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Analysis of the French Five Factors Fama Model on Excess Return of Stocks Listed on IDXBUMN20 for the Period 2020-2023

Linda Damayanti Putri[1*], Riaman[2], Sukono[3]

[1]*Mathematics Undergraduate Study Program, Faculty of Mathematics and Natural Science, Padjadjaran University, Sumedang, Indonesia*
[2,3]*Department of Mathematics, Faculty of Mathematics and Natural Science, Padjadjaran University, Sumedang, Indonesia*

**Corresponding author email: linda21003@mail.unpad.ac.id*

Abstract

Excess return is the difference between the rate of return earned on an investment and the rate of risk-free return in a given period. This shows how much return is received because they are willing to take risks in investing. This study aims to analyze the Fama French Five Factor model on the excess return of stocks listed in IDXBUMN20 2020-2023 period. The factors in the model are market factors, size factors, book to market ratio, profitability, and investment. The population in this study amounted to 20 companies registered in the IDXBUMN20 index, the sample selection in this study used the purposive sampling method and a sample of 12 companies was obtained. The data used in the study are close price, number of shares outstanding, Bank Indonesia (BI) interest rate, and company financial statements. The analysis method used was the Common Effect Model (CEM) panel data regression analysis. Based on hypothesis testing, market factors were obtained which only had an effect on excess returns. This factor shows the influence of the ups and downs of market performance on the price of a stock.

Keywords: Excess Return, Fama French Five Factor, IDXBUMN20

1. Introduction

The capital market is one of the important pillars in a country's economy, because through the capital market, companies can obtain funds from investors to support their businesses. One of the most popular instruments in the capital market is stocks. Shares are defined as proof of a company's share of ownership, which means that if someone owns shares then that person owns a share of the company's ownership (Tannadi, 2020). Stock investing basically offers great profit potential. An investment is a current commitment to money or other resources in the hope of earning profits in the future (Bodie, 2014)

Seeing the wishes of the public and considering the growth of the capital market in Indonesia, it is important for investors to know the performance of stocks (Munawaroh & Sunarsih, 2020). Based on data from the Indonesian Central Securities Depository (KSEI), the growth in the number of stock investors has increased since 2020, Overall the number of investors in the Indonesian capital market has increased significantly from 3,880,753 in 2020 to 12,168,061 in December 2023. The purpose of investment is to optimize returns. Return is the return of income or returns received by investors from the investments they make, and is used as a factor that motivates investors to make investments (Acaravci & Karaomer, 2017). Returns are always an early indicator of performance, but excess returns provide a clearer picture of the added value that investors get after deducting risk-free returns.

A popular calculation model is the Capital Asset Pricing Model (CAPM). Where this model uses market risk factors to measure risk in estimating returns. However, over time, CAPM began to show its weakness that the expected return estimate was often unable to explain the true return. Fama and French in 1993 found that stocks with small market capitalizations but high book-to-market ratios tend to provide higher average returns than stocks with large market capitalizations but low book-to-market ratios. They then created the Fama French Three Factor Model which includes the market factor (MKT), size factor or Small Minus Big (SMB), book to market ratio or High Minus Low (HML). In further research, Fama & French (2015) added profitability or Robust Minus Weak (RMW), and investment or Conservative Minus Aggressive (CMA) to the three-factor model, making it the Fama French Five Factor Model.

According to Komara (2020), market factors can be used as an analytical tool in making decisions by investors, whether to invest in the capital market or not. According to Shiddiq (2020), size (market capitalization) can affect excess stock returns because the size and size of a company's capitalization will affect profits and risks. The book to market ratio shows how far a company is able to create company value relative to the amount of capital invested. Profitability describes the level of profitability of a company. Investment is earned by looking at the total growth of assets. Companies with high total assets have low average returns, while companies with low total assets have high average returns (Djamaluddin, 2017).

