AICIEB **Annual International Conference**
on Islamic Economics and Business, 2023, Vol 3, 95-104

Analysis and Prediction of Bank Syariah Indonesia Stock (BRIS) with Monte Carlo in Covid-19 Pandemic and Post Pandemic

Siti Nur Khasanah[1*], *Bibit* Waluyo Aji[2], and *Nabila* Cahya Ramadhani[3]

[1]Faculty of Economics and Business, Diponegoro University, Indonesia
[2]Faculty of Science and Mathemathics, Diponegoro University, Indonesia
[3]Faculty of Economics and Business, Diponegoro University, Indonesia

Abstract. The purpose of this study was to analyze risk and prediction of the effect of Bank Syariah Indonesia Stock (BRIS) in Covid-19 and post pandemic.The population of this study is Islamic Banks in Indonesia in 2012-2017 are 13 BUS. The selection of samples in this study using purposive sampling method and selected 8 banks. The data was analyzed using multiple linear regression analysis, path analysis, and sobel test. The results showed that the number of DPS supervision days has a positive effect on the Sharia financial performance, multiple positions of DPS have a positive effect on profit sharing financing. The profit-sharing financing is not able to mediate the relationship of the characteristics of the Sharia Supervisory Board to the Sharia financial performance. Islamic Commercial Banks in Indonesia suggest improving the financial performance in accordance with sharia principles. This research is the first study that used intervening variable profit sharing financing.

Keywords: risk analysis, prediction, BRIS, pandemic, monte carlo

1. Introduction

The capital market has an important role in advancing a country's economy, because the role of the capital market can support the country's economy in many sectors. The capital market is a meeting place for two parties who have more funds and those who need funds (Ahmad, 2020). In the capital market, understanding and measuring risk before investing in stocks is very important. Stock investment has risks that investors need to observe and understand in order to make good and right decisions.

Bank Syariah Indonesia (BSI) is a bank that received à merger from the merger of three state-owned Islamic banks, namely Bank Rakyat Indonesia Syariah, Bank Negara Indonesia Syariah and Bank Syariah Mandiri (Budi and Nadia 2022). BRIS shares have fluctuated since the news of the merger plan by the Minister of BUMN (Taufiq and Rinwantin, 2021). Therefore, it is very important to analyze the risk of BRIS to help investors make decisions. The Monte Carlo method was chosen as a risk analysis method because the method is able to help analyze and understand the risk of stock investment accurately and well.

* Corresponding author: sitinurkhasana739@gmail.com

The purpose of this study is to find out how BRIS risk analysis can be done using Monte Carlo, as well as to understand the results and implications of the analysis for stock investors. The results of this study are expected to provide information and insight for stock investors in managing stock investment risk in the Indonesian capital market.

2. Literature Review

2.1 Risk

The definition of risk is the prospect of an unfavorable outcome (operational as standard deviation) (Keown, 2000). Whereas according to ISO 31000:2009, risk is defined as the effect of uncertainty on the achievement of objectives. So it can be concluded, that risk is the possibility of adverse events (Gunarta, 2015). There are several ways that can be done in measuring a risk (Uban Sofyan, 2005), including the following:

1. Measure risk through acceptance variability.
   There are several ways used in measuring risk through variability of acceptance, namely:
   - Profit Expectations
   - Variance as a measure of risk
2. *Covariance and correlation coefficient*
3. Average *difference rule*
4. Seinsiitiiviity analysiis Iinveistmeint seinsiitiiviity (SA analysiis)
   Sensitivity analysis Investment sensitivity (SA analysis) can be used to overcome the weaknesses of previous analytical tools used in measuring risk, because this sensitivity analysis can calculate the magnitude of the effect of changes that occur both on revenue and on the cost component of existing project proposals.
5. *Operating leverage and risk Operating leverage*
   Operating leverage and risk Operating leverage is the use of company assets accompanied by fixed expenses in the hope of increasing sales volume and ultimately increasing sales volume and ultimately increasing the company's profit. The relationship between operating leverage and company risk actually occurs due to increased efforts to increase the volume of activities.
6. *Tree Diagram approach in dealing with risk*
   The Tree Diagram approach is the right choice for project investment selection that has successive or sequential requirements because the Tree Diagram approach is a diagram that illustrates the various alternatives available to decision makers which is described as various slope columns shaped like trees that have branches or branches.

