

The Determinants of Stock Return Using by Fama and French Three Factor Model (FF3FM) in IDX

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ABSTRACT

The purpose of this study is to empirically examine the influence of market, size, and value factors in the Fama and French Three Factor Model (FF3FM) on stock return of LQ45 companies from 2014 to 2018. The population of this study are all the LQ45 companies listed in the Indonesia Stock Exchange (IDX). The sampling technique used is purposive sampling, which resulted in 10 companies as the samples. The results of this study indicate that beta has a significant positive effect on stock return. Firm size has a significant negative effect, while book-to-market ratio has a positive but not significant effect on stock return. From the results of this research, it can be indicated that FF3FM is still considered as a potential asset pricing model in IDX.

Keywords: *stock return, beta, firm size, book to market ratio, Fama and French Three Factor Model (FF3FM)*

1. INTRODUCTION

The purpose of investors in making investments is to obtain the profit in form of rate of return, and there are several things that investors must pay attention to in order to obtain maximum return, one of which is the uncertainty or risk factor. Hence, this phenomenon raises an important role in asset pricing for investors in order to predict stock return.

One of the asset pricing models that can be used to estimate a stock's return is the Capital Asset Pricing Model (CAPM). CAPM theory explains that the rate of return of an asset is influenced by beta (market risk). Investors will expect a high rate of return on assets that have a high risk (high-risk high-return). This is supported by the research done by [1] and [2], which shows that beta has a positive and linear effect on expected return. However, in the application, this model is considered less able to explain the actual market conditions due to the use of assumptions that are considered too simplistic.

Following the development of CAPM, other studies have found that beta is not the only factor that can affect stock return. Some of them are earnings-price ratio from [3], firm size from [4], and book-to-market ratio from [5]. Taking into account of other factors that can affect stock return becomes the background of other asset pricing models formed. Based on that research, [6] used size, E/P, leverage, book-to-market ratio, and beta, which proved that book-to-market ratio and firm size had a significant effect on stock return. The effect of leverage and E/P on stock return can be found from a combination of firm size and book-to-

market ratio. This research found that beta cannot explain stock return.

In other research, [7] added two fundamental factors, namely size and book-to-market ratio into the CAPM. Therefore, Fama and French Three Factor Model (FF3FM) includes market factors, size factors (small minus big or SMB), and value factors (high minus low or HML). From the size factor (SMB), investors can see how the returns are generated in companies that have a small market capitalization with those having big market capitalization. From the value factor (HML), investors can see how the returns are generated in companies that have a high book-to-market ratio with those having a low book-to-market ratio. Based on these conditions, it is expected to be the basis for investors to make an investment decision by taking into account about the risk factors.

There are several studies on the FF3FM conducted by [8] [9] [10], who found that the FF3FM can explain cross-sectional stock return. The research of [11] and [12] showed that beta has an influence on predicting stock return while the size factor and value factor do not have any effect on almost the entire portfolio. With some differences in these findings, the research aimed to analyze the influence of the FF3FM in assessing the company's stock return in the Indonesia Stock Exchange (IDX).

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Literature Review

2.1.1. Investment Theory

Conceptually, [13] described investment as a capital investment in the form of money or other resources carried out at present to obtain profits in the future. In achieving its objectives, investors certainly want to get the maximum profit. Therefore, investors need to pay attention to factors that can influence the investment decisions.

2.1.2. Portfolio Theory

In portfolio theory, [14] discussed about the rational behavior of investors in making investments in order to obtain optimal profits by building a portfolio or diversification in order to minimize the risk of the asset. The guideline in this theory is "don't put all your eggs in one basket" which means not to invest your capital in one investment instrument or just in one asset, because if the investment does not give any gain, all the capital invested will be lost. This can be a consideration for investors to get the maximum profit with the lowest possible risk.

2.1.3. Capital Asset Pricing Model (CAPM)

The asset pricing model developed by [1] and [2] explains the effect of risk on the rate of return. In CAPM theory, risk is measured through the sensitivity of the rate of return to market changes, in which market risk is represented by beta. CAPM theory also states that risk and return have a positive and linear relationship whereas the greater the risk is, the greater the rate of return expected by investors (high-risk high return) will be.