There are several studies that raise excess return as an object. Darma and Lestari (2022) researched the Fama French Five Factors Model on the excess return of Kompas 100 index stocks. The results showed that Market Factor (MKT), Small Minus Big (SMB), and High Minus Low (HML) had a significant positive effect on excess return while Robust Minus Weak (RMW) had a negative effect on excess return and Conservative Minus Aggressive (CMA) did not affect excess return. Wahyudi, Nurmatias, and Nugraha (2022) examined the analysis of the Fama French Five Factors Model in influencing stock excess returns in LQ45. The results of the study show that all factors in the model have a significant positive effect on the excess return of stocks in all portfolios formed.

Based on previous research, this study has differences in the data, namely the IDXxBUMN20 index. This index is an index consisting of 20 shares of state-owned companies (BUMN) listed on the Indonesia Stock Exchange (IDX). The next difference is the criteria for the purposive sampling method used for the selection of the number of IDXBUMN20 stocks selected for the research.

2. Literature Review

2.1. Investment

Investment is the process of investing funds in a current investment asset or instrument, with the hope of making profits in the future. Tarigan (2021) defines investment as delaying current consumption to obtain higher value or profit in the future.

Investment can be made through two methods, namely direct investment and indirect investment (Khomari, 2020). Direct investment is made by purchasing financial assets directly from a company either through intermediaries or in other ways. Meanwhile, indirect investment is carried out by buying shares from investment companies that have a portfolio of financial assets from other companies (Jogiyanto, 2014). Individuals or Institutions who make investments with the aim of getting returns as compensation for the risks taken are called investors.

2.2. Stock Return and Excess Return

According to Komara (2016), return is the return of income or returns received by investors from their investments, which serves as a driver for investors to invest. Stock returns consist of two components: realized return and expected return. Realized return is a return that has already occurred and can be calculated based on historical data, while expected return is the return expected by investors in the future. While the return of expectations is futuristic, the return of realization is one that has been realized. Realized stock return can be calculated using equation (1)

$$R_{it} = \frac{P_{it} - P_{i\,(t-1)}}{P_{i\,(t-1)}} \tag{1}$$

with

R_{it} : return of stock i at time t
P_{it} : The closing price of the stock i at time t
$P_{i\,(t-1)}$: The closing price of the stock i at time $(t-1)$
n : the amount of stock data observed
m : the number of observation periods.

Excess return is defined as the difference between the return of each company's shares (return and risk-free rate) (Hartono, 2017). The risk-free rate is the level of return that investors can earn without facing the risk of loss. Excess Return will depend on the comparison of the investment returns designated for analysis. Excess return can also be interpreted as the difference between risky investments and risk-free investments. According to Shiddiq (2020) Excess return can be calculated using the equation (2)

$$\text{Excess Return} = R_{it} - R_{ft} \tag{2}$$

with

R_{it} : actual individual return of the stock i at time t
R_{ft} : risk free at time t

2.3. Fama French Five Factor Model

Fama & French (2015) tested a five-factor asset pricing model that added probability and investment factors to market factors, size and book to market from the Fama French Three Factors Model. In Fama & French's (2015) study, the left-side asset (LHS) used to test the five-factor model is a portfolio formed by the size of the company and a combination of book to market equity ratio, profitability, and investment. Fama & French (2015) note that adding all five factors results in better accuracy compared to the Three Factors Model. The factors considered, namely, size or Small Minus Big (SMB), book to market or High Minus Low (HML), as well as adding profitability or Robust Minus Weak (RMW) and investment or Conservative Minus Aggressive (CMA). The Fama French Five Factor model equation is as follows:

$$R_{it} - R_{ft} = \beta_0 + \beta_1 MKT_t + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 RMW_t + \beta_5 CMA_t + e_{it} \quad (3)$$

with

R_{it} : actual individual return of the stock i at time t
R_{ft} : risk free at time t
β_0 : intercept
$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$: the coefficient of each factor
MKT_t : Market Factor at the time oft
SMB_t : Small Minus Big factor at time t
HML_t : High Minus Low factor at time t
RMW_t : Robust Minus Weak factor at time t
CMA_t : Conservative Minus Aggressive factor at time t
e_{it} : Error for the stock i at time t