Stock investment is used as a public choice to be able to get passive income in an easy way (Shelly Midesia, 2020). Stock prices fluctuate from time to time, so it is necessary to analyze stock risk before starting an investment. Stock risk analysis is defined as a process carried out to determine the level of investment risk in stocks. Risk is the chance of an unwanted event (Yosua, Ivonne and Saerang, 2019).

Types of stock risk are divided into two, namely systematic risk and unsystematic risk. Systematic risk is a risk that cannot be eliminated by diversifying, because fluctuations in this risk are influenced by macro factors such as changes in interest rates, foreign exchange rates and government policies that can affect the market as a whole (Ahmad and Iwan, 2020). Systematic risk can also be interpreted as a risk that affects all investments and cannot be reduced or eliminated (Try, 2021). Meanwhile, unsystematic risk can be eliminated by diversifying, because this risk is only found in certain companies or industries. Risk in stock investment can be measured using statistical methods, such as the variance method or standard deviation method.

2.2 Monte Carlo Method

The Monte Carlo method is one of the numerical methods described as a statistical simulation method. The Monte Carlo method is a computer simulation method that mimics real life or makes a prediction (Bias and Julius, 2019). This method is used to determine the risk in stock investment. This method makes repeated simulations of stock price movements, so as to estimate the distribution of stock prices in the future. Simulation is an analytical method that aims to make imitations or imitations of a system that is random or uncertain, and if used other models will be very complex. Monte Carlo simulation is one of the simplest simulation methods that can be built quickly. The construction of Monte Carlo Simulation Models is based on probabilities obtained from historical data of an event and its frequency, where:

$$Pi = \frac{f_i}{n}$$

Note:

Pi = probability of occurrence i
Fi = frequency of occurrence i
N = sum of frequencies of all occurrences

Monte Carlo simulation is divided into five simple steps, which are as follows:

1. Establishes a probability distribution for important variables.
   The basic idea of Monte Carlo simulation is to generate values for variables on the model being tested. In real-world systems, most variables have natural probabilities. Among them are: demand for supplies, grace time for orders to arrive, time between broken machines, time between customer arrivals at a service facility, service time, time needed to complete project activities, and the number of employees who are absent every day. A way to establish probability distributions for certain variables is to test historical results. The probability distribution can be found, or relative frequency, for any possible variable output by dividing the number of observations by the total number of observations.
2. Creiatei a cumulatiivei probabiiliity diistriibutiion for eiach variiablei
   The conversion from a regular distribution to a cumulative distribution is done by summing each probability number by the previous sum.
3. Deiteirmiinei thei random numeiriical iinteirval for eiach variiablei
   After determining the cumulative probability for each variable included in the simulation, a limit number must be determined that represents each possible outcome/output. It is aimed at random number intervals (creating random number intervals). The determination of intervals is based on cumulative possibilities.
4. Creiatei random numbeirs Random numbeirs can bei geineirateid iin two ways.
   If the problem at hand is large and the process being studied involves many simulation experiments, then Microsoft Excel software is used to generate random numbers. If the simulation is done by hand calculation, random numbers can be drawn from a table of random numbers.
5. Creiatei a siimulatiion of an eixpeiriimeintal seiriieis
   The results of an experiment can be simulated simply by selecting random numbers from a table of random numbers.

2.3 Stocks Return

Return on an asset is the rate of return on assets or profits obtained as a result of making investments (Ruppert, 2004). The return can be in the form of capital gains and dividends, but an asset that can only be held for one day or not dividends, so the return is only the difference between the selling price and the purchase price (Ghozali, 2007). The equation

of return on the realization of a single asset without dividends that is often used according to is (Jorion, 2002) as follows:

$$Rt = ln \frac{X_t}{X_{t-1}}$$

Where Rt is the return of the t-th period, and Xt is the stock price in the t-th period.

