



Comparative Analysis of Stock Systematic Risk Based on Business Sector

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Abstract. In the realm of financial investment, stock investments are categorized as high-risk investments, especially in conditions of economic shocks due to the pandemic. The condition of increasing risk seems contradictory when compared with the fact that the number of individual investors in the capital market has increased. Investment in the stock market is a representation of the concept of investment returns and investment risk moving in the same direction. But often investors only focus on high potential returns and tend to ignore the possibility of high losses. Therefore, the purpose of this study is to fulfill the need for information about the condition of the stock's systematic risk based on the characteristics of the issuer at this time. The research method used is a regression model on 10 business sectors. Using secondary data on stock return variables and market return variables. The empirical results state that the systematic risk of stocks increases during the pandemic period accompanied by changes in sector position for stocks with the lowest and highest risk and changes in distribution patterns for sectors that have high risk in the 2 research periods.

Keywords: Stock Systematic Risk · Systematic Risk Based on Business Sectors · Investment

1 Introduction

At the beginning of the pandemic in 2020, capital market conditions did experience a decline in index values. However, capital market indicators other than the index value turned out to provide different facts. In the period from 2020 to 2021, there has been a massive increase in the number of investors in the capital market. This is indicated by an increase in the number of SIDs as shown in Fig. 1 as follows.

The increasing public interest in investing in the capital market when the economy is recovering from the shock of the pandemic is a unique phenomenon. Unique because the phenomenon describes contradictory conditions. In the realm of financial investment, stock investment is categorized as an investment with high risk, especially when macroeconomic conditions are experiencing a pandemic shock which will certainly increase the risk of stock investment. This condition of increased risk appears contradictory when compared with the fact that the number of individual investors in the capital market has increased, which is presented in Fig. 1.

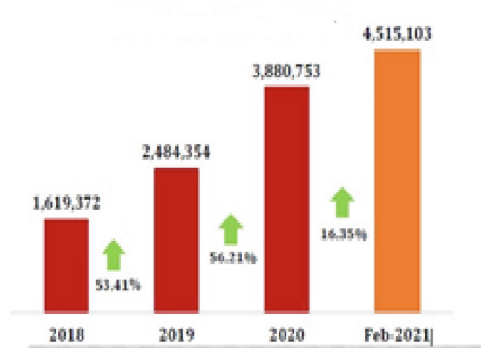


Fig. 1. The number of investors in the Jakarta stock exchange.

1.1 Explore Importance of the Problem

Investment in the stock market is a representative example of the understanding that investment returns and investment risks move in the same direction. However, often the community of potential investors and even investors only focuses on high potential returns and tends to ignore the possibility of high losses. Stock investment risk comes from 2 things, namely individual stock risk and systematic risk or market risk.

Systematic risk represents the risk caused by changes in macro variables. Systematic risk can be categorized based on the similarity of the character of the stock issuer. The classification is based on the argument that the impact of changes in macro variables on issuers will be different so that the resulting risks will also be different. This view is in line with the conclusions of Glushkov research [1] which proves that different issuers' characters have an effect on the size of market sentiment received. Therefore, the risk classification based on the similarity of characters aims to make the calculation of the resulting risk value more precise. In this study, the classification of stocks is based on sectoral similarity. The Jakarta Stock Industrial Classification (JASICA) categorizes companies on the Indonesia Stock Exchange in 10 sectoral indices.

This study is based on research by Sihotang and Hasanah [2] which states that of the 10 sectoral indices on the IDX, they show different impacts when going through the Covid-19 pandemic in 12 months of trading. In order to make the research results more practical for making stock investment decisions, the focus of this research lies on changes in sectoral risk and stock returns during a pandemic.

The need for information regarding the condition of systematic risk of shares based on the characteristics of the issuer at this time as well as the many facts that show the dominance of the influence of market conditions on stock investment returns, are the background for the importance of this research. It is understood that the condition of each economic sector will cause a different response to external shocks. So this study aims to analyze the comparison of inter-sectoral stock risk in the period before the pandemic and during the pandemic. Based on the purpose of the research, the contribution of this research is to be able to produce useful information for stock investors so that investment decisions become more rational and not get caught up in the euphoria of the stock index rising trend.

