

## *Capital Asset Pricing Model (CAPM) Analysis: Technology Sector Stock Conditions Before and During the Pandemic*

### **Analisis Capital Asset Pricing Model (CAPM) pada Saham Sektor Teknologi Periode Sebelum dan Selama Pandemi COVID-19**

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#### **ABSTRACT**

The COVID-19 pandemic made people more active in saving, such as investing in the capital market. Stocks in the technology sector were excellent stocks because the trading volume increased by up to 7.3 times during the pandemic. The Capital Asset Pricing Model (CAPM) was a model to see the expected rate of return and aimed to assist investors in making investment decisions. CAPM used beta ( $\beta$ ) to measure the sensitivity a stock or portfolio is to market movements. Beta indicates the tendency of an asset's return to react to fluctuations in the overall market. This study aimed to look at differences in technology sector stocks in the period before and during the pandemic using the CAPM method and paired t-test. The research using a purposive sampling method. A quantitative descriptive method was used in this study and used secondary data in the form of financial statements of technology sector companies listed on the Indonesia Stock Exchange. Based on the results of the study, seven stocks had an average negative return before the pandemic and positive returns during the pandemic. There was one efficient stock in the pre-pandemic period and six inefficient shares, and seven shares were classified as efficient shares during the pandemic. The results of the paired t-test showed that there was a significant difference between individual returns before and during the pandemic.

**Keywords:** Beta, CAPM, investment decision, stock, paired t-test.

#### **ABSTRAK**

Pandemi COVID-19 membuat masyarakat memilih untuk menabung saham di pasar modal. Saham sektor teknologi menjadi saham yang primadona karena volume perdagangan yang meningkat hingga 7,3 kali selama pandemi. *Capital Asset Pricing Model* (CAPM) adalah model untuk melihat tingkat *return* yang diharapkan dan bertujuan untuk membantu investor dalam mengambil keputusan investasi. Penelitian ini bertujuan untuk melihat perbedaan saham sektor teknologi pada periode sebelum dan selama pandemi menggunakan metode CAPM serta uji-t berpasangan. Penelitian menggunakan metode penarikan sampel yaitu *purposive sampling*. Metode deskriptif kuantitatif digunakan dalam penelitian ini yang menggunakan data sekunder berupa laporan keuangan perusahaan sektor teknologi yang terdapat di Bursa Efek Indonesia sebanyak tujuh sampel penelitian. Berdasarkan hasil penelitian, tujuh saham memiliki rata-rata *return* yang negatif sebelum pandemi dan *return* positif pada periode selama pandemi. Terdapat satu saham efisien periode sebelum pandemi dan enam saham tidak efisien serta tujuh saham tergolong saham efisien selama pandemi. Dari hasil uji-t berpasangan menunjukkan bahwa adanya perbedaan yang signifikan antara *return* pengembalian individu pada sebelum dan selama pandemi.

**Kata kunci:** CAPM, keputusan investasi, saham, sebelum dan sesudah pandemi, uji-t berpasangan.

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## INTRODUCTION

The COVID-19 pandemic has also made many changes, one of which is to make people reduce their consumptive behavior to become more diligent in saving. The existence of pandemic has caused the number of investors to increase quite quickly (Karatri *et al.*, 2021). A significant increase occurred during the COVID-19 pandemic, in which in 2020 there were 3.8 million more investors and experienced an increase of 92.99 percent in 2021 with 7.4 million more investors in Indonesia. Then the figure in 2021 will increase by 30.55 percent in 2022 until September.

Even though there was an increase in the number of investors, the capital market capitalization value before the COVID-19 pandemic (2017-2019), in Indonesia was always above 7,000 trillion rupiahs, while in 2020 the market capitalization value fell to 6,968 trillion rupiahs (Rinestu *et al.*, 2022). This is because people's interest in investing in the capital market is influenced by various factors, such as perceived risk and minimum investment capital. Differences in public perception of interest in investing results in two different views, namely positive and negative views from the community.

People with a negative view of investment tend not to dare to take investment risks, while people with a positive view tend to be brave in taking investment risks. This is following the basic principle of financial management, which is that the higher the risk taken, the greater the possibility of profit to be received. The stock market itself offers a high return on funds. Increased interest in investing can be caused by higher risks (Malik, 2017). Therefore, one way for investors help make investment decisions in the capital market is to use the balance model used to determine asset risk and expected return. To determine asset risk and return, an appropriate measuring instrument, such as the Capital Asset Pricing Model (CAPM), which was developed to assist investors in making investment decisions (Turlinda & Hasnawati, 2021).

