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Test of Fama & French five factor-model on Indonesian stock market

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ABSTRACT: This study aims to test the Fama & French Five-Factor Model (5FF) and the Three-Factor Model (3FF) on stocks listed in the LQ-45 Index over the 2013-2015 periods. The 5FF model includes factors of market risk premium, size, book-to-market equity, profitability, and investment. This study used a multiple linier regression analysis model in the form of panel data for the entire portfolio and each formed portfolio. The number of observations in this study was 648 consisting of 18 portfolios over the period of January 2013 - December 2015. The research findings were similar to Fama and French research (2014) that is market risk premiere has significant effect on return. Profitability has a positive effect but not significant on return. Size and investment have a significant negative effect on return. The difference in yield lies in the profitability factor, whose effect is not significant on return.

Keywords: market risk premium, size, book to market, profitability, investment

1 INTRODUCTION

According to Megginson (1997), the rate of return on an investment is the ultimate consideration for investors in investing, whereas capital gains are an important component in calculating the rate of return other than dividends in a certain period. Fama & French (1992) examined the relationship between average return by size factor, price earnings ratio, leverage, and B / M. The main result of Fama & French (1992) concludes that the size factor and book equity to market equity factor gives a simple but strong explanation for the characteristics of cross-section average returns.

Fama & French (2014) tested the performance of the Five-Factor Model (5FF) in predicting the excess return of stocks listed in the United States. At the beginning of the study, Fama and French looked at patterns of factor size, B/M, profitability, and investment against average returns. Fama and French formed three portfolio sorts, based on factor size intersection to B/M, profitability, and investment (Fama & French 2014). The pattern of a negative correlation between size and investment to return was found in all portfolios. Meanwhile, B/M and profitability had a positive correlation to return. Fama & French also conducted tests to determine the most suitable portfolio factor formation in predicting the return using 5FF. The test results showed the 2 x 3 factor (size-B/M, size-OP, size-Inv) is the best. Through simultaneous test, it was found out that the HML or B/M variable has no correlation on the 5FF model because the high average return rate of HML, as reflected by other dependent variables (Chiah & Zhong 2015). However, the regression testing result for each portfolio; i.e. formed portfolio (that is based on size - B/M, size - OP, and Size - OP – Inv) shows that: market risk premium B/M and profitability has a significant positive correlation to return while size and investment have a significant negative correlation to return. The most important result of the Fama & French model (2014) is the 5FF model that is proven able to describe the correlation of risk and return better than the 3FF model (Fama & French 2006).

This study is limited to investigate only the correlation of market risk premium, size, B/M, profitability, and investment towards excess return in all companies listed in the LQ-45 index over the three consecutive years of 2013-2015 periods.

The purpose of this research is to find empirical evidence on the effect of market risk premium, size, book-to-market equity, profitability, and investment

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against the excess return of companies listed in the LQ-45 index over the 2013-2015 period.

2 RESEARCH METHODS

This research is classified as basic research (Gujarati 2008) type that is a study to develop research that has been done before. Based on the objectives, this study is causal research type because it was conducted to examine the effect of independent variables (market risk premium, size, B M, profitability, and investment) towards the excess return variable of companies listed in the LQ-45 index over the three consecutive years of 2013-2015 periods. This research used quantitative data by involving lots of time (time series) with many samples (cross section) or called panel data (Gujarati & Porter 2012). The study used secondary data of companies obtained from the company's financial statements listed in the LQ-45 index over the three consecutive years of 2013-2015 periods.

The measurement scale used in the study was ratio scale. The data collection procedure used in the research was as follows: first, determining the required data according to the variables measured in this study; second, collecting secondary data from the data provider's site; third, processing raw data obtained from the data provider's site that matches with need analysis; and fourth, performing data tabulation in Microsoft Excel. This research used multiple linear regression method to measure the dependent variable correlation with five independent variables (Five-factor model) and three variables (Three-factor model).

3 RESULT AND DISCUSSION

The regression equation in this table shows the results of regression testing of Five-Factor Model as excess return is dependent variable, and independent variables are market risk premium, size, B / M, profitability, and investment

Table 1. The result of the Fama & French Five-Factor Model Regression Testing

Variable	Coefficient	t-statistic	prob.
C	0.00	1.43	0.06
RMRF	0.95	9.56	0.00***
SMB	-0.33	-3.23	0.00***
HML	0.18	2.70	0.01***
RMW	0.00	0.03	0.98
CMA	0.17	3.30	0.00***

*** Significance level at 1%.

$$RIRF = 0.00 + 0.95(RMRF) - 0.33(SMB) + 0.18(HML) + 0.18(RMW) + 0.17(CMA) \quad (1)$$

This equation has a constant value of 0.00 which signifies that if all independent variables are considered constant then excess return (Ri-Rf) will increase by 0.00. The coefficient (Rm-Rf) has a value of 0.95 which shows that each variable (Rm-Rf) has increased or decreased by 1 point. Thus, the variable (Ri-Rf) will increase or decrease by 0.95 points with the assumption that other variables remain constant.

