"Smart beta portfolio investment strategy during the COVID-19 pandemic in Indonesia"

AUTHORS	Dwi Fitrizal Salim [iD] [R]
	Aldilla Iradianty [iD] [R]
	Farida Titik Kristanti [iD] [R]
	Widyadhana Candraningtias

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
45	2	3

BUSINESS PERSPECTIVES

Dwi Fitrizal Salim, Doctor, Economy and Business Faculty, Management Department, Telkom University, Indonesia. (Corresponding author)

Aldilla Iradianty, Master, Economy and Business Faculty, Management Department, Telkom University, Indonesia.

Farida Titik Kristanti, Doctor, Economy and Business Faculty, Management Department, Telkom University, Indonesia.

Widyadhana Candraningtias, Student, Economy and Business Faculty, Management Department, Telkom University, Indonesia.

Conflict of interest statement:
Author(s) reported no conflict of interest

Dwi Fitrizal Salim (Indonesia), **Aldilla Iradianty** (Indonesia), **Farida Titik Kristanti** (Indonesia), **Widyadhana Candraningtias** (Indonesia)

SMART BETA PORTFOLIO INVESTMENT STRATEGY DURING THE COVID-19 PANDEMIC IN INDONESIA

Abstract

Covid-19 has had an impact on stock investment, especially in Indonesia, marked by the decline in the Jakarta Composite Index (JCI) at the beginning of the Covid 19 pandemic. During the Covid-19 era, there was a lot of negative information about the uncertainty of the market, which made investors irrational about the choice of stocks in the portfolio. So this research will have a hypothesis that the High Volatility stock group will be the best portfolio in Covid-19 conditions. The sample used is the Group of stocks that have the largest market capitalization value in JCI. Stocks with large market caps are chosen because of one of the indicators of blue chip stock. The sample will be divided into three portfolio groups, High Volatility, Moderate Volatility, and Low Volatility. The results obtained that High Volatility became the best portfolio during the Covid-19 period. The results of this study prove that the group of stocks with High Volatility will get positive returns and sharpe performance results are the highest and positive, compared to moderate volatility and low volatility portfolios. This result arises because stocks with High Volatility are subject to large price fluctuations and in this situation, investors can invest in these stocks in a short time frame. The short-term process is carried out regularly so that it can be in accordance with investors' expectations for investments in the portfolio.

Keywords	crisis, investment, portfolio, volatility, high volatility, moderate volatility, low volatility
JEL Classification	G11, G12, G14, G17

INTRODUCTION

Investment will not be spared from future risks due to the uncertainty of future price movements, as has been researched by the best researchers in asset pricing such as Scholes (1996), long before Modern Portfolio Theory (Markowitz, 1952), Capital Asset Pricing Model (Treynor, 1961, 1962), and Single index model (Sharpe, 1963) discuss the relationship of risk and return that will be accepted for investment decisions taken. These theories are continuously used and implemented to create the best model and avoid investment risks/errors from investment decisions.

Indonesia experienced a significant decline in 2020 due to Covid-19 cases. The Indonesian economic sector has experienced a considerable decline when compared to 2019. The Jakarta Composite Index (JCI) was reduced to a minimum of 3937.6 on March 24, 2020 when the first Covid-19 case in Indonesia was discovered. The declining condition in the capital market sector occurred first in China, which was the first country to find a Covid-19 case. China's stock market fell by 10 percent, China's market capitalization fell by more than IDR 5,800 trillion, the Shenzhen Composite stock index fell by 8.3 percent, and the Shanghai stock index fell by 8.13 percent.

This study focuses on the object of market capitalization because market capitalization is very important to reflect the overall value of a company. A company's market capitalization value will reflect the value of Indonesia's market capitalization. Researchers raised the Covid-19 case that caused the Indonesian capital market to decline so that the period used was 2019 to 2021.

The measurement of changes in the rate of return or risk compared to market indices is called beta. Beta and the market have the same relationship. When the market is high, beta is also high, and when the market goes down, then beta also goes down. The measurement of portfolio performance that compares the difference between the average return on the portfolio and the average return on risk-free assets with a standard deviation is called Sharpe. The better the performance of the Sharpe index, the better the performance of the portfolio, the index was introduced by Sharpe (1996). This study uses Smart Beta, because Smart Beta can adjust the returns and risks received by taking into account risks from outside the market (Amenct et al., 2016). The use of each of these stocks' Smart Beta portfolios can be quickly changed in composition to generate returns that exceed expectations (Alford et al., 2017).

This Smart Beta is recommended to use a portfolio with an active and systematic stock strategy (Chow et al., 2018), and grouping stocks like this study is carried out, which groups stocks into three groups, namely High Volatility, Moderate Volatility, and Low Volatility to get maximum returns. As done by Agapova et al. (2017), which results in stocks belonging to the High Volatility group with a high beta resulting in lower growth when compared to Low Volatility stocks with a low beta. The study was conducted by Henriksson et al. (2019) who performed the same weighting in portfolios based on Smart Beta but used Variable Rate Preferred (VRP) as a portfolio tool to increase returns and diversification.