1.2 Describe Relevant Scholarship

The relative measure of systematic risk is also known as the Beta coefficient. Beta is a statistical coefficient that shows a measure of the relative risk of a stock to the market portfolio [3, 4]. Beta is also a measure of the volatility of stock returns to market returns. The greater the fluctuation of a stock's return on market returns, the greater the beta of the stock. And vice versa, the smaller the fluctuation of a stock's return to market return, the smaller the beta of the stock.

The beta of securities can be measured by estimation techniques, using historical market data and company fundamental data. Beta estimation is at the center of many financial decisions, also related to portfolio management, capital budgeting, and performance appraisal [5]. Estimating the systematic risk of a security can be done by regressing the security return (as the dependent variable) with the market return (as the independent variable). The time series data regression equation will produce a beta coefficient (β) which is assumed to be stable over time. Meanwhile, Elton et al. [6], also stated that measuring the beta of a stock can be done using the Single Index Model. This model assumes that stock returns are correlated with changes in market returns, and to measure this correlation, it can be done by linking stock returns with market index returns. The Single Index Model is a method used in measuring the return value and portfolio risk with the assumption that the movement of stock returns only relates to market returns [7]. This model can be used to simplify the Markowitz model. This model is based on the observation that the price of a security fluctuates in the direction of the market price index. Most stocks tend to increase in price when the stock price index rises, and vice versa. This means that the returns on securities are correlated because of the general reaction to changes in market value [8].

Systematic risk in this study is measured by stock beta, which shows how much influence market returns have on certain stock returns. Although much debated about the use of Beta as a proxy for systematic risk as suggested in Eisenbeiss [4] dan Isakov [9] research. However, from these various debates it can be concluded that Beta remains the best alternative for systematic risk measurement with various modifications. Several modifications to the stock Beta formulation have been carried out such as in Estrada [10] and Eisenbeiss [4] research. The magnitude of the influence of market returns represents the magnitude of the external influence beyond the fundamentals of the stock that cannot be controlled by the issuer. Because the magnitude of the external influence cannot be controlled by the issuer, the magnitude of the market influence is interpreted as systematic risk.

2 Method

2.1 Data Types, Population, and Sample

This research is classified as quantitative research, using secondary data. The data used are monthly time series return data in 10 business sectors and monthly market return data. The research period starts from January 2018 to December 2021.

2.2 Analysis Methods

This study uses a regression model with the following equation:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$

R_{it} = Stock return of sector i in period t

R_{mt} = Market index return in period t

α_i = intercept

β_i = beta which is a coefficient that measures the change in R_i (i th sector stock return) due to changes in R_M (market return)

ϵ_{it} = random residual error

Furthermore, because this study uses 10 business sectors according to the JASICA index, the regression equation for each sector is as follows:

$$R_{tam,t} = \alpha_{tam,t} + \beta_{tam} R_{m,t} + \epsilon_{tam}$$

$$R_{kons,t} = \alpha_{kons,t} + \beta_{kons} R_{m,t} + \epsilon_{kons}$$

$$R_{kebun,t} = \alpha_{kebun,t} + \beta_{kebun} R_{m,t} + \epsilon_{kebun}$$

$$R_{indaskim,t} = \alpha_{indaskim,t} + \beta_{indaskim} R_{m,t} + \epsilon_{indaskim}$$

$$R_{aneka,t} = \alpha_{aneka,t} + \beta_{aneka} R_{m,t} + \epsilon_{aneka}$$

$$R_{prop,t} = \alpha_{prop,t} + \beta_{prop} R_{m,t} + \epsilon_{prop}$$

$$R_{trans,t} = \alpha_{trans,t} + \beta_{trans} R_{m,t} + \epsilon_{trans}$$

$$R_{keu,t} = \alpha_{keu,t} + \beta_{keu} R_{m,t} + \epsilon_{keu}$$

$$R_{jasa,t} = \alpha_{jasa,t} + \beta_{jasa} R_{m,t} + \epsilon_{jasa}$$

$$R_{manuf,t} = \alpha_{manuf,t} + \beta_{manuf} R_{m,t} + \epsilon_{manuf}$$

There are two stages in estimating systematic risk as measured by beta, namely:

- Determine the security return (R_i) and market return (R_M).