2.1.4. Fama and French Three Factor Model

The asset pricing model was developed by Fama and French by using a market, size, and value factors to overcome the CAPM's shortcomings in predicting stock return. Then, [6] conducted a study of corporate stock return data from NYSE, AMEX, and NASDAQ in the period 1962 - 1989 by not including financial companies as data in the research to see the effect of each risk factor characteristic in influencing stock return.

2.1.5. Firm Size

Firm size is scaling the size of a company that can be described through total assets, stock market prices, and average sales of total assets. Based on these measurements, company size can be classified into large, medium, and small companies. With the grouping of company stocks, investors can see how the company's behavior is in

generating the return based on market capitalization from [12].

2.1.6. Book-to-Market Ratio

Book-to-market ratio is obtained by comparing the book value of a company and the market value per-share ratio. This ratio is usually used to find out how much profit is generated from the asset. Investors can use the book-to-market ratio to analyze their investments, because book value is considered as a more stable measurement indicator compared to market value. Book-to-market ratio can also be used as a comparison of companies in one sector to assess whether the companies are undervalued or overvalued by [12].

2.2. Hypothesis Development

2.2.1. The Effect of Beta on Stock Return

Market return (beta) is a systematic risk that cannot be eliminated through the diversification of a stock portfolio. The CAPM theory shows that there is a risk factor, namely the systematic risk that can affect the stock return, in which the risk factor is described through the market return. In the investors' view, the greater the risk of an asset is, the higher the rate of return the investors expect. Therefore, it can be said that the rate of return of an asset is also determined by the size of beta (market risk). In the research conducted by [15] and [11], they found that beta has a positive and significant effect on stock return. However, the research conducted by [16] found that beta has no influence on stock return. Based on the explanation, the first hypothesis is:

H₁: Beta influences stock return.

2.2.2. The Effect of Firm Size on Stock Return

A firm size, which is one of the factors in the FF3FM Model, shows an influence on the magnitude of stock return [6]. This research found that the size of a company can be the basis of investment decision making for investors, in which investors can see the performance of the company to generate profits based on market capitalization. According to [17], companies that have small market capitalization are considered able to develop their retained earnings to reduce debt, increase production capacity, and open subsidiary companies. With the growth in the company, it will attract investors to do some investment. In the research conducted by [6] and [18], firm size has a significant effect on stock return. However, [19] discovered that firm size does not have a significant effect on stock return. Based on the explanation above, the next hypothesis is:

H₂: Firm size influences stock return.

2.2.3. The Effect of Book-to-Market Ratio on Stock Return

The company's performance can be observed from the high and low book-to-market ratios. The high value of book-to-market ratio indicates the market valuation of the company's shares as a value stock or undervalued. The low value of book-to-market ratio indicates the market valuation of the company's shares as a growth stock or overvalued. Although overvalued company shares are considered too expensive by investors, they are less profitable. An overvalued share can attract the investors' attention due to several things, namely the existence of market optimism in the company's future so that investors have an optimistic view of the company's prospects, and believe the company will generate a high rate of return. On the other hand, an undervalued company share is considered too cheap by investors due to the lack of belief from market valuations, but for short-term investors, this has a potential benefit through capital gain. In the research conducted by [20], they found that the book-to-market ratio has a positive and significant effect on stock return. However, [12] found that the book-to-market ratio does not have a significant effect on stock return. Based on the explanation, the next hypothesis in this study is:

H3: Book-to-market ratio influences stock return.

3. RESEARCH METHOD

3.1. Design

This study used a quantitative analysis method, which is a research that uses numerical data or numbers obtained by statistical methods and is carried out to test the hypotheses to determine the significance of the relationship between the variables studied. Quantitative approach aims to answer the hypothetical problems in the research through observation of secondary data [21].