2.3.1. Market Factor

The market factor is formed by calculating the difference between market returns and the risk-free rate (Sutrisno and Ekaputra, 2016). If the market factor value is high, the return that will be obtained by investors will also be high. Meanwhile, the lower the market factor, the lower the risk that investors will face, so that the return on the shares obtained will be low (Komara, 2020). To find market excess return (MKT), the calculation formula is as follows:

$$MKT_t = R_{mt} - R_{ft} \quad (4)$$

with

R_{mt} : return market at time t
R_{ft} : risk free rate at time t

2.3.2. Size Factor

Size refers to the size of the company, which is expressed in the market capitalization value (Wijaya & Murhadi, 2015). In portfolio analysis, the size of the company is calculated based on the market equity value of each stock at the end of the year. To find the tsize at the time, the calculation formula is as follows:t

$$\text{Size}_t = \text{stock price}_t \times \text{number of stock outstanding}_t \quad (5)$$

The size factor is projected with Small Minus Big (SMB). SMB is the difference each month between the average return on nine small stock portfolios and the average return on nine large stock portfolios. SMB can be calculated with the following equation:

$$SMB_{BM} = \frac{(SH + SM + SL) - (BL + BM + BH)}{3} \quad (6)$$

$$SMB_{\frac{O}{P}} = \frac{(SR + SM + SW) - (BR + BM + BW)}{3} \quad (7)$$

$$SMB_{INV} = \frac{(SC + SM + SA) - (BC + BM + BA)}{3} \quad (8)$$

$$SMB = \frac{SMB_{\left(\frac{B}{M}\right)} + SMB_{\left(\frac{O}{P}\right)} + SMB_{(INV)}}{3} \quad (9)$$

2.3.3. Book to market

The book to market (BM) ratio is the ratio of book equity and market equity. Total equity is obtained from the company's annual financial statements.

$$\mathrm{BM} = \frac{\text{Total equity}_t}{\text{Market capitalization}_t} \tag{10}$$

Stocks that fall into the high category are 30% of stocks that have the highest BM ratio. Stocks that fall into the low category are 30% of stocks that have the lowest B/M ratio, and stocks that fall into the medium category are the other 40% (Acaravci & Karaomer, 2017). BM is projected with High Minus Low (HML). HML is the difference every month between the average return on two portfolios that have a high book-to-market risk and the average return on two portfolios that have a book-to-market risk. HML can be calculated with the following equation (11):

$$\mathrm{HML} = \left(\frac{(\mathrm{SL} + \mathrm{BL})}{2}\right) - \left(\frac{(\mathrm{SH} + \mathrm{BH})}{2}\right) \tag{11}$$

with

SL : Return Company Portfolio Small-Low
SH : Return Company Portfolio small-high
BL : Return Company Portfolio Big-Low
BH : Return Company Portfolio Big-High

2.3.4. Profitability Factor

Profitability measures a company's ability to generate net profit based on a specific level of sales, assets, and share capital. The three main ratios that are often discussed are profit margin, return on total assets (ROA), and return on equity (ROE). Profit margin assesses the extent to which a company can generate a net profit from sales, as well as reflecting cost efficiency. ROA measures net profit based on a company's total assets, while ROE shows profit based on share capital. The calculation of ROE can use the equation (12)

$$\mathrm{ROE} = \frac{\text{Net income}}{\text{Total equity}} \tag{12}$$

The profitability factor is proxied with Robust Minus Weak (RMW) which calculates the average difference in return between portfolios with high and low profitability. In general, high profitability is positively related to higher returns for investors, while low profitability will result in lower returns (Sutrisno, 2016). RMW can be calculated by equation (2.13).

$$\mathrm{RMW} = \frac{(\mathrm{SR} + \mathrm{BR})}{2} - \frac{(\mathrm{SW} + \mathrm{BW})}{2} \tag{13}$$

with:

SR : Return Company Portfolio small-robust
SW : Return Company Portfolio small-weak
BR : Return Company Portfolio Big-Robust
BW : Return Company Portfolio Big-Weak

2.3.5. Investment Factor

Investment reflects the level of investment of a company as measured through the growth of total assets. Investment can be calculated using the equation (14)

$$\mathrm{INV} = \frac{\text{Total assets}_t}{\text{Total assets}_{t-1}} - 1 \tag{14}$$