1. Calculating stock return i in period t with the formula:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

$R_{i,t}$ = return of stock i in period t .

$P_{i,t}$ = stock price i in period t .

$P_{i,t-1}$ = stock price i in period $t-1$.

2. Determining market return in period t is calculated based on market index data in period t with the formula:

$$R_{M,t} = \frac{IHSG_t - IHSG_{t-1}}{IHSG_{t-1}}$$

$R_{M,t}$ = Market return in period t .

JCI_t = JCI in period t .

JCI_{t-1} = JCI in period $t-1$.

- Estimating the beta coefficient (β) by regressing the stock return rate i (R_i, t) with the market return rate (R_M, t). The regression equation to estimate beta based on the Single Index Model is:

$$R_{it} = \alpha_i + \beta_i R_{M,t} + e_{it}$$

After estimating the beta of the stock, the result of the beta of the stock will be obtained. A stock beta above one ($\beta > 1$) indicates a fluctuating stock return to changes in market returns (high systematic risk). Stock beta below one ($\beta < 1$) indicates that stock returns are less volatile to changes in market returns (low systematic risk). Regression, in addition to being done in each business sector, was also done in 2 periods, namely the period before the pandemic and the period during the pandemic.

3 Result

3.1 Comparison of Systematic Risk of Stocks by Sector in the Period Before the Pandemic and During the Pandemic

Based on statistical tests conducted on the data, the resulting sectoral stock Beta value as a proxy for the magnitude of stock risk. Sectoral stock risk will be divided into 2 periods, namely before the pandemic, namely 2018 to 2019 and during the pandemic, namely 2020 to 2021 (Table 1).

Based on the results of calculations carried out, the lowest stock risk sectorally changes from the pre-pandemic period to during the pandemic. If before the pandemic the lowest stock risk was in the consumer sector, then during the pandemic the lowest stock risk was in the property sector. Likewise for the highest risk of shares experiencing changes, where before the pandemic the basic industrial sector was the stock with the highest risk. However, during the pandemic, high-risk stocks were in the Financial sector, although they were not far away from the Basic Industry sector.

Table 1. Dynamics of sectoral stock risk in 2018 – 2021.

No.	Sector	Systematic Risk 2018–2019	Sector	Systematic Risk 2020–2021
1	Basic Industry	1,01	Financial	1,17
2	Financial	0,73	Basic Industry	1,15
3	Infrastructure	0,7	Mining	1,07
4	Mining	0,69	Infrastructure	1,03
5	Agriculture	0,3	Agriculture	0,77
6	Miscellaneous	0,29	Business	0,27
7	Property	0,2	Miscellaneous	0,27
8	Business	0,07	Consumer	0,16
9	Consumer	0,02	Property	0,06

In addition to changes in sector positions for stocks with the lowest and highest risk, there was also a change in the distribution pattern for sectors with high risk in the two research periods. In the period before the pandemic, there was only 1 sector that had a stock Beta > 1, namely the Basic Industry sector, 3 sectors with a Beta Stock value above 0.5 and 5 other sectors having a stock Beta below 0.5. Meanwhile, during the pandemic period, there were 4 sectors that had a stock Beta of > 1, and 4 sectors that had a stock Beta of less than 0.5. From the change in the Beta stock distribution pattern, it can be concluded that stock risk in general has increased during the pandemic period.

Stock beta actually describes the sensitivity of the stock to market changes, thus it can also be interpreted as a measure of stock volatility. The greater the volatility of the stock is identical to the greater the risk given. The increasing number of sectors that have volatile stocks during the pandemic period can illustrate the magnitude of the impact of the pandemic on the stock market.

The comparison of stock betas between periods in each sector illustrates changes in stock risk for each business sector as a result of the pandemic. From the data processed, it can be concluded that the majority of the business sectors experienced an increase in stock risk during the pandemic. The increase in stock risk occurred in 7 sectors, while stock risk decreased in the Property sector and the combined business sector (Fig. 2).