One of the stocks that has experienced an increase is the technology sector which has increased by around 7,3 times during the pandemic and of course has also become the prima donna of the stock market (Ajaib, 2021). The development of the technology sector is not spared by the risks that occur in conducting transactions on the capital market. The technology sector also has long-term potential business prospects. This can be seen from the number of households accessing the internet which is growing every year and reaching 82.07 percent in 2021. This is followed by the growth of the population accessing the internet which is also growing every year up to 62.1 percent in 2021 (BPS, 2021). From these data, it can be concluded that in the future, companies engaged in the technology sector are also experiencing growth and this will also have an impact on investment growth in the technology sector.

IDXTECHNO is an index that describes stock price movements in the technology sector on the Indonesia Stock Exchange (IDX). The movement of the technology sector stock price index for more than one year starting from January 25 2021 to October 31 2022 shows that the increase in the technology sector stock price index and the composite stock price index had a percentage of 203.66 percent, while the increase in the composite stock price index was 19.81 percent. Judging from the percentage increase in these two stocks, it can be concluded that technology sector stocks can provide a better rate of return when compared to returns on the market. Based on the background previously described, the researchers wanted to analyze the Capital Asset Pricing Model (CAPM) method for technology sector stocks before and during the pandemic and analyze the differences between the two periods.

There were three aspects that distinguish this research from previous studies, 1) the object of research 2) the research event, and 3) the analysis method. In previous studies, Arsyad and Matoati (2022) focused on the health sector, whereas this study examined the information technology sector, which experienced growth during the pandemic. Additionally, this study differentiated between events during and after the pandemic. In contrast, previous research by Arsyad and Matoati (2022), Aloui (2022) only considered events during the pandemic. This study emphasized events before and during the pandemic, employed a paired sample t-test analysis to determine the significance of the differences.

## **Literature Review**

### Investment

Investment is very important because with this investment it will be able to solve various problems related to the country's economy such as economic problems related to the financial crisis and challenges in the development of the country's economy (Kambono & Marpaung, 2020). Investing is an appropriate activity to improve the financial welfare of investors in the future. Investors are not always rational in decisions because they also involve emotions coupled with fear about various conditions that may change or fluctuate (Aldahan *et al.*, 2019). This results in an individual's risk-taking being closely related to financial behavior (Robiyanto & Puryandani, 2015). A decision in this investment is related to investors' understanding of circulating market information and this is understood differently by each investor (Sakinah *et al.*, 2021).

### Capital Market

The capital market serves as a marketplace where securities like stocks and bonds, typically with a maturity period exceeding one year, are traded for buying and selling purposes (Tandelilin, 2010). IDX is a place for buying and selling securities and can be interpreted as a physical capital market. To get funds from investors, a company can sell some of the shares they own and can also issue bonds publicly (Jogiyanto, 2017).

### Capital Asset Pricing Model

The CAPM model employs beta to integrate risk and return simultaneously (Hadi, 2015). CAPM is associated with factors that absorb abnormal returns thereby reducing pricing errors that result in not being statistically significant (Rocciolo *et al.*, 2022). CAPM can also be described as a model that links the anticipated rate of return from a portfolio of risky assets in a well-balanced market environment (Tandelilin, 2010).

## **RESEARCH METHOD**

This study uses a descriptive quantitative analysis method that functions to identify and describe the independent value of the CAPM method for each variable. The variables used are one or more variables and will compare one variable with another. The analysis in this study uses financial reports from technology sector shares listed on the IDX and has financial reports for the period January 2018 to June 2022 which have been examined by auditors. The objects of research are several companies engaged in the technology sector and have been listed on the IDX for the period 2018 to the Q2 2022. In this study, the sampling procedure used was purposive sampling with the aim that the samples obtained would be appropriate. The following are the criteria in the sampling strategy with the purposive sampling method:

1. Companies in the technology sector listed on the IDX in the period 2018 to the Q2 2022

2. Companies in the technology sector that have never been delisted from the IDX for the period 2018 to the Q2 2022

This research is divided into two event, namely before the pandemic which started from January 2018 to March 2020, and during the pandemic which started from April 2020 to June 2022. The analysis of this research were used paired sample t-test which is a hypothesis testing method using independent or paired data. The t-test is used to compare a measurement of the same sample such as comparing the before and after values in the research sample then determine whether there is a real difference that occurs (Hernikawati, 2021)

## RESULT AND DISCUSSION

Descriptive statistical analysis (Table 1) is an analysis that calculates only data using descriptions and descriptions in the form of histograms and basic statistics such as mean, median, minimum, maximum, standard deviation, and others (Maswar, 2017). Descriptive statistical analysis is divided into two periods, namely before and during the pandemic. This analysis uses the average size (mean), median, standard deviation, maximum value, and minimum value combined with  $R_i$  (average individual stock return rate),  $R_f$  (Risk-free rate of return),  $R_m$  (Market rate of return), Beta, and CAPM (Expected rate of return) for technology sector companies listed on the IDX in the before pandemic period January 2018 to March 2020.

