

The Use of the Three Factor Asset Pricing Models and Carhart Four Factors to Assess Excess Return

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Abstract. The research was conducted to find out which method is the best in assessing stock returns in LQ 45 companies. The populations used are companies included in the LQ 45 Index, which are the most liquid and large capitalized companies during the 2012-2016 period totaling 20 companies with purposive sampling sampling technique and the analysis technique used is multiple regression analysis. Data analysis method in this study uses statistical data processing application, SPSS, the last paired simple test is used to see models that better predict or explain excess returns. From this study it was found that both three factors and four factors have a joint effect on stock excess returns. The amount of influence on excess stock returns (Y) is 0.772 or 77% and 0.790 or 79%, respectively. Whereas based on the paired test results the test sample revealed that between three factors and four factors there was no significant difference in explaining excess return.

Keywords: Pricing models, Carhart, Factors, Excess Return

1 Introduction

Economic conditions that are experiencing growth are important objectives of a macroeconomic policy carried out by the central government that will have implications for the society's welfare. But there has been a decline in economic growth from 2013 to 2015 and has improved again in 2016 and 2017. Despite the decline in economic growth, this condition is far better than that of developed countries, this is seen Indonesia's economic growth is still above the average growth of the world economy, at amidst the economic slowdown and various risks faced, the Indonesian capital market has progressed, reflected in the Composite Stock Price Index (CSPI) of 6.05 percent. The JCI in the last 5 years was also able to record a good performance with a return of 27.14 percent. The JCI, which tends to move positively, certainly influences the performance of equity funds, which allocate a majority of its assets to stock instruments. This will affect investors in investing; there are at least three basic factors in making investment decisions by investors which consist of the rate of return (risk), risk to be faced (risk), and time period (the time factor).

In the investment portfolio there is a model that is often used by investors in predicting expected returns, namely the Capital Asset Pricing Model (CAPM) and Arbitrage Pricing

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Theory (APT), because of the limitations possessed by both, so that in a study [1] whose results have been very influential to date, namely in asset pricing and portfolio management using a three-factor model to describe stock returns. These three factors are market return, firm size, and book to market companies. Susanti [2] states that the research conducted by Eugene Fama and Kenneth French produced a negative relationship between the size of the company and beta, while the beta and return correlations were not apparent, these results contradicted the CAPM. Research during the period 1963-1990 resulted in book to market equity and firm size having the strongest relationship with return. The development of the Asset Pricing theory continues until Carhart adds the WML momentum factor (Winner minus Loser) to three factors that are in the Fama-French Three Factor Model. According to Carhart [3] this model can explain the expected return in the short and long term.

In this study selected groups of shares included in the LQ45. The LQ45 Index is created and published by the Indonesia Stock Exchange. This index consists of 45 companies whose shares have high liquidity selected through several selection criteria. The LQ45 index is one of the stock index indicators on the IDX which can be used as a reference as a material to assess the performance of stock trading. Among the stocks in the Indonesian capital market, the LQ45 shares on the Indonesia Stock Exchange are shares that are in great demand by investors. Based on the shares listed on LQ45 after being re-selected according to the criteria that have been set, shows that of the 45 companies listing in LQ45 respectively from 2012-2016 20 companies were selected. Although the shares in LQ45 are in the category of superior stocks, it was found that the majority of stocks produced negative returns in a row. The following developments in excess stock returns in 20 companies from 2012-2016:

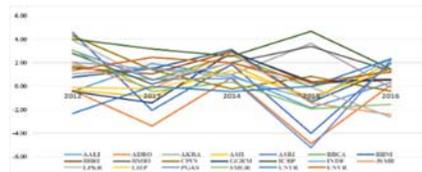


Fig. 1. Development of the Stock Return for the 2012-2016 Period

Based on figure above, development of Stock Returns for the 2012-2016 period, LQ45 shares are active shares so they can continue to experience changes in stock prices and will later affect stock returns. It can be seen in the graph above that there is a fluctuation in stock returns from 2012-2016. Of the 20 companies that were used as research samples, there were 16 companies that produced fluctuating negative returns and 4 companies that produced a steady positive return during the study period. This is because stock returns are influenced by investor demand and supply in investing. Based on the discussion, the researcher conducted this research to find out which factor was the best in assessing stock excess return at the LQ 45 index for the period 2012-2016.