Another study that uses Smart Beta is Waspada et al.'s (2021) study that develops Smart Beta using three variables such as alpha, VaR, and beta to produce an optimal portfolio. Hendrawan and Salim (2017) use Tobin's q medium ratio. Salim (2019) uses EVA, ROE, and ROA ratios to form an optimal portfolio. A study by Salim et al. (2020), which formed a portfolio using alpha, VaR, and beta variables, was carried out using logistic regression. Not only stocks are investment instruments in the portfolio, but currency is one of the investment instruments that can be used as a portfolio (Salim et al., 2020). A study conducted by Salim and Rizal (2021), which used two variables, namely beta and alpha and produced high alpha, would get a high return. Smart beta model on the Indonesia Stock Exchange was used by Waspada et al. (2021). Based on previous research, this research raises the issue of the difficulty of predicting the direction of market movements during Covid-19 by obtaining a positive portfolio return. This research will design the best portfolio during the Covid-19 period, by comparing three portfolios based on individual stock risk with market risk.

1. LITERATURE REVIEW AND HYPOTHESIS

The effect of the crisis is a decrease in the pace of the economy in both the emerging market and the non-emerging market (Baker et al., 2020). Barro et al. (2020) explained that the crisis will also affect investors' behavior to make investments, because investors are worried as there is no clarity on the equity market, which is experiencing high volatility. The more information that exists will create bias in the market so that investors will be irrational in determining investment choices into which sector they will spend investment funds. Hirshleifer (2001) explains that the bias occurs due to three factors, self-fraud, heuristic simplification, and loss of emotional control of the investor himself.

At a time when the market is falling, the nature of investors with this situation is more pessimistic, which makes investors short sell their investments (Burns et al., 2012). The occurrence of short selling will cause significant price changes in assets and make other investors affected and panic about the price decline event, so it is far below the investor's expected return (Shu, 2010). BenSaïda et al. (2018) describe the occurrence of crises in financial markets in the world starting from Black
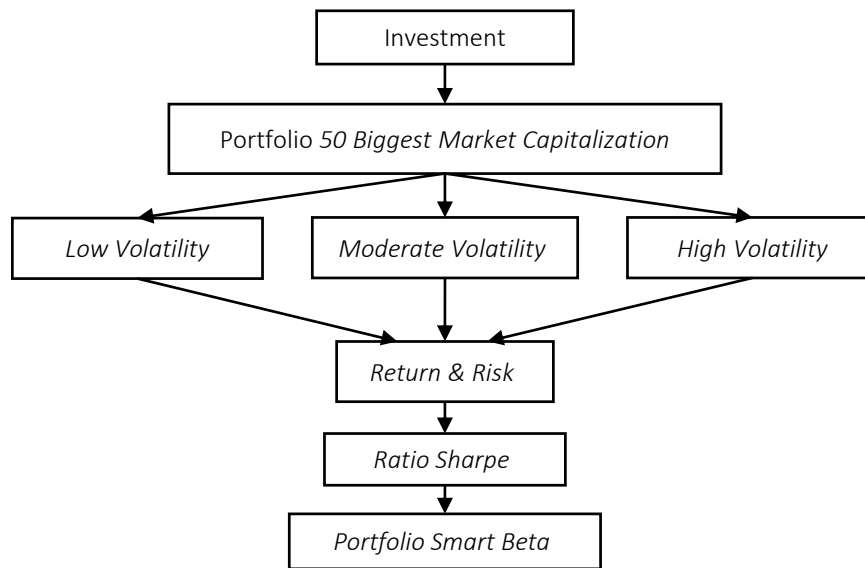
Figure 1. Research framework

Monday (1987), the Asian financial crisis (1997), the Subprime mortgage crisis (2008), the Eurozone crisis (2010), and the Chinese stock market crash (2015). There have been many studies describing the occurrence of volatility caused by crises in various events such as economic, financial, political, and health (Yousaf & Hassan, 2019; Stoupos & Kiohos, 2021).

The year of the UK Brexit referendum discourse in 2016 was a political event that had a negative impact such as financial instability and damaged the economic relations of the EU and the UK (Belke et al., 2018). In a state of high market volatility, investors will find it difficult to make an accurate choice (Bauer et al., 2009; Kumar et al., 2021).

Market conditions have different criteria, so accurate information and different strategies are needed to be different from market characteristics (Chong, 2004). The discussion of derivatives is commonly known as the long straddle strategy and the short straddle strategy, which investors can use to maximize portfolio returns. Like the long straddle strategy, investors have a benchmark for buying or selling the market, and investors must know about information on the market because the investment will be made in the long term. Then the investor's short straddle strategy will target on volatile stock price movements for relatively shorter investments without considering the market.

The price has entered at the upper limit, investors can immediately sell and get an expected return, and if there is a price drop, they will sell losses so that there is no greater loss. The discussion of the long straddle strategy and the short straddle strategy can be seen in, Sheu and Wei (2011) in the Taiwanese market, and Samuel (2018). High volatility also shows good results so that it produces high returns for investors and has high accuracy (Maris et al., 2007). Smart Beta is an advance in the theory of the Capital Asset Pricing Model (CAPM), and it shows that the return on a security or equity beta zero is equal to a risk-free return with a high yield, then the value of beta is also high.