Table 1. Descriptive statistics before pandemic

	BI 7 Days Repo Rate	IHSG	$R_i$	$\beta_i$	CAPM
Mean	0.05296	6,111.504	-0.01723	0.51826	-0.00449
Median	0.05250	6,188.990	-0.02032	0.47274	-0.00371
Maximum	0.06000	6,605.630	0.02493	1.27356	0.00801
Minimum	0.04250	4,538.930	-0.07815	-0.209119	-0.01747
Standard Deviation	0.00639	415.4331	0.03218	0.50621	0.00805
Observation	27	27	7	7	7

Source: Eviews 12 (2023)

Then for the descriptive statistical values of technology sector shares in the period during the April 2020 to June 2022 pandemic, the following Table 2.

Table 2. Descriptive statistics during pandemic

	BI 7 Days Repo Rate	IHSG	$R_i$	$\beta_i$	CAPM
Mean	0.03704	6,017.251	0.07076	0.05145	0.00369
Median	0.03500	5,995.620	0.06214	0.40725	0.00788
Maximum	0.04500	7,228.9100	0.12699	1.11029	0.01615
Minimum	0.03500	4,716.400	0.01045	-2.40297	-0.02518
Standard Deviation	0.00318	760.60650	0.04901	1.13999	0.01242
Observation	27	27	7	7	7

Source: Eviews 12 (2023)

### Analysis of Capital Asset Pricing Model (CAPM) Method Individual Stock Returns Analysis Results

In this study, the stock returns are computed using the monthly closing prices of technology sector stocks on the Indonesian Stock Exchange. The data for stock closing

prices was collected from Yahoo Finance for the period between January 2018 and June 2022 in Table 3.

Table 3. Individual stock return before pandemic

Technology company name	Stock code	Ri
Anabatic Technologies Tbk.	ATIC	0.00498
Elang Mahkota Teknologi Tbk.	EMTK	-0.02540
Kioson Komersial Indonesia Tbk.	KIOS	-0.07815
Kresna Graha Investama Tbk.	KREN	-0.02032
M Cash Integrasi Tbk.	MCAS	-0.02117
Multipolar Technology Tbk.	MLPT	-0.00549
Metrodata ElectronicTbk.	MTDL	0.02493

Source: Yahoo Finance, Author's Calculation (2023)

The stock return rate is obtained from the current stock closing price minus the previous stock closing price divided by the previous stock closing price with the formula;

$$R_i = \frac{P_t - P_{t-1}}{P_{t-1}}$$

Stocks in the technology sector in the before pandemic period showed returns that tended to be negative, in which only two stocks earned positive returns. Among individual stocks, Metrodata Electronics Tbk. (MTDL) exhibits the highest average rate of return, which is 0.02493 or 2.493 percent. This implies that investors can expect a monthly rate of return of 2.493 percent from this stock.

Table 4. Individual Stock Return During Pandemic

Technology company name	Stock code	Ri
Anabatic Technologies Tbk.	ATIC	0.02335
Elang Mahkota Teknologi Tbk.	EMTK	0.06214
Kioson Komersial Indonesia Tbk.	KIOS	0.10824
Kresna Graha Investama Tbk.	KREN	0.01045
M Cash Integrasi Tbk.	MCAS	0.12699
Multipolar Technology Tbk.	MLPT	0.12468
Metrodata ElectronicTbk.	MTDL	0.03948

Source: Yahoo Finance, Author's Calculation (2023)

From Table 4, there were seven stocks in the technology sector during the pandemic showing positive returns. Among individual stocks, M Cash Integrasi Tbk. (MCAS) exhibits the highest average rate of return, which is 0.12699 or 12.699 percent. This implies that investors can expect a monthly rate of return of 12.699 percent from this stock.

#### Risk-Free Rate Analysis Results

A risk-free asset is an asset that has a certainty of a return value in the future that can be ascertained at this time and is characterized by a zero return variance. This study uses risk-free assets obtained from the BI seven Days Repo Rate for the period January 2018 to March 2020 before the pandemic and the period April 2020 to June 2022 for data during the pandemic.

