The Application of Capital Asset Pricing Model (CAPM) Analysis Method as the Basis of Stock Investment Decision Making: Study of 18 Technology Companies on the Indonesia Stock Exchange

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A B S T R A C T

This study aims to determine the application of the capital asset pricing model method as a basis for consideration in making stock investment decisions (study on shares of technology companies on the Indonesia Stock Exchange). The research variable is based on the concept of the Capital Asset Pricing Model. This research is a descriptive study with a quantitative approach. The population in this study is 27 shares of technology companies that have been listed on the Indonesia Stock Exchange (IDX) for the period November 2020-October 2022, while the sample is 18 company shares which is selected based on purposive sampling technique. The data processed is the closing price of shares (closing price) sourced from the IDX. The data was collected by literature study and data collection from several websites, including:(www.idx.co.id, www.finance.yahoo.com, https://www.bi.go.id and www.pefindo.com.) Data analysis is carried out by using the stages of the capital asset pricing model (CAPM) which starts from collecting stock closing price data to classifying stocks as investment decisions. The results of this study indicate that there is a unidirectional or non-linear relationship between systematic risk and the expected rate of return. There are 7 stocks that are included in the efficient stock category, and 11 stocks that are included in the inefficient stock category. Thus, the investment decision is to buy in efficient stocks and to sell in inefficient stocks if they have them.

1. Introduction

Tech companies have flocked to the Stock Exchange Indonesia (IDX) in the last few years. By 2022, there will be 23 technology companies that have conducted IPOs in IDX. Some of these technology companies include Gojek Corp, Tokopedia Corp Inc (GOTO), Bukalapak.Com Corp Inc, DCI Indonesia (DCII) Corp Inc, Indointernet (EDGE) CorpInc, and Elang Mahkota Teknologi Corp Inc (EMTK). These companies are also very familiar to Indonesian society and the public. For example, Gojek, Tokopedia, and Bukalapak became the leaders of technology companies in the transportation sector and marketplaces. Both did IPOs at a relative distance, where Bukalapak conducted a public offering of its shares in August 2021 and Gojek Tokopedia in March 2022.

The number of technology companies that are on the IDX are responded positively by the investor. This is evidenced by the public's high interest in acquiring shares of technology companies. For example, Bukalapak Corp shares reached 24.71 percent within the first 30 minutes of the IPO. It doesn't stop there; stock BUKA also touches Auto Reject Up (ARA) (To). The success story of Bukalapak's IPO was also followed by Gojek Tokopedia Corp (GOTO), which conducted an IPO in early 2022. GOTO also often reaches the ARA, as happened at BUKA at the

beginning of the IPO. Even on the first day of its IPO, GOTO managed to raise funds of IDR 15,000,000,000,000,000. The high enthusiasm of investors for the shares of this technology company doesn't just happen on the first day of the IPO as it is assumed by several parties. For example, the shares of Indointernet Corp Inc. (EDGE) rose by 106.44 percent from the initial price for one week of trading (Sunariyah, 2003). Shares of this company, which is owned by Otto Toto Sugiri, conducted an IPO on February 8, 2021, at a price of IDR 7,375 per share. On Friday, October 14th, 2022, EDGE's stock hit the number IDR 19,500 per share.

Although technology companies are increasingly showing off in trading, not everything went smoothly. A number of technology companies even have their shares immediately drop when they IPO first on the IDX. On the other hand, of the 27 technology companies on the IDX, some of them also do not have a healthy financial performance. One example of a company whose finances, according to the author, are not healthy is Cashlez Worldwide Indonesia Corp Inch. with the stock code CASH. On the financial statements of the last few years, the company's performance actually has a minus. To optimize investment and minimize investment risk, investors must be able to see companies that are able to provide promising investment increases, so that later these investments can produce optimal returns with minimal risk. There are various ways that can be used by investors to determine which companies are eligible to buy their shares in the capital market.

