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ANALYSIS OF FAMA AND FRENCH 3-FACTOR MODEL VARIABLES IN THE FORMATION OF EXPECTED STOCK RETURNS (ISSUERS OF LQ-45 INDEX MEMBER STOCKS FOR THE PERIOD 2020 – 2022)

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ABSTRACT

Abstract: Fama and French Three Factor Model is one of the models for calculating expected return on stock portfolios that can be used by investors. This model was developed by Eugene F. Fama and Kenneth R. French by adding two factors, namely company size (SMB), and company book value (HML) to the CAPM calculation model. The purpose of this study is to determine stock issuers that can provide high expected returns to investors, determine the overall influence and each variable in Fama and French Three Factor Model (market return, SMB, and HML) on the expected return of each portfolio used in this study consisting of 6 portfolios, namely Big High, Big Medium, Big Low, Small High, Small Medium, and Small Low, and to all 6 portfolios in 2020, 2021, and 2022 respectively. This study used 28 selected stock issuers listed on the LQ-45 Index consecutively from 2020 - 2022 using the purposive sampling method from the period 2020 - 2022. The Multiple Linear Regression method is used to determine the level of influence of the whole and each independent variable on the dependent variable. The results show that mining sector issuers are the issuers that provide the highest expected return to investors during the period 2020 - 2022. Based on the results of Linear Regression, there is a significant difference in results, between doing linear regression for each portfolio (Big High, Big Medium, Big Low, Small High, Small Medium, and Small Low) and doing linear regression on portfolios divided by observation year (2020, 2021, and 2022).

Keywords: JCI; LQ-45; Fama and French Three Factor Model; Market return; SMB and HML

Introduction

The COVID-19 pandemic has caused the economy in Indonesia to suffer a recession as a result of the Indonesian government's policy of limiting social activity outside the home. This policy resulted in small and medium-sized enterprises (SMEs) in Indonesia not being able to operate during the social restriction due to where their business must be closed, companies in the service sector implement the WFH system as well as maximize the use of telecommunications services in serving complaints of their customers, and manufacturing companies must limit the number of employees working within the factory to prevent the spread of the COVID-19 virus resulting in reduced production

capacity. Employees also experience salary reductions because they work from home (WFH), and if they refuse they are welcome to resign. The Indonesian government decided to loosen the social restriction policy after six months of implementation of the policy based on complaints from UMKM entrepreneurs who suffered large losses, and even some who went bankrupt due to social restrictions, and helped boost the country's economic activity during the pandemic. The latest government policy, helping UMKM entrepreneurs, especially five-foot merchants to sell back. However, UMKM entrepreneurs face another problem of falling demand as many consumers tighten their belts because of their wages cut by the company during the period of social restriction. The government has implemented a new policy of providing direct cash assistance (BLT), and soft loans from banks to UMKM entrepreneurs so that they can survive during the period of social restriction.

Large companies have also suffered a sharp blow to the government's social restriction policies. Companies in the consumerism sector were hardest hit by government policies, causing them to experience a drastic decline in profits compared to 2019, such as PT Mitra Adi Perkasa, Tbk (MAPI), PT Ace Hardware Indonesia (ACES), PT. Pizza Hut Indonesia (PZZA), PT Unilever Indonesia (UNVR), and PT Matahari Department Store Tbk (LPPF). The above-mentioned companies are companies that sell consumer products that can be said to be secondary or tertiary products. However, not all companies operating in the consumer goods sector experienced a decrease in profits, companies such as PT Kalbe Farma Tbk (KLBF), PT Chemia Farma T bk (KAEF), PT Indofood Success Makmur T bc (INDF), and PT Indafood CBP Success Macmur Tbc (ICBP) high profit performance during COVID-19. The reason is because the previously mentioned companies sold high-demand health products during COVID-19, and food products such as milk are already considered as basic food by Indonesian society.

