International Journal of Current Science Research and Review
ISSN: 2581-8341
Volume 08 Issue 09 September 2025
DOI: 10.47191/ijcsrr/V8-i9-49, Impact Factor: 8.048
IJCSRR @ 2025
www.ijcsrr.org

Impact of Fama and French Six Factor Model on Indonesian Healthcare Stock Returns

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ABSTRACT: The Fama and French Six Factor Model (FF6FM) is an extension of the Fama and French Five Factor Model (FF5FM). The purpose of this study was to examine the Fama and French Six Factor Model's ability to explain the excess returns of healthcare sector companies listed on the Indonesia Stock Exchange (BEI). The Fama and French Six Factor Model consists of six factors: Market Excess Return (MKT), Size Factor (SMB), Book to Market Ratio (HML), Profitability (RMW), Investment (CMA), and Momentum (UMD). This study employed a purposive sampling method to get a sample of 18 healthcare sector companies listed on the Indonesia Stock Exchange (BEI) during the Covid-19 epidemic, specifically from March 2020 to June 2023. The data is derived from secondary sources and is of a quantitative nature. This study uses a panel data regression analysis model as its primary analytical technique. The findings indicate that Momentum (UMD), Market Excess Return (MKT), Size Factor (SMB), and Investment (CMA) have a statistically significant positive impact on excess returns. Among these variables, Momentum (UMD) has the most influence on excess returns. However, it has been observed that the Book to Market Ratio (HML) and Profitability (RMW) do not exhibit a positive and statistically significant impact on excess returns. Nevertheless, according to the adjusted r-square results, the Fama and French six factor models demonstrate a lower capacity to elucidate the additional returns observed in healthcare sector stocks during the period spanning from March 2020 to June 2023.

KEYWORDS: Excess Return, Fama and French Six Factor Model, Healthcare Sector, Investment, Momentum.

INTRODUCTION

The Covid-19 epidemic has hit several countries, including Indonesia. President Joko Widodo announced the first Covid-19 case in Indonesia in March 2020 and then in June 2023 the Covid-19 case was determined to be endemic or had its pandemic status revoked. The Covid-19 pandemic has caused changes in economic conditions throughout the world. Based on data released by the Central Statistics Agency (BPS), the contraction in Indonesia's economic growth in 2020 was -2.07 percent. The low level of economic growth in Indonesia during the Covid-19 pandemic was caused by a decrease in people's interest in consumption and investment, as well as disruption to the global supply chain due to the lockdown to prevent the spread of the virus. The impact of this change also affects economic conditions, one of which is the Jakarta Composite Index (JCI). The decline in the JCI caused by Covid-19 has caused investors to worry and build speculation on the Indonesian capital market.

Stock investment is favoured by many investors due to its potential for large returns, particularly during the Covid-19 epidemic when policies are being implemented to address and mitigate the spread of the virus. This response can indicate good prospects and has the potential to get quite good returns. This has led to an increase in stock performance in the healthcare sector in 2020. The increase in stock performance in the health sector shows that health sector companies in Indonesia are also trying to maintain balanced financial performance to achieve optimal excess returns (Ferli et al., 2024). Therefore, investors can pay attention to the performance of a company's shares to serve as a measuring tool for management's success or achievements in running the company's finances (Budhijana, 2022).

Selecting the appropriate investment vehicle can enable investors to achieve the anticipated yield. When making investment decisions, it is crucial to forecast the trajectory of share prices using three fundamental principles: the ability of share prices to reflect pertinent information, the indication of information through historical price changes, and the occurrence of recurrent patterns in share price fluctuations (E. Komara et al., 2021). Investors also need to consider two factors, namely expected return and risk. Therefore, investors need to understand shares that can provide high returns with low risk, so that they can reduce uncertainty and minimize risk.

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Portfolio analysis is very important in every investment activity because it can be used as a basis for diversifying shares so that it can produce an efficient composition. This explains the maximum expected return at a risk level or minimum risk level to produce a certain return (Wijaya & Sadria, 2019). Diversification of assets is carried out by combining several securities so that they can form an optimal portfolio value. In forming a portfolio, investors need to evaluate the actual return obtained from the portfolio. The return obtained by investors is determined by computing the portfolio return and subtracting the risk-free rate, resulting in what is known as the excess return. Excess returns in a stock can show the difference between the return used and the interest rate risk, which can then influence the results that investors will receive.