The capital asset pricing model (CAPM) is one model that can relate the expected rate of return of a risky asset to the risk of the asset in a balanced market condition. CAPM aims to assist investors in selecting stocks and minimizing risky investments. The use of CAPM analysis is expected to help investors to get a picture of complex market conditions. If you want to get maximum investment returns in the future, an investor must choose rationally, rational investors will choose efficient stocks, namely stocks that have a large individual rate of return compared to the expected return. Inefficient stocks are stocks that should be avoided because these stocks have a small individual rate of return compared to the expected return. CAPM can also assist investors in calculating non-diversified risk in a portfolio and comparing it to the predicted rate of return. The measure of risk, which is an indicator of stock sensitivity in the CAPM, is indicated by the variable β (Beta). The greater β of a stock, the greater the risk contained in it. The market rate of return used is the average rate of return from investment opportunities in the capital market (market index). Sources of data from this study are data on the Indonesia Stock Exchange (IDX), Yahoo Finance, and several other references. The research is focused on technology companies that have been listed on the Indonesia Stock Exchange. There are 18 technology companies that are sampled. This study aims to analyze the best investment choices in technology company shares on the Indonesia Stock Exchange (IDX) according to the capital asset pricing model (CAPM) approach in terms of risk and return.

2. Literature Review
Financial ratio

Financial ratios are activities to compare the numbers in the financial statements by dividing one number by another. This comparison can be made between a component with other components in a financial statement. In addition, it can also be used as a comparison between components that exist in the financial statements of a company.

Technology company

Technology companies are companies that have an electronic base. Some examples of businesses such i.e internet business, computer hardware, software, e-commerce, communication devices, semiconductors, and other computer services. Jacques Ellul explained that technology is a whole method that is rationally

directed and has the characteristics of efficiency in every activity carried out by humans.

Stock

According to Fahmi, shares are a sign of ownership of capital or funds (partially or wholly) in a company or business that generates profit (Budisantoso, 2006). In addition, the owners of shares in a company have rights and obligations, and these rights and obligations are clearly explained to the shareholders.

Stock exchange

Budisantoso (2006) explained that the stock exchange is a system that brings together buyers and sellers of securities, which is carried out either indirectly or directly. In article 1 of the Capital Market Law Number 8 of 1995, article 1, paragraph 4, the Stock Exchange is referred to as the party that organizes and provides a system to bring together offers from sellers to buyers of securities as well as other parties, where this aims to trade securities on the market among them.

Stock price index

The Stock Price Index is a change in the increase or decrease in the stock price of a company that is listed on the capital market. A previous study explains that the stock price index is the main indicator that describes stock price movements. This index consists of an individual stock price index and IDX composite (IHSG). An individual stock price index can show a comprehensive set of information on the value of a company from a certain period. Meanwhile, the IDX Composite is the price of a share that is valued in a group or jointly.

The capital asset pricing model (CAPM)

The capital asset pricing model (CAPM) is an equilibrium asset pricing model that states that the expected return on certain securities is a positive linear function of the sensitivity of securities to changes in market portfolio returns (Fahmi, 2014). CAPM is a model that connects the returns of the expected rate of a risky asset with the risk of that asset in a balanced market condition (Tandelilin, 2010).

Company acquisition

Sudana explained that the acquisition is a merger of two companies in which the company acting as the acquirer buys a portion of the shares of the company being acquired. This resulted in the management of the acquired company being transferred to the acquiring company, even though the two companies were still operating as separate legal entities. An acquisition is a transaction that occurs between two parties, where one party, as the buyer, ultimately gets and becomes the owner of most or all of the wealth of the other party, as the seller. According to previous research, acquisition is the takeover of ownership or control of shares or assets of a company by another company.