Companies in the mining sector such as PT Adaro International TBK (ADRO), PT Bumi Resources Tbk (BUMI), PT Bukit Asam T bk (PTBA), PT Medco Energy International Tbc (MEDC), and PT Indoraya Mining Megah Tbg (ITMG) also experienced a decline in profits during the implementation of social restrictions due to COVID-19 which caused demand for mining commodities to decline drastically. One evidence of a decrease in demand for mineral commodities during the COVID-19 pandemic, i.e. the demand for coal used as fuel for PLTU, has been reduced due to decreased electricity consumption as a result of many factories leaving their employees or operating with limited capacity, and offices being closed during the implementation of social restriction policies. The decline in demand also occurs for other energy commodities such as petroleum, one of which is the BBM, which due to social restriction policies makes the consumption of bbm decrease drastically, and natural gas, which is also like coal, becomes a source of fuel for power plants and manufacturing industries. (Bei, Xinyue,et all, 2014)

The impact of COVID-19 and the policy of social restriction were also felt by the Indonesian Stock Exchange. The volume of transactions in 2020 on the Indonesian Stock

Exchange was 27.495.947.445, down from 2019 by 36.534.971.048. Another negative impact, is the decline in IHSG values during the COVID-19 pandemic from area 6300 to area 3900 over 3 months, indicating the emergence of panic among investors due to the announcement of Covid-19 as an epidemic, and accompanied by the enforcement of social restriction policies. The only positive impact of the COVID-19 pandemic on the Indonesian Stock Exchange is the increase in the number of local retail investors from 2,484,354 in 2019 to 7,489,337 in 2021.

The index used in this study is the LQ-45 Index, as this Index is based on the market capitalization value and liquidity of an issuer of shares as a condition for entering as a member of the issuer LQ-45. Most stock issuers that are members of the LQ-45, such as BBCA, ASII, BMRI, BBNI, and BBRI, are known as blue-chip stocks that have a good foundation and are the primary target for institutional and retail investors as stock components in their portfolios. These blue chip stocks are also known to have a major influence on IHSG's movements, and when these stocks go down, it can affect the value of the IHSG to go down as well and vice versa. (Siddiq, 2020)

The Fama and French Three Factor Model is used as a method of calculation in this study, as this method calculates the expected return of stocks in addition to the market return, also based on the size of capitalization, and the stock book value that describes the intrinsic value of the stocks (Hendra, 2017) . This calculation model was developed by Fama and French based on their criticism of the CAPM model that relies only on market return, and they argue that there are other factors that affect the price of a stock. Later, Fama and French introduced the size of the market and the value of the stock book as factors that influenced the return on stocks. The main difference between the Fama and French Three Factor Model and the Arbitration Pricing Theory is that the Fama and French three-assumes Model assume that the book value and market capitalization already represent the macroeconomic influence on the stock, while the Arbitrage Price Theory assumes that macro-economics directly affects the issuer of the stock. (Fawziah & Naning, 2016)

The research aims to find out the expected return on shares of the selected LQ-45 stock issuer for the period 2020-2022. The calculation model used in this study is the Fama and French Three Factor Model. The reason for choosing this method is because the Fama and French model uses variables that represent the fundamental value of the stock itself, namely the size of capitalization and stock book value. LQ-45 was chosen as a member of the LQ45 Index, which is considered to be a blue chip stock and has a major influence on IHSG's value.

Previous Research

Research conducted by Citra Amanda, and Zaafri Ananto Husodo entitled Empirical test of Fama and French Three Factor Model and Illiquidity Premium in Indonesia (Amanda & Husodo, 2015). The purpose of their research was to determine the effect of market beta, size, book value, and liquidity on excess stock returns in Indonesia. This study used Amihud illiquidity (2002) as a representative of illiquidity, used Ordinary Least Squares (OLS) regression monthly data taken over 10 years, from 2003 - 2013, and used dummy variables to make a difference in crisis and non-crisis times. The study divided the portfolio into 12 portfolios, sorted by size-illiquidity and book-to-market (BM/)-illiquidity (Sari & Alteza, 2019). The results show that market beta consistently has a positive and significant impact on each portfolio when sorted according to these two criteria (Setiawan, 2017). The size factor (SMB) has an influence to explain the illiquidity factor and vice versa. The research also found that stocks with small capitalization beat stocks with large capitalization. The HML coefficient increases when book-to-market also increases, while the SMB coefficient increases when liquidity decreases. This indicates that small-cap stocks are more difficult to trade on the stock exchange (illiquid) (Sutrisno & Ekaputra, 2016).

