

Analysis Application of The Capital Asset Pricing Model (CAPM) Method in Determining Investment Decision in Stocks (Case Study on Pharmaceutical and Health Research Sub-Sector Companies on the Stock Exchange for the 2017-2022 Period)

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Abstract

Investment in the capital market has its own charm for investors. The share price of each company listed on the Indonesia Stock Exchange sometimes changes, either increasing or decreasing the share price. Therefore, investors often have difficulty in choosing which stocks have a small risk but can generate a large return. This study aims to determine the expected return on stocks of the pharmaceutical and health research sub-sectors based on the use of the Capital Asset Pricing Model (CAPM) method. The research method used is the Capital Asset Pricing Model (CAPM) to determine the estimated rate of return or expected return and to determine the relevant risk and return on each asset when the capital market is in a balanced condition. The population of the study is the shares of companies in the pharmaceutical and health research sub-sector 2017-2022. The research sample used a purposive sample method and resulted in 8 companies that did not experience delisting and were listed on the IDX during the study period. Efficient stocks are stocks with individual returns greater than the expected rate of return. There are 5 stocks with a positive average return and are included in the efficient stock group and 3 are included in the inefficient stock group.

Keywords

Capital Asset Pricing Model, Expected Return, Pharmacy and Health Research, Beta

1. Introduction

The Indonesia Stock Exchange is a place for investors to trade every share or securities they own. The capital market is a meeting between parties who have excess funds and those who need funds by trading securities. Investment can be said as a commitment of a sum of money or other resources made now or now with the hope of getting benefits in the future. The basis for investment decisions consists of the level of expected return, the level of risk and the relationship between return and risk.

The Capital Asset Pricing Model method describes a method that relates the expected rate of return of a risky asset with the risk of the asset in equilibrium or balanced market conditions. The CAPM has two main advantages for calculating a company's cost of capital related to shares. The first advantage is that the model is simple and easy to understand and implement. The model variables are readily available from public sources and a second advantage is that the model does not depend on dividends or any assumptions about growth in dividends. CAPM is very interesting logical and rational in its intellectual level.

Information on stock performance can be found on the Indonesia Stock Exchange (IDX). The shares listed or listed on the IDX are divided into several sectors. While this research focuses on the health sector where there are pharmaceutical and health research sub-sectors, where the development of stock prices in pharmaceutical and health research sub-sector companies from 2016 to 2020 can be seen in the Figure 1 and Table 1 below.

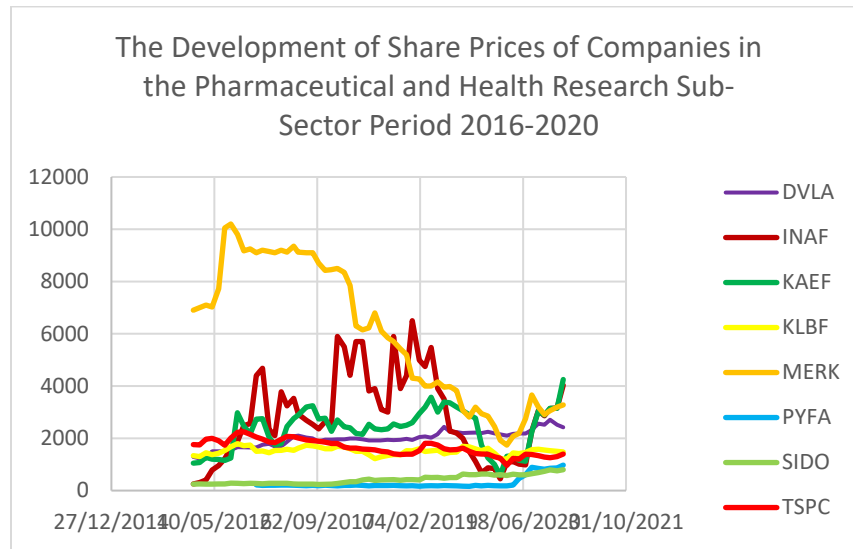


Figure1. The Development of Share Prices of Companies in the Pharmaceutical and Health Research Sub-Sector on the Indonesia Stock Exchange for the 2016-2020 Period

Based on Figure 1 shows that the stock prices of companies in the pharmaceutical and health research sub-sectors on the Indonesia Stock Exchange each year experience changes, either increasing stock prices or decreasing stock prices. For companies with codes DVLA, INAF, KAEF, MERK, PYFA, SIDO, TSPC experiencing an increase in the 2020 period, this increase could have occurred due to a pandemic that has unconsciously opened everyone's mind about the importance of medical devices, medicines and health workers, where there has been a competition between countries in developing a COVID-19 vaccine, causing many investors to compete in investing related to this development.