Smart Beta takes into account the market capitalization value at each stage in choosing a portfolio that can generate high returns and expects the Smart Beta strategy to continue to function in the long run. Portfolio performance evaluation that takes into account returns and risks is a Sharpe performance evaluation. Sharpe Performance Evaluation is a potent performance measurement by comparing the difference between the average return on the portfolio and the average return on risk-free assets with the standard deviation of the portfolio. To clarify what will be done in this study, see the framework in Figure 1.

This study has preliminary thoughts about the Smart Beta portfolio that aims to find out which portfolio has the best return, because the use of

this Smart Beta can take into account the high level of return with a certain level of risk. This study is supported by the research of Hendrawan and Salim (2017), Salim (2019), Salim and Rizal (2021) who formed a portfolio from various ways that have the aim of finding and comparing the best model in increasing portfolio returns.

This study used a sample of stock groups that were included in the 50 Market Capitalization during the pandemic, namely 2019, 2020, and 2021. The data is divided into once every three months for its exchange. January – March 2020, April – June 2020, July – September 2020, October – December 2020, January – March 2021, April – June 2021, and July – September 2021. From this division, a beta search was carried out to be sorted from the highest to the lowest, which was sorted into three parts, namely, Low valatility, Moderate Volatility, and High Volatility. Then a search for returns and risks from each part was carried out and tested with Sharpe performance. The search flow is used to navigate the portfolio with the best Smart Beta.

H1: *High volatility strategy is the best strategy in choosing the composition of a stock portfolio during the Covid-19 period in Indonesia.*

This hypothesis is based on *"High risk High return"*. In times of crisis, investors are expected to conduct periodic evaluations to regulate the composition of funds, the selection of the types of stocks in the portfolio. Investment strategies in times of crisis such as Covid-19 are indeed different ways of managing them with stable conditions (not crisis). This study continues the study by Kristanti et al. (2022) where it is suggested to implement a smart beta strategy in Indonesia.

2. METHODOLOGY

This study will design the best portfolio during the Covid-19 period by choosing from a group of 50 Biggest Market Capitalization stocks in Indonesia in 2020–2021. This study aims to test the hypothesis that the High Volatility stock group is the best portfolio for times of crisis. The data taken is daily closing price data from January 2020 – September 2021, each share from Yahoo Finance and Risk-free data taken from Bi repo data from Bank Indonesia. The portfolio will be divided into 3 based on the level of volatility, High Volatility, Moderate Volatility, and Low Volatility. From the three groups of stocks based on the type of Volatility, the best portfolio in times of crisis will be generated. This study will perform the following calculations:

1. Collecting stocks that entered consecutively in the 50 Biggest Market Capitalization in 2019, 2020, and 2021.

2. Collecting closing price data from each stock from January 2020 to September 2021.

3. Calculating the return from the closing price data of each stock:

$$Ri = \frac{p_t - p_0}{p_0}. \tag{1}$$

4. Share the portfolio into once every three months for its exchange. January – March 2020, April – June 2020, July – September 2020, October – December 2020, January – March 2021, April – June 2021, and July – September 2021.

5. Seeking the beta, alpha of each stock calculated quarterly:

$$\beta i = \frac{\sigma_{im}}{\sigma_{m^2}}, \tag{2}$$

$$Alpha = E(R_i) - \beta_i \cdot E(R_m). \tag{3}$$

6. Performing rankings based on betas of the high, Moderate and low given the following categories: *High Volatility, Moderate Volatility, Low Volatility*

7. Variance:

$$\sum_{i=1}^{n} \frac{(R_{it} - E(R_i))^2}{n}. \tag{4}$$

8. Expected return portfolio:

$$E(Rp) = \alpha p + \beta p \, x \, E(Rm). \tag{5}$$

9. Risk Portfolio:

$$\sigma p^2 = \beta p^2 \cdot \sigma m^2 + \left(\sum_{i=1}^{n} w_i \cdot \sigma ei\right)^2. \tag{6}$$

10. Sharpe performance calculations from each category:

$$SP = \frac{R_p - R_f}{\sigma p}. \qquad (7)$$

3. RESULTS

A beta search was conducted on each sample to sort stocks from highest to lowest then sorted into three categories, namely Low Volatility, Moderate Volatility, and High Volatility. Furthermore, the portfolio will be recompositioned in a three-month period, the periods are January – March 2020, April – June 2020, July – September 2020, October – December 2020, January – March 2021, April – June 2021, and July – September 2021. From this division, calculations are carried out to determine the returns and risks of each portfolio, namely High Volatility, Moderate Volatility, Low Volatility, and JCI.

Table 1. Portfolio smart beta 2020–2021

Source: Processed data.