2 Literature Review

2.1. Three Factors Pricing Model

Fama and French Three Factors Pricing model [4] becomes an alternative model in estimating expected returns. Doubts and the pros and cons of the accuracy of market beta as the only explanatory variable of the CAPM in estimating expected returns bring the Three Factors Pricing Model as a very influential multifactor model. If in CAPM return and risk behavior is only determined by market risk, Fama and French add the company's fundamental factors, namely firm size and book to market. Thus, three explanatory variables in estimating

expectations returns include premium market, premium size, and book to market premium. Fama and French added the size and book to market factors to complete the role of market beta coefficients in the CAPM which was explained in the previous section. Monthly returns are regressed to the premium market, premium size, and book to market premium formulated in the following equation:

$$E(R_i) = R_f + b_i [E(R_m) - R_f] + s_i E(SMB) + h_i E(HML) + e$$

Information:

$E(R_i)$:	expected return of stock i
R_f	:	risk free rate asset
$E(R_m)$:	rate of return on market
SMB	:	difference in value weighted return of small stock portfolio and value weighted return large capitalization stock portfolio
HML	:	difference in value weighted return of the stock portfolio with high book to market and value weighted return stock portfolio book to market low
b_i, s_i, h_i	:	regression slope

2.2. Market Return

Market return can be defined as the difference from the average every month of all stocks with a monthly risk free rate [5]. Market return can be used by investors as an analytical tool in making decisions, whether to invest in the capital market or not [6]. If the market is in a bullish condition, almost all stock prices on the stock exchange will increase, which means investors can take the decision to invest in the capital market. If the market is in bearish condition, the stock price will decline. Meanwhile, if the market return is positive, it indicates that investors can choose high-value market returns, because the higher the market return, the higher the excess return received by investors [7].

2.3. Firm Size

The company size is a symbol that is related to the company's opportunity and ability to enter the capital market and other financing types that show the ability to borrow. Following is the definition of company size according to experts, the company size is a scale in which the size of the company can be classified according to various ways, among others by total assets, Loq size, stock market prices, and others [8]. Company size is a measure which is indicated by the total assets of the company [9]. The company size will affect the company's ability to bear the risks that may arise from various situations faced by the company. Large companies have lower risk than small companies; this is because large companies have better control over market conditions, so they are able to face economic competition [10]. In addition, large corporate companies have more resources to increase the company value because they have better access to external information sources compared to small companies. In this asset pricing research, company size is measured based on market capitalization.

To include the size factor in estimating the expected return, Fama and French form a portfolio that represents the effect of size risk factors called small SMB (small minus big) portfolios [11]. SMB is a return on a portfolio strategy that takes long positions against stocks with small market capitalization and takes a short position on stocks with large capitalization with other factors. The SMB portfolio is designed to measure additional returns received by investors by investing in small-cap stocks. This additional return is often referred to as "premium size". SMB is calculated by subtracting small-capitalized stock returns and large capitalized stock returns with a weighted average book to market so that it is free from the influence of these other factors. The results of a positive SMB calculation indicate that small-

cap stocks are better than large-cap stocks. The size of the company is measured by using the natural logarithm of total assets [12].

2.4. Book to Market Premium

The book to market ratio is a comparison between the current book value of equity per share and market value per share. This ratio shows how far a company is able to create corporate value relative to the amount of capital invested. The book to market ratio can be an indicator that the company is undervalued or overvalued [13]. If the book value of a security is smaller than the market value (book to market ratio <1), then the company's stock is overvalued. Conversely, if book value securities are greater than the market value (book to market ratio > 1), then the company's shares are undervalued.