3. Methods

The type of research conducted in this research is descriptive through a quantitative approach. The population of this study is the shares of 27 technology companies listed on the Indonesia Stock Exchange (IDX) during the period of 2020-2022. The sampling technique that will be used in this research is the purposive sampling technique. There are 18 samples of technology companies in IDX from the sample selection results with the following criteria: (1) Technology companies listed on IDX. (2) Companies that record profits, where expense is greater than income. (3) A loss-making company, where income is less than expenses. The variable of this study is the Capital Asset Pricing Model (CAPM). CAPM is measured through several calculations, such as risk-free rate of return, systematic risk, individual stock returns, market returns, and so on. This kind of calculation is expected to be a security market line to guide the acquisition of a technology company. The

data used in this study is secondary data in the form of company financial statements. Data is taken from the Indonesia Stock Exchange through websites www.idx.co.id, www.finance.yahoo.com, https://www.bi.go.id/, and www.pefindo.com. Other data was obtained from various related sources, i.e., books, internet, journals, and others. Data is obtained from November 2020 until October 2022. The analytical technique used in this study is the analysis of the capital assets pricing model (CAPM). Data processing is done using MS Excel Program. To show the acquisition decisions of technology companies by using the line method that connects the expected rate of return of a company with its risk.

Analysis of the application of the CAPM method in valuing stocks and determining investment directions is carried out in the following way:

a) Collect data on shares of technology companies that have been listed on the Indonesia Stock Exchange (IDX). A total of 27 companies have been listed on the Indonesia Stock Exchange (IDX). However, the samples in this study were 18 companies. The data collected is the closing price of the stock at the end of the month (closing price). b) Calculating the individual rate of return (Ri)

In finding individual return values, the equation is as follows:

$$Ri = \frac{P_1 - P_0}{P_0}$$

c) Calculating the market rate of return (Rm)
Calculating market returns can be done using the following equation:

$$Rm = \frac{IHSGt - IHSGt - 1}{IHSG\ t - 1}$$

d) Calculating the risk-free rate of return (Rf)
Calculating market returns can be done using the following equation:

$$R_f = \frac{\Sigma R_f}{N}$$

e) Calculating stock beta (β)

The CAPM method describes the beta value as the ratio between individual stock covariance and market variance. simply written in the equation:

$$\beta = \frac{\sigma iM}{\sigma^2 M}$$

f) Calculating expected returns in CAPM.

$$E(Ri) = R_f + \beta[Rata - Rata\ R_m - R_f]$$

g) Depiction of security market line. h) Classification of stocks as an investment decision.

Assessment of efficient and inefficient stocks by comparing individual returns with expected returns. An efficient stock is a stock that has an individual rate of return that is greater than the expected rate of return [Ri>E(Ri)]. Efficient stocks will appear to be above the SML line. Meanwhile, inefficient stocks are stocks that have individual returns that are smaller than the expected rate of return [Ri<E(Ri)]. Inefficient stocks will appear to be below the SML line.

4. Results and Discussion
Individual shares of return (Ri)
The results of the analysis of individual stock returns (Ri)

The calculation of individual stock returns from 18 company stocks that became the research sample for the November 2020-November 2022 period. The results of the calculation of individual stock returns show that the stock with the highest average individual return is PT. Indosterling Technomedia Tbk (TECH), amounted to 0.769 or 76.9%. Meanwhile, the stock with the smallest individual return average is PT. Cashlez Worldwide Indonesia Tbk (CASH) and PT. M Cash Integration Tbk (MCAS) which is -0.019 or -1.9%.

Table 1. Individual stock returns (Ri).

No.	Stock code	Company	Ri
1	ATIC	Anabatic Technologies Tbk	0,028
2	CASH	Cashlez Worldwide Indonesia Tbk	-0,019
3	DIVA	Distribusi Voucher Nusantara Tbk	0,007
4	DMMX	Digital Mediatama Maxima Tbk	0,113
5	EMTK	Elang Mahkota Teknologi Tbk	0,020
6	HDIT	Hensel Davest Indonesia	-0,002
7	KIOS	Kioson Komersial Indonesia Tbk	0,150
8	KREN	Kresna Graha Investama Tbk	-0,002
9	MCAS	M Cash Integrasi Tbk	-0,019
10	MLPT	Multipolar Technology Tbk	0,099
11	NFCX	NFC Indonesia Tbk	0,121
12	PGJO	Tourindo Guide Indonesia Tbk	0,005
13	TECH	Indosterling Technomedia Tbk	0,769
14	TFAS	Telefast Indonesia Tbk	0,229
15	GLVA	Galva Technologies Tbk	-0,002
16	LUCK	Sentral Mitra Informatika Tbk	0,024
17	MTDL	Metrodata Electronics Tbk	0,034
18	PTSN	Sat Nusapersada Tbk	-0,005