Table 1. Calculation of Capital Asset Pricing Model of Kimia Farma Tbk's shares

Date	KAEF	Return
1/4/2017	2450	0.2673
1/4/2018	2150	-0.0186
1/4/2019	3000	-0.1900
1/4/2020	1330	0.0150
1/4/2021	2800	0.0857
Average return		3.19%
Risk (std Dev)		16.6%
(Rm-Ri)		0.0656
Beta		0.397
BI 7-Day Reverse Repo Rate		0.035
CAPM		$R_f + b (R_m - R_i)$
CAPM		6.10%

Based on Table 1 calculation of Capital Asset Pricing Model of Kimia Farma Tbk's above, we can see know that the stock return of KAEF < CAPM is 3.19% smaller than 6.10%, this shows that the stock is not good for investing in the long term. Therefore, the use of the CAPM method is very useful in investing, the results of the method will provide accurate predictions and forecasts regarding the relationship between the risk of an asset and the expected return so

that it can be used as a preference in determining the right group of shares for investment needs. No.23/332/Dkom, the Board of Governors Meeting (RDG) of Bank Indonesia on 15-16 December 2021 decided to maintain the BI 7-Day Reverse Repo Rate (BI7DRR) at 3.50%, and Indonesia's total equity risk premium at 6, 56% in the last updated data, country default spreads and risk premium on January 08, 2021, and the beta number from Kimia Farma Tbk (KAEF) shows the number 0.397 in the Pefindo Beta Stock document edition December 23, 2021.

Pharmacy and health are sectors with the most promising potential in Indonesia. The Indonesian government in its efforts to realize Making Indonesia 4.0. The program automatically seeks to increase the competitiveness of the pharmaceutical sector by encouraging technology-based digital transformation. The Indonesian government has prepared a path to accelerate the development of the pharmaceutical industry, including procedures and product development targets which have a long-term focus on helping the pharmaceutical industry become an independent industry. (bpkm.go.id). Therefore, with the COVID-19 pandemic, it has a positive influence on the stock performance of companies in the pharmaceutical sub-sector along with the development and marketing of COVID-19 vaccines, medical devices or drugs that can increase the body's immune system. in times of pandemic.

1.1 Objectives

Based on the problems and the formulation of the research questions above, the research objectives are analyzed and find out the amount of return and risk of each share of the pharmaceutical and health research sub-sector companies. Analyze and find out the expected rate of return of each share of the pharmaceutical and health research sub-sector companies. Assess and classify stocks of companies in the pharmaceutical and health research sub-sectors that are efficient and inefficient based on the application of the Capital Asset Pricing Model method.

2. Literature Review

Share. Investing is making a current commitment to finance and other resources with the hope of making a profit in the future. Investors who currently buy a number of shares in the hope of benefiting from rising stock prices or various dividends in the future. Those who participate in investment operations are referred to as investors. Stock returns. Actual returns that are estimated based on historical data are known as realized returns. Realized returns are used as a measure of the company's success and as a basis for predicting the expected returns from investors in the future, it is considered important. Stock Risk. Almost all types of investment have some level of risk or uncertainty. Since the investment must be made or made, there is a risk that the return on investment will not reach expectations.