The coefficient (SMB) has a value of - 0.33. This shows that each variable (SMB) has increased or decreased by 1 point. Thereby, the variable (Ri-Rf) will increase or decrease by - 0.33 points with the assumption that other variables remain constant. The coefficient (HML) has a value of 0.18. This shows that each variable (HML) has an increase or decrease of 1 point. Thus, the variable (Ri-Rf) will increase or decrease by 0.18 points with the assumption that other variables remain constant.

The coefficient (RMW) has a value of 0.00. This shows that each variable (RMW) has increased or decreased by 1 point. Then, the variable (Ri-Rf) will increase or decrease by 0.00 points with the assumption that other variables remain constant. The coefficient (CMA) has a value of 0.17. This shows that each variable (CMA) has increased or decreased by 1 point. Thereby, the variable (Ri-Rf) will increase or decrease by 0.17 points with the assumption that other variables remain constant.

Table 2. The result of the Fama & French Three-Factor Model Regression Testing

Variable	Coefficient	t-statistic	prob.
C	0.00	1.33	0.31
RMRF	0.93	15.41	0.00***
SMB	-0.27	-6.95	0.03**
HML	0.15	2.65	0.10*

*** Significance level at 1%, ** Significance level at 5%, * Significance level at 10%

Table 2 shows that market risk premium and book-to-market equity have a significant positive effect on excess return. While size has a significant negative effect to excess return. Ri-Rf = 0.00 + 0.93 (RM-RF) - 0.27 (SMB) + 0.15 (HML). Constant has a value of 0.00. This shows that if all independent variables are considered constant then the excess return (Ri-Rf) will decrease by 0.00. The coefficient (Rm-Rf) has a value of 0.93. This shows that each variable (Rm-Rf) has increased or decreased by 1 point. Thus, the variable (Ri-Rf) will increase or decrease by 0.93 points with the assumption that other variables remain constant.

The coefficient (SMB) has a value of -0.27. This indicates that each variable (SMB) has an increase or

decrease of 1 point. Thereby, the variable (Ri-Rf) will increase or decrease by -0.27 points with the assumption that other variables remain fixed. The coefficient (HML) has a value of 0.15. This shows that each variable (HML) has an increase or decrease of 1 point. Then, the variable (Ri-Rf) will increase or decrease by 0.15 points assuming the other variable remains constant.

4 CONCLUSION

Eviews 8 software was used for data processing of this research. Based on simultaneous test result, using F test, it was obtained that independent market risk (Rm-Rf), size (SMB), book-to- market (HML), profitability (RMW), and investment (CMA) simultaneously affect the portfolio returns formed on the basis of stocks listed in the LQ-45 Index over the January 2013 - December 2015 period. Judging from the coefficient of determination, the 5FF model can describe the change of return equal to 58.21% and the 3FF model can describe return change equal to 54.91%.

This study also performed the regression test per portfolio. Out of a total of 18 portfolios, only 2 portfolios show the coefficient of determination of the 3FF model is higher than the 5FF model. The coefficient of determination of the 5FF model for all portfolios is in a range 37% - 83%, while for the 3FF model is 24% - 81%. For companies that are in the consumer goods sector, this research can be used for consideration to make decisions about future company performance and prevent the company from the possibility of being in financial distress.

In addition, these factors can also be used for consideration for Malaysian, Thailand, Singapore, Vietnam, and Philippine companies in predicting future company performance and the possibility of the company being in financial distress. Based on the coefficient of determination, we can observe the ability of each model in describing the return. The coefficient of determination is only as high as 58.21% for the 5FF model and 54.91% for the 3FF model. While the coefficient of determination of the 5FF model for the test per portfolio is in a range of 37% - 83%, and for the 3FF model is 24% - 81%. In addition, if observed further and calculated its average, the coefficient of determination for the portfolio of small size companies is higher than large size companies which indicate the 5FF and 3FF models have not been able to explain the large firm return accurately.

Therefore, it is advisable for the next researcher to add some factors to be used as independent variables, in order to describe the return better. This study also shows that in the selection of stock investments or the establishment of a portfolio, there are several factors which are characteristics of the company that can be considered by investors to earn a higher return. These factors include; firm size (calculated by market capitalization), book-to-market ratio, profitability level, and level of company investment.

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