In 2015, Fama and French again developed their three-factor pricing model by adding two factors, namely investment and profitability. This model became known as the five-factor model. Fama and French conducted research again in 2018 by developing the five-factor model and adding momentum which became known as the six-factor model. Momentum is proxied by Up Minus Down (UMD) (Fama & French, 2018). Research related to the Fama-French six factor model has been conducted by (Ayub et al., 2020; Candika, 2017; Chai et al., 2019; Doğan et al., 2022; Maharani & Narsa, 2023; Mård, 2020; Munawaroh & Sunarsih, 2020). In the momentum factor research carried out using either the four-factor Carhart model or a combination of the five-factor Fama-French model and momentum, it can be explained that the addition of the momentum factor can increase the explanatory power of the asset pricing model on the excess return value. Meanwhile, in research conducted by Dirkx & Peter (2020), Fama & French (2018), and Hendra et al. (2017), the momentum factor (UMD) does not offer a substantial explanation for the outcomes observed in the model study.

LITERATURE REVIEW

Fama and French Three Factor Model

Fama and French developed a model from CAPM and introduced the Fama and French Three Factor Model as one of the models that can project returns and risks. In a study conducted by Fama and French (1992), it was concluded that there is no relationship between return and beta. On the contrary, return is related to the size variable measured by Small Minus Big (SMB) and book to market measured by High Minus Low (HML), because both variables have been proven to be able to cover return movements in cross-section data from the average return. The first variable in the Fama and French Three Factor Model (FF3FM) is the market excess return obtained from the monthly difference between market return and risk-free rate (Munawaroh & Sunarsih, 2020).

Fama and French Five Factor Model

Fama and French (2015) developed the Fama and French Five Factor Model (FF5FM) by adding two factors to the Fama and French Three Factor Model (FF3FM), namely profitability and investment, to support the modeling of market excess return, size, and book to market in explaining stock returns. Fama and French (2015) concluded that FF5FM provides a better explanation of stock excess returns compared to FF3FM. The factors contained in the Fama and French Five Factor Model are market excess return, size proxied as Small Minus Big (SMB), book to market proxied as High Minus Low (HML), profitability proxied as Robust Minus Weak (RMW), and investment proxied as Conservative Minus Aggressive (CMA).

Fama and French Six Factor Model

Fama and French (2018) formed a six-factor model or commonly referred to as the Fama and French Six Factor Model by adding the Fama and French Five Factor Model with factors that can provide results that support the measurement pattern of market excess return, size factor, book to market ratio, profitability, and investment. Fama and French then added a momentum factor in their 2018 study, while in the study conducted by (Roy & Shijin, 2018) added the human capital variable. Fama and French (2018) stated that FF6FM provides better results than FF5FM in explaining excess stock returns. Research conducted by (Ayub et al., 2020; Chai et al., 2019; Doğan et al., 2022; Maharani & Narsa, 2023; Munawaroh & Sunarsih, 2020; Nagy & Dezméri, 2022; Roy, 2023) stated that the six-factor model is better at explaining excess returns compared to the previous models, namely CAPM, FF5FM, and FF3FM. The equations in the Fama and French Six Factor Model are:

$$\boldsymbol{R_{i,t} - F_{i,t} = \alpha_{i,t} + \beta_i MKT_{i,t} + s_i SMB_{i,t} + h_i HML_{i,t} + r_i RMW_{i,t} + c_i CMA_{i,t} + m_i UMD_{i,t} + \varepsilon_{i,t}}$$

Source: (Fama & French, 2018)

Where:

$\boldsymbol{R_{i,t} - F_{i,t}}$ = *Excess return*

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$MKT_{i,t}$ = *Market excess return*
$SMB_{i,t}$ = *Small Minus Big*
$HML_{i,t}$ = *High Minus Low*
$RMW_{i,t}$ = *Robust Minus Weak*
$CMA_{i,t}$ = *Conservative Minus Aggressive*
$UMD_{i,t}$ = *Up Minus Down*
$\beta_i, s_i, h_i, r_i, c_i, m_i$ = Koefisien regresi
$\varepsilon_{i,t}$ = *Random error terms*

The factors contained in the Fama and French Six Factor Model are market excess return, a size factor that proxied as Small Minus Big (SMB), book to market which is proxied as High Minus Low (HML), profitability which is proxied as Robust Minus Weak (RMW), investment which is proxied as Conservative Minus Aggressive (CMA), and momentum which is proxied as Up Minus Down (UMD) (Fama & French, 2018).

