status and status than marriage.

The discriminant model equation is used to generate the discriminant function score for predicting object classification. Table canonical discriminant functions as ascertainable the discriminant model formed. Grouping function or marital status discriminant function is obtained from the discriminant analysis technique is as follows.

Zscore = - 1.363 - 1.614 Herding + 0.063 Heuristics + 1.894 Market

At the function, it can be seen the highest discriminant coefficient 1.894 compared to the others , indicating that the group of investors based on marital status turned out to be the dominant decision forming element lies in the variation of the financial behavior associated with the market. The discriminant model equations are used to generate the discriminant score that serves to predict the classification of an object (a group other than the married or married), namely:

If the value Zscore < Zcu then put into groups of respondents were married status.

If the value Zscore > Zcu the respondent entered into a section other than the married group.

$Z_{CU} =$ $(N_A Z_A + N_B Z_B) : (N_A + N_B)$
$Z_{CU} =$ Critical cutting score
$N_A =$ number of samples in group A (married status) = statitics group shown in the table
$N_B =$ number of samples in group B (status other than married)
$Z_A =$ centroid value for the group shown in table A = function of group centroids
$Z_B =$ centroid value for group B
$Z_{CU} =$ (112x0,073 + 8x(-1.016)):(112+8)
$Z_{CU} =$ 0.0004

If Zscore respondent presents under Zcu value, it will be included in a group married status, meanwhile, If Zscore respondent presents above Zcu value, it will be included in a group status other than marriage. Full results of the calculation of discriminant scores for respondents can be seen in Table Casewise in the discriminant output (data attached).

Classification Result table illustrates the crosstabulation between the initial model (original) by classifying the results of the discriminant model (predicted group). Table Classification Result shows that overall, the model has formed discriminant validation level (level of accuracy) is quite high at 93,3%.

b. Investor decisions based on gender

Table Test of Equality of Group Means proves that the value of the F test is known for herding behavior variables, heuristic, and behaviors associated with the market having p-value > 0.05, which means a group of men and women have the same relative assessment of the behavior of herding, heuristics, and behavior associ *Juli Melizza, et all* . Testing homogeneity listed in Table Test Result Box 's M , with sig box's is 0.274 > 0.05 indicates a homogeneous variance between groups of men and women.

Canonical Correlation values in Table Eigen Value is 0.112 , with quadrate value is 1.25 % which means 1.25 % of the variance of the dependent variable can be explained from the discriminant model formed. Table Wilks' Lamda indicates statistical significance chi square value is 0.689 > 0.05 means there is no significant difference on the behavior of groups of men and women in the discriminant model. Table Structure Matrix shows that the market variables most distinguishing characteristic into the group of men and women.

Discriminant model equations are used to generate the discriminant function score for predicting object classification. Table discriminan canonical discriminant is function as ascertainable the discriminant model formed:

Zscore = - 7.211 – 0.110 Herding – 0.213 Heuristics + 2.302 Market

At the function, it can be seen the highest discriminant coefficient 2,303 compared with others, this indicates that the group of investors based on sex turns forming the dominant element lies in the variation of the financial behavior associated with the market. Table classification result shows that overall, the discriminant model formed have this level of validation (accuracy) is quite high at 95.8 %.

c. Investor decisions based on level of education

Table Test of Equality of Group Means proves that the value of the F test for herding, heuristic , and behaviors associated with the market having p-value > 0.05, which means the group of S1 and other than S1 have the same relative valuation about herding behavior, heuristics, and behavior associated with the market.

Testing homogeneity in Table Test Result Box's M proves that sig box 's value is 0.326 > 0.05 indicates a homogeneous variance between groups with the group of S1 and other than S1. Canonical Correlation values in Table Eigen Value is 0,107, with quadrate value is 1,15 % which means 1,15 % of the variance of the dependent variable can be explained from the discriminant model formed.

Table Wilks ' Lamda indicates statistical significance chi square value of 0,717 > 0,05, it means there is no significant difference on the behavior of groups with the group of S1 and other than S1 in the discriminant model. Structure Matrix table proves that the behavior of the variables associated with the market becoming the most distinguishing characteristics of the two groups. Table canonical discriminant functions as ascertainable the discriminant model formed. Zscore = - 1.813 + 0.320 Herding – 1.304 Heuristics + 1.447 Market

At the function, it can be seen the highest discriminant coefficient 1.447 compared to the others, this indicates that the group of investors based on the level of education is

forming the dominant element lies in the variation of the financial behavior associated with the market.

Table classification result shows that overall, the discriminant model formed have this level of validation (accuracy) is quite high at 92,5%.

3.2. Discussion

The results show that there are significant differences between the groups decision of married status and other than marriage. Investors who are in a group of married status when making investment decisions tend to be more emphasis on financial behavior associated with the market, meanwhile for the investor group other than marriage proved relatively similar decisions. Generally, respondents who are single, use only the excess funds to meet the financing needs for short-term pleasure.

One of the ten respondents interviewed gives statement that financial arrangements cannot manage well compared to respondents who are married. Married life gives many positive benefits, especially in finance, one of which related terms for future funding. This is the evidence from the large number of respondents married couples compared to other couples status. Married couple appeared to have a clear vision of investment that can be relied on to old age or inheritance for their children, which invest in stocks. The results of this study differ from Mandot study (2012) and with Lee et al., study (2009), prove that there are significant differences between the group's decision of married status and other than marriage.

The results show that there are no significant differences between men's group with women's groups in the process of financial investment decision. This means that gender factors distinguish financial investment decision process of the investors. Groups of men and women relatively have the same opinion related to herding, heuristics and behavior associated with the market. The results shows that men and women investors when making investment decisions are not affected herding action. This is supported by the school activities of capital market securities of the company in cooperation with the Jakarta Stock Exchange Medan's Branch for all investors. These activities provide knowledge related to financial investments and provide moments of discussion and exchange of opinion among investors. Both men and women investors in this study have conducted an analysis related to the decision they do, so that every action is based on rationality. The results of observations are conducted by researchers proves that investors are likely to make more rational decisions, with an estimated return is received in accordance with the expectations of investors. The results of this study is accord with research conducted by Lee et al. (2009), proves that there are no significant differences between the groups decision of married status and other than marriage.

The results show that there are no significant differences between S1 group with other than S1 in the process of financial investment decision. In other words, the factors of education level prove that it cannot distinguish financial investment decision process of the stock investors Medan. S1 groups and other than S1 have the same relative valuation to herding, heuristics, and behavior associated with the market. The results of observations and interviews is conducted by the researchers showed that investors in Medan, before investing, they turns out follow schools of capital markets at no charge or for free, the activities are carried out by the securities firm in cooperation with the Jakarta Stock Exchange. Thus, regardless of who receive the diplomas, all investors will study again at the school's capital markets. Through the school's capital markets, the investor knowledge is related to financial investments become well, so that the investment decision has been through good analysis. The results of this study is accord with the research conducted by Lee et al. (2009) that there are no significant differences between the groups decision of S1 group and other than S1.

4. Conclusions

The results show that there are significant differences between stock investment decisions based on the status of married and other than married. Investors who are in a group of married status when making investment decisions tend to be more emphasis on financial behavior associated with the market, meanwhile, for the investor group status than marriage proved relatively similar decisions. The results show that there are no differences between men's groups and women's groups in the process of financial investment decision. This means that gender factors distinguish financial investment decision process of the stock investors.

The results showed that there are no differences between S1 groups and other than S1. This means level of education factor do not differentiate the process of financial investment decisions of the investors in Medan. S1 groups and other education S1 have the same relative valuation to herding, heuristics, and behavior associated with the market.

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