Individual Stock Return. The rate of return is one of the various factors that motivate investors to interact and is also included in the reward for the courage of investors to take risks on the investments made (Utami, 2015). Lack of return from the expected value or value, uncertainty of future returns, and the chance of the opposite happening are examples of risk. The following are the dangers that will be faced, according to perspective

$$R_t = \frac{P_t - P_{t-1}}{P_{t-1}} \quad (1)$$

Return market. The market rate of return is the return that investors get from investing in various stocks as reflected by changes in the price index within a certain period of time.

$$R_m = \frac{\text{indeks pasar } t - \text{indeks pasar }_{t-1}}{\text{indeks pasar }_{t-1}} \quad (2)$$

Risk free return. The risk-free rate of return is the return that investors get based on an agreed-upon agreement without any risk. Based on the perspective (Husnan, 2015) explains that the risk-free rate of return is a measure of the minimum rate of return at the time of beta risk (β_i) which has a value or is zero.

$$R_f = \frac{\sum R_f}{N} \quad (3)$$

Capital Asset Pricing Model. The CAPM is defined as a set of forecasts for the projected net return on risky assets. The CAPM is a linkage model that predicts the expected return on a risky investment in a balanced market environment. The returns expected by investors who have invested in a stock are subject to the systematic risk associated with the stock, as calculated by the CAPM

$$E(R_i) = R_f + [E(R_m) - R_f] \beta_i \quad (4)$$

Beta Market. The risk of stock price fluctuations in the market is measured by beta (β). In other words, beta is the standard deviation of stock returns when compared to market returns. Beta (β) can alternatively be defined as the relationship between market and stock returns.

$$\beta_i = \text{Slope}(y \text{ data saham}, x \text{ IHSG}) \quad (5)$$

3. Methods

The research method used is the Capital Asset Pricing Model (CAPM), which is to see the relevant or appropriate returns and risks, as well as to find estimates or estimates of the level of profit expected by investors or the expected return on each asset if the capital market is in equilibrium. Population and Sample. The population of this study are companies that are included in the pharmaceutical and health research sectors listed or listed on the IDX in the period from 2017 to 2022.

The sample in this study is to utilize the use of purposive sampling technique. The criteria used in this study are as follows Pharmaceutical and health sub-sector companies listed or listed on the Indonesia Stock Exchange (IDX). Companies that are included in the pharmaceutical and health research sub-sectors that have never been delisted on the IDX during the observation period for the 2017 to 2022 period. Companies that are included in the pharmaceutical and health research sub-sectors that have active trading on the IDX during the observation year period 2017 to 2022.

Table 2. Companies that are used as research samples for the period January 2017 – April 2022

Number	List of Pharmaceutical and Health Research Companies	Stock Code	IPO Date
1	Darya-Varia Laboratoria Tbk	DVLA	11 Nov 1994
2	Indofarma Tbk	INAF	17 April 2001
3	Kimia Farma Tbk	KAEF	04 Jul 2001
4	Kalbe Farma Tbk	KLBF	30 Jul 1991
5	Merck Tbk	MERK	23 Jul 1981
6	Pyridam Farma Tbk	PYFA	16 Oct 2001
7	Industri Jamu dan Farmasi Sido Muncul Tbk	SIDO	18 Des 2015
8	Tempo Scan Pasific Tbk	TSPC	17 Jun 1994

Based on Table 2, there are eight companies that are included in the criteria determined based on the purposive sampling method and there are two stocks (PEHA, SOHO) that are not included in the criteria determined by the author because the two companies have not been listed on the Indonesia Stock Exchange (IDX) during the period of observation.

Data analysis technique. The data analysis technique used in the research is descriptive quantitative, quantitative descriptive statistics provide a description or show some basic statistics, for example maximum average, minimum, standard deviation and others (Winarno, 2017). This research is a type of quantitative data, namely data that can be measured by using a numerical scale. Data source. The data sources used in this study use secondary data on stock prices (pharmaceuticals and health research sub-sector companies) closing prices per month during the period January 2017-April 2022, composite stock price index and BI 7-Day (Reverse) Repo Rate as well as other supporting sources in the form of necessary journals and other sources.

4. Data Collection

The data collection technique in this research is to utilize or use secondary data. Secondary data obtained based on list of shares of pharmaceutical and health research sub-sector companies listed on the Indonesia Stock Exchange during the period of observation, namely from 2017 to 2022. Second, Other sources needed are in the form of books and utilizing the internet network, namely journals, articles, and official websites and the results of previous research related to this research. Types of data in this study, researchers utilize or use secondary data types, which are data that

are not directly provided or distributed by sources to those in need or data collectors, namely through documents or other people. (Sugiyono, 2015: 193).