HYPOTHESIS STATEMENTS

Market excess return (MKT) is one of the variables contained in the Fama and French Six Factor Model. A market excess return that has a high value indicates the market is in a bullish condition. This makes investors want to invest in the capital market. The more investors invest, the more it will influence the increase in share prices and this is also related to the increase in returns and excess returns. A market that has a positive value can indicate that the increase in market excess return is directly proportional to stock returns. The market excess return (MKT) variable has a positive influence on excess returns based on research conducted by Ayub et al. (2020), Fama & French (2018), and Munawaroh & Sunarsih (2020). The hypothesis in this research is derived from the information provided in this description:

H_{01}: market excess return has no positive effect on excess return.
H_{a1}: market excess return has a positive effect on excess return.

The size factor is represented by the Small Minus Big (SMB) proxy. The size of a firm is positively correlated with its market value since a larger capitalization leads to higher share prices and a greater number of shares in circulation (Munawaroh & Sunarsih, 2020). Fama and French in their research show that the size factor can explain stock returns, therefore the size factor has a positive effect on excess stock returns. In the research of Ayub et al. (20200, Doğan et al. (2022), Fama & French (2018), and Tanzil et al. (2022) shows that SMB has a positive effect on excess returns. Meanwhile, in Chai et al. (2021) and Nagy & Dezméri (2022) show that SMB has a negative effect on excess returns. Based on this description, the first hypothesis in this research is:

H_{02}: size factor has no positive effect on excess return.
H_{a2}: size factor has a positive effect on excess return.

The book to market ratio is a measure that indicates a company's capacity to generate value in relation to the capital it has invested. The Book to Market Ratio is represented by the difference between high and low values, also known as HML. The book-to-market ratio, also known as HML (high minus low), exerts a beneficial impact on the excess returns of stocks. In the research of Ayub et al. (2020), Fama & French (2018), Nagy & Dezméri (2022), and Tanzil et al. (2022) shows that HML has a positive effect on excess returns. The hypothesis formulated in this research is derived from the information provided in the description as follows:

H_{03}: book to market ratio has no positive effect on excess return.
H_{a3}: book to market ratio has a positive effect on excess return.

High profitability will provide a high and better excess return value for investors. Profitability is proxied as Robust Minus Weak (RMW). Profitability has a positive influence on excess return. This is in accordance with research by Ayub et al. (2020), Fama & French (2018), Munawaroh & Sunarsih (2020), and Tanzil et al. (2022). Based on this description, the hypothesis in this research is:

H_{04}: profitability has no positive effect on excess return.
H_{a4}: profitability has a positive effect on excess return.

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The investment value can be seen from the growth of the company's total assets (Wijaya & Sadria, 2019). Investors should choose shares from companies that have a high investment value, because high investment indicates a high excess return value and is good for investors. Investment is proxied as Conservative Minus Aggressive (CMA). Investment has a positive influence on excess returns. In research conducted by Ayub et al. (2020), Munawaroh & Sunarsih (2020), and Tanzil et al. (2022). Based on this explanation, the hypothesis in this research is:

H_{05}: investment has no positive effect on excess return.
H_{a5}: investment has a positive effect on excess return.

The momentum factor describes a portfolio's past performance. Momentum is proxied by Up Minus Down (UMD), which is the difference between the return of the winning/up stock portfolio minus the return of the stock portfolio with lost/down stocks. In the research of Ayub et al. (2020), Nagy & Dezméri (2022), and Tanzil et al. (2022), who tested UMD on excess returns, found that UMD had a positive effect on excess returns. Based on this explanation, the hypothesis in this research is:

H_{06}: momentum has no positive effect on excess return.
H_{a6}: momentum has a positive effect on excess return.

Given the provided background information, this study aims to investigate several aspects that may impact the generation of higher-than-expected profits in industrial firms, herewith, researchers want to determine the impact of the six-factor Fama-French model on the healthcare sector's excess returns on the Indonesia Stock Exchange (IDX) for three consecutive years, started March 2020 to June 2023.