3.2. The Subject and Object of This Study

The subject in this study is LQ45 companies listed in the Indonesia Stock Exchange (IDX) from the year 2014 to 2018. The total sample of 10 companies were obtained through purposive sampling technique. The criteria used in the sample selection technique are: 1) The companies are consistently listed in the IDX; 2) The companies are consistently registered in LQ45 category during the period of 2014 – 2018; 3) The companies do not have a negative book-to-market equity ratio during the research period. The objects used in this study include three independent variables, namely beta, firm size, and book-to-market ratio, with one dependent variable, stock return. The data used in this research is secondary data obtained from the websites www.yahoo.finance.com, www.idx.co.id, and www.sahamok.com.

3.3. Operational Definition and Variable Measurement

3.3.1. Market Return

Beta (market return) is the difference between the market return (R_M) and the risk-free rate (R_F) per month, whereas the risk-free rate used is referred to as BI-rate / month.

$$\text{Market Return (Rm)} = R_M - R_F \dots\dots\dots (1)$$

3.3.2. Small Minus Big (SMB)

Size factor (SMB) is the difference between the average excess return on a small company's stock portfolio with an average excess return on a large company's stock portfolio which is calculated each month. The small minus big (SMB) can be measured by using this formula:

$$\frac{(\text{Small Value} + \text{Small Neutral} + \text{Small Growth})}{3} - \frac{(\text{Big Value} + \text{Big Neutral} + \text{Big Growth})}{3} \dots\dots\dots (2)$$

3.3.3. High Minus Low (HML)

Value factor (HML) is the difference between the average excess return on a high BE/ME portfolio with an average excess return on a low BE/ME portfolio which is calculated each month. The high minus low (HML) can be measured by using this formula:

$$\frac{(\text{Small Value} + \text{Big Value})}{2} - \frac{(\text{Small Growth} + \text{Big Growth})}{2} \dots\dots\dots (3)$$

3.3.4. Stock Return

Stock return is the result of stock investment obtained by investors. There is a difference between expected return and realized return. The stock return can be measured by using this formula:

$$\text{Stock Return} = \frac{(P_t - P_{t-1})}{P_{t-1}} \dots\dots\dots (4)$$

3.3.5. Data Analysis Method

The data used in this study is a combination of time-series and cross-sectional data, namely panel data. This research used the multiple linear equations which were tested by random effect model (REM). Due to the use of panel data, the classical assumption test used is the multicollinearity test and the heteroscedasticity test, to find out whether the regression model in this study is free from the multicollinearity and heteroscedasticity effects. The regression model in this research is as follow:

$$R_i - R_F = a + b_i (R_M - R_F) + s_i (\text{SMB}) + h_i (\text{HML}) + e \dots (5)$$

whereas:

- R_i = Historical stock return (monthly)
- R_F = Risk-free rate (monthly SBI)
- a = Constants
- b_i = Market beta regression coefficient
- R_M = Monthly market return
- SMB = Difference in return of small stock portfolio with return of large stock portfolio
- s_i = Stock regression coefficient i against SMB return
- HML = Difference in return of high BE / ME portfolio and return of low BE / ME portfolio
- h_i = Stock regression coefficient i against HML return
- e = Error-term

4. RESULTS AND DISCUSSIONS

4.1. Descriptive Statistics

The description of the objects and subjects tested in this research is shown to identify the behavior of each independent variable. The statistical test results on asset pricing factors and the correlations can be seen through the following Table 1a & Table 1b.

Table 1a Descriptive Statistics

Parameter	E(R _m)	SMB	HML
Mean	0.000413	-0.011418	-0.01627
Std. Dev	0.007281	-0.004625	-0.02047
Median	0.02496	0.008284	0.014519
Min	-0.061452	-0.0417	-0.04189
Max	0.015408	0.018694	0.022215

Source: Data processing results (2020)

Table 1b Correlations

Parameter	E(R _m)	SMB	HML
E(R _m)	1	0.553374	0.219586
SMB	0.553374	1	0.655143
HML	0.219586	0.655143	1

Source: Data processing results (2020)

From the results of the statistical test of asset pricing factors, it can be seen that the average market return is 0.000413 with a standard deviation of 0.015408. This positive risk-premium value indicates that the average market return (R_M) tends to be greater than the risk-free interest rate (R_F). Small Minus Big (SMB) has an average value of -0.011418 with a standard deviation of 0.018694. A negative SMB value indicates that companies with large market capitalization have a greater average return than those with small market capitalization.