The data analysis technique used or utilized in this research is quantitative descriptive and uses the Capital Asset Pricing Model or CAPM research method, where in quantitative descriptive statistics it provides a description description or shows the appearance of the frequency distribution of the data in the form of a histogram and several statistical principal counts for example the average maximum, minimum and others (Winarno, 2017). The research method used is the Capital Asset Pricing Model (CAPM), which is to see relevant or appropriate returns and risks, as well as to find estimates or estimates of the level of profit expected by investors or the expected return on each asset if the capital market is in equilibrium. . This research is a type of quantitative data, namely data that can be measured using a numerical scale. The source of data used in this research is by using secondary data on stock prices (pharmaceuticals and health research sub-sector companies) closing or closing prices per month during the 2017-2022 period, composite stock price index and BI Rate as well as other supporting sources in the form of required journals, and others.

5. Results and Discussion

5.1 Descriptive Statistics

Table 3. Descriptive Statistics

	BI 7 Days repo rate	IHSG	RI	Beta	CAPM
Mean	0.0454	5981.83	0.0147	0.4077	0.0046
Median	0.0450	5995.11	0.0129	0.4534	0.0047
Maximum	0.0600	7228.91	0.0413	1.1151	0.0059
Minimum	0.0350	4538.93	-0.0097	-0.4294	0.0030
Standar Deviasi	0.0085	551.1933	0.0182	0.4835	0.0009
Observations	64	64	8	8	8

Based on the information data in the Table 3 above, the following is a description of descriptive statistical explanations for each research variable, as follows:

1. BI 7-Day (Reverse) Repo Rate

Based on data processing using Microsoft Excel, the BI 7-Day (Reverse) Repo Rate has an average value of 0.0454 or 4.54%. The lowest value with a value of 0.0350 or 3.50 %. The lowest value occurred in the period February 2021-April 2022 because it is in line with the need for the government to maintain exchange rate stability and the financial system amidst low inflation estimates and the government's efforts to support economic growth (bi.go.id). The highest value with a value of 0.0600 or 6.00%, was caused by the government's efforts to strengthen external stability of the economy as well as control the current account deficit within reasonable limits and maintain the attractiveness of domestic financial assets (bi.go.id). (Figure 2)

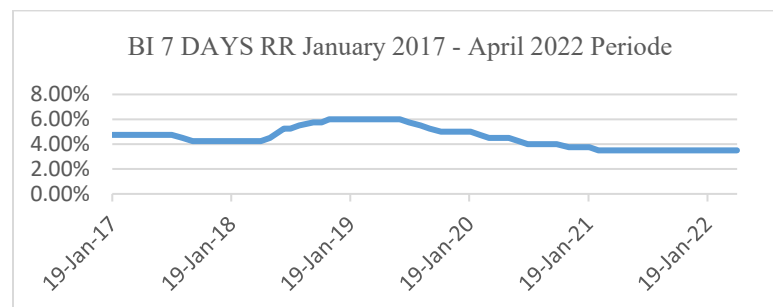


Figure 2. Developments in BI 7-Day (Reverse) Repo Rate Period January 2017- April 2022

2. Composite Stock Price Index

The composite stock price index has an average value of 5981.83. The lowest value with a value of 4538.93 occurred in the March 2020 period due to a trading halt or a temporary suspension of relevant trading in accordance with the decree regarding changes to the guidelines for handling trade continuity on the Indonesia Stock Exchange in an emergency condition when the virus first spread. Meanwhile, the highest value with a value of 7228.91 occurred in the April 2022 period due to the improving domestic economy which is slowly recovering relevant to the policy of easing social distancing (bi.go.id) (Figure 3).