Calculating the market rate of return (Rm)

The average Rm has a positive value of 0.001, which comes from the total amount of Rm of 0.17 divided by the number of months of research that has a market return (Figure 1), which is 24 months. The highest market rate of return occurred in February 2021 at 0.065 or 6.5%.%. This illustrates that stock trading conditions in that month were very active. Meanwhile, the lowest market rate of return in March 2021 was -0.041 or -4.1%, which illustrates that stock trading during that month was sluggish.
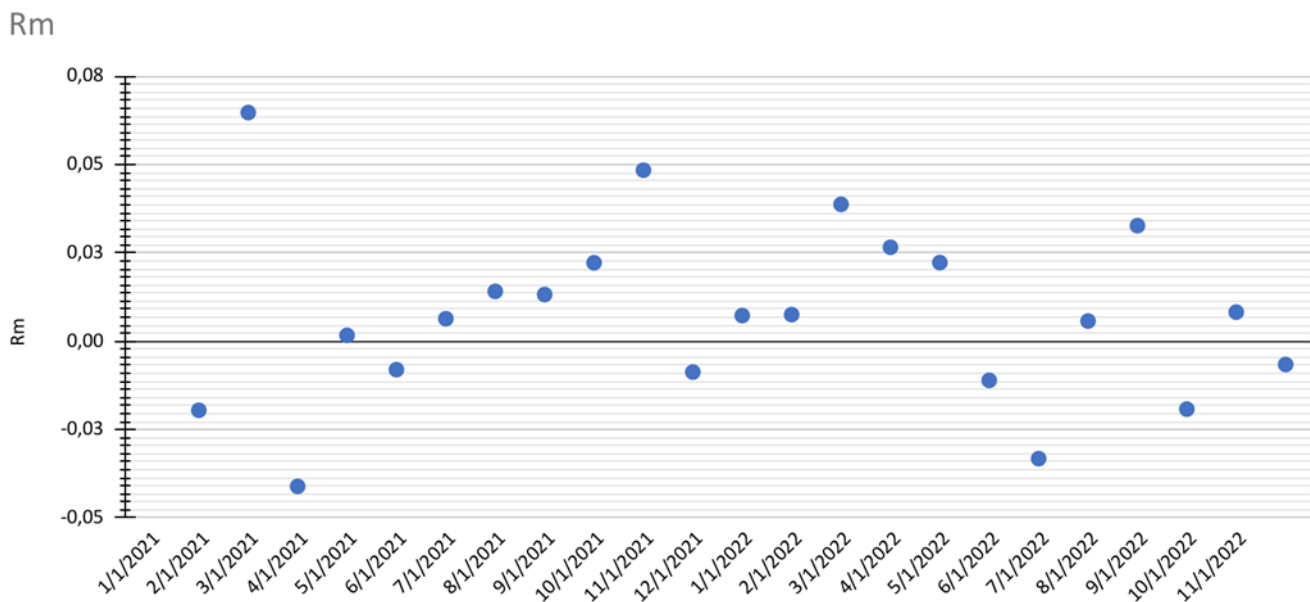

Figure 1. Market returns (Rm).

The results of the analysis of the risk-free rate of return (Rf)

In this study, the BI 7-day (reverse) repo rate data is used as risk-free (Rf). The calculation of the risk-free rate of return (Rf), it shows that the average monthly Rf in the study period (November 2020-October 2022) is 0.0363 or 3.63%. To calculate the annual Rf used in the CAPM calculation, divide the average monthly Rf of 0.87 or 87% by the total number of months in 2 years or 24 months. The calculation results obtained an annual Rf value of 0.0363 or 3.63%.