Period	Portfolio	Return	Risk	Sharpe
January – March 2020	High Volatility	−39.84%	8.48%	−14.928%
	Moderate Volatility	−26.69%	5.75%	−11.903%
	Low Volatility	−23.65%	0.54%	−13.638%
	JCI	−30.63%	3.66%	
April – June 2020	High Volatility	14.12%	4.59%	6.053%
	Moderate Volatility	7.83%	1.66%	3.949%
	Low Volatility	6.69%	0.28%	4.294%
	JCI	8.50%	3.42%	
July – September 2020	High Volatility	2.96%	2.42%	1.406%
	Moderate Volatility	−7.46%	1.07%	−6.520%
	Low Volatility	2.21%	0.12%	1.173%
	JCI	−0.27%	0.91%	
October – December 2020	High Volatility	28.73%	1.74%	19.528%
	Moderate Volatility	15.67%	0.71%	12.580%
	Low Volatility	5.71%	0.01%	4.756%
	JCI	20.87%	0.65%	
January – March 2021	High Volatility	2.3%	1.5%	1.1%
	Moderate Volatility	0.0%	0.6%	−0.4%
	Low Volatility	−7.5%	0.1%	−5.4%
	JCI	1.9%	0.7%	
April – June 2021	High Volatility	−7.14%	0.78%	−6.062%
	Moderate Volatility	−6.75%	0.40%	−6.566%
	Low Volatility	−4.88%	0.05%	−4.559%
	JCI	0.88%	0.36%	
July – September 2021	High Volatility	1.35%	0.78%	0.591%
	Moderate Volatility	9.44%	0.36%	7.234%
	Low Volatility	0.72%	0.07%	0.072%
	JCI	5.10%	0.36%	

Based on Table 1, it was found that all portfolios received negative results due to the beginning of the emergence of the Covid-19 pandemic. So that the market responded to this with negative results, which were marked by negative JCI returns. It is very difficult to get a return in that period. So it is advisable to sell shares in the portfolio to minimize higher risks. Based on Table 1, the JCI Index began to improve, indicated by positive returns, the index began to improve from the previous period. The High Volatility portfolio gets a more return on the JCI market return. This is in line with the high risk of high returns being attached. The composition of stocks in a High Volatility portfolio is a stock that has a level of risk above the market risk calculated by the beta method.

An interesting result seen in Table 1 is that the High Volatility portfolio and the Low Volatility portfolio get a positive return contrary to the return obtained by the negative JCI market. Then the Moderate Volatility portfolio produces a negative return below the JCI market return. This result means that the Moderate Volatility stock group has similarities with the JCI market movement, this is proven if the market return is negative, the moderate portfolio return is also negative.

Table 1 shows that Portfolio High Volatility still gets returns above JCI market returns, and Moderate and Low Volatility portfolios get negative returns. This result proves that stocks that are classified as risky compared to market risk will get high returns even in the market returns. Table 1 results obtained for High, Moderate, and Low portfolios did not get positive returns, all portfolios got negative returns. This result needs to be evaluated for the recomposition of existing stocks in the portfolio for the next period because the existing composition fails to produce a positive return when the JCI market gets a positive return.

The results in Table 1 also show that the greater the value of the negative return, the greater the risk obtained. So not only the higher positive return value will have a high risk. From these results it can be concluded that the higher the return, whether negative or positive, there is a positive relationship with the level of risk obtained. Based on Table 1, it is found that moderate volatility portfolio returns get the highest returns and beat the high volatility

return level, this result differs from the results in the previous Table 1. This result is because in that period, the composition of stocks in the portfolio is right so that it produces optimal returns and can beat the market. Moderate Volatility portfolios are a group of stocks that are stable in price movements, and the risks faced are close to and even equal to market risks. Therefore, there are so many strategies to get optimal returns, it really depends on what method is used to form a portfolio.

Table 2. Portfolio accumulation results

Accumulated Results	Return	Risk
High Volatility	2%	20.317%
Moderate Volatility	−9%	10.545%
Low Volatility	−21%	1.144%

Table 2 is an accumulation of all periods from January 2020 to September 2021. As a result, the portfolio gets the highest returns than the Moderate and Low Volatility portfolios. Thus, during the pandemic that makes all stock prices fall with the Smart Beta portfolio that is managed every 3-month period, it manages to get a positive return. When viewed from the level of risk obtained that differs from the statement in the previous Table 1, this result needs to be emphasized that the results of Table 2 are the result of the accumulation of all periods of research so as to produce different results from a single risk in one period.

Accumulated Performance in each portfolio can be seen in Table 3, the results of the High portfolio get the best return when compared to moderate and low volatility portfolios. With this result, the Smart Beta portfolio during the Covid-19 pandemic when the market experiences a decline in the High Volatility portfolio can get a high and positive performance. This result indicates that the group of stocks that have a risk level above the market provides positive returns and can beat the JCI market returns, Low Volatility gets a negative performance.

Based on Table 2, it was found that the returns from the High Volatility portfolio were positive and with the greatest level of risk than the Moderate, and Low portfolios, this result was strengthened again with the result of the Sharpe ratio Average positive at Table 3. So with these results the research hypothesis is accepted that High Volatility strategy is the best strategy in choosing the composition of a stock portfolio during the Covid-19 period in Indonesia. The limitation of the advantage of this study is not to conduct significant tests but to make a formula that can be applied directly by investors when investing using the formula used in this study.