Sudiyatno [14] reinforces evidence that book to market is positively correlated with securities returns. The market views high book to market ratios companies as undervalued stocks that are more risky than companies with low book to market ratios so investors expect higher returns as greater risk compensation. To include the book to market factor in estimating expectations returns, Fama and French [15] form a portfolio that represents the effect of book to market risk factors called HML (High minus Low). HML is a return on portfolio strategy that takes long positions on stocks with high book to market and takes short positions on shares with low book to market with other factors. The HML portfolio is designed to measure additional returns received by investors by investing in company shares with a high book to market value. This additional return is often referred to as "premium value". HML is calculated by subtracting stock returns that have a high book to market and stock returns that have a low book to market with the weighted average of the size factor free from the influence of other factors. The results of a positive HML calculation show that shares with high book to market yield a better return than shares with low book to market.

2.5. Four Factors Pricing Model

The Fama-French model is considered to be able to explain anomaly more than the CAPM model. However, these three factors cannot explain the short-term reversal pattern. The four factor model used in evaluating funding work begins with Carhart [16], he found that there is a momentum anomaly that describes portfolio performance in the literature model. Carhart added the momentum factor of WML (Winner minus Loser) in the Fama-French Model. According to Carhart [17] this model can be considered as an additional performance model in which the coefficients on this portfolio drawing factor indicate the average return which is explained by four factors.

$$R_i(t) - R_f(t) = a_i + \beta_i [R_m(t) - R_f(t)] + s_i SMB(t) + h_i HML(t) + w_i WML(t) + e(t)$$

Four factors proposed here as variables that affect portfolio return are book to market equity and company size, because there are HML and SMB factors obtained and grouping of stock returns. Stocks that have book to market high (H), medium (M) and low (L) and grouping of stock returns that have a small (S) and large (B) company size and plus WML which is a momentum factor which is difference between return winners and losers in circulation. Stock rating based on past returns for six minus two months. This four-factor model is able to explain the relationship between risk and return more clearly both in the long and short term.

2.6. Momentum (WML)

Momentum is a stock portfolio investment strategy that purchases stocks with good performance in the past (winners) and sells stocks with poor performance in the past (losers). The effect of using the momentum strategy in predicting stock expectation returns can be measured by calculating the difference between the values weighted return of the Winners stock portfolio and the value weighted return of the losers' stock portfolio, which is denoted as WML. Jegadesh and Titman [18] document that during medium term horizons (three to twelve months) companies that have higher returns in the past tend to produce positive abnormal returns over the same time frame. Liew and Vassalou [19] use the moon momentum strategy t-12 to examine the effect of momentum in predicting returns.

3 Research Methodology

An explanatory method used here. The population in this study were the shares listed in the LQ45 period 2012 to 2016. The number of population in this study there were 45 companies listing on LQ45. The company is re-selected according to the criteria or considerations that have been set, so that the sample used is 20 companies. The three factors variable consists of Market Return, SMB, and HML. As for the four factors, adding one variable is WML. Data analysis method here uses statistical data processing application, SPSS, the last pared simple test is used to see models that better predict or explain excess returns.

4 Results and Discussion

4.1. Three Factors Models Test (R2 or R Square)

Table 1. Test Results of Three Factors Models (R2 or R Square)

Model Summary ^b									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.795 ^a	.772	.762	.893	.212	12.483	3	96	.001

a. Predictors: (Constant), MarketReturn, SMB, HML

b. Dependent Variable: Excess Return

It is known that the variable market return (X_1), SMB (X_2), and HML (X_3), explains the variation of Excess Return (Y) by 77%, the remaining 23% is determined by other variables outside the model. In other terms, it means that the three explanatory variables chosen by the researcher can explain the variation of variable Y in a large sample.

4.2. Carhart Four Factors Model Test (R2 or R Square)

It is known that the variable market return (X_1), SMB (X_2), HML (X_3), and WML (X_4) explain the variation of Excess Return (Y) by 79%, the remaining 21% is determined by other variables outside the model. In other terms, it means that the four explanatory variables chosen by the researcher can explain the variation of variable Y in a large sample.