The results of the systematic risk analysis of each stock (β)

The results of the systematic risk analysis of each stock (β). The results of the beta calculation of each individual stock (β) of the 18 stock samples are as follows:
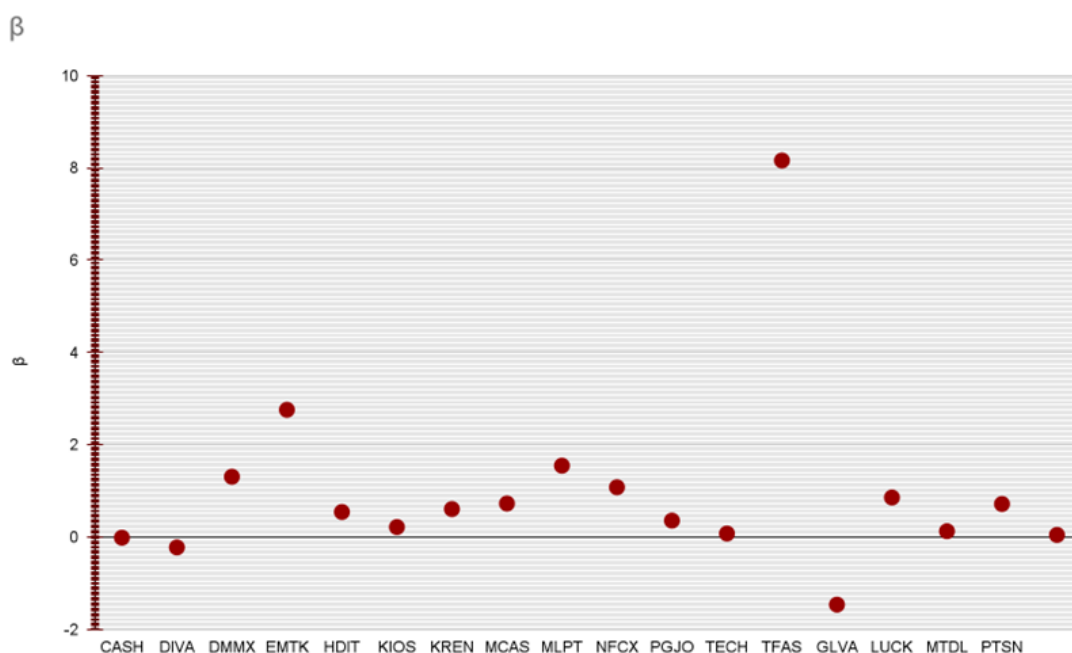

Figure 2. Beta value of each stock.

Based on Figure 2 of the calculation of systematic risk, the calculation results show the average value of β is less than 1 (0.971 < 1). There are 13 stocks with a value of β < 1 and 5 stocks with a value of $\beta_i > 1$, and there are no stocks with a value of i = 1. The stock with the highest beta value is Indosterling Technomedia Tbk (TECH) stock of 8.16 (β > 1), which indicates that the stock has high risk, is very active, and is very sensitive to changes in market prices. Meanwhile, the stock with the lowest β_i value is Telefast Indonesia Tbk (TFAS) of -1.46 (β< 1), which indicates that the stock has a small risk, tends to be passive and is less sensitive to changes in market prices.