Figure 2 is 6 groups of stocks Financial sector (BBCA, BMRI, BBNI, BBRI), automotive sector (ASII), infrastructure sector (TLKM), Market (JCI). that have the highest market capitalization value in Indonesia. At the beginning of the emergence of Covid-19 in March 2020, the JCI index and six other stocks also experienced a significant decline, and at the end of September 2021, the majority of the stock groups were not able to match the price at the beginning of 2020. So it is very difficult to determine what strategy is used in a crisis situation like Covid-19. Therefore, this study offers an active strategy (short selling) by choosing groups of stocks that have volatility above market volatility in order to get a chance for a positive return. The composition of stocks within portoflio is supported by the data in Table 3 that the High volatility portfolio is the best and gives a positive Shrape ratio.

Table 3. Sharpe portofolio performance

| Period	High Volatility	Moderate Volatility	Low Volatility
January – March 2020	−0.149275758	−0.119033998	−0.136380056
April – June 2020	0.060532931	0.039493976	0.042934529
July – September 2020	0.014056193	−0.06519992	0.011728218
October – December 2020	0.190962222	0.120703859	0.042276534
January – March 2021	0.010925949	−0.011907714	−0.053698472
April – June 2021	−0.060621031	−0.065663178	−0.045587201
July – September 2021	0.005905214	0.072341477	0.000722847
Sharpe Accumulation	7%	−3%	−14%
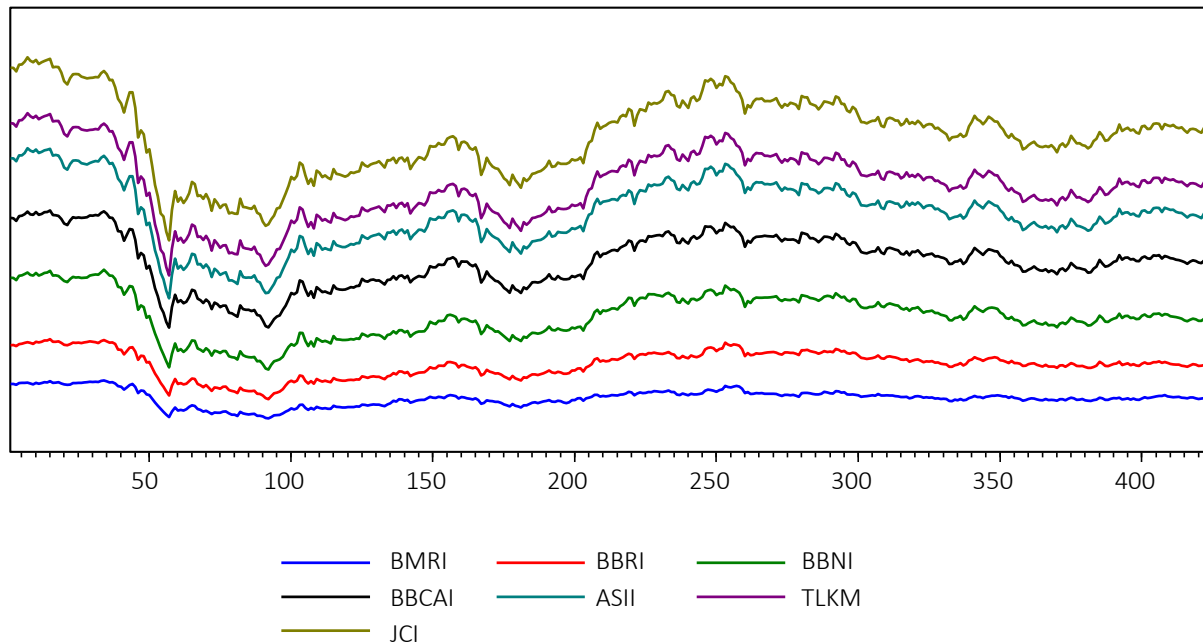
Figure 2. Top 6 capitalizations of the Indonesian stock market

4. DISCUSSION

This study supports the research of Kristanti et al. (2022) where a high volatility portfolio provides the best returns in Indonesia. The selection of stocks that are high volatile is not always good because there will be high risks attached. Then the selection of stocks with small sizes needs to be watched out for because there are indications that the company is experiencing financial difficulties (Musanovic & Halilbegovic, 2021).

The opposition was raised by the research of Nguyen et al. (2021) where undervalued stocks provide high returns, when compared to overvalued companies. The decline in company revenue in Indonesia was illustrated by the research of Meliana et al. (2022) in the Covid-19 period. In that situation, there was an anomaly in a company's stock price; this occurred because there was a mismatch of information from financial statements, the increase in OCF and FCF did not affect the stock price. Therefore, investors panic and behave irrationally towards investment decisions. Different conditions obtained by Spulbar et al. (2022) during the Covid-19 event did not have an impact on the stock market of the NIKKEI 225 index in Japan, marked by no high volatility when compared to countries around Japan.

Thus the conclusion was drawn that the Japanese stock market is more stable and characterizes the market as efficient and safe for long-term investment and avoids extreme events such as crises. Companies in the financial sector have more impact than non-financial companies on the Amman Stock Exchange (ASE). The shock before Covid-19 also occurred at the time of the Uk Brexit from the European Union, where the Indian country, which is a commonwealth country from the UK, is also affected by the political policy. So Nagarakatte and Natchimuthu (2022) suggested diversifying the portfolio limited to the Indian, UK, EU, and US stock markets. Risk and volatility will directly affect stock prices and investor sentiment (Hawaldar, 2015).