Risk is defined as the difference between the expected return and its realization. The greater the deviation, the higher the risk. Return and investment risk are two inseparable words. Harry Markowitz says that the investment decisions made by investors are based on expected returns and variants of returns (as a measure of risk). Investors are willing to accept greater risk but must be compensated by the opportunity to earn a large return. In investment jargon or in daily work we often hear "no pain, no gain" or "high return high risk". Returns and risks go in the same direction. The greater the desired outcome, the greater the risk. Conversely, the smaller the risk taken, the smaller the risk that will be obtained (Zubir, 2011).

2.4 Investment

Investment is the current commitment of money or other resources in the hope of earning profits in the future. Investment is essentially the placement of a certain amount of funds at this time in the hope of obtaining profits in the future. The difference in the rate of gain between future consumption (future dollars) and current consumption (current dollars) is called the pure rate of interest. This desire to pay the difference in the rate of acquisition, whether to borrow or lend is often called the pure time value of money. Islamic investment is the sacrifice of resources in the present to get definite results, in the hope of obtaining greater results in the future, either directly or indirectly while remaining based on sharia principles as a whole (kaffah). In addition, all forms of investment are made in the context of worship to God to achieve happiness in the inner birth, in the world and the hereafter for both the present and future generations (Nafik, 2009:70).

Halim (2005: 5) states that in general, investment can be categorized into two types, namely investment in real assets and in financial assets. Real asset investment is an investment made in assets that can be seen and can be measured clearly, for example investment by buying land, houses, gold and so on. Financial asset investment is a type of investment that can be done by buying financial assets that can be traded in the money market, capital market, or derivative market. The money market instruments themselves include interbank call money, Indonesian bank certificates (SBI) / treasury bills, certificates of deposit, money market securities, banker's acceptance, commercial paper, and repurchase agreements. Then in the capital market, the instruments traded consist of stocks and bonds. Finally, in the derivative market, there are options, warrants, and future contracts as options for investing.

2.5 Stock Market

Stock is one of the most popular financial market instruments. Stocks are known as investment instruments that many investors choose because stocks are able to provide attractive levels of profit. Shares can be defined as a sign of capital participation of a person or party (business entity) in a company or limited liability company. By including the capital, the party has a claim on the company's income, a claim on the company's assets, and is entitled to attend the General Meeting of Shareholders. Stocks are one of the investment instruments that have high risk. According to Nazwar (2008), trading in several types of securities, both in the conventional capital market and the Islamic capital market, has different levels of return and risk. Stocks are one of the securities among other securities

that have a high level of risk. High risk is reflected in the uncertainty of returns that will be received by investors in the future.

Shares are proof of owning a company whose owners are also called shareholders (shareholders or stockholders). Proof that a person or a party can be considered a shareholder is if they have been recorded as shareholders in a book called the Register of Shareholders (DPS). In general, DPS is presented a few days before the General Meeting of Shareholders is held and each party can see the DPS. Proof that someone is a shareholder can also be seen on the back page of the shareholder, whether his name has been registered by the company (issuer) or not. Stock prices can go up, but they can also go down. This is the risk of investing in stocks. So that the investment is not wrong, investors need to make an assessment of the stocks they will choose, to further determine whether the shares will provide a level of profit (return) in accordance with the expected level of return (Indarto, 2014: 4.2). The valuation of these shares can be done by forming a stock portfolio. Stock portfolios can be grouped into efficient portfolios and optimal portfolios.

2.6 Portofolio

A significant change in the stock price will result in investors experiencing heavy losses. Listed companies have also experienced the same thing and this is reflected in their sharply declining stock prices. The foregoing indicates that instruments in the capital market contain an element of uncertainty. Investors must understand for sure that in investing there is the potential to make a profit and also the potential to suffer losses. What an investor should do is to maximize the level of return obtained and minimize the potential risks that will occur.

