

Fama-French Three Factor Model: A Study on LQ 45 Companies In Indonesia Stock Exchange

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Abstract: *This study aims to determine the effect of the Fama-French Three Factor Model variable, which is excess return (market, size, and book to market equity) on excess return portfolio of shares in LQ-45 companies in the Indonesia Stock Exchange in January 2016 – December 2018. Data sources used in this research is the closing price of shares taken from the official website of the Indonesia Stock Exchange (www.idx.co.id) and the risk free rate per month is obtained from the website of Bank Indonesia (www.bi.go.id). The samples used in this study is 32 companies using the purposive sampling method. The analytical method used is multiple linear regression. The results of this study indicate that all variables in the Fama-French Three Factor Model have a significant positive effect on the excess return of stock portfolios in LQ-45 companies on the Indonesia Stock Exchange.*

Keywords: *Fama-French Three Factor Model, Excess Return, Market Risk, Size, Book to Market Equity*

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I. Background

The capital market is very attractive for investors to invest in this modern age. Investors can invest in various instruments offered in the capital market, one of which is stocks. The aim of investors to invest is to improve welfare or maximize its profits. But in addition to the benefits, there are also risks in investing in the capital market. Therefore it is necessary to determine the expected rate of return as a balance between investment return and risk that is willing to be borne by using a pricing model.

Fama and French (1992) developed an assessment model combining several factors, namely the market, size, and the market ratio (book to market equity). Fama and French (1992) suggest that companies with high book to market equity provide higher returns compared to low book to market equity in 12 capital markets and companies with small stocks give higher returns than large stocks in 11 capital markets. Estimating excess stock returns is important for investors, if it is positive it will be very profitable for investors because the profits are above deposit interest, and vice versa if negative will be detrimental because investors want to invest in deposit interest. Estimating with the Fama and French model is one way to predict the excess returns on shares to be purchased.

The capital market in Indonesia is still classified as a thin market capital transaction, the capital market where most securities are less actively traded. The Composite Stock Price Index (IHSG) which includes all shares issued (most of which are not actively linked) is considered inappropriate as an indicator of capital market activity. Therefore, on February 24, 1997 another alternative index was introduced, namely Liquid-45 Index (LQ-45). The LQ-45 Index began on July 13, 1994 and this date is the base day of the index with an initial value of 100. This index only consists of 45 stocks that are most actively traded (Hartono, 2017). The reason for taking companies published in LQ-45 as an objective of this study is because companies listed in LQ-45 have liquidity and top 60 market capitalization over the past 12 months and are updated every 6 months, making it very easy for investors to invest in shares listed on this LQ-45 Index.

Research using the French Fama model found mixed research results. According to Dolinar (2013) in the Fama French Three Factor Model Testing in Croatia, stated that the Fama French Three Factor Model did not show success in describing the return-risk relationship in the Croatian capital market. In the case of the Croatian stock market, the size factor and book to market ratio (B/M) are not always significant, but on average they individually have a certain marginal explanatory power. While research conducted by Abbas et al., (2014) in a study for the application of the Fama French Three Factor Model in the KSE 100-Index concluded that the model applies to shares listed on KSE-100 from July, 2004 to June, 2014 and estimated results in line with Fama and French.

Because the research results are still diverse, this study will re-examine whether the variables of the Fama-French Three Factor Model, which is market excess return, excess return size small minus big (SMB), and excess return high book to market equity minus low book to market equity (HML) has a significant effect on excess return portfolio of shares in LQ-45 companies listed on the Indonesia Stock Exchange.

II. Literature Review And Hypothesis

Portfolio Theory was introduced by Markowitz (1952) through an article in the Journal of Finance and continued with his book in 1959. This theory was the first theory introduced for the discussion of return and risk. In building this theory, Markowitz gives the idea that investors will always choose a high rate of return with low risk. Investment risk reduction can be done by diversifying investments in various investment instruments. The asset pricing model is an important part of financial matters used to predict the relationship between expected return and the risk of an asset. The asset pricing model continues to develop along with the many criticisms directed at the first asset pricing model, the Capital Asset Pricing Model (CAPM). The Capital Asset Pricing Model (CAPM) is a single index model developed by William Sharpe, John Lintner, and Jan Mossin in 1964. This model is used to predict the expected return balance of a risky asset. Many criticisms addressed to the model have led to the development of multifactor asset pricing models such as Arbitrage Pricing Theory (1976) and Fama-French Three Factor Model (1992).