Table 5. Risk-Free Rate Before Pandemic

Month	BI7DRR	Month	BI7DRR
January 2018	4.25%	April 2019	6.00%
February 2018	4.25%	Mey 2019	6.00%
March 2018	4.25%	June 2019	6.00%
April 2018	4.25%	July 2019	5,75%
Mey 2018	4.25%	Auguts 2019	5.50%
June 2018	5.25%	September 2019	5.25%
July 2018	5.25%	October 2019	5.00%
Auguts 2018	5.50%	November 2019	5.00%
September 2018	5.75%	December 2019	5.00%
October 2018	5.75%	January 2020	5.00%
November 2018	6.00%	February 2020	4.47%
December 2018	6.00%	March 2020	4.50%
January 2019	6.00%	Total	143.00%
February 2019	6.00%	Mean	0.0530
March 2019	6.00%	Risk Free Rate per Month	0.00441

Source: Bank Indonesia, Author’s Calculation (2023)

From Table 5, the lowest BI7DRR interest rate in the before pandemic period was 4.25 percent or 0.0425 which occurred in the period January 2018 to April 2018 and the highest BI7DRR interest rate was 6 percent or 0.06 which occurred in November 2018 to June 2019. For average the BI7DRR interest rate during the before pandemic period was 0.0530 or 5.3 percent which was then divided by the number of months in a year so that the value of the risk-free rate of return (Rf) per month was 0.00441 or 0.441 percent.

Table 6. Risk-Free Rate During Pandemic

Month	BI7DRR	Month	BI7DRR
April 2020	4.50%	July 2021	3.50%
Mey 2020	4.50%	Auguts 2021	3.50%
June 2020	4.25%	September 2021	3.50%
July 2020	4.00%	October 2021	3.50%
Auguts 2020	4.00%	November 2021	3.50%
September 2020	4.00%	December 2021	3.50%
October 2020	4.00%	January 2022	3.50%
November 2020	3.75%	February 2022	3.50%
December 2020	3.75%	March 2022	3.50%
January 2021	3.75%	April 2022	3.50%
February 2021	3.50%	Mey 2022	3.50%
March 2021	3.50%	June 2022	3.50%
April 2021	3.50%	Total	100.00%
Mey 2021	3.50%	Mean	0.0370
June 2021	3.50%	Risk Free Rate per Month	0.00309

Source: Bank Indonesia, Author’s Calculation (2023)

From Table 6, the lowest BI7DRR interest rate during the pandemic was 3.50 percent or 0.035 which occurred in the period February 2021 to June 2022 and the highest BI7DRR interest rate was 4.50 percent or 0.0450 which occurred from April 2020 to May 2020. For average The BI7DRR interest rate during the pandemic period is 0.0370 or 3.7 percent which is then divided by the number of months in a year so that the risk-free rate of return (Rf) per month is 0.00309 or 0.309 percent.

### Market Return Analysis Results

The market return is the level of investor acceptance in investing and is determined by changes in the price index over a certain period. This study uses the Composite Stock Price Index (IHSG) to calculate the market rate of return.

Table 7. Risk-Free Rate Before Pandemic

Month	IHSG	Rm	Month	IHSG	Rm
January 2018	6605.63	-	April 2019	6455.35	-0.00207
February 2018	6597.22	-0.00127	May 2019	6209.12	-0.03814
March 2018	6188.99	-0.06188	June 2019	6358.63	0.02408
April 2018	5994.6	-0.03141	July 2019	6390.5	0.00501
May 2018	5983.59	-0.00184	August 2019	6328.47	-0.00971
June 2018	5799.24	-0.03081	September 2019	6169.1	-0.02518
July 2018	5936.44	0.02366	October 2019	6228.32	0.00960
August 2018	6018.46	0.01382	November 2019	6011.83	-0.03476
September 2018	5976.55	-0.00696	December 2019	6299.54	0.04786
October 2018	5831.65	-0.02424	January 2020	5940.05	-0.05707
November 2018	6056.12	0.03849	February 2020	5452.7	-0.08204
December 2018	6194.5	0.02285	March 2020	4538.93	-0.16758
January 2019	6532.97	0.05464	Total		-0.34474
February 2019	6443.35	-0.01372	E(Rm)		-0.01277
March 2019	6468.75	0.00394			

Source: Yahoo Finance, Author's Calculation (2023)

From the calculation results in Table 7, the market rate of return is lower than the risk-free rate of return ( $-0.01277 < 0.00441$ ), which means that stock performance in the period before the pandemic was still not good.

Table 8. Risk-Free Rate During Pandemic

Month	IHSG	Rm	Month	IHSG	Rm
April 2020	4716.4	-	July 2021	6070.04	0.01413
May 2020	4753.61	0.00789	August 2021	6150.3	0.01322
June 2020	4905.39	0.03193	September 2021	6286.94	0.02222
July 2020	5149.63	0.04979	October 2021	6591.35	0.04842
August 2020	5238.49	0.01726	November 2021	6533.93	-0.00871
September 2020	4870.04	-0.07034	December 2021	6581.48	0.00728
October 2020	5128.23	0.05302	January 2022	6631.15	0.00755
November 2020	5612.42	0.09442	February 2022	6888.17	0.03876
December 2020	5979.07	0.06533	March 2022	7071.44	0.02661
January 2021	5862.35	-0.01952	April 2022	7228.91	0.02227
February 2021	6241.8	0.06473	May 2022	7148.97	-0.01106
March 2021	5985.52	-0.04106	June 2022	6911.58	-0.03321
April 2021	5995.62	0.00169	Total		0.40095
May 2021	5947.46	-0.00803	E(Rm)		0.01485
June 2021	5985.49	0.00639			

Source: Yahoo Finance, Author's Calculation (2023)

From Table 8, the market rate of return is higher than the risk-free rate of return ( $0.01485 > 0.00309$ ), which means that stock performance during the pandemic can be said to be good.