In investing in stocks there are two factors that are most considered by investors, namely the rate of return (return) and risk (risk). These two factors are opposites, in the sense that invertors like high returns and don't really like high risks. In fact, there is a natural relationship between the amount of return and the amount of risk, because the greater the expected return, the greater the risk that will be faced or a high rate of return will always be followed by a high level of risk. Investment risk is generally divided into two, namely systematic risk and unsystematic risk. Systematic risk is risk that cannot be avoided because this risk is influenced by macro factors that can affect the market as a whole such as economic and political circumstances. While unsystematic risk is investment risk that can be avoided through diversification, because this risk only exists in one particular company or industry. Diversification of stock investment can be done by forming a stock portfolio.

2.7 Return and Risk on Investment

Return and Investment Risk The two elements inherent in every capital or fund invested are return and risk. Return is the result obtained from investment in accordance with the investment objectives made by investors aimed at maximizing profits (returns). The rate of return is usually divided into two, namely: realized return and expected return. Expected return is the return expected to be obtained by investors in the future. Realized return is the return that has occurred, calculated based on historical data. The definition of risk described by Tandelilin (2001: 47) is: risk is the possibility of the difference between actual return and expected return. The more likely the difference, the greater the risk of the investment. Likewise, Halim's opinion (2005: 42) regarding the definition of risk, namely: risk is the magnitude of the deviation between the expected rate of return and the actual return. Based on the above opinion, it can be concluded that risk is the possibility of investments made by investors failing to meet the expected investor return. According to Halim (2005: 51) the types of investment risks are:

Systematic risk is a risk that cannot be eliminated by diversifying, because fluctuations in this risk are influenced by macro factors that can affect the market as a whole. This risk

is caused by concurrent factors that affect stock prices in the capital market, such as changes in economic conditions, political climate, tax regulations, government policies and others.

Unsystematic risk Is a risk that can be eliminated by diversifying, because this risk only exists in one company or certain industry, for example capital structure factors, asset structure, liquidity levels, profit levels and so on. This risk diversification is very important for investors, because it can minimize risk without having to reduce the return received.

3. Research Method

This research uses Monte Carlo method. Monte Carlo simulation is a computerized matheimatiical technique that allows people to account for risk in quantitative analysis and decision making.

This type of research includes quantitative descriptive research. In this study, what will be described is the formation of an optimal portfolio of stocks listed on model indices and meiasuriing the value at risk of the portfolio using the monte carlo simulation method.

In this study, the variable as well as the population are Bank Syariah Indonesia shares which were entered from January 1, 2018 to January 1, 2023. The research time took place in the peiriiod from January 1, 2018 to January 1, 2023. Sugiyono Research Population (2017: 115) states that population is a generalized area consisting of objects or subjects that have certain qualities and characteristics and are determined by researchers to be studied and then drawn conclusions.

The source of data in this study is secondary data, namely data that has been processed by other parties and through literature studies that have to do with the problems faced and analyzed, presented in the form of information. The other party in question that processes data in this case is Yahoo Finance. Secondary data obtained from the https://finance.yahoo.com/ website.

4. Results and Discussion

4.1 Statistical Descriptive

	Open	High	Low	Close	Adj Close	Volume
count	225.000000	225.000000	225.000000	225.000000	225.000000	2.250000e+02
mean	1434.000008	1458.451310	1410.909198	1431.244451	1429.059050	2.390854e+07
std	120.495553	121.490874	117.603176	119.591233	118.785118	3.435738e+07
min	1100.000000	1140.000000	1095.000000	1100.000000	1100.000000	2.243800e+06
25%	1355.000000	1370.000000	1335.000000	1350.000000	1350.000000	6.830900e+06
50%	1420.000000	1450.000000	1410.000000	1420.000000	1415.000000	1.193150e+07
75%	1535.000000	1555.000000	1510.000000	1530.000000	1525.000000	2.596150e+07
max	1720.000000	1745.000000	1685.000000	1715.000000	1715.000000	2.527383e+08

The data above is a descriptive statistic of Bank Syariah Indonesia (BRIS) share price data. With an adjusted close value, namely the closing price adjusted for corporate actions such as right issue, stock split or stock reverse, the average share price of Bank Syariah Indonesia (BRIS) is Rp1429.05. The standard deviation is 118.78. This means that the distribution of data used in research is evenly distributed in terms of the standard deviation coefficient which is smaller than the average coefficient. In addition, it can be concluded that the investment risk to be carried out is likely to have a smaller risk.