Research conducted by Teddy Chandra entitled Testing Fama and French Three Factor Model in Banking Companies in Indonesia Stock Exchange. This study aims to examine the effect of the Fama and French Three Factor Model and CAPM on returns generated by banking sector stocks in Indonesia. This study used 29 samples of stock issuers listed in the banking sector from January 2010 to December 2013. This study used multiple linear regression. The results showed that CAPM can be used to predict the return of stock issuers in the banking sector. On the other hand, Fama and French Three Factor Model cannot be used in its entirety in Indonesia. Only excess market returns and company size can affect changes in stock returns, while book-to-market equity shows no significant effect. (Chandra, 2015)

Research Method

This type of research is quantitative research and uses secondary data. The data collection method is as follows: (1) monthly IHSG price data, and shares taken from Investing.com., (2) ORI data (Indonesia Retail Bonds) used is FR0081 published on July 30, 2019 obtained from danamon.co.id., (3) summary financial reports or fact sheets of issuers of selected shares from IDX.com, (4) LQ-45 member data taken from doktersaham.com., (5) data on research articles taken from Google Scholar.com, (6) materials on investments, stocks, bonds, income, risk, IHSG, LQ-45 Index, and Fama and French 3 Factor Model taken from lectures. (Aghdam, 2022)

The population in this study is all stock issuers selected to be members of the LQ-45 Index for the period January 2020 - December 2022. The LQ-45 Index is updated 2 times a year, and there are always changes in stock issuers that enter and exit become members of the LQ-45 Index. Thus, it was decided to carry out a purposive sampling

method in determining the sample of stock issuers used in this study. The criteria for selected samples are as follows:

1. Stock issuers that are consistently members of the LQ-45 Index for the period 2020 - 2022.
2. Issuers of shares that have conducted an IPO in January 2019.
   This study uses 6 portfolios formed based on small minus big, and high minus low.

The study used a linear regression analysis technique that was performed twice, the first performed a lineary regression to each of the portfolios of the period 2020 - 2022, and the second carried out a Linear Regression to all of the respective portfolio - each observation year. The formula of Fama and French 3 Factor Model is as follows:

$$Y = \alpha + \beta 1X1 + \beta 2X2 + \beta 3X3 + \varepsilon$$

Where as:

Y	= *Expected return Fama-French Three Factor Model*
α	= constant value
$\beta_1, \beta_2, \beta_3$	= Coefficient regression/stock volatility
X1	= *Excess of Market Return*
X2	= *SMB (Small minus Big)*
X3	= *HML (High minus Low)*
ε	= *residual error*

The research uses six portfolios that are formed based on small minus big, and high minus low.

Result And Discussion

Table 1 Ranking of Expected Return of LQ-45 Index Stock Issuers from Highest to Lowest for the 2020 - 2022 Period Based on Fama and French 3 Factor Model

Issuer Code	Expected return
ITMG	1.441364916
ANTM	1.245245576
ADRO	0.998140744
INCO	0.797220443

TBIG	0.688370025
PTBA	0.321121543
TOWR	0.307399086
BBNI	0.296536140
INKP	0.275356156
BMRI	0.246941943
ERAA	0.245122067
UNTR	0.188404099
KLBF	0.135582882
BBCA	0.122578380
BBRI	0.092696623
PGAS	0.063917273
BBTN	(0.051112911)
JPFA	(0.083549738)
TLKM	(0.156284686)
ASII	(0.192787027)
ICBP	(0.212942791)
CPIN	(0.221491282)
INDF	(0.281335178)
EXCL	(0.341890318)
SMGR	(0.551851890)
INTP	(0.675962338)
MNCN	(0.746554314)
HMSP	(0.957886934)