RESEARCH METODOLOGY

This study seeks to examine the hypothesis regarding the impact of market excess return (MKT), size factor (SMB), book to market ratio (HML), profitability (RMW), investment (CMA), and momentum (UMD) on excess returns in healthcare sector companies listed on the Indonesian Stock Exchange during the Covid-19 pandemic from March 2020 to June 2023. This research distinguishes itself through the selection of organizations as research subjects, the timeframe coinciding with the occurrence of Covid-19, and the inclusion of an additional independent variable.

The research methodology employed in this study is a quantitative technique, utilizing quantitative data and statistical analysis in numerical form. The data sources were acquired from the Indonesian Stock Exchange website (www.idx.co.id), the official Yahoo Finance website (www.finance.yahoo.com), the Bank Indonesia website (www.bi.go.id), and the financial reports of each company included in the research sample.

The sample is part of the number and characteristics of the population. If the population is large, a sample is needed so that you can study the population through the sample. The research samples were selected using purposive sampling methodology, which involved considering multiple criteria. Initially, the companies needed to belong to the healthcare industry sector and be publicly traded on the Indonesian Stock Exchange. Furthermore, it was necessary for them to undergo registration as companies operating in the healthcare industry sector on the Indonesia Stock Exchange amidst the Covid-19 pandemic. Furthermore, only corporations that released comprehensive financial statements within the Covid-19 outbreak were considered. Ultimately, the financial reports of these enterprises were required to be provided in Rupiah.

Table 1. Research Sample Criteria

Criteria	Total
A healthcare business that is listed on the Indonesia Stock Exchange	33
Less:	
Non-registered healthcare companies on the Indonesia Stock Exchange during the Covid-19 pandemic	(14)
Companies that failed to disclose comprehensive financial statements within the Covid-19 outbreak.	(1)
Companies that do not disclose their financial statements in the Indonesian currency, Rupiah (Rp)	(0)
Total companies as the sample	18

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Based on the purposive sampling method and established criteria, it was found 18 companies that were consistently registered in the healthcare sector during the Covid-19 pandemic. Using the data from these 18 companies, a computation was performed to determine the number of observations. This was done by multiplying the observation time (in months) by the number of companies, resulting in a total of 720 observations (18 x 40 months). Subsequently, throughout the process of data analysis, it was identified that there were instances of data outliers. These outliers refer to cases or data points that exhibit distinct features and deviate significantly from the rest of the observations, often manifesting as extreme values. Upon detection, there were a total of 50 data points that deviated significantly from the norm. To ensure accuracy, it is necessary to exclude any outlier data from the calculation, resulting in a total of 670 observations. The findings from these observations are consolidated in the subsequent table:

Table 2. Total observations after removing outliers

Criteria	Total
Number of sample companies	18
Observation Periode (Months)	40
Number of Observations	720
Data Outliers	(50)
Total Observations after Outliers	670

This study employs both descriptive statistical analysis and quantitative analysis using a panel data regression model to calculate and then analyze the data.Given that the data belongs to the panel data category, Eviews version 12 application is suitable for analyzing time series, cross-sectional, or panel data problem.

RESULTS AND DISCUSSION

According to the findings of the investigation and subsequent discussion regarding "Impact of Fama-French Six Factor Model on Indonesian Healthcare Stock Returns on the Indonesia Stock Exchange for the Period March 2020 - June 2023" there are four variables that have a significant positive influence with the momentum variable (UMD) having the highest influence on the excess value returns which can then be used as consideration by various interested parties such as investors. The objects used as material for this research are 18 companies included in the healthcare sector on the Indonesia Stock Exchange for the period March 2020 – June 2023. This time period encompasses the period beginning with the initial announcement of the Covid-19 pandemic in Indonesia and ending with the Government of Indonesia's decision to convert the status of the pandemic to that of an endemic.

The goodness of fit test is a testing stage used to see whether there is a significant influence on the overall regression model. The feasibility test for the goodness of fit model can be seen through a simultaneous significance test (f test) with a significance level of 0.05 (5%). Based on the results obtained through the goodness of fit test, the F-statistic or calculated F value is 97.73814 > F table, namely 2.112237 with a probability value of 0.000000 < 0.05, it can be explained that the variables MKT, SMB, HML, RMW, CMA, and UMD has a simultaneous and significant influence on the excess return value of healthcare sector stock companies during the period March 2020 – June 2023.