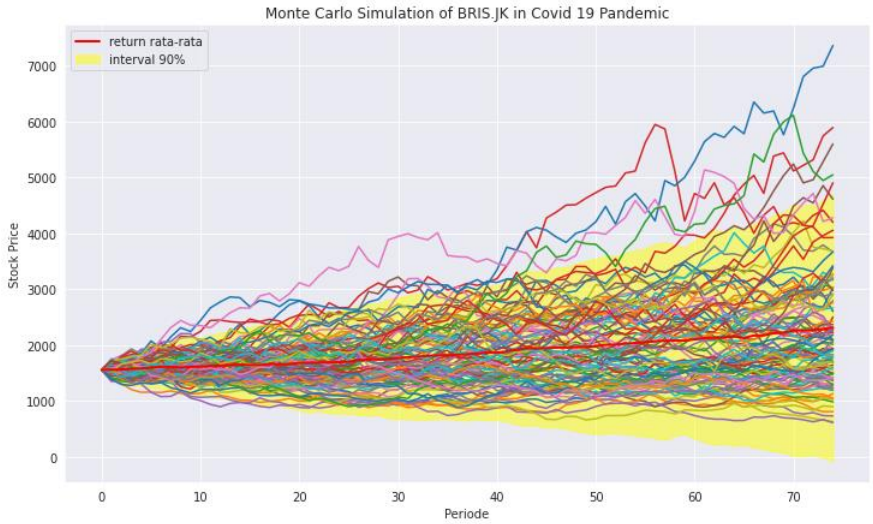

Figure 1. Monte Carlo simulation of risk analysis and stock price predictions in BRIS during the pandemic

The picture above is the result of a Monte Carlo simulation of risk analysis and stock price predictions in BRIS during the pandemic . The results of investment risk analysis with Value at Risk use monte carlo simulation, using the closing daily stock price of Bank Syariah Indonesia (BRIS). From the results of the calculation of return , that stocks tend to face meaningful fluctuations, face price changes can go up and can go down to negative. Negative return shows the profit obtained when investing, negative return there is investment risk that must be borne by investors, then zero return shows no price change or in other words there is no profit or risk when investing. This can be seen in the image blocked by yellow. Based on monte carlo simulation calculations, it produces a stock price prediction with a significance level of 90%. With a 90% interval level, risk simulation analysis of stock price movements ranges from Rp1000-Rp4000 with an average stock price ranging from Rp1500.