The investment factor is proxied with Conservative Minus Aggressive (CMA). CMA is the difference every month between the average return on two portfolios with conservative investment and the average return on two portfolios with aggressive investment. CMA can be calculated by equation (15).

$$\text{CMA} = \frac{(\text{SC} + \text{BC})}{2} - \frac{(\text{SA} + \text{BA})}{2} \tag{15}$$

with

SC : Return Company Portfolio Small-Conservative
SA : Return Company Portfolio small-aggressive
BC : Return Company Portfolio Big-Conservative
BA : Return Company Portfolio Big-aggressive

2.4. Panel Data Regression Analysis

Panel data regression analysis is a data analysis technique that combines cross section data and time series data. Panel data is data collected from several of the same individuals over a certain period of time. Using panel data regression analysis in the case of stocks has an advantage because stock data typically has cross-sectional (inter-company) and time series (time-based) characteristics. The general form of linear regression of panel data can be statistically expressed as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \cdots + \beta_k X_{kit} + e_{it} \tag{16}$$

2.5. Panel Data Regression Estimation Model

According to Muhammad Iqbal (2015), panel data regression has the same purpose as multiple linear regression, namely predicting intercept and slope values. The use of panel data in regression will result in different intercepts and slopes at each corporate entity and each time period. Tests to determine the panel data regression estimation model can use the chow test. The chow test is used to decide whether the Common Effects Model or Fixed Effects Model is more appropriate (Baltagi, 2008).

2.5.1. Common Effect Model (CEM)

The common effect model assumes that there is no difference in intercept and slope values in the regression results either for differences between entities or between times. The Ordinary Least Square (OLS) method is the simplest method of parameter estimation in the common effect model, namely by combining time series data and cross section data.

2.5.2. Fixed Effect Model (FEM)

The Fixed Effect model approach assumes that the interception of each entity is different while the slope between entities is fixed (the same). The method of estimating panel data regression in the Fixed Effect model uses the technique of adding dummy variables or Least Square Dummy Variables (LSDV).

2.6. Classic Assumption Test

2.6.1. Normality Test

According to Dewi (2018), the normality test aims to find out whether the data or variables used have been distributed normally or not. The normality test can use the Jarque-Bera test. The basic concept of the Jarque-Bera test is to measure the difference between skewness and data kurtosis. Skewness is a statistic that describes the tendency of the distribution of data to be skewed to the left, to the right, or symmetrical, while kurtosis is a measure that shows how sharp or pointed the distribution of data is. The criterion for the Jarque-Bera test is if the data $\text{p} - \text{value} > \alpha$ is distributed normally. With α is the level of significance.

2.6.2. Autocorrelation Test

Mardiatmoko (2020) explained that autocorrelation is a state in the regression model that there is a correlation between the residual in the period (t) and the residual in the previous period $(\text{t} - 1)$. Decision-making on whether or not there is autocorrelation through the Breusch-Godfrey Serial Correlation LM Test. If the p-value is higher than the significance level, then the data is free from autocorrelation. The criteria for the Breusch-Godfrey Serial Correlation LM Test test are if $(\text{n} - \text{p})\text{R}^2 > \text{X}_\text{p}^2$ or $\text{p} - \text{value} < \alpha$ then H_0 rejected

2.6.3. Multicollinearity Test

The multicollinearity test is used to find out whether there is a relationship or correlation between independent variables in the regression model. The criterion for the multicollinearity test is that if the Variance Inflation Factor (VIF) is < 10 and the tolerance value is > 0.01, then it means that there is no multicollinearity problem. And conversely, if the VIF value is > 10 and the tolerance value is < 0.01, then there is a problem of multicollinearity.