### Levered Beta Analysis Results

Levered beta quantifies the systematic risk of a stock by encompassing risks associated with macroeconomic occurrences such as wars, political events, recessions,

and other similar factors. Investors can pay attention to the number of projected returns and changes in stock prices that are influenced by beta.

Table 9. Technology Sector Stock that have a Levered Beta of more than 1

Technology Company Name	Stock code	$\beta$	Period
Kresna Graha Investama Tbk.	KREN	1.16848	Before
M Cash Integrasi Tbk.	MCAS	1.72691	Before
Metrodata Electronics Tbk.	MTDL	1.34822	Before
M Cash Integrasi Tbk.	MCAS	1.51914	During

Source: Author's Calculation (2023)

From Table 9, there are four stocks that have a levered beta of more than 1. Shares in the company M Cash Integrasi Tbk. (MCAS) before the pandemic period had the highest levered beta, namely 1.72691, which if the market experienced a 5 percent increase or decrease, MCAS shares would increase by 1.72691 times from 5 percent and decrease by 1.72691 times from 5 percent.

Table 10. Technology Sector Stock that have a Levered Beta of less than 1

Technology company name	Stock code	$\beta$	Periode
Elang Mahkota Teknologi Tbk.	EMTK	0.00498	Before
Kioson Komersial Indonesia Tbk.	KIOS	-0.02540	Before
Multipolar Technology Tbk.	MLPT	-0.07815	Before
Elang Mahkota Teknologi Tbk	EMTK	-0.02032	During
Kresna Graha Investama Tbk.	KREN	-0.02117	During
Multipolar Technology Tbk.	MLPT	-0.00549	During
Metrodata ElectronicTbk.	MTDL	0.02493	During

Source: Author's Calculation (2023)

Based on Table 10, seven stocks have a levered beta of less than 1. The statement suggests that when the IHSG (Indonesia Stock Exchange Composite Index) rises, the value of the shares is expected to increase. However, the magnitude of this increase will always be less than the rise in the IHSG because the beta is positive and less than 1. In the case of a beta value equal to 1, the return on the stock or portfolio will fluctuate by the same percentage as the market return for each fluctuation in the market return.

Table 11. Technology Sector Stock that have a Levered Beta of less than 0

Technology Company Name	Stock code	$\beta$	Period
Anabatic Technologies Tbk.	ATIC	-0.78629	Before
Anabatic Technologies Tbk.	ATIC	-0.47930	During
Kioson Komersial Indonesia Tbk.	KIOS	-3.62486	During

Source: Author's Calculation (2023)

Based on Table 11, three stocks have a levered beta value of less than 0. The lowest beta value is Kioson Komersial Indonesia Tbk. (KIOS) which has a beta value of -3.62486. When the value of the beta is classified as less than 1 and has a negative beta, then the movement of the stock will be opposite to the market movement.

### Unlevered Beta Analysis Results

Unlevered beta can be determined by eliminating the impact of debt on levered beta. The debt effect is computed by multiplying the debt-to-equity ratio (1-tax) and then adding 1 to the resulting value.



Table 12. Technology Sector Stock that have a Unlevered Beta of more than 1

Technology Company Name	Stock code	$\beta$	Period
M Cash Integrasi Tbk.	MCAS	1.27356	Before
M Cash Integrasi Tbk.	MCAS	1.11029	During

Source: Author's Calculation (2023)

Based on the data in Table 12, two stocks have an unlevered beta value of more than 1. M Cash Integrasi Tbk. (MCAS) in the period before and during the pandemic had an unlevered beta of more than 1. The highest unlevered beta was on MCAS shares, namely in the before pandemic period of 1.27356. Stocks that have a beta value of more than 1 are considered aggressive stocks. It can be said that if the market experiences a 5 percent increase or decrease, MCAS shares will increase by 1.27356 times from 5 percent and decrease by 1.27356 times from 5 percent.