Covid-19 has caused stock prices to experience high volatility. According to Duttilo et al. (2021), Kumar et al. (2020), and Hawaldar (2016), volatility can measure how much risk level will arise for investment assets. So investors need to anticipate this situation with a special strategy, plus the news of Covid-19 greatly affects volatility patterns (Baek et al., 2020). Du (2021) and Spulbar et al. (2020) conducted research on the stock market of emerging countries and non-emerging markets and concluded they are also significantly affected by negative information on Covid-19, then it will affect investor behavior. Risk and volatility will

directly affect stock prices and investor sentiment (Hawaldar, 2015).

Strategies to predict the price/return of an asset are very necessary during this Covid-19 because with high volatility there is an opportunity to get more returns in a short time (short intermittent). Then Covid-19 also caused a stock price shock that varies between companies, depending on a company's revenue during Covid-19 (Mazur et al., 2021). Japan is very dependent on political and economic events, and this is manifested internationally in relation to foreign exchange, stock markets. Spulbar and Birau (2019) suggest that diversifying the international portfolio is not fixed in one country, so that risks can be suppressed and minimized. This result means that the group of stocks that have moderate to low volatility risk during the pandemic cannot get a good performance, because the risk follows the market risk even below the market risk. When the market is down, it is necessary to find loopholes to get the best returns and this can even beat market returns, so that risks that exceed the market are the solution to get the best results. This statement is supported by "High risk High return".

So the purpose of the study was answered that the best portfolio is the High Volatility portfolio with the data used in this study. It needs to be emphasized to readers or future research, these results only apply to the data used in this study. So that different data will produce different interpretations as well as "no free lunch", so it is necessary to practice to get satisfactory results and in accordance with expectations.

CONCLUSION

When Covid-19 was declared a crisis that occurred in the World, everyone was in panic, there was uncertainty. Many investments have suffered losses, therefore this study tries to build the best portfolio during the Covid-19 period. The results showed that portfolio High Volatility generated positive Sharpe returns and performance results. It is not always the risky asset that will mislead the investor in losses. This study has proven that risky assets if managed correctly will be able to generate positive and best returns when compared to moderate volatility and low volatility portfolios. So with these results the research hypothesis is accepted that High Volatility strategy is the best strategy in choosing the composition of a stock portfolio during the Covid-19 period in Indonesia. The limitation of the advantage of this study is not to conduct significant tests but to make a formula that can be applied directly by investors when investing using the formula used in this study.

In the event of a crisis in the future, investors are advised not to panic and make rash investment decisions in a stock, diversification of assets is necessary to overcome losses from part of the assets in the portfolio. Negative information can make decisions that will be made to be biased and not in accordance with real circumstances. Then the information first needs to be digested and studied. For future research, it is proposed to add portfolio categories such as adding the Alpha portfolio group, Varians and being tested in times of crisis, as described by BenSaïda et al. (2018); build a portfolio by combining different investment instruments such as commodities, currencies, cryptocurrencies, stocks, and indices in a number of different countries to provide the best portfolio diversification.

AUTHOR CONTRIBUTIONS

Conceptualization: Dwi Fitrizal Salim, Aldilla Iradianty, Farida Titik Kristanti.
Data curation: Dwi Fitrizal Salim, Aldilla Iradianty.
Formal analysis: Widyadhana Candraningtias.
Funding acquisition: Dwi Fitrizal Salim, Widyadhana Candraningtias.
Investigation: Dwi Fitrizal Salim, Aldilla Iradianty, Farida Titik Kristanti.
Methodology: Farida Titik Kristanti.
Project administration: Widyadhana Candraningtias.

Resources: Dwi Fitrizal Salim.
Software: Dwi Fitrizal Salim, Widyadhana Candraningtias.
Validation: Dwi Fitrizal Salim.
Supervision: Dwi Fitrizal Salim, Aldilla Iradianty, Farida Titik Kristanti.
Visualization: Aldilla Iradianty.
Writing – original draft: Dwi Fitrizal Salim, Widyadhana Candraningtias.
Writing – review & editing: Dwi Fitrizal Salim, Aldilla Iradianty, Farida Titik Kristanti.