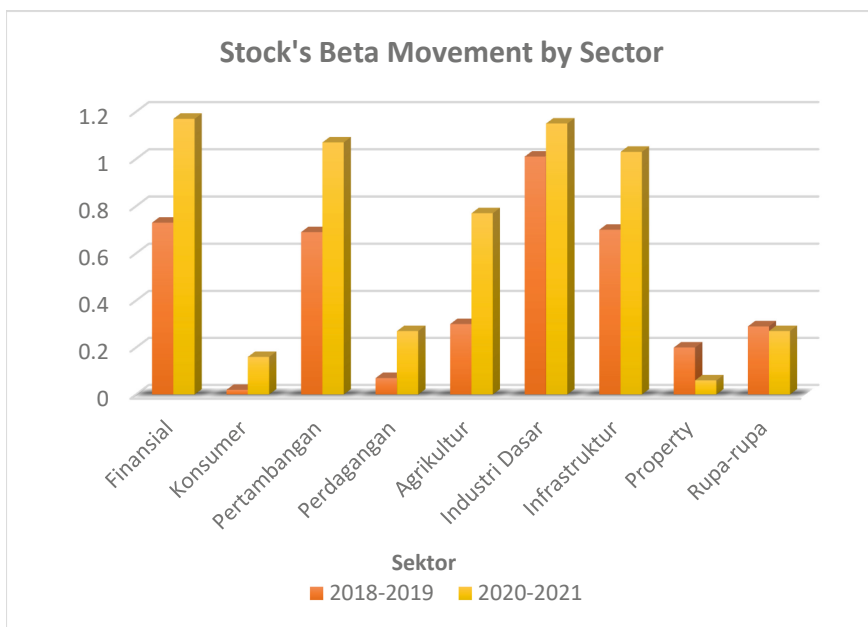


Fig. 2. Systematic risk of stocks by sectoral period before and during the pandemic.

3.2 Comparison of Stock Systematic Risk with Average Return by Sectoral

The Table 2 will compare the beta of sectoral stocks with the average sectoral return. This comparison will provide an illustration of whether the stock risk conditions in each sector are in accordance with the concept of high risk high return.

In the Table 2, it is evident that during the period 2018 to 2019 it turned out that the highest returns were generated by the business sector which also experienced the highest stock risk, namely the Basic Industry sector. On the other hand, the lowest return occurs in the Consumer sector, which is also the sector with the lowest stock risk. Based on the fact that the results of the comparison of the stock's Beta value with the average return, it can be concluded that during the period before the pandemic the amount of risk and stock return was consistent with the principle of high risk high return.

During the pandemic period, from 2020 to 2021, the highest return was obtained by the agriculture sector (Table 3). This fact also shows that the sector with the highest risk

Table 2. Sectoral stock beta and average sectoral return 2018–2019.

No.	Business Sector	Stock Beta	Average Return	Description
1	Basic Industry	1,01	0,39	Highest Return
2	Financial	0,73	0,2	
3	Infrastructure	0,7	-0,01	
4	Mining	0,69	0,01	
5	Agriculture	0,3	-0,03	
6	Miscellaneous	0,29	-0,08	
7	Property	0,2	0,05	
8	Business	0,07	-0,17	
9	Consumer	0,02	-0,3	Lowest Return

Table 3. Sectoral stock beta and average sectoral return 2020–2021.

No.	Business Sector	Stock Beta	Average Return	Description
1	Financial	1,17	0,18	
2	Basic Industry	1,15	0,35	
3	Mining	1,07	0,12	
4	Infrastructure	1,03	-0,09	
5	Agriculture	0,77	2,31	Highest Return
6	Business	0,27	0,19	
7	Miscellaneous	0,27	-0,07	
8	Consumer	0,16	-0,8	Lowest Return
9	Property	0,06	1,08	

does not provide the highest return so that it is inconsistent with the principle of high risk high return. The reality of the inconsistency of the concept of high risk high return on stock investment during the pandemic indicates that this reality is one of the impacts of the pandemic as an external shock.