Calculation of E (Ri)

Expected rate of return [E(Ri)] The results of calculating the expected rate of return [E(Ri)] of each stock from the 18 research stock samples on technology company stocks are as follows:
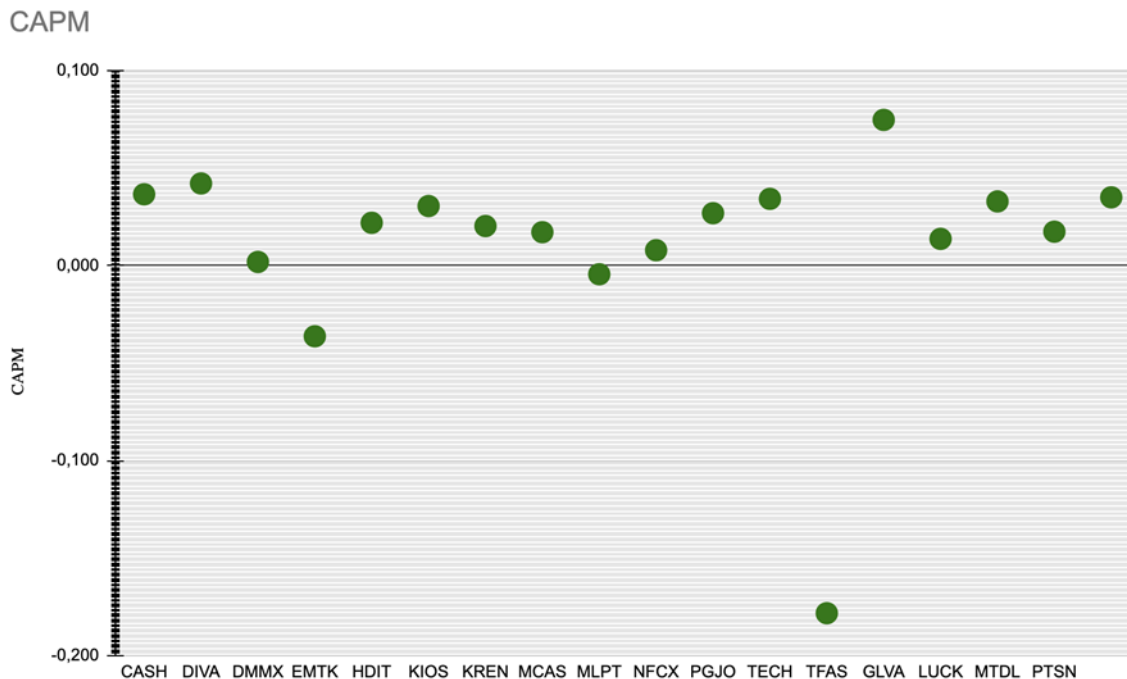
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Figure 3. Graph of the expected rate of return [E(Ri)].

Karya Sehat Tbk (MIKA) of 0.00429 with βi of -0.02146, which is βi is the lowest compared to βi of other stocks. Meanwhile, the lowest E(Ri) shares from PP (Persero) Tbk (PTPP) of -0.00126 with βi of 2.99351, which is the highest value of βi compared to βi of other stocks.

Graphic depiction of security market line (SML)

The SML shows the relationship between the magnitude of systematic risk and the expected rate of return. The following is an SML chart of 18 company stocks that are used as research samples. Based on Figure 4, it can be seen that the greater the systematic risk/beta (βi), the smaller the level, indicating that there is a non-linear or non-linear relationship between βi and E(Ri). The graph also shows that when the beta value is 1, the expected rate of return is equal to the market rate of return, which is 0.01 or 1%.

Meanwhile, when the value of βi is 0, then E(Ri) = Rf is 0.036 or 3.6%. Of the 18 stocks that became the research sample, there were 13 stocks with a beta value greater than 1 (βi>1) with an E(Ri) value.