REFERENCES

1. Agapova, A., Ferguson, R., & Leistikow, D. (2017). A continuous return model for the low-volatility and low-beta anomalies. *The Journal of Investing*. http://dx.doi.org/10.3905/joi.2017.26.3.107

2. Alford, A. W., & Rakhlin, D. A. (2017). Implementing a smart beta index: the implications of a dual performance objective and limited liquidity. *The Journal of Portfolio Management, 43*(5), 135-146. https://doi.org/10.3905/jpm.2017.43.5.135

3. Amenc, N., Goltz, F., & Lodh, A. (2016). Smart beta is not monkey business. *The Journal of Index Investing, 6*(4), 12-29. https://doi.org/10.3905/jii.2016.6.4.012

4. Baek, S., Mohanty, S. K., & Glambosky, M. (2020). COVID-19 and stock market volatility: An industry-level analysis. *Finance Research Letters, 37,* 101748. https://doi.org/10.1016/j.frl.2020.101748

5. Baker, S. R., Bloom, N., Davis, S. J., Kost, K. J., Sammon, M.,C., & Viratyosin, T. (2020). The Unprecedented Stock Market Impact of COVID-19 (*Working Paper 26945*). Cambridge, MA: National Bureau of Economic Research. https://doi.org/10.3386/w26945

6. Bauer, R., Cosemans, M., & Eichholtz, P. (2009). Option trading and individual investor performance. *Journal of Banking & Finance, 33*(4), 731-746. https://doi.org/10.1016/j.jbankfin.2008.11.005

7. Belke, A., Dubova, I., & Osowski, T. (2018). Policy uncertainty and international financial markets: the case of Brexit. *Applied Economics, 50*(34-35), 3752-3770. https://doi.org/10.1080/00036846.2018.1436152

8. BenSaïda, A., Litimi, H., & Abdallah, O. (2018). Volatility spillover shifts in global financial markets. *Economic Modelling, 73*(February), 343-353. https://doi.org/10.1016/j.econmod.2018.04.011

9. Burns, W. J., Peters, E., & Slovic, P. (2012). Risk perception and the economic crisis: A longitudinal study of the trajectory of perceived risk. *Risk Analysis: An International Journal, 32*(4), 659-677. https://doi.org/10.1111/j.1539-6924.2011.01733.x

10. Chong, J. (2004). Options trading profits from correlation forecasts. *Applied Financial Economics, 14*(15), 1075-1085. https://doi.org/10.1080/0960310042000281194

11. Chow, T.-M., Li, F., & Shim, Y. (2018). Smart beta multifactor construction methodology: mixing vs integrating. *The Journal of Index Investing, 8*(4), 47-60. https://doi.org/10.3905/jii.2018.8.4.047

12. Du, W. (2021). News and Market Efficiency in the Japanese Stock Market. *Journal of Behavioral Finance, 22*(3), 306-319. https://doi.org/10.1080/15427560.2020.1774886

13. Duttilo, P., Gattone, S. A., & Di Battista, T. (2021). Volatility Modeling: An Overview of Equity Markets in the Euro Area during COVID-19 Pandemic. *Mathematics, 9*(11), 1212. https://doi.org/10.3390/math9111212

14. Hawaldar, I. T. (2015). Empirical Testing of Capital Asset Pricing Model on Bahrain Bourse. *Asian Journal of Finance & Accounting, 7*(2), 107-119. http://doi.org/10.5296/ajfa.v7i2.8356

15. Hawaldar, I. T. (2016). The CrossSectional Variations in Portfolio Returns: Evidence from Bahrain Bourse. *British Journal of Economics, Finance and Management Sciences, 12*(2), 1-11. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3504527

16. Hendrawan , R., & Salim, D. F. (2017). Optimazing Active and Passive Stock Portfolio Formed Tobin's Q and Ptice Earning Ratio Model Stock on Kompas Index-100 Period 2012-2017. *International Journal of Applied Bussiness and Economic Research, 15*(26), 625-641.

17. Henriksson, R., Livnat, J., Pfeifer, P., & Stumpp, M. (2019). A multi-factor strategy for index alpha enhancement. *The Journal of Index Investing, 9*(4), 67-79. https://doi.org/10.3905/jii.2019.9.4.067

18. Hirshleifer, D. (2001). Investor psychology and asset pricing. *The Journal of Finance, 56*(4), 1533-1597. https://doi.org/10.1111/0022-1082.00379

19. Kristanti, F. T., Salim, D. F., Indrasari, A., & Aripin, Z. (2022). A stock portfolio strategy in the midst of the COVID-19: Case of Indonesia. *Journal of Eastern European and Central Asian Research (JEECAR), 9*(3), 422-431. https://doi.org/10.15549/jeecar.v9i3.822

20. Kumar, A., Soni, R., Hawaldar, I. T., Vyas, M., & Yadav, V. (2020). The Testing of Efficient Market Hypotheses: A Study of Indian Pharmaceutical Industry.

International Journal of Economics and Financial Issues, 10(3), 208-216. https://doi.org/10.32479/ijefi.9764

21. Maris, K., Nikolopoulos, K., Giannelos, K., & Assimakopoulos, V. (2007). Options trading driven by volatility directional accuracy. *Applied Economics, 39*(2), 253-260. https://doi.org/10.1080/00036840500427999

22. Markowitz, H. (1952). Portfolio selection. *The Journal of Finance, 7*(1), 77. https://doi.org/10.2307/2975974

23. Mazur, M., Dang, M., & Vega, M. (2021). COVID-19 and the March 2020 stock market crash. Evidence from S&P 1500. *Finance Research Letters, 38,* 101690. https://doi.org/10.1016/j.frl.2020.101690