Table 13. Technology Sector Stock that have a Unlevered Beta of less than 1

Technology company name	Stock code	$\beta$	Periode
Elang Mahkota Teknologi Tbk.	EMTK	0.47274	Before
Kioson Komersial Indonesia Tbk.	KIOS	0.18563	Before
Kresna Graha Investama Tbk.	KREN	0.89161	Before
Multipolar Technology Tbk.	MLPT	0.20266	Before
Metrodata ElectronicTbk.	MTDL	0.81124	Before
Elang Mahkota Teknologi Tbk	EMTK	0.50338	During
Kresna Graha Investama Tbk.	KREN	0.59513	During
Multipolar Technology Tbk.	MLPT	0.18467	During
Metrodata ElectronicTbk.	MTDL	0.40725	During

Source: Author's Calculation (2023)

Based on Table 13, nine stocks have an unlevered beta of less than 1, of which there are five shares in the before pandemic period and four shares in the period during the pandemic. It can be said that the stock value will increase if the IHSG increases, but the increase will always be smaller than the increase in the IHSG because the beta is positive and smaller than 1. However, for a beta whose value is equal to 1, the return on the stock or portfolio will fluctuate based on the same amount with market returns for each percent fluctuation in market returns.

Table 14. Technology Sector Stock that have a Levered Beta of less than 0

Technology Company Name	Stock code	$\beta$	Period
Anabatic Technologies Tbk.	ATIC	-0.20919	Before
Anabatic Technologies Tbk.	ATIC	-0.03758	During
Kioson Komersial Indonesia Tbk.	KIOS	-2.40297	During

Source: Author's Calculation (2023)

Based on Table 14, four stocks have an unlevered beta value of less than 0. The lowest beta value is found in Kioson Komersial Indonesia Tbk. (KIOS) which has a beta value of -2.40297 during the pandemic. When the value of the beta is classified as less than 1 and has a negative beta, then the movement of the stock will be opposite to the market movement.

### Expected Rate of Return Analysis Results

Three stocks have positive return expectations in the before pandemic period. Anabatic Technologies Tbk. (ATIC) has the largest rate of return, namely 0.00801 or 0.801 percent. In the calculations in Table 15, it can be seen that market conditions are

bearish (negative growth) so it is advisable to buy defensive beta stocks, ATIC shares have positive return expectations. Shares M Cash Integrasi Tbk. (MCAS) has the lowest rate of return, namely -0.01747 or -1.747 percent. If the market declines, that is, it is in a negative number, then the share price will decrease at a higher price than the market. This is because if MCAS has a beta of 1.27356, when the market drops -1.277 percent, the MCAS share price will decrease -1.747 percent. From these data, it can be concluded that the average expected rate of return in the before pandemic period was negative for technology sector stocks, namely -0.449 percent per month.

Table 15. Expected Rate of Return Before Pandemic

Stock code	Rf	Beta	E(Rm)	E(Rm) - Rf	$\beta^*(E(Rm)-Rf)$	E(Ri)
ATIC	0.00441	-0.20919	-0.01277	-0.01718	0.00359	0.00801
EMTK	0.00441	0.47274	-0.01277	-0.01718	-0.00812	-0.00371
KIOS	0.00441	0.18563	-0.01277	-0.01718	-0.00319	0.00122
KREN	0.00441	0.89161	-0.01277	-0.01718	-0.01532	-0.01091
MCAS	0.00441	1.27356	-0.01277	-0.01718	-0.02188	-0.01747
MLPT	0.00441	0.20226	-0.01277	-0.01718	-0.00348	-0.00094
MTDL	0.00441	0.81124	-0.01277	-0.01718	-0.01394	-0.00952
Total						-0.03144
Mean						-0.00449

Source: Author's Calculation (2023)

Furthermore, for the period during the pandemic, there were (Table 16) six positive return expectations. Shares M Cash Integrasi Tbk. (MCAS) has the largest rate of return, namely 0.01615 or 1.615 percent. Because MCAS shares have the largest beta and the market value rises, MCAS shares have the highest expected rate of return as well. Shares Kioson Commercial Indonesia Tbk. (KIOS) has the lowest rate of return, namely -0.02518 or -2.518 percent. Because KIOS shares have the lowest stock beta value, therefore KIOS shares also have a low expected rate of return. This is related to the CAPM method which assumes that there is a positive and directly proportional relationship between the expected rate of return and investment risk. From these data, it can be concluded that the average expected rate of return has a positive value in technology sector stocks during the pandemic, namely 0.369 percent per month.