Meanwhile, the High Minus Low (HML) value is -0.016269 with a standard deviation of 0.022215. A negative HML value indicates that companies with a low book-to-market ratio have a greater average return than those with a high book-to-market ratio.

4.2. Classic Assumption Tests

4.2.1. Multicollinearity Test

The multicollinearity effect is tested by looking at the value of Centered VIF on the test results. The regression model is said to be free of multicollinearity if the Centered VIF value is smaller than 10. The multicollinearity test results can be seen in Table 2.

Table 2 Multicollinearity Test Results

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.60E-05	1.700934	NA
E(R _M)	0.061292	1.520928	1.519814
SMB	0.069431	3.499075	2.534271
HML	0.035835	2.858211	1.847293

Source: Data processing results (2020)

Based on the multicollinearity test results, each independent variable has a Centered VIF value smaller than 10 so that it can be interpreted that there is no multicollinearity problem in the regression equation.

4.2.2. Heteroscedasticity Test

The heteroscedasticity effect is tested by looking at the value of Prob. Chi-Square (3) on the test results. A regression model is said to be free from heteroscedasticity effect, if the value of Prob. Chi-Square (3) is larger than 5%. The results can be seen in Table 3 below.

Table 3 Heteroskedasticity Test Results

Parameter	Number	Parameter	Number
F-statistics	0.243738	Prob. F (3,46)	0.8654
Obs*R-squared	0.782361	Prob. Chi-Square (3)	0.8537
Scaled explained SS	0.889535	Prob. Chi-Square (3)	0.8280

Source: Data processing results (2020)

The heteroscedasticity test results show that the value of Prob. Chi-Square (3) in Obs* R-squared is 0.8537 (> 0.05) so that it can be interpreted that there is no heteroscedasticity effect in the regression equation.

4.3. The Results of Multiple Linear Regression Analysis

Based on the results of multiple analysis test results in Table 4 below, the multiple linear regression is obtained as follow: Excess Return = - 0.006158 + 1.534220 Market Return – 0.303329 SMB + 0.056479 HML.

Table 4 Multiple Regression Analysis Test Results

Variable	Coefficient	Std. Error	t-statistic	Prob.
C	-0.006158	0.002602	-2.366918	0.0222
E (Rm)	1.534220	0.161244	9.514892	0.0000
SMB	-0.303329	0.171617	-1.767480	0.0838
HMB	0.056479	0.123293	0.458091	0.6490
R-Squared	0.504210	F-stat	15.59371	
Adj-R Squared	0.471875	DW	1.139701	

Source: Data processing results (2020)

A constant value of -0.006158 means that if the market return, firm size, and book-to-market are zero, then the value of the excess return is -0.006158. The market return regression coefficient shows the value of 1.534220, which means that if the market return increases by 1 percent, it will cause an increase in the excess return by 1.534220 percent. The SMB regression coefficient shows the value of -0.303329, which means that, if the size (SMB) increases by 1 unit, it will cause a decrease in the excess return by 0.303329 percent. The HML regression coefficient shows the value of 0.056479, which means that, if the value of HML increases by 1 unit, it will cause an increase in the excess return by 0.056479 percent.

The adjusted R-squared value of 0.471875 indicates that the three independent variables, namely beta, firm size, and book-to-market ratio have a contribution in predicting the excess return by 47.18%, while the remaining 52.82% of the variation in the excess return is influenced by other variables not included in this research.

The F-test (simultaneous test) conducted on the independent variables is used to determine whether the regression model is feasible or not. It can be seen that the prob (F-statistics) value of the test result is 0.0000 (< 0.05), which means that the regression model used is good fit.

The partial test (t-test) on each independent variable can be seen in the results of the multiple regression analysis test in Table 4. Market return (beta) shows a coefficient of 1.534220 with a probability-value of 0.0000 (< 0.05). This shows that market return has a positive and significant effect on stock return. The results of this test are following the first hypothesis proposed in this research, that beta has a significant effect on stock return. Therefore, H_1 was accepted.