Fama-French Three Factor Model

The asset pricing model is a set of predictions about the returns that will be obtained against the selected risk assets. One model that can be used as a container for the calculation of excess return is a model developed by Fama and French (1992) known as the Fama-French Three Factor Model. The basis of the Fama and French model (1992) is that the average portfolio excess is influenced by 3 factors; excess market return portfolio (market risk), excess return size (market capitalization), which is the difference between the return of a small stock portfolio and the return of a large stock portfolio (SMB), and excess return book to market equity, which is the difference between high book to market equity portfolio return and low book to market equity portfolio return (HML).

Excess Return Market

Excess market return (market risk) is a reduction in market return with a risk free rate. This assumption is based on portfolio theory which assumes a linear relationship between return and risk. Investors consider compensation return on market risk because this risk category affects all companies in the economy, investors cannot avoid its impact. Based on Markowitz's theory, the impact of risk can be reduced by diversifying (forming a portfolio). Based on the description above, it can be concluded that the market excess return (market risk) variable has a positive effect on the excess return on stock portfolios, according to research conducted by Abbas et. Al. (2014), Eraslan (2013), and Yolita and Fauzie (2014) which states that the market excess return variable (market risk) has a significant positive effect on stock excess return on all portfolios.

H1 : Market excess return has a significant positive effect on stock portfolio excess returns.

Excess Return Size (SMB)

Size (company capitalization) can affect stock portfolio excess returns because large and small capitalization of a company will affect profits and risks. In this study, size is proxied by Small Minus Big (SMB). This proxy will measure the additional historical returns received by investors in investing in small companies. Small companies tend to have a higher level of risk than large companies, so with the concept of high risk high return, small companies have higher return expectations. It can be concluded that the variable size (SMB) has a positive effect on stock portfolio excess returns. In accordance with previous research, Abbas et. al. (2014) and Yolita and Fauzie (2014) stated that variable size (SMB) had a significant positive effect on stock portfolio excess returns.

H2 : Excess return size (SMB) has a significant positive effect on stock portfolio excess returns.

Excess Return Book to Market Equity (HML)

Book to market equity is a comparison of book value with market value. Book value means business value according to each company's bookkeeping or financial statements. Book value is calculated based on the company's balance sheet which is the difference between the company's total assets and total debt (total equity). Market value is the value of a company according to the stock market. Market value is calculated by multiplying the number of shares outstanding and the closing price of each company's shares. The lower the market value compared to the book value, the stock tends to have a low rate of return (high book to market equity) and means that it doesn't meet the investors' expectations of the company, which in this case is realized with capital gains and dividend yields, so the value the company is considered low by investors. If the market value is higher than the book value, the company has a high rate of return (book to market equity is low) which means the company is in good condition so it tends to produce high returns with high risk. In this study book to market equity is proxied by High Minus Low (HML). This proxy will measure the additional historical returns received by

investors in investing in high companies. In accordance with previous researches, Abbas et al (2014) stated that HML has a significant positive effect on high book to market equity portfolios, Eraslan (2013) also stated that HML has a significant positive effect on high book to market equity portfolios, while Yolita and Fauzie (2014) stated that the effect of book-to-market ratio risk has a significant positive effect on the SH portfolio.

H3 : Excess return book to market equity (HML) has a significant positive effect on stock portfolio excess returns.

III. Research Methods

The population in this study are all companies listed in LQ-45 for the period January 2016 - December 2018, as many as 45 companies. Sampling uses the purposive sampling method with the criteria that companies that are consistently listed in the LQ-45 index in the period January 2016 to December 2018. The companies sampled totaled 32.

In accordance with the hypothesis to be tested, the variables to be examined in this study are as follows.

- 1) Excess portfolio return ($R_p - R_f$). This variable is measured by the weighted average of the realized returns of each single security in the portfolio minus the risk free rate.
- 2) Excess Market Return Portfolio (Market Risk). This variable is measured by the difference between the monthly market return (CSPI) reduced by the risk free rate.
- 3) Excess Return Size (Small Big Minus). The size of the company using the company's market capitalization is calculated by the closing price of shares in period t times the number of shares outstanding in period t. The size in this study is proxied by Small Big Minus (SMB), which is the average small portfolio return (SL, SM, SH) minus the average big portfolio return (BL, BM, BH).
- 4) Excess Return Book to Market Equity (High Minus Low). This variable is measured by the ratio of the market price of a stock to the book value. In this study, book to market equity is proxied by High Minus Low (HML), which is the average high portfolio return (SH, BH) minus the average low portfolio return (SL, BL).

The research data is analyzed using the regression model as follows.

$$\text{Excess Return Portfolio} = \alpha + b_1\text{Excess Return Market} + b_2\text{Excess Return Size} + b_3\text{Excess Return Book to Market equity} + et$$

Before a regression analysis is performed to test the research hypothesis, classical assumption testing is performed first. The data distribution used is free from all classical assumptions, namely normality, multicollinearity, heteroscedasticity, and autocorrelation.