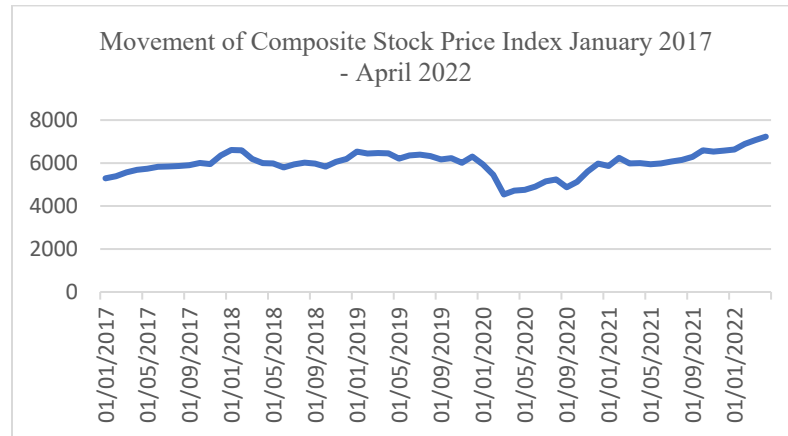


Figure 3. Movement of the Composite Stock Price Index for the Period January 2017 – April 2022

3. Return Individual (Ri)

The average rate of return of shares has an average of 0.0147 or 1.47%. This shows that the average rate of return on individual shares provides an average profit of 1.47% during the observation period. The lowest value of individual stock returns of -0.0097 or -0.97% is found in the company Merck Tbk (MERK). Meanwhile, the highest value of individual stock returns of 0.0413 or 4.13% is found in the company Indofarma Tbk (INAF). This shows that the return on individual shares of Indofarma Tbk provides an average profit with a value of 4.13% during the observation period January 2017 – April 2022.

4. Beta

Beta has an average value of 0.4077. The highest beta value is 1.1151 found in the company Merck Tbk (MERK). A beta of 1.1151 can be interpreted if the market is experiencing a decline or an increase of 2%, then the BRAND stock will increase by 1.1151 times from 2% and will decrease by 1.1151 times from 2%. The lowest beta value is -0.4294 at Kimia Farma Tbk (KAEF).

5. Capital Asset Pricing Model (CAPM)

CAPM has an average value of 0.0046. The lowest expected rate of return is 0.0030 or 0.30% for Kimia Farma Tbk (KAEF) company and the highest expected return is 0.0059 or 0.59% for Merck Tbk (MERK). This can be interpreted that investors expect a profit rate of 0.59% at the company Merck Tbk and expect a profit rate of 0.30% at the company Kimia Farma Tbk (KAEF).

5.2 Analysis of Systematic Risk Results of Each Stock (β)

Table 4. Stocks with beta more than 1 (β>1)

Number	List Company	Stock Code	β
1	Merck Tbk	MERK	1.1151

Based on Table 4 above stocks that have a beta of more than 1 show that the stock is an aggressive stock. That is, if the market (Composite Stock Price Index) is rising, then the stock will also increase but the increase exceeds the market, and vice versa if the market is down then the decline will exceed the market decline.

Table 5. Stocks with beta less than 1 ($\beta < 1$)

Number	List Company	Stock Code	β
1	Darya-Varia Laboratoria Tbk	DVLA	0.0948
2	Indofarma Tbk	INAF	0.1437
3	Kalbe Farma Tbk	KLBF	0.6278
4	Pyridam Farma Tbk	PYFA	0.6340
5	Industri Jamu dan Farmasi Sido Muncul Tbk	SIDO	0.2790
6	Tempo Scan Pasific Tbk	TSPC	0.7967

Based on Table 5 above beta which is positive and has a value of less than 1 can be interpreted that the market (Composite Stock Price Index) increases, then the stock will also increase but the increase is always lower than the increase in the market or market.

Table 6. Stocks with beta less than 0 ($\beta < 0$)

Number	List Company	Stock Code	β
1	Kimia Farma Tbk	KAEF	-0.4294

Based on Table 6 above stocks that have a negative beta and are worth less than 1, the movement will be opposite to the market or the market where if the market (Composite Stock Price Index) goes up, the stock will fall lower than the percentage increase in the market, whereas if the market is down, the stock will go up but the increase will not higher than the market decline.