Table 16. Expected Rate of Return During Pandemic

Stock Code	Rf	Beta	E(Rm)	E(Rm) - Rf	$(E(Rm) - Rf)$	E(Ri)
ATIC	0.00309	-0.03758	0.01485	0.01176	-0.00044	0.00264
EMTK	0.00309	0.50338	0.01485	0.01176	0.00592	0.00901
KIOS	0.00309	-2.40297	0.01485	0.01176	-0.02827	-0.02518
KREN	0.00309	0.59513	0.01485	0.01176	0.00700	0.01009
MCAS	0.00309	1.11029	0.01485	0.01176	0.01306	0.01615
MLPT	0.00309	0.18467	0.01485	0.01176	0.00217	0.00526
MTDL	0.00309	0.40725	0.01485	0.01176	0.00479	0.00788
Total						0.02584
Mean						0.00369

Source: Author's Calculation (2023)

### Security Market Line (SML)

The Security Market Line (SML) is a graphical representation that illustrates the CAPM model. The SML depicts the connection between the average rate of return and

the average investment risk. The technology sector stocks in the before pandemic period were in a straight line but in a declining condition. This is because market conditions are also in a negative position so the expected rate of return is the opposite of market conditions. Therefore, in the before pandemic period, if the beta value is below 0 or negative, the expected rate of return will be even greater (Figure 1).

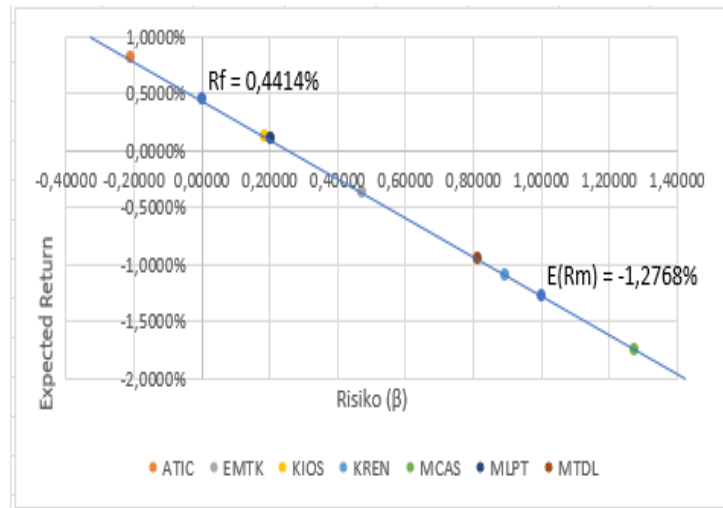


Figure 1. Security Market Line Before Pandemic  
Source: Author's Calculation (2023)

Then during the pandemic period, it can be said that the greater the systematic risk or beta of a stock, the greater the expected return. Therefore, stocks in the technology sector during the period of the pandemic were on a straight line (Figure2).

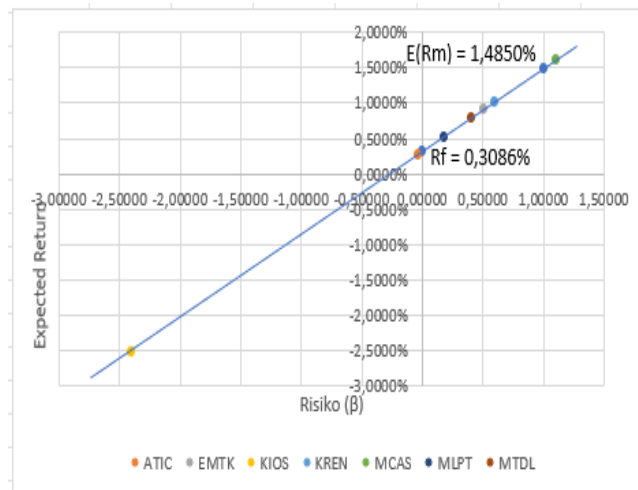


Figure 2. Security Market Line During Pandemic  
Source: Author's Calculation (2023)

### Efficient Stock and Investment Decision

Efficient stocks are those that generate returns surpassing expectations, whereas inefficient stocks are those that yield returns below expectations.

Tabel 17. Efficient Stock Before Pandemic

Technology Company Name	Stock Code	Ri	E(Ri)	Ri E(Ri)	Evaluation
Metrodata Electronics Tbk.	MTDL	0.02493	-0.00952	0.03445	Efficient
Anabatic Technologies Tbk.	ATIC	0.00498	0.00801	-0.00303	Not Efficient
Elang Mahkota Teknologi Tbk.	EMTK	-0.02540	-0.00371	-0.02169	Not Efficient
Kioson Komersial Indonesia Tbk.	KIOS	-0.07815	0.00122	-0.07937	Not Efficient
Kresna Graha Investama Tbk.	KREN	-0.02032	-0.01091	-0.00942	Not Efficient
M Cash Integrasi Tbk.	MCAS	-0.02117	-0.01747	-0.00370	Not Efficient
Multipolar Technology Tbk.	MLPT	-0.00549	0.00094	-0.00643	Not Efficient

Source: Author's Calculation (2023)

From Table 17, there is only one efficient stock, namely Metrodata Electronics Tbk. (MTDL) has a difference between returns and expectations of 0.03445 or 3.445 percent. In short, shares of Metrodata Electronics Tbk. (MTDL) can generate a return of 3.445 percent of the return expected by investors. Then the rest, namely 6 stocks are not efficient. Shares Kioson Commercial Indonesia Tbk. (KIOS) has the biggest difference between returns and expectations, namely -0.07937 or -7.937 percent. In making investment decisions, investors may think not to buy these shares.