Portfolio Formation

The steps to form a Small Minus Big (SMB) portfolio include the followings (Fawziah and Margasari, 2016).

1. Calculate the market capitalization of each company obtained by multiplying the number of shares outstanding by the closing price of each share.
2. Determine the median of market capitalization value.
3. Sorting existing shares based on market capitalization into two groups; 50% of shares with small market capitalization (S) and 50% of shares with large market capitalization (B).

The steps in forming a High Minus Low (HML) portfolio are as follows (Fawziah and Margasari, 2016).

1. Calculate the book to market equity value by dividing the total equity obtained from the financial statements by the result of multiplying the number of shares outstanding by the closing price.
2. Sort shares based on book value to market equity into three groups; 30% shares with low book to market equity value (L), 40% shares with medium book to market equity value (M), and 30% shares with high book to market equity value (H) (Fama and French, 1996).

After each company's position is determined based on market capitalization and book to market equity, the next step is to classify the results of market capitalization and book to market equity sequences into the following portfolios.

1. SL: portfolio of stocks that have small size and low book to market equity value.
2. SM: portfolio of stocks that have small size and medium book to market equity value.
3. SH: portfolio of stocks that have small size and high book to market equity value.
4. BL: portfolio of stocks that have big size and low book to market equity value.

5. BM: portfolio of stocks that have big size and medium book to market equity value.
6. BH: portfolio of stocks that have big size and high book to market equity value.

Based on these steps, the company portfolio is obtained in Table 1. Data from Table 1 shows that small companies with high book-to-market equity (SH) have the highest average number in a portfolio, at is 8, and the least average number of companies in portfolios is big companies with high book-to-market equity (BH), which is 2.

In Table 2, the average monthly portfolio excess returns are negative except for the HML. The results also show that HML has the largest average average monthly portfolio excess return of 0.00285, with a coefficient of variation (CV = SD / means) of 25.74737. The SL portfolio has the smallest average monthly portfolio excess return of -0.06416 with CV -0.90586.

Table 1. CompaniesIn Portfolio

No	2016		2017		2018	
	Portfolio	Issuer	Portfolio	Issuer	Portfolio	Issuer
1	BH	BBNI	BH	ADRO	BH	PGAS
2	BH	INDF	BM	SMGR	BM	BBRI
3	BH	PGAS	BM	BBRI	BM	INTP
4	BH	ADRO	BM	UNTR	BM	INDF
5	BM	ASII	BM	BMRI	BM	BMRI
6	BM	BBRI	BM	ASII	BM	ASII
7	BM	BMRI	BM	BBNI	BM	BBNI
8	BM	UNTR	BM	INDF	BM	SMGR
9	BM	INTP	BM	JSMR	BM	UNTR
10	BM	SMGR	BL	ICBP	BL	GGRM
11	BL	GGRM	BL	INTP	BL	KLBF
12	BL	ICBP	BL	KLBF	BL	ICBP
13	BL	UNVR	BL	UNVR	BL	TLKM
14	BL	KLBF	BL	GGRM	BL	UNVR
15	BL	TLKM	BL	BBCA	BL	BBCA
16	BL	BBCA	BL	TLKM	BL	PTBA
17	SH	ADHI	SH	PGAS	SH	ADRO
18	SH	SRIL	SH	BSDE	SH	BSDE
19	SH	BBTN	SH	WSKT	SH	WSKT
20	SH	LPKR	SH	INCO	SH	WIKA
21	SH	BSDE	SH	PTPP	SH	PTPP
22	SH	INCO	SH	WIKA	SH	MNCN
23	SM	JSMR	SH	LPKR	SH	SRIL
24	SM	PTBA	SH	SRIL	SH	LPKR
25	SM	WSKT	SH	ADHI	SH	ADHI
26	SM	MNCN	SM	BBTN	SM	AKRA
27	SM	WIKA	SM	PTBA	SM	BBTN
28	SM	PTPP	SM	AKRA	SM	INCO
29	SL	LPPF	SM	MNCN	SM	JSMR
30	SL	SCMA	SL	SCMA	SL	SSMS
31	SL	AKRA	SL	LPPF	SL	LPPF
32	SL	SSMS	SL	SSMS	SL	SCMA

Table2.Statistic Descriptive of Excess Return

	Mean	SD	CV
SL	-0.06416	0.05812	-0.90586
SM	-0.04841	0.06235	-1.287957
SH	-0.05639	0.07190	-1.275049

BL	-0.03630	0.03382	-0.931680
BM	-0.04326	0.05451	-1.260056
BH	-0.02316	0.10176	-4.393782
X1 Market Risk	-0,04211	0,02676	-0.635478
X2 SMB (Size)	-0,01701	0,05175	-3.042328
X3 HML (Firm value)	0,00285	0,07332	25,74737

Multiple Linear Regression

Based on the results of the regression using Eviews 10 on Table 3, it can be explained as follows.