According to the data in table 4, the adjusted R-squared value is 0.464555, which is equivalent to 46.4555%. The coefficient of determination indicates that the independent variables, including MKT, SMB, HML, RMW, CMA, and UMD, account for 46.4555% of the variation in the excess return variable. The remaining 53.5445% of the variance (calculated as 100 minus the modified R-squared value) is attributed to factors that were not included in this study model. The findings suggest that the Fama and French Six Factor Model has little efficacy in elucidating the additional returns on healthcare sector stocks on the Indonesia Stock Exchange over the period from March 2020 to June 2023. These findings are in accordance with research conducted by Ali & Ülkü (2021) and Tanzil et al. (2022) for the evidence suggests that the Fama and French Six Factor Model fails to adequately account for stock returns, specifically excess returns. Therefore, additional investigation is required. This can be taken into consideration and can be utilized by companies that are members of the healthcare sector on the Indonesian Stock Exchange and other parties.

The analysis in this research indicates that the market excess return variable has a positive and significant impact on excess returns of healthcare sector companies listed on the Indonesia Stock Exchange from March 2020 to June 2023. The results of the research show that during the research period, the market rate of return was measured based on the JCI movement. relatively high. Investors

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can use the market excess return indicator as a decision to invest, but investors still must carry out an analysis first regarding the shares they will buy and look at market conditions. Market conditions are important to research because positive market conditions will increase share prices so that the returns received by investors are quite optimal compared to negative market conditions. This is in accordance with the theory of the influence of market excess returns which has a positive relationship with excess returns, because the greater the market excess return value, the greater the excess return and the smaller the market excess return, the smaller the excess return.

Size factor (SMB) variable has a positive and significant effect on excess returns in shares of healthcare sector companies. Based on the results of the analysis in this study, it can be concluded that the size factor (SMB) has a positive and significant effect on excess returns on healthcare sector stocks listed on the Indonesia Stock Exchange for the period March 2020 – June 2023. This happens because a large firm size will have a higher price position. strong shares and the shares concerned will strengthen in the capital market. Investors can consider the size factor (SMB) indicator as a basis for making investment decisions. This shows that the formation of share prices in healthcare sector shares is more influenced by movements in large capitalization shares because large companies are better able to survive in crisis situations, even though large companies do not provide large profits, they tend to be stable in making profits. If share price movements are dominated by large capitalization shares, the size factor value will increase, which can cause an increase in share prices.

The book to market ratio (HML) variable does not have a beneficial impact on the excess returns of healthcare sector companies. The analysis in this research demonstrates that the book to market ratio has a statistically negligible and adverse effect on the excess returns of healthcare sector stocks listed on the Indonesia Stock Exchange during the period from March 2020 to June 2023. Book to market ratio analysis is important for investors because the greater the ratio book to market will show that shares are undervalued and have an increasing opportunity to provide higher stock return compensation (E. Komara et al., 2021). A decline in the book to market ratio (HML) even though stock performance is increasing can occur if stock market prices increase rapidly, such as the drastic increase in 2020 and there are innovative developments in the healthcare sector with new government regulations or policies. This affects the market valuation of healthcare sector companies and affects the book to market (HML) value. A decrease in the book to market ratio (HML) which is followed by an increase in market prices, results in investors or interested parties being optimistic about a company's performance in the future. Low market value can also result in small returns that will be obtained by investors. This happened because healthcare sector shares experienced a decline at the start of the Covid-19 pandemic, so investors did not use the book to market ratio (HML) indicator as a basis for making investment decisions.

The profitability variable (RMW) has a negative impact on the excess returns of healthcare sector companies' shares. The research findings indicate that profitability does not have a significant and beneficial impact on excess returns of healthcare sector shares listed on the Indonesia Stock Exchange over the period from March 2020 to June 2023. Stock investors typically select shares from companies that demonstrate a substantial level of profitability. This is because high profitability can provide higher excess returns and be profitable for investors. However, these insignificant results can indicate that a high profitability value will tend to have a low excess return value. This occurs due to investors' neglect of probability considerations, which are assessed by Return on Equity (ROE), when making investment choices. Investors disregard the profitability metric, Return on Equity (ROE), due to various factors impacting the healthcare industry, particularly during the Covid-19 pandemic.