Size (SMB) shows the coefficient of -0.303329 with a probability-value of 0.0838 (< 0.10). This shows that size has a negative and significant effect on stock return. The result of this test is in accordance with the second hypothesis proposed in this study, namely firm size has a significant effect on stock return. Therefore, H_2 was accepted.

Value (HML) shows the coefficient of 0.056479 with a probability-value of 0.6490 (> 0.05). This shows that value has a positive, but not significant effect on stock return. The result of this test is not following the third hypothesis proposed in this study, namely the book-to-market ratio has

a significant effect on stock return. Therefore, H_3 was rejected.

4.4. Discussions

4.4.1. The Effect of Beta on Stock Return

The result of the first hypothesis test found that beta has a positive and significant effect on LQ45 company stock return in the period of 2014 - 2018. Therefore, this indicates that the higher market return or risk premium in the market will cause an increase in stock return. Furthermore, the result of this study is not consistent with the research conducted by [6], which found that beta does not affect stock return. From the results of data analysis, the difference in this research can be caused by the difference in capital market behavior, whereas investors in Indonesia view the risk as an important and very influential factor in predicting stock return. Meanwhile, the result of this study is consistent with the research conducted by [15] and [11], which found that beta has a positive and significant effect on stock return. This finding supports the enforceability of CAPM in IDX.

4.4.2. The Effect of Firm Size on Stock Return

Based on the second hypothesis, it is found that firm size has a negative and significant effect on LQ45 company stock return in the period of 2014 - 2018. This indicates that the smaller market capitalization of the company causes a decrease in stock return. The result of this study indicates that large market-capitalized companies tend to generate higher excess return compared to small market-capitalized companies, because investors find that large companies can generate maximum profit which can be seen from the rate of return on investment. This means that large companies can generate return which is higher based on the company's stock market price. The result of this study is consistent with the research conducted by [6] and [18], which found that firm size has a significant effect on stock return. This finding supports the enforceability of FF3FM in IDX.

4.4.3. The Effect of Book-to-Market Ratio on Stock Return

Based on the third hypothesis, it is revealed that the book-to-market ratio has a positive effect, but it does not significantly affect the LQ45 company stock return in the period of 2014 - 2018. This indicates that the higher the company's book-to-market ratio is, the higher the increase in stock return it can cause. The result of this study indicates that companies with high book-to-market ratio tend to generate a greater excess return than those with low book-to-market ratio. However, the insignificance of book-to-market ratio on stock return due to the high or low book-to-market ratio among the LQ45 companies does not always describe that those companies have a bad prospect based on their market values. Therefore, an undervalued or

overvalued company share does not always mean that the company has a good or bad future prospect. The result of this research is consistent with the research conducted by [12], which shows that the book-to-market ratio does not have a significant effect on stock return. This finding does not support the enforceability of FF3FM in IDX.

5. CONCLUSION & SUGGESTION

5.1. Conclusion

The results of this study show that the Capital Asset Pricing Model (CAPM) theory is still relevant to be used in predicting the stock return. This is indicated in the result of the first hypothesis testing, which found that beta significantly influences stock return as evidenced by the significance value of 0.000 (< 0.05). However, it does not rule out the Fama and French Three-Factor Model (FF3FM), which is a multifactor model used to predict the stock return. This is indicated by one of the two fundamental factors in FF3FM, namely size that has a significant effect on stock return as evidenced by the significance value of 0.0838 (< 0.10), while the book-to-market ratio does not have a significant effect on stock return as evidenced at the significance value of 0.6490 (> 0.05). Finally, from the overall results of hypotheses testing, this research can indicate that FF3FM is still considered as a potential asset pricing model in IDX.

5.2. Suggestion

For further research, it can be suggested to add other independent variables that can influence the stock return, such as momentum, investment, and profitability, so that the investors can predict the stock return more accurately. It is advised to add more research samples such as companies listed in the IDX other than the LQ45 companies so that the scope of research can be wider. In further research, the research period can also be extended to illustrate the long-term condition of the companies. Future researchers can include the systemic and idiosyncratic risk factors due to the occurrence of the global pandemic COVID-19 crisis to see the extent of the testing power and consistency of the results of FF3FM, when the capital market is not normal.

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