4.2 Risk analysis

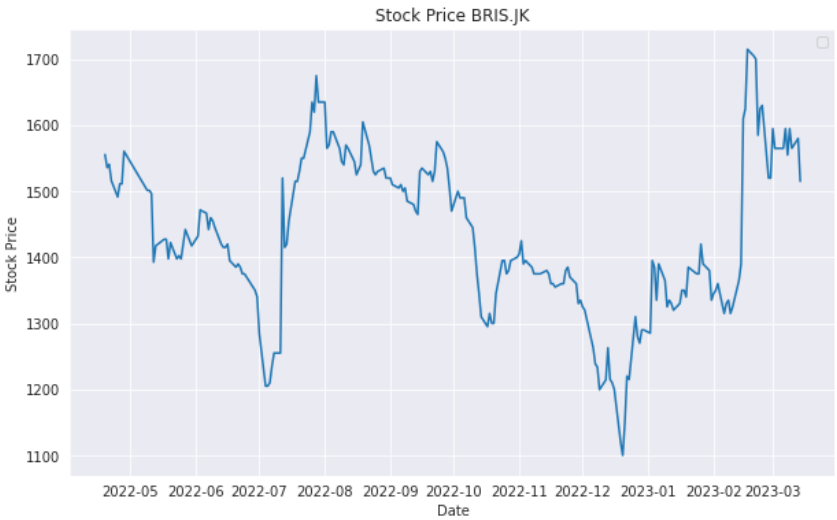

Figure 2. Bank Syariah Indonesia (BRIS) stock prices after the pandemic

The picture above is a picture of Bank Syariah Indonesia (BRIS) stock prices after the pandemic took place. It can be seen that the stock price has experienced significant fluctuations. This level of fluctuation has a certain pattern where after a sharp enough depression will experience a sharp increase and after its peak, stock prices will decline again. Pada saat harga turun, disarankan untuk membeli saham karena harga saham akan mengalami kenaikan setelahnya. It's because the risk of loss that will be borne by investors tends to be low so that the decision to buy shares when prices fall is the right decision. Conversely, when prices rise, selling shares is advisable because when the stock price rises some time afterwards it will experience a sharp decline.

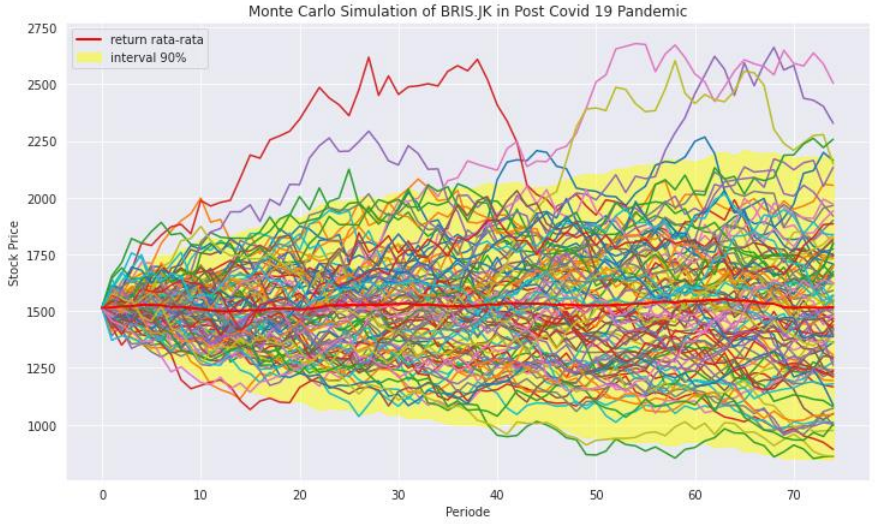

Figure 3. Stock price prediction simulation using Monte Carlo after the pandemic

The image above is the result of a stock price prediction simulation using Monte Carlo after the pandemic occurred. With an interval rate of 90% share price

5. Conclusion

In conclusion, the application of a combination of Monte Carlo methods in BRIS stock risk analysis will produce a more accurate and efficient analysis in determining the level of risk of BRIS stock investment. Based on research, it can be concluded that the return on shares of Bank Syariah Indonesia (BRIS), facing fluctuations means facing price changes can go up and can go down to negative.

References

Anam, K., Di Asih, I. M., & Kartikasari, P. (2020). Measurement Of Value At-Risk In Bond Portfolios Using The Variance-Covariance Method. Gaussian Journal, 9(4), 434-443.

Anam, K., Di Asih, I. M., & Kartikasari, P. (2020). Pengukuran Value At-Risk Pada Portofolio Obligasi Dengan Metode Varian-Kovarian. Jurnal Gaussian, 9(4), 434-443.

Ghozali, I, 2007. Banking Risk Management. Semarang: Diponegoro University Publishing Agency.

Halim, Abdul. 2005. Analisis Investasi. Edisi kadua. Jakarta: Salemba Empat.