Source: Data processed by researchers

Table 2 Ranking of Expected Return of LQ-45 Index Stock Issuers from Highest to Lowest in Each Observation Year Based on Fama and French 3 Factor Model

FF3FM 2020		FF3FM 2021		FF3FM 2022	
Issuer Code	Expected return	Issuer Code	Expected return	Issuer Code	Expected return
ANTM	1.14793036	TBIG	0.665464020	ITMG	0.68867083
INKP	0.45785460	ADRO	0.519768755	ADRO	0.53404291
ERAA	0.39427916	ITMG	0.398721936	INCO	0.47362107
INCO	0.38993452	ERAA	0.314309448	BMRI	0.30872510
ITMG	0.35397215	JPFA	0.183356166	PTBA	0.30218334
TBIG	0.31909665	TOWR	0.174890726	BBNI	0.28306957
UNTR	0.22190119	ANTM	0.168422324	PGAS	0.23362147

TOWR	0.20230280	TLKM	0.158666306	KLBF	0.20513472
BBTN	0.18314443	EXCL	0.132694054	UNTR	0.14720358
SMGR	0.09203211	BBNI	0.092327491	BBRI	0.13863876
JPFA	0.05472633	BMRI	0.059266908	ICBP	0.11219847
PTBA	0.05384784	BBTN	0.050037547	BBCA	0.11161536
CPIN	0.00666967	KLBF	0.044877645	INKP	0.07367794
PGAS	(0.00472563)	BBCA	0.024605155	INDF	0.01056572
BBCA	(0.01364214)	BBRI	(0.028183129)	ASII	(0.02474209)
BBRI	(0.01775901)	PTBA	(0.034909638)	TOWR	(0.06979444)
ADRO	(0.05567092)	INCO	(0.066335138)	ANTM	(0.07110710)
ASII	(0.07180514)	ASII	(0.096239802)	CPIN	(0.09572653)
BBNI	(0.07886092)	INDF	(0.131920953)	SMGR	(0.11960124)
EXCL	(0.08941126)	CPIN	(0.132434423)	TLKM	(0.12068346)
KLBF	(0.11442948)	ICBP	(0.148672215)	HMSP	(0.16603779)
BMRI	(0.12105006)	INTP	(0.153613372)	MNCN	(0.22317981)
INDF	(0.15997994)	PGAS	(0.164978573)	INTP	(0.25415395)
ICBP	(0.17646905)	UNTR	(0.180700677)	BBTN	(0.28429489)
TLKM	(0.19426753)	MNCN	(0.250262253)	TBIG	(0.29619065)
INTP	(0.26819502)	INKP	(0.256176386)	JPFA	(0.32163223)
MNCN	(0.27311225)	HMSP	(0.483631089)	EXCL	(0.38517311)
HMSP	(0.30821806)	SMGR	(0.524282754)	ERAA	(0.46346654)

Source: Data processed by researchers

Table 3 Portfolio Formation Results

Portfolio 2020						
Number	B/H	B/M	B/L	S/H	S/M	S/L
1	BMRI	BBRI	BBCA	ADRO	INCO	INTP
2	BBNI	ASII	TLKM	PGAS	PTBA	TOWR
3	INDF	ICBP	HMSP	BBTN	EXCL	ANTM
4	INKP	UNTR	CPIN	MNCN	JPFA	TBIG
5		SMGR	KLBF	ERAA	ITMG	
Portfolio 2021						
Number	B/H	B/M	B/L	S/H	S/M	S/L
1	BMRI	BBRI	BBCA	INDF	INCO	ANTM
2	ASII	ICBP	TLKM	SMGR	EXCL	INTP
3	BBNI	UNTR	HMSP	INKP	PTBA	
4		ADRO	CPIN	PGAS	ITMG	
5			KLBF	BBTN	JPFA	
6			TBIG	MNCN	ERAA	
7			TOWR			