5.3 Analysis of Expected Rate of Return Results [E(Ri)]

Table 7. Expected Rate of Return

Number	Code	RF	β	E(Rm)	E(RM)-RF	$\beta*(E(Rm)-Rf)$	E(Ri)	E(Ri) %
1	DVLA	0.0038	0.095	0.0057	0.0019	0.0002	0.0040	0.40%
2	INAF	0.0038	0.144	0.0057	0.0019	0.0003	0.0041	0.41%
3	KAEF	0.0038	-0.43	0.0057	0.0019	-0.0008	0.0030	0.30%
4	KLBF	0.0038	0.628	0.0057	0.0019	0.0012	0.0050	0.50%
5	MERK	0.0038	1.115	0.0057	0.0019	0.0021	0.0059	0.59%
6	PYFA	0.0038	0.634	0.0057	0.0019	0.0012	0.0050	0.50%
7	SIDO	0.0038	0.279	0.0057	0.0019	0.0005	0.0043	0.43%
8	TSPC	0.0038	0.797	0.0057	0.0019	0.0015	0.0053	0.53%

Based on Table 7 above the highest rate of return is 0.0059 or 0.59% on shares of Merck Tbk (MERK) having a positive expected rate of return because MERK stocks have the highest beta. While the lowest rate of return is 0.0030 or 0.30% in Kimia Farma Tbk (KAEF) stock which has the lowest beta. This is relevant to the Capital Asset Pricing Model method, between the expected profit and the risk of the investment having a direct and positive relationship. it can be concluded that stocks of the pharmaceutical and health research sub-sectors have a positive expected rate of return in the observation period.

Efficient Stock List and Inefficient Stock List Grouping

Table 8. List of Efficient Stocks

Number	List Company	Stocks Code	Ri	E(Ri)
1	Darya-Varia Laboratoria Tbk	DVLA	0,0065	0,0040
2	Indofarma Tbk	INAF	0,0413	0,0041
3	Kimia Farma Tbk	KAEF	0,0192	0,0030
4	Pyridam Farma Tbk	PYFA	0,0366	0,0050
5	Industri Jamu dan Farmasi Sido Muncul Tbk	SIDO	0,0218	0,0043

Table 9. List of Inefficient Stocks

Number	List Company	Stock Code	Ri	E(Ri)
1	Kalbe Farma Tbk	KLBF	0,0038	0,0050
2	Merck Tbk	MERK	-0.0097	0,0059
3	Tempo Scan Pasific Tbk	TSPC	-0.0017	0.0053

Based on Table 8 and Table 9 above stocks that are said to be efficient are stocks with an individual rate of return (Ri) greater than the expected rate of return [$R_i > E(R_i)$], included in the efficient stock list are DVLA, INAF, KAEF, PYFA, SIDO. Meanwhile, the condition of inefficient stock shows that the individual rate of return (Ri) is smaller than the expected rate of return [$R_i < E(R_i)$], included in the inefficient stock list are KLBF, MERK, TSPC. Investment decisions on stocks included in the stock list are efficient, namely reviewing or considering buying the shares, while investment decisions for stocks included in the stock list are inefficient, namely reviewing or considering selling the shares.

6. Conclusion

Based on the analysis and description of the discussion in the previous chapter, the results of the research that have been carried out can be concluded as follows:

- The results showed that there were 3 stocks of the pharmaceutical and health research sub-sector with a negative average return and 5 stocks of the pharmaceutical and health research sub-sector with a positive average return.
- Based on the results of the study, there is 1 stock that has > 1 , 6 shares that have < 1 , and there is 1 stock that has < 0 . The average systematic risk of stocks in the pharmaceutical and health research sub-sectors has a value of 0.4077, so that in general the 8 shares of companies that are used as research samples have a systematic risk that is not too large.
- Based on the research, there are 8 stocks with positive expected returns. The highest rate of return is 0.0059 or 0.59%, namely the shares of the company Merck Tbk (MERK). Meanwhile, the lowest rate of return, which is 0.0030 or 0.30%, is in the shares of Kimia Farma Tbk (KAEF).
- There are 8 company stocks that are used as research samples. There are 5 stocks classified as efficient stock criteria and 3 stocks classified as inefficient stock criteria. Efficient stock is when the rate of return on individual shares (individual return) is greater than the expected rate of return $E(R_i)$.

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