These factors include the additional expenses incurred by companies for acquiring personal protective equipment (PPE) to prevent and manage viral infections. Covid-19, the influence of sentiment or market volatility which refers to the level of significant price fluctuations or changes, as well as the influence of changes in income (profit). These factors can reduce the company's net profit which is the basis for calculating Return on Equity (ROE). As a result, the level of return obtained by investors is not influenced by the profitability value because investors will be more considerate and tend to take protective steps in conditions of uncertainty. Apart from that, there are other factors such as interest rates, the Composite Stock Price Index (JCI), and phenomena that occurred in the healthcare sector during the Covid-19 pandemic which can have a big influence so that it is possible that profitability has a smaller influence than with these factors (Munawaroh & Sunarsih, 2020).

The investment variable, also known as the Capital Market Advantage (CMA), has a notable and favorable impact on the excess returns of healthcare sector company shares. The research findings indicate that investing has a favorable and substantial impact on the surplus returns of healthcare sector stocks listed on the Indonesia Stock Exchange during the period from March 2020 to June 2023. Investors themselves can consider the decision to invest by choosing shares from companies that have a high investment

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value. so that it can provide higher excess returns for investors. The test results show that the company can generate high total assets, so that it can attract investors' interest in investing. In this condition, investors see that companies that actively invest can manage their resources well and have long-term prospects for existence, so that investors can feel safe and get long-term profits when investing.

The sixth hypothesis is that the momentum variable (UMD) is a variable that has a significant positive effect on the excess return of shares of healthcare sector companies listed on the Indonesia Stock Exchange for the period March 2020 – June 2023. Based on the research results, it can be concluded that momentum (UMD) has the highest influence compared to the three variables, namely market excess return (MKT), size factor (SMB), and investment (CMA), which have a positive and significant effect on excess returns on healthcare sector stocks. Momentum (UMD) has a positive and significant influence because healthcare sector companies show an increase in stock performance due to the high demand for medical equipment and medicines to reduce the spread of Covid-19 in Indonesia in 2020. So, with an increase in the momentum value will increase and have a fairly large influence on the excess return value. In research, Fama & French (2018) explained that the asset pricing model by adding a momentum factor produced good performance in the entire test. Investors can consider making investment decisions by implementing a momentum strategy, namely by buying shares when there is an increase and selling them when there is a decline in share prices. This behavior assumes that investors will look for the right momentum when price changes occur which will then be able to provide profits (returns) for investors through selling and buying activities.

CONCLUSION

Based on the Fama and French Six Factor Model approach, the momentum factor (UMD) is the highest factor influencing excess returns because there was an increase in stock performance during 2020. Other factors are market excess return (MKT), size factor (SMB), and investment (CMA) also have a positive effect on excess returns. Meanwhile, the book to market ratio (HML) and profitability (RMW) variables have no positive and insignificant effect on healthcare sector companies on the Indonesia Stock Exchange in March 2020 - June 2023. Overall, this Fama and French Six Factor Model has a contribution of only 46.4555 % of healthcare sector shares. It is hoped that this research can be used as material for consideration in making the right decision to choose shares that provide good potential for healthcare sector shares on the Indonesia Stock Exchange. Investors can consider and choose companies that have a positive influence on excess returns.

SUGGESTION FOR FUTURE RESEARCH

Future researchers are expected to be able to use shares in other sectors or indices listed on the Indonesia Stock Exchange as research objects and add research periods such as the year before and after the Covid-19 pandemic, so that they can provide a comparison between before and after the pandemic occurred. Then, it is recommended for future researchers to use the Seven Factor Asset Pricing Model as in the research of (Gregoriou et al., 2019) and can add several other factors such as human capital factors as in the research of (Roy & Shijin, 2018).

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DOI: 10.47191/ijcsrr/V8-i9-49, Impact Factor: 8.048
IJCSRR @ 2025
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Cite this Article: Wijaya, E., Tatukude, F.H. (2025). Impact of Fama and French Six Factor Model on Indonesian Healthcare Stock Returns. International Journal of Current Science Research and Review, 8(9), pp. 4845-4852. DOI: https://doi.org/10.47191/ijcsrr/V8-i9-49