24. Meliana, M., Kesuma, H., Enjelina, D., Rijanto, A., & Savitri Saraswati, D. (2022). Is cash flow growth helping stock performance during the COVID-19 outbreak? evidence from Indonesia. *Investment Management and Financial Innovations, 19*(1), 247-261. https://doi.org/10.21511/imfi.19(1).2022.19

25. Musanovic, E. B., & Halilbegovic, S. (2021). Financial statement manipulation in failing small and medium-sized enterprises in Bosnia and Herzegovina. *Journal of Eastern European and Central Asian Research (JEECAR), 8*(4), 556-569. https://doi.org/10.15549/jeecar.v8i4.692

26. Nagarakatte, S. G., & Natchimuthu, N. (2022). Return and volatility spillover between India, UK, USA and European Stock Markets: The brexit impact. *Investment Management and Financial Innovations, 19*(1), 121-134. https://doi.org/10.21511/imfi.19(1).2022.09

27. Nguyen, A. P, Nguyen, A. V., Ho, T. H., & To, T. T. (2021). Diversification of Business and technical efficiency of companies in Vietnam. *Journal of Eastern European and Central Asian Research (JEECAR), 8*(4), 481-494. https://doi.org/10.15549/jeecar.v8i4.772

28. Salim , D. F., & Rizal, N. A. (2021). Portfolio Optimal Beta dan Alpha. *Jurnal Riset Akuntansi Dan Keuangan, 9*(1), 181-192. https://doi.org/https://doi.org/10.17509/jrak.v9i1.27586

29. Salim , D. F., Disman, Waspada, I., & Utama, W. (2020). Optimal Portfolio with Smart Beta, Alpha, Diversification, and Var On Horizon Indenesia's Stock Exchange. *European Journal of Molecular & Clinical Medicine, 7*(2), 5371-5381.

30. Salim, D. F. (2019). Perancangan Portfolio Optimal Dengan Menggunakan Return On Assets, Return On Equity, dan Economic Value Addes Pada Indeks Jakarta Islamix Index Periode 2014-2018. *Jurnal Riset Akuntansi Dan Keuangan, 7*(1), 43-54. https://ejournal.upi.edu/index.php/JRAK/article/view/15470

31. Salim, D. F., Heliola, S., & Waspada, I. (2020). Portofolio Optimal Currency. *Jurnal Riset Akuntansi Dan Keuangan, 8*(1), 187-194.

32. Samuel, Y. M. Z.-T. (2018). Option implied beta and option return. *Applied Economics, 50*(2), 128-142. https://doi.org/10.1080/00036846.2017.1313958

33. Scholes, M. S. (1996). Global financial markets, derivative securities, and systemic risks. *Journal of Risk and Uncertainty, 12*(2-3), 271-286. https://doi.org/10.1007/bf00055798

34. Sharpe, W. F. (1963). A simplified model for portfolio analysis. *Management Science, 9*(2), 277-293. https://doi.org/10.1287/mnsc.9.2.277

35. Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance, 19*(3), 425. https://doi.org/10.2307/2977928

36. Sheu, H.-J., & Wei, Y.-C. (2011). Effective options trading strategies based on volatility forecasting recruiting investor sentiment. *Expert Systems with Applications, 38*(1), 585-596. https://doi.org/10.1016/j.eswa.2010.07.007

37. Shu, H.-C. (2010). Investor mood and financial markets. *Journal of Economic Behavior & Organization, 76*(2), 267-282. https://doi.org/10.1016/j.jebo.2010.06.004

38. Spulbar, C., & Birau, R. (2019). *Emerging Research on Monetary Policy, Banking, and Financial Markets* (322 p.). USA: IGI Global. http://doi.org/10.4018/978-1-5225-9269-3

39. Spulbar, C., Trivedi, J., & Birau, R. (2020). Investigating abnormal volatility transmission patterns between emerging and developed stock markets: a case study. *Journal of Business Economics and Management, 21*(6), 1561-1592. https://doi.org/10.3846/jbem.2020.13507

40. Stoupos, N., & Kiohos, A. (2021). Euro area stock markets integration: Empirical evidence after the end of 2010 debt crisis. *Finance Research Letters*, September, 1544-6123. https://doi.org/10.1016/j.frl.2021.102423

41. Treynor, J. L. (1961). Market Value, Time, and Risk. *SSRN Electronic Journal*. http://dx.doi.org/10.2139/ssrn.2600356

42. Treynor, J. L. (1962). Toward a Theory of Market Value of Risky Assets. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.628187

43. Waspada, I., & Salim, D. F. (2020). Smart Beta In Index Country ASEAN. *European Journal of Molecular & Clinical Medicine, 7*(11), 906-918.

44. Waspada, I., Salim, D. F., & Fariska, P. (2021). An Application of the Smart Beta Portfolio Model: An Empirical Study in Indonesia Stock Exchange. *Journal of Asian Finance, Economics and Business, 8*(9), 0045-0052. https://doi.org/https://doi.org/10.13106/jafeb.2021.vol8.no9.0045

45. Yousaf, I., & Hassan, A. (2019). Linkages between crude oil and emerging Asian stock markets: New evidence from the Chinese stock market crash. *Finance ResearchLetters, 31,* 207-217. https://doi.org/10.1016/j.frl.2019.08.023