Classification of stocks as investment decisions

There are 7 stocks (DIVA, DMMX, KIOS, NFCX, PGJO, TECH, TFAS) that are included in the efficient stock category, and as many as 11 stocks are included in the inefficient stock category. It can also be seen on the security market line chart that the position of the average return of efficient individual stocks on the chart is above the SML line, which means the stock is undervalued. On the other hand, in inefficient stocks, the individual return point is below SML, which indicates that the stock is overvalued.
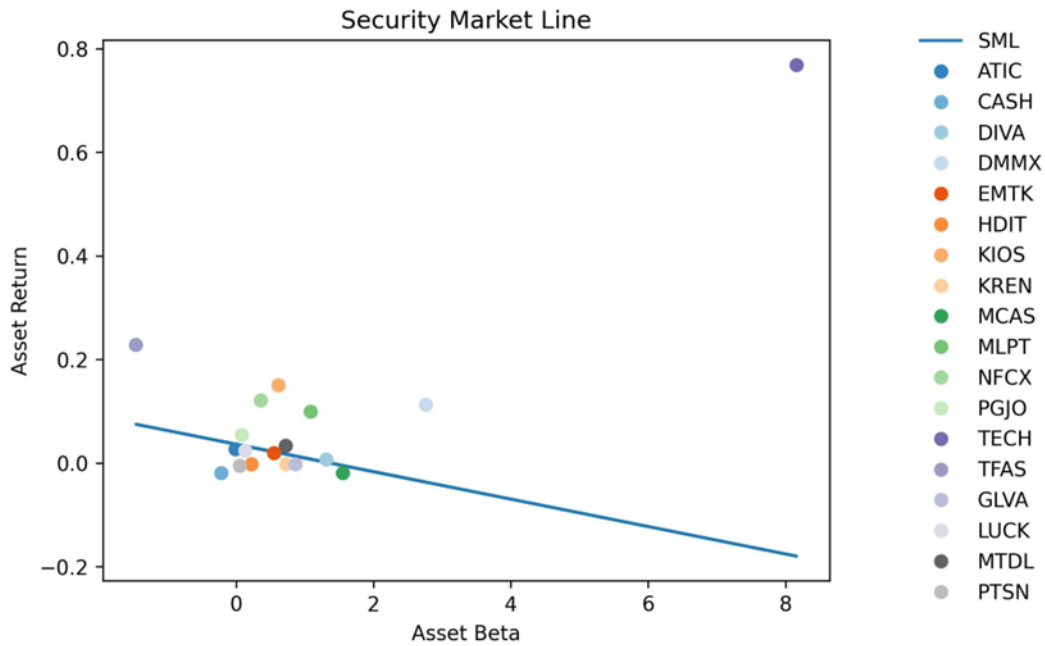
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Figure 4. Security market line.

Based on the data that has been processed and analyzed by the CAPM method, the results of the calculation of individual stock returns (Ri), of the 18 samples of companies analyzed, there are 12 stocks with a positive average individual return and 6 stocks with a negative individual return average. A negative value for Ri indicates that during the research period (November 2020-October 2022) the company's shares experienced a capital loss or losses that occur when investment assets decrease in value. Meanwhile, stocks with a positive Ri value indicate that the stock received a capital gain or profit during the research period (November 2020-October 2022). From the results of the data analysis of this study, the stock with the largest average individual return is Indosterling Technomedia Tbk (TECH) stock. The average individual return obtained by companies engaged in technology, especially in the field of wholesale software trading, computer consulting activities, and other computer facilities management and holding company activities. Currently, TECH's main business activity is in the field of information technology. This high average score was also due to

good management performance during the research period (November 2020-October 2022). Meanwhile, the stock with the smallest individual return average is PT. Cashlez Worldwide Indonesia Tbk (CASH) and PT. M Cash Integration Tbk (MCAS). This is because, during the research period, the shares of companies engaged in financial technology. PT. Cashlez Worldwide Indonesia Tbk (CASH) is a finance company that offers solutions for merchants through mPOS (mobile point of sale), QR codes, virtual accounts, and Cashlez Link. The integrated system also provides temporary reporting support for PT. M Cash Integration Tbk (MCAS). PT. M Cash Integration Tbk (MCAS) is a provider of digital self-kiosk and innovative IT solution services. M Cash offers a variety of digital products such as credit and electricity tokens, bill payments, ticket reservations, e-tickets and digital vouchers. These two companies have the lowest average scores during the study period (November 2020-October 2022) which have decreased continuously.