2.6.4. Heterokedasticity Test

The purpose of the heteroscedasticity test is to test whether in a regression model there is a difference in residual variance from one observation to another. Heteroscedasticity can be interpreted as the occurrence of dissimilarity or difference in variance from residual for all observations in the regression model (Mardiatmoko, 2020). Heteroscedasticity testing was carried out using the Glejser test. In the Glejser test, in the first stage, Y is regressed against X to obtain e_i. Furthermore, in the second stage, $.|e_i|$ is regressed against X

2.7. Simultaneous Test (F Test), Partial Test (t Test), and Determination Coefficient Test

The F-test tests the overall influence of variables, H_0 rejected if $F_{count} > F_{(a,k,n-k-1)}$ it means that the relationship between all independent variables nd dependent variables has a significant effect. The t-test tests the influence of each variable, If after the calculation is obtained $|t_{hitung}| > t_{(\alpha/2,n-k-1)}$, then the value is in the rejection area, so H_0 it is rejected at the confidence level $(1 - a) - 100\%$. And the R^2 test measures how well the model explains the variation in excess return, the R^2 value ranges from $0 < R^2 < 1$. The value of R^2 is always positive, because it comes from the ratio of the number of regression squares to the total number of squares.

3. Materials and Methods

3.1. Materials

The object of this study uses companies listed in the index IDXBUMN20 the 2020-2023 period. This research uses secondary data obtained from various sources, including close price data, number of outstanding shares, Bank Indonesia interest rates, and financial statements of IDXBUMN20-listed companies published in 2021-2023. Data is uploaded from https://stockanalysis.com/, www.bi.go.id, and www.idx.co.id websites.

The population in this study is 20 companies listed in IDXBUMN20 2020-2023 period. Sampling technique with purposive sampling where the data taken is in accordance with certain considerations (Siregar, 2013). The criteria used in the selection of research samples are:

a) Companies that are consistently included in the IDXBUMN20 index during the 2020-2023 period.
b) Companies that publish financial statements that have complete data for the 2020-2023 period.
c) Financial statements are presented in rupiah (Rp)

From a population of 20 companies, 12 companies were obtained that met the criteria, including BBNI, BBRI, BBTN, BJBR, BMRI, ELSA, JSMR, PTPP, SMGR, TINS, TLKM, WIKA.

3.2. Methods

a) Collect data from financial statements to calculate size using equation (2.5), calculate BM using equation (2.10), calculate ROE using equation (2.12), and calculate INV using equation (2.14)
b) Categorize portfolio size/BM, size/ROE, and size/INV
c) Calculating Excess Return (ER), MKT, SMB, HML, RMW, and CMA
d) Analyzing the Descriptive Statistics of the French Five Factor Fama Model Data
e) Determining the Estimation Method with the Chow Test to determine whether the estimation model to be used is common effect or fixed effect
f) Perform a Classical Assumption Test which includes normality test, autocorrelation test, multicollinearity test, and heteroscedasticity test on Fama French Five Factor Model Data
g) Analyzing Regression on the French Five Factor Fama Model Data
h) Hypothesis Testing with Simultaneous Test (F Test), Partial Test (t Test), and Determination Coefficient Test (R^2)

4. Results and Discussion

The first step to produce the data to be analyzed is to calculate the size. After obtaining the size value, it is then sorted from the smallest to the largest value and divided into two groups, namely the small (S) and big (B) company groups. Then to form a portfolio size/BM, the company's BM value is sorted from smallest to largest value and then

divided into three categories, namely low (L) 30%, medium (M) 40% and high (H) 30%. The same is also done to the size/ROE, and size/INV portfolios. Based on the results of the research data processing, the following descriptive statistical results were obtained:

Table 1. Descriptive Statistics

	ER	MKT	SMB	HML	RMW	CMA
Mean	−0.0522	−0.0297	−0.1496	1.2911	−1.5235	−0.5780
Median	−0.0435	−0.0288	−0.1730	1.2644	−1.4539	−0.7100
Maximum	0.2827	0.2063	0.1951	1.6694	−0.4460	1.0013
Minimum	−0.4973	−0.3245	−0.4523	0.9141	−2.5788	−1.5860
Std. Dev.	0.1599	0.1048	0.1914	0.2119	0.6284	0.7888
Sum	−0.8350	−0.4759	−2.3937	20.6575	−24.3753	−9.2485
Observations	16	16	16	16	16	16

Based on Table 1, the average ER is negative, which means that in general the stocks in the sample have returned lower than expected. The same thing happened to MKT, SMB, and CMA, which also had negative averages. Meanwhile, HML has the highest average of 1.2910, indicating that stocks with high book to market provide better returns than growth stocks. The results of the chow test using Eviews yielded a cross-section probability value of F of 0.7299. This means that the value is greater than the significance value (5%), so the estimation model used in the study is the Common Effect Model approach.