Table 2. Carhart Four Factors Model Test Results (R2 or R Square)

Model Summary^b									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			Sig. F Change
						F Change	df1	df2	
1	.841 ^a	.790	.735	22.319	.512	10.238	4	95	.000

a. Predictors: (Constant), MarketReturn, SMB, HML, WML
 b. Dependent Variable: ExcessReturn

4.3. Paired Sample Test Results

Table 3. Paired Sample Test Results

		Paired Samples Test							
		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	<i>Three factors – four factors</i>	.173766	.051947	.018263	.158321	.189210	9.17	19	.058

The significance value (2-tailed) is 0.058 ($p > 0.05$). So in estimating or calculating using the three factors asset pricing model and the four factors have no differences. Based on descriptive statistical results three factors asset pricing models and Carhart four factors proved that the value of the level of influence or significance of the Three asset pricing model and Carhart four factors were not much different, namely 77% and 79%.

5 Discussion

5.1. Effect of Three Factors Pricing Model on Excess Stock Return (Y)

It was found that market return, SMB, HML had a joint effect on stock excess returns. The magnitude of the effect of market return (X_1), SMB (X_2), HML (X_3) on excess stock returns (Y) is 0.772 or 77% while 23% is influenced by other factors outside the variables studied. This means that investors can use the market return value, SMB, HML as one indicator to consider the excess stock return which can then be used as a basis for decision making for their investment. This study results are in accordance with the research conducted by Susanti [20] which states that simultaneously all three Fama French variables are very large at 99.8%. The influence of this together shows that the factors contained in the Fama French three factor model together influence the magnitude of stock returns. The other studies' results that support this research were carried out by Aldarmi [21] whose results show that the Fama and French [22] models have a clearer power and power in explaining changes in stock returns. In line with previous research conducted by Singh [23] concluded that the asset pricing factor Fama and French [24] performs better than the CAPM for each portfolio. The three factor asset pricing model in this study has been good in assessing the excess return, but this model only includes internal company indicators, while each investor has different behavior in assessing returns, therefore other internal factors should also be considered as

well as companies external factors such as inflation, exchange rates, JUB, SBI, GDP, oil prices, in others so that this can lead to the ability to explain returns to a maximum.

5.2. Effect of Four Factors Pricing Model on Excess Stock Return (Y)

It was found that market returns, SMB, HML, and WML influence jointly on stock excess return, the magnitude of the effect is 0.790 or 79%. This means that investors can use the market return value, SMB, HML, and WML as one indicator to consider the excess stock return which can then be used as a basis for decision making for their investment. Whereas for companies with this research provide input in decision making for management in managing company fundamentals so that they can provide positive sentiment, this is done by paying attention to the variables in this study. The government itself as a regulator in this research through related institutions can certainly supervise and socialize and intervene to issuers and the market in terms of management and regulation to facilitate issuers in accessing policies and create positive sentiment through Bank Indonesia is needed so that the market is always stable and the Bank Indonesia must always maintain the International Investment Position (PII), because this will provide sentiment that can have a positive and negative impact on investors. The results here are in line with Candika [25] and Nwani [26] states that there are four factors that influence the excess stock return.

6 Conclusions and Suggestions

It was found here that both three factors and four factors have a joint effect on stock excess returns. The amount of influence on excess stock returns (Y) is 0.772 or 77% and 0.790 or 79%, respectively. Whereas based on the paired test results the test sample revealed that between three factors and four factors there was no significant difference in explaining excess return. Based on the results, discussion and conclusions of the author, this study still contains some limitations and is expected to be refined in subsequent studies. This research is only limited to the LQ45 Index, therefore the researchers can then involve other indices or in other industrial sectors so that the results of their research become more comprehensive. Investors in investing their funds in a security should first identify and understand any developments that occur in the securities. They must be able to know how the factors that can affect the movement of prices or returns that can be created or produced by the company as the company's contribution to its investors. Based on these results, investors can use the Three factor asset pricing model or Carhart four factor to assess the feasibility and return of an asset.

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