Tabel 18. Efficient Stock During Pandemic

Technology Company Name	Stock Code	Ri	E(Ri)	Ri E(Ri)	Evaluation
Anabatic Technologies Tbk.	ATIC	0.02335	0.00264	0.02070	Efficient
Elang Mahkota Teknologi Tbk.	EMTK	0.06214	0.00901	0.05313	Efficient
Kioson Komersial Indonesia Tbk.	KIOS	0.10824	-0.02518	0.13342	Efficient
Kresna Graha Investama Tbk.	KREN	0.01045	0.01009	0.00036	Efficient
M Cash Integrasi Tbk.	MCAS	0.12699	0.01615	0.11084	Efficient
Multipolar Technology Tbk.	MLPT	0.12468	0.00526	0.11943	Efficient
Metrodata Electronics Tbk.	MTDL	0.03948	0.00788	0.03160	Efficient

Source: Author's Calculation (2023)

Based on Table 18, seven stocks are considered efficient during a pandemic. Shares Kioson Commercial Indonesia Tbk. (KIOS) has a difference between returns and expectations of 0.13342 or 1.3342 percent. KIOS shares are one of the inefficient stocks and even have a quite large gap between expected returns in the before pandemic period, but these stocks were able to become the most effective stocks during the pandemic. It can be seen, shares of Kioson Commercial Indonesia Tbk. (KIOS) can generate a return of 1.3342 percent of the return expected by investors. In conclusion, when making an investment decision, investors must consider purchasing effective and high-quality stocks.

### Paired T-Test Analysis Results

Paired t-test analysis is a data test conducted to find out how big the average share of the technology sector was before and during the COVID-19 pandemic period.

Tabel. 19 Paired T-Test

	Mean	Std. Deviation	Std. Error Mean	T	Siq. (2-tailed)
Before – As Long As	-0.08799	0.06903725	0.02609363	-3.372	0.015

Source: SPSS 16.0 (2023)

Based on Table 19, it is shown that the calculated t is -3.372 with a probability value (sig. 2-tailed) of 0.015. Judging from the probability value which is less than 0.05, there is a difference between the returns on individual technology sector stocks in the period before and during the pandemic. These results are in line with research (Hutauruk, 2021) which states that there is a positive difference between the average stock price before the pandemic and during the pandemic. The results of the different tests above are also in line with research (Dharani *et al.*, 2022) which states that there are differences in return rates from before to during the pandemic. The technology sector is one of the sectors that has a higher rate of return during the pandemic.

## CONCLUSION

Based on the results of the research that has been done, it can be concluded as follows; the return on stocks in the technology sector in the before pandemic period was on average negative, in which five out of seven stocks were negative, while during the period during the pandemic, the average return of seven shares in the technology sector was positive. During the period before and during the pandemic, there were two stocks with more than one unlevered beta, nine shares with less than one unlevered beta, and three stocks with less than zero unlevered beta. Of the seven research samples, the technology sector stocks in the before pandemic period had an average unlevered beta of 0.51826, while in the period during the pandemic, they had an average unlevered beta of 0.05145. This indicates that the risk of technology sector stocks is not too high. There were three stocks with expected returns that had a positive value in the before pandemic period. Anabatic Technologies Tbk. (ATIC) has the largest rate of return, namely 0.00801 or 0.801 percent. Meanwhile, the shares of M Cash Integrasi Tbk. (MCAS) has the lowest rate of return, namely -0.01747 or -1.747 percent.

During the pandemic period, there were six stocks with positive expected returns. Shares M Cash Integrasi Tbk. (MCAS) has the largest rate of return, namely 0.01615 or 1.615 percent. Meanwhile, shares of Kioson Commercial Indonesia Tbk. (KIOS) has the lowest rate of return, namely -0.02518 or -2.518 percent. Out of seven stocks in the technology sector, in the before pandemic period, only 1 stock was considered efficient and during the pandemic, all stocks were classified as efficient. Efficient stocks occur when the stock return exceeds the expected rate of return. There was a difference between the conditions of individual stock returns in the period before and during the pandemic which were influenced by pandemic conditions which made activities completely online so that businesses offering fintech, digital platforms, storage service providers, and network providers experienced a significant increase.

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