Portfolio 2020						
Number	B/H	B/M	B/L	S/H	S/M	S/L
Portfolio 2022						
Number	B/H	B/M	B/L	S/H	S/M	S/L
1	BMRI	ADRO	BBCA	INKP	ANTM	TOWR
2	ASII	INCO	BBRI	SMGR	ITMG	TBIG
3	UNTR	BBNI	TLKM	BBTN	PGAS	
4	INDF		ICBP	MNCN	PTBA	
5			KLBF	ERAA	INTP	
6			HMSP		EXCL	
7			CPIN		JPFA	

Data sources processed by researchers

Table 4 Linear Regression Results of Portfolio

Based on Each - Maing Portfolio						
Information	Big High	Big Medium	Big Low	Small High	Small Medium	Small Low
R	0.559	0.715	0.690	0.481	0.118	0.899
R^2	0.313	0.512	0.476	0.232	0.014	0.808
Adjusted R^2	0.018	0.329	0.371	0.039	(0.197)	0.665
F	1.062	2.797	4.539	1.205	0.066	5.628
t JCI	1.307	0.240	1.743	(1.211)	0.305	(1.699)
t SMB	(0.043)	2.089	1.401	1.093	(0.368)	1.897
t HML	(0.336)	(1.513)	(1.482)	(0.938)	(0.165)	(2.451)
By Year						
Information	Portfolio 2020	Portfolio 2021	Portfolio 2022			
R	0.932	0.801	0.943			
R^2	0.868	0.642	0.890			
Adjusted R^2	0.670	0.104	0.724			
F	4.381	1.193	5.371			
t JCI	1.534	(0.487)	3.598			
t SMB	(0.869)	(0.821)	2.620			
t HML	1.667	1.681	(2.848)			

Discussion

Table 1 shows that hypothesis H 1 which assumes that issuers of shares in the mining sector have a higher expected return than the expected return of stock issuers from other industrial sectors is accepted. The top five issuers with the highest expected return are

dominated by four issuers in the mining sector, namely ITMG, ANTM, ADRO, and INCO. Only one non-mining sector issuer entered the top five, namely TBIG (Fakriah et al., 2020).

The high expected return of the four mining sector stocks above is directly proportional to the increase in mining commodity prices throughout 2020 - 2022. Although in 2020 the performance of these four mining companies experienced a decline in financial performance due to the COVID-19 pandemic, these four companies reported high-profit profits in 2021 - 2022 due to demand for coal mining commodities after several countries began to relax social distancing policies during 2021, and increased demand for nickel mines which is one of the main components in electric car batteries (Woen & Patricia, 2022).

TBIG provides a high expected return influenced by the increasing tower rental income they have from telecommunication operators in Indonesia such as PT. Indosat Tbk, PT. Telkom Tbk, PT. XL Axiata, Tbk, and PT. Smartfren Tbk. The company's ability to carry out corporate expense efficiency, and increased revenue from the acquisition of 3,000 towers owned by PT. Inti Bangun Sejahtera Tbk in 2021.

Table 2, presents data on the total expected return of issuers from the highest to the lowest in 2020, 2021, and 2022. The hypothesis of H_2 was partially accepted, and rejected, because, in 2020, the issuer that provided a high expected return was the issuer of the mining sector, namely ANTM. Throughout 2020, ANTM's share price increased due to rumors of cooperation between ANTM and Tesla to build a car battery factory in Indonesia with ANTM as the main supplier of nickel ore to Tesla's battery factory in Indonesia. Other causes are the increasing nickel ore price and nickel sales volume in the domestic market as well as ANTM's management ability to reduce production cash costs throughout 2020 (Yunita, 2023).