- The market excess return (market risk) has a positive effect on stock excess returns on the entire portfolio. Market risk has a positive effect on portfolio excess returns indicating that the higher the value of market risk, the higher the stock portfolio excess returns.
- The size proxied by SMB has a positive effect on excess return of small stock portfolios (SL, SM, SH). It can be interpreted that the larger the size (SMB), the greater the stock portfolio excess return.
- The firm value proxied by HML has a positive effect on the excess return of stock portfolios in high book to market equity (SH and BH) stock portfolios. The SM and BM portfolios are not taken into account because they are not included in forming book to market equity (HML) variables (Abbas et al, 2014). In high book to market equity (SH and BH), stock portfolios that have a positive relationship, means that the greater the firm value (HML), the greater the stock portfolio's excess return to be obtained.

Based on Table 4, all portfolios (SL, SM, SH, BL, BM, and BH) have a level of F-significance below 5%, so it can be concluded that the overall excess return variables (market, size, and book to market equity or firm value) significantly influence the stock portfolio excess return.

Table3. Ordinary Least Square Regression Results

Intercept			t statistic			p value			
Size	Book to Market Equity (firm value)								
	L	M	H	L	M	H	L	M	H
S	-0.0069	-0.0025	0.0142	-0.4934	-0.2317	1.6429	0.6251	0.8182	0.1102
B	0.0048	0.0162	0.0128	0.7455	1.3723	0.7846	0.4614	0.1795	0.4384
Excess Return Pasar (Market Risk)			t statistic			p value			
Size	Book to Market Equity (Firm Value)								
	L	M	H	L	M	H	L	M	H
S	1.1813	0.7385	1.3815	4.1955	3.3416	7.9736	0.0002***	0.0021***	0.0000***
B	1.0174	1.4666	1.1363	7.8116	6.2142	3.4731	0.0000***	0.0000***	0.0015***
Excess Return Size (SMB)			t statistic			p value			
Size	Book to Market Equity (firm value)								
	L	M	H	L	M	H	L	M	H
S	0.4088	0.9390	0.8351	2.6672	7.8060	8.8545	0.0119**	0.0000***	0.0000***
B	-0.1335	-0.1237	-0.5521	-1.8833	-0.9626	-3.0998	0.0688*	0.3430	0.0040***
Excess Return Book to Market Equity (HML)			t statistic			p value			
Size	Book to Market Equity								
	L	M	H	L	M	H	L	M	H
S	-0.1898	0.4259	0.6266	-1.7167	4.9082	9.2098	0.0957*	0.0000***	0.0000***
B	-0.2014	0.0819	0.8714	-3.9375	0.8838	6.7822	0.0004***	0.3834	0.0000***

Note: *** Significant at level 1%, ** significant at level 5%, and * significant at level 10%.

Table4. F-Test and Adjusted R Square Results

Size	F Statistic			F Significance		
	Low	Medium	High	Low	Medium	High
Small	10.1371	28.1964	73.4174	0.0000	0.0001	0.0000
Big	22.2443	15.3800	63.5597	0.0000	0.0000	0.0000

	<i>Adjusted R²</i>		
Size	Book To Market Equity		
	Low	Medium	High
Small	0.4392	0.6998	0.8612
Big	0.6455	0.5521	0.7530

IV. Conclusions And Implications

This research was conducted to see the testing of the Fama-French Three Factor Model on shares in the LQ-45 Index on the Indonesia Stock Exchange in 2016-2018. Based on the results, it can be concluded that all hypotheses are supported and in line with portfolio theory which states that the direct relationship between return and risk, which in this study there is a positive relationship of the three Fama-French variables, namely market excess return, excess return size (SMB), excess return book to market equity (HML) to portfolio excess return. In addition to supporting the Fama-French Three Factor Model, this study also supports previous research conducted by Abbas et al (2014) and Eraslan (2013) which states that the overall variable market return, excess return size (SMB), excess return book to market equity (HML) has a significant positive effect on portfolio excess return.

The research implication for investors is that it can be used as an investment consideration. When investors want to invest in a company it should pay attention and consider market risk, size, and book to market equity. For academics, this research is expected to add to the literature insight for science, and can be used as material for consideration and additional information in conducting further research, especially those that examine pricing models.

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