In addition to calculating the rate of return on individual shares, this study also calculates the market rate of return (Rm). From the research results,

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the value of the market rate of return (Rm) is smaller than the risk-free rate of return (Rf), which means that the performance of the 18 samples of technology companies listed on the IDX is not good during the study period. This is also illustrated through the image of the security market line. In theory, it is said that the expected rate of return [E(Ri)] and the level of systematic risk (β) is directly proportional or has a linear relationship, but because the market return is lower than the interest rate (Rf) causes a relationship between E(Ri) and becomes non-unidirectional or non-linear. The size of the expected rate of return depends on the size of the level of systematic risk of the stock, in other words, it is linearly related. However, in this study, there is a non-unidirectional relationship between E(Ri) and β. The smaller the systematic risk of a stock, the greater the expected rate of return, and vice versa, the greater the systematic risk of a stock, the smaller the expected rate of return. In this study, there are 7 stocks with individual returns greater than the expected rate of return, which are efficient stocks because they are above the Security Market Line; in this case, the shares are eligible to be purchased; the stocks that are worth buying include PT. Voucher Distribution Nusantara Tbk (DIVA), PT. Digital Mediatama Maxima Tbk (DMMX), PT. Kioson Commercial Indonesia Tbk (KIOS), PT. NFC Indonesia Tbk (NFCX), PT. Tourindo Guide Indonesia Tbk (PGJO), PT. Indosterling Technomedia Tbk (TECH) and PT. Telefast Indonesia Tbk (TFAS). Meanwhile, there are 11 stocks with individual returns that are less than the expected rate of return, which are inefficient stocks because they are below the SML line or overvalued shares; in this case, the shares are not purchased or sold if they have them.

5. Conclusion

There are 7 stocks that are included in the efficient stock category, including PT. Voucher Distribution Nusantara Tbk (DIVA), PT. Digital Mediatama Maxima Tbk (DMMX), PT. Kioson Commercial Indonesia Tbk (KIOS), PT. NFC Indonesia Tbk (NFCX), PT. Tourindo Guide Indonesia Tbk (PGJO), PT. Indosterling Technomedia Tbk (TECH) and PT. Telefast Indonesia Tbk (TFAS) and 11 stocks that are included in the inefficient stock category i.e. : PT. Anabatic Technologies Tbk (ATIC), PT. Cashlez Worldwide Indonesia Tbk (CASH), PT. Elang Mahkota Teknologi Tbk (EMTK), PT. Hensel Davest Indonesia Tbk (HDIT), PT. Kresna Graha Investama Tbk (KREN), PT. M Cash Integration Tbk (MCAS), PT. Multipolar Technology Tbk (MLPT), PT. Tourindo Guide Indonesia Tbk (PGJO), PT. Indosterling Technomedia Tbk (TECH), PT. Telefast Indonesia Tbk (TFAS) and PT. Galva Technologies Tbk (GLVA). Stocks that include 7 efficient stocks, the decision that must be taken (Buy/Hold) by investors is to take or buy these shares. Meanwhile, while 11 stocks are included in the category of inefficient shares, the investment decision taken by investors is to consider selling the shares before the price drops.

Based on the data analysis, there is a unidirectional or non-linear relationship between systematic risk or beta (β) and the expected return [E(Ri)]. For example, the stock with the lowest E(Ri) value is PT. Indosterling Technomedia Tbk (TECH) of -0.178 with βi of 8.16 which is the highest compared to other stocks. Meanwhile, the highest E(Ri) is shares from PT. Telefast Indonesia Tbk (TFAS) of 0.075 or 7.5% with β of -1.46 which is the lowest value compared to other stocks. The average systematic risk of the entire sample is less than 1 (0.97 > 1), so in general, the 18 company stocks that are sampled have low systematic risk. In theory, if the beta value is less than one, the stock price sensitivity is smaller than the IDX Composite, but because the average systematic risk value is almost close to 1, it can be concluded that the shares of 18 samples of technology companies have the same movement as the IDX Composite shares in the research period (November 2020-October 2022).

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