TBIG, which provides the highest expected return in 2021, makes the H2 hypothesis partially accepted. The factors that influence the high expected return provided by TBIG are inseparable from the increase in TBIG's net profit in 2021 by 53.4% compared to net profit throughout 2020 which was influenced by TBIG's success in acquiring 3,000 towers owned by PT. Inti Bangun Sejahtera contributed to an increase in revenue of 16% year-on-year and positive investor sentiment toward the increase in revenue growth of technology sector issuers during COVID-19 throughout 2021 (Zainuri et al., 2021).

Hypothesis H_3 which states that mining sector issuers provide the highest expected return compared to other sector issuers is accepted. ITMG is a mining sector issuer and LQ-45 Index issuer that provides the highest expected return throughout 2022 (Putri, 2018). The contributing factor is that the coal produced by ITMG is coal that has a fairly high calorific value, and ITMG's coal price exposure to Newcastle coal prices is quite high. Another factor is that ITMG is the dominant stock issuer in coal exports,

throughout 2022, except for Q1 2022 due to the high rainy season, ITMG's coal production growth is quite solid, and investors' high expectations that ITMG will distribute dividends at a ratio of 70% of 2022 net profit like the previous year's dividend distribution ratio.

Table 4 shows the results of linear regression which can be explained as follows:

1. Based on R, R2, and Adjusted R2, Small Low portfolios are the only portfolios that have values close to 1 (0.899, 0.808, and 0.606), which means that the independent variable has a high correlation (89.9%0, and is able to explain 80.8%/60.6% variance of the dependent variable. Meanwhile, the Small Medium portfolio has the lowest value among the six portfolios with values of 0.118, 0.014, and -0.197. The meaning of this value is, the independent variable has a low correlation of 11.8%, and is only able to explain or not able to explain at all when viewed from the negative Adjusted R2 value to the dependent variable. If the linear regression of the portfolio is based on the year, it can be seen that the R, R 2, and Adjusted R2 values of the portfolio in 2020, and 2022 have values close to 1 (R, and R 2), and above 0.5 (Adjusted R2). Different results were obtained in the 2021 portfolio which had the lowest value compared to the other two portfolios. However, when compared to the linear regression results of each 6 portfolios, the values of R, and R 2 are only inferior to the values of R, and R2 Small Low. However, for the Adjusted R2 value, the 2021 portfolio is only higher than the Big High, Small High, and Small Medium portfolios.
2. Based on the F value, the High-Low portfolio is the only portfolio where hypothesis H_4 is accepted. In this portfolio, a set of independent variables has a strong influence on the formation of dependent variables. In other portfolios, hypothesis H_4 is rejected. Based on the results of linear regression it was found that a set of independent variables has a weak influence on the formation of expected return. However, when the six portfolios are combined and separated only by year (2020, 2021, and 2022), the results show that a set of independent variables has a weak influence on the formation of expected returns.
3. Based on the t value, the majority of portfolios (Big High, Big Low, and Small High) the formation of expected return is influenced by the JCI variable, which means H5 is accepted. SMB has only the greatest influence on the formation of expected return 2 portfolios (Big Medium, and Small Medium), meaning H6 is received. The independent variable HML has only the greatest influence on the formation of the portfolio's expected return of 1% (Big Low), meaning H7 is received. However, when the six portfolios are combined and separated only by year (2020, 2021, and 2022), it is found that HML has a strong influence on the formation of expected returns for all portfolios in 2020, and 2021, which means H7 is received. However, in 2022, JCI is an independent variable that has a strong influence on the formation of expected returns for the entire portfolio, which means H5 is received.

Conclusion

The conclusions from the results of the above research are as follows: There are 28 stock issuers that are consistently included in the LQ-45 Index members for the period 2020 – 2022, Issuers in the mining sector are the issuers that provide the highest expected return to investors during the period 2020 – 2022, Based on the results of Linear Regression, there is a significant difference in results, between doing linear regression for each portfolio (Big High, Big Medium, Big Low, Small High, Small Medium, and Small Low) and doing linear regression on portfolios divided by observation year (2020, 2021, and 2022).

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