3.3 The Implications of All Sectoral Stock Betas Are Positive

In the results of data processing, it is confirmed that the Beta value of sectoral shares for all sectors is positive. The positive value of a stock's beta describes the movement of stock prices following the general market price movement. Thus, it can be stated that the price movement of the majority of shares for all business sectors follows the movement of market prices. This uniformity indicates that the flow of information received by investors tends to be homogeneous. This condition could be a sign that the producers of information that investors rely on are still very limited, so that investors receive less variety of information. At first glance, this statement seems irrelevant to the digital era that facilitates access to information. However, the problem is not in excess of information but in the production of information about the performance of stock issuers. Credible sources of information regarding strategic issues and the performance of issuers so far have only come from the Indonesia Stock Exchange, while information producers from private institutions are still very limited.

The condition of information flow in the market tends to be homogeneous and has implications for the potential for mispricing and overreaction in the capital market. Homogeneous information causes investors to react the same way. The same reaction by all investors can push the market price further away from the internal value of the stock. Another impact of homogeneous information flow is the small chance of getting abnormal returns for the majority of investors. For investors who rely on public information, the opportunities to get high abnormal returns are limited. Meanwhile, for a small number of investors who have private sources of information, they have a great opportunity to get high abnormal returns.

3.4 Implications of Increasing the Number of Stocks with Beta Stocks > 1 During a Pandemic

Stock beta measures how much influence external variables have on stock returns, where external influences are beyond the control of the issuer. Variables that cannot be controlled by issuers but are able to influence stock returns are certainly something that needs to be considered. The ideal expectation is that changes in these external variables will have a positive effect on stock returns, but there is also a chance for a negative effect to occur. The chance of a negative influence from this external variable is interpreted as risk. The risk that is measured through the stock beta is termed systematic risk because this risk comes from the conditions surrounding the market so that it cannot be minimized through stock diversification. When the Beta value of a stock is equal to 1, it means that the change in share price is exactly the same as the change in the stock market price in general, which is reflected in the change in the composite stock price index. While the Beta value of the stock that is greater than 1 indicates that external influences or market influences result in larger changes in stock prices.

Price changes in stocks that are greater than the effect of changes in market prices, besides being meaningful, have a high systematic risk, they can also be strategic. The character of a stock that has a high beta of a stock can be used to maximize profits if it is owned at a time of positive market price changes.

3.5 Implications of Stock Beta Changes on Investor Strategies

The data in Fig. 1, which illustrates the high increase in the number of stock investors during the pandemic, indicates that people are using stock investments as an opportunity to earn additional income in difficult times. While in pandemic conditions there is an increase in uncertainty in all business sectors, which results in an increase in investment risk including stock investment. The increase in stock Beta as one measure of stock risk should be a reminder for stock investors, especially beginner investors, to not only focus on return expectations, but to balance stock risk as a stock analysis variable.

Based on information about the spread of beta risk in each business sector, investors can plan 2 types of strategies. First, when market stability indicator variables such as interest rates, exchange rates and inflation show a positive tendency, then the strategy to maximize returns is chosen. The strategy is done by focusing portfolio selection on stocks with a high Beta stock category. Second, on the other hand, when the market stability indicator variable gives a negative signal, the chosen strategy is to minimize risk. The strategy is done by choosing the members of the stock portfolio from stocks with a low stock beta category.

4 Conclusion

From the comparison of risk and stock returns by sector during the pre-pandemic period with the pandemic, several conclusions can be drawn, namely:

- The systematic risk of stocks in general increased during the pandemic period accompanied by changes in sector position for stocks with the lowest and highest risk and changes in distribution patterns for sectors that had high risk in the 2 research periods.
- During the pre-pandemic period, the amount of risk and stock return is consistent with the principle of high risk high return. On the other hand, during the pandemic period, the sector with the highest risk did not provide the highest return so that it was inconsistent with the principle of high risk high return.
- The sectoral stock beta for all sectors is positive, describing the movement of the majority of stock prices following market price movements.

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