The classical assumption test was carried out using Eviews 10 and produced normally distributed data with a Jarrque-Bera probability value of 0.620976 which is greater than 5%. Based on the Breussch-Godfrey Seral Coreelation LM Test , the probability value shows a figure of 0.1674. That is, it is greater than 5%, It can be said that there is no correlation between the residual in the period (t) (time) and the error of the period $(t-1)$. Multicollinearity testing by looking at the VIF value, and the results showed all variables had a VIF value of < 10 and a tolerance value > 0.01. That is, there is no strong correlation or relationship between the independent variables in the regression model. And the Glesjer test for heteroscedasticity testing also yielded a value of 0.2836, where the value is more than 5%. This shows that in the model there is no heteroscedasticity problem. The estimation of regression parameters is obtained by the following equation-like model:

$$\text{ER} = 0.0025 + 1.7359\,\text{MKT} + 0.0358\,\text{SMB} + 0.0123\,\text{HML} + 0.0056\,\text{RMW} - 0.0107\,\text{CMA} \qquad (4.1)$$

An interception of 0.0025 is the expected excess return when all factors are zero. Any 1% increase in market factor (MKT) will increase the excess return by 0.017359, making it the most influential factor in the model. A 1% increase in the size factor (SMB) will increase the excess return by 0.0358. A 1% increase in the book to market (HML) factor adds 0.0123 to excess return. A 1% increase in profitability factor (RMW) increased excess return by 0.0056. Meanwhile, the investment factor (CMA) has a negative influence, where every 1% increase in this factor actually decreases the excess return by 0.0107.

Testing the hypothesis simultaneously produces a probability value of F-statistic $>$ significance value 5% $(0.0672 > 0.05)$. Therefore, the researcher transformed the data by squaring the values of MKT, SMB, HML, and CMA variables. The data is then retested and produces the following values:

Table 2. F Test Results

	Df	Sum of Squares	Mean Square	F	Significance F
Regression	5	0.0446	0.0089	6.6408	0.0057
Residual	10	0.0134	0.0013		
Total	15	0.0581			

Based on Table 2, the F-statistical probability value < significance value $(0{,}0057 < 0.05)$. Because $F_{table} = 3{,}3258$ then $F_{count} > F_{table}$ so it can be concluded that independent variables have a significant relationship with dependent variables. The test results can be seen in Table 3

Table 3. T Test Results

	Coefficients	Standard Error	t Stat	P-value
MKT	1.7360	0.4069	4.2665	**0.0016**
SMB	0.0358	0.2040	0.1757	0.8640
HML	0.0123	0.0197	0.6261	0.5453
RMW	0.0056	0.0171	0.3279	0.7498
CMA	-0.0107	0.0125	-0.8597	0.4101

Only MKT has a p-value below 5%, so it can be concluded that MKT has a significant influence on excess return. This means that the overall market movement greatly affects the level of profit of the stock in the IDXBUMN20. Broader market conditions, such as JCI closing prices, market returns, and interest rates can affect investment decisions. The magnitude of the R-square value is . This shows that the 0.7685 dependent variable (excess return) can be explained by the independent variable (MKT, SMB, HML, RMW, and CMA) of 76.85%

5. Conclusion

Based on the results of the research and discussion, it was concluded that the stocks selected based on the purposive sampling method with the specified criteria were BBNI, BBRI, BBTN, BJBR, BMRI, ELSA, JSMR, PTPP, SMGR, TINS, TLKM, WIKA. The influence of market factors, size factors, book to market ratio, profitability, and investment on excess returns on IDXBUMN20 stocks is not all significant, only market factors have a significant influence on excess returns. On the other hand, SMB, HML, RMW, and CMA did not have a significant influence on excess returns in the study period. These stocks are more influenced by government policies and overall economic conditions than internal factors of the company. The variable strength of the Fama French Five Factor model affects the excess return on IDXBUMN20 shares, which is 76.85%.

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