Iasha, D., & Hasnawati, S. (2020). Penggunaan Simulasi Monte Carlo Untuk Pengukuran Value At Risk Aset Tunggal Dan Portofolio Dengan Pendekatan Capital Asset Pricing Model Sebagai Penentu Portofolio Optimal Pada Indeks Saham Lq-45.

Iasha, D., & Hasnawati, S. (2020). The Use of Monte Carlo Simulation for Measuring Value At Risk of Single Assets and Portfolios with a Capital Asset Pricing Model Approach as an Optimal Portfolio Determinant on the Lq-45 Stock Index.

Keown, A. J. 2000. Financial Management: Principles and Applications. Upper Saddle River, N.J.: Pearson Education.

Jabar, A. K. A., & Cahyadi, I. F. (2020). Effect of Exchange Rate, Inflation, Systematic Risk and BI Rate on Sharia Stock Returns in the Jakarta Islamic Index (JII) for the 2015-2018 period. MALIA: Journal of Islamic Banking and Finance, 4(1), 12-39.

Jabar, A. K. A., & Cahyadi, I. F. (2020). Pengaruh Exchange Rate, Inflasi, Risiko Sistematis Dan BI Rate Terhadap Return Saham Syariah Di Jakarta Islamic Index (JII) Periode 2015-2018. MALIA: Journal of Islamic Banking and Finance, 4(1), 12-39.

Jorion, P, H 2002, Value at Risk: The New Benchmark for Managing Financial Risk, 2 nd edn, New York: The McGraw-Hill Companies, Inc.

Midesia, S. (2020). Dampak Covid-19 Pada Pasar Saham Syariah Di Indonesia. Jurnal Penelitian Ekonomi Akuntansi (JENSI), 4(1), 68-79.

Midesia, S. (2020). The Impact of Covid-19 on the Sharia Stock Market in Indonesia. Journal of Economic Research in Accounting (JENSI), 4(1), 68-79.

Parendra, A., Firmansyah, A., & Prakosa, D. K. (2020). The size of the company, leverage, risk of shares in banking companies. Dynamics of Financial and Banking Accounting, 9(2), 119-132.

Parendra, A., Firmansyah, A., & Prakosa, D. K. (2020). Ukuran perusahaan, leverage, risiko saham di perusahaan perbankan. Dinamika Akuntansi Keuangan dan Perbankan, 9(2), 119-132.

Prijanto, B., Damayanti, N., & Sari, A. R. (2022). Analisis perbandingan harga saham PT. Bank Rakyat Indonesia Syariah, TBK sebelum dan sesudah merger menjadi PT. Bank Syariah Indonesia, TBK. Jurnal Penelitian Pendidikan Indonesia, 8(2), 390.

Prijanto, B., Damayanti, N., & Sari, A. R. (2022). Comparative analysis of PT. Bank Rakyat Indonesia Syariah, TBK before and after the merger became PT. Bank Syariah Indonesia, TBK. Indonesian Journal of Educational Research, 8(2), 390.

Ruppert, D, 2004. Statistics and Finance An Introduction, Springer: New York.

Tendean, Y. P., Saerang, I. S., & Tulung, J. E. (2019). Analisis Perbandingan Risiko Saham Jakarta Islamic Index Dan Indeks Lq45 Di Bursa Efek Indonesia. Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi, 7(3).

Tendean, Y. P., Saerang, I. S., & Tulung, J. E. (2019). Comparative Analysis of Jakarta Islamic Index and Lq45 Stock Risk Analysis on the Indonesia Stock Exchange. EMBA Journal: Journal of Economic Research, Management, Business and Accounting, 7(3).

Wulandari, T. (2021). Analisis Pengaruh Varian dan Tingkat Suku Bunga Terhadap Return Saham Studi pada perusahaan IDX30 BEI. MBIA, 20(3), 235-247.

Wulandari, T. (2021). Analysis of the Effect of Variants and Interest Rates on Stock Returns Study on IDX30 IDX companies. MBIA, 20(3), 235-247.

Zubir, Zalmi. 2011. Portfolio Management Its Application in Stock Investment.Jakarta Salemba Empat