



An Empirical Implementation of Markowitz Modern Portfolio Theory on Indonesia Sharia Equity Fund: A Case of Bahana Icon Syariah Mutual Fund

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ABSTRACT

Bahana Icon Syariah, one of Bahana TCW's mutual fund products, is less preferred by investors due to historical poor performance over the last five years compared to the reference index of Indonesia Sharia Stock Index (ISSI). Therefore, this study will evaluate and determine the optimal portfolio using the Markowitz's Modern Portfolio Theory in four different market conditions – overall in the last five years, sideways, bullish, and bearish – with two variables, active and semi-active investment strategy. Data input refers to stocks that have always been recorded at least 80% in the Jakarta Islamic Index 30 (JII 30) and Jakarta Islamic Index 70 (JII 70) from October 2015 to October 2020. The findings reveal that active investment strategy is always superior to the semi-active under any form of market conditions. The results showed that there were 8 stocks worthy of being included in the portfolio, 4 stocks worthy of consideration, and 9 stocks worthy of being removed from the portfolio. The results are expected to be used and developed as one of the company's tools to obtain optimal portfolio returns.



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1. Introduction

According to World Economic Outlook: A Long and Difficult Ascent published by International Monetary Fund (IMF) in October 2020, the IMF has changed Indonesia's economic growth forecast from 0.5 percent in June 2020 to shrink by 1.5 percent by the end of 2020. The downward revision for Indonesia is attributable to the ongoing spread of the pandemic and the adverse impact on severely affected sectors. Although social distancing will continue through 2021, the economy is expected to rebound as vaccine coverage has improved and government fiscal spending has been expanded. The rise in commodity prices and accommodative fiscal and monetary policies would help lift the economy. In conclusion, the IMF forecast that the Indonesian economy will boost and expand by approximately 6.1 percent in 2021.

The correlation between economic growth and the stock market is a recurring question amongst investors and analysts. While several researchers believe that both numbers theoretically should be the same, others think that there is no connection at all. Park (1997) conducted research on the correlation between real rate of stock return (price appreciation and dividends) on S&P 500 Index stocks and five real macroeconomic variables, including annualized growth rates of nonfarm payrolls (employment), Gross Domestic Product (GDP), private investment, industrial production, and retail sales. The data included weekly, quarterly and annual data covering the 40 years between 1956 and 1995. Stock returns were found to be most negatively with employment growth and most positively to growth in GDP. With strong statistical and economic significance, GDP has positive coefficients. In one of the models, when GDP rises by 1 percentage point, stock return rises by 3.38 percentage points. Both statistical and economic significance are relatively poor for the other three variables. In order to analyze the effect of the shift in investment and the rate of GDP growth on Amman Stock Exchange (ASE) index for the period 1990 – 2009, Al-Abedallat and Al Shabib (2012) use statistical analysis and multiple regression. The research concluded that market movements on the ASE were affected by the movements of these two macroeconomic factors.

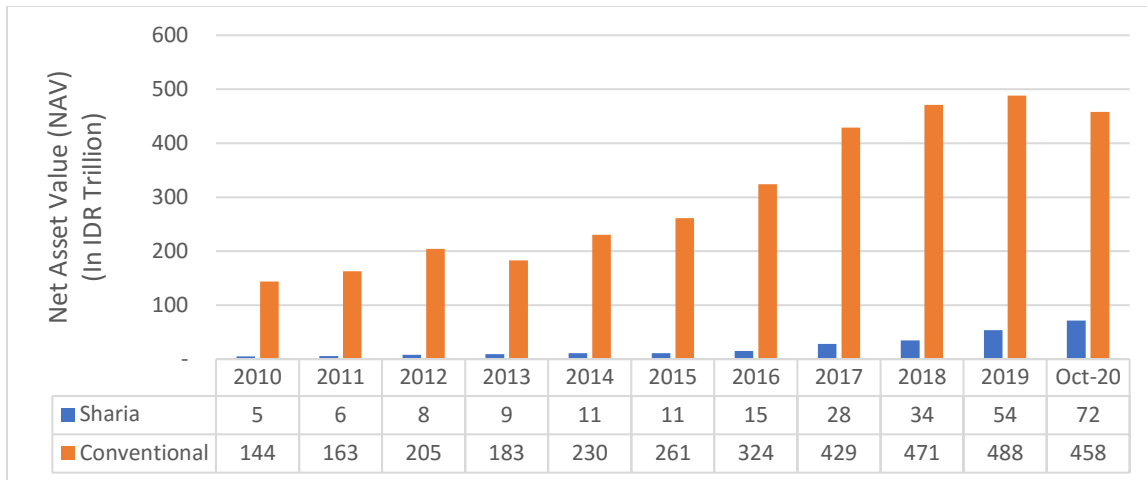
The cross-sectional correlation between the compounded actual return on equity and the compounded growth rate of real per capital GDP for 19 developed countries over the 112-year period beginning in 1900 and ending in 2011 is -0.39 (Dimson, Marsh, & Staunton, 2012). This negative correlation implies that investors were actually better off investing in companies in countries that have ended up experiencing lower economic growth per capita economic growth, rather than investing in countries with higher average per capita growth rates. Not only developed countries, but even emerging countries have witnessed this negative result. For 15 emerging markets over the 24-year period from 1988 to 2011 – including BRIC countries of Brazil, Russia, India, and China – the correlation is strikingly close to -0.41 (Ritter, 2012).

Setiawan (2020) reveals that the GDP and Indonesia Stock Exchange (IDX) Composite are significantly positive. In this analysis, the IDX Composite was taken from the closing index at the end of each year from 1999 to 2019 on the last trading day. The GDP constant price data for the same period was taken from the official website of the World Bank. To evaluate the effect of GDP on the stock market, multiple regressions were applied. The results show that every 1% rise in GDP will bring positive effect to Indonesia Stock Exchange (IDX) Composite as 1.03%. This is somewhat conflicted with the findings from Ritter (2012) that mentioned if GDP affects the stock market negatively. The findings of the experiments were somewhat contradictory, depending on the geographical areas and the time framework of the research.

According to Indonesia Central Securities Depository as of July 2020, the most significant growth in the number of investors lies in mutual fund instruments by 30.50%, followed by investors in state securities (21.09%) and stock investors (15.88%). A wider distribution channel is driving the growth of mutual fund investors, especially through the use of information technology, marketing campaigns, and more efficient in account opening. In general, mutual funds can be divided into money market, fixed income, equity, and a mixture of the three investment instruments. Money market funds invest only in debt securities with a maturity of less than one year, fixed income funds invest at least 80% of their investments in the form of debt securities, equity funds invest at least 80% of their assets in the form of stocks, while balanced funds invest in a combination of money markets, debt and equity instruments. The equity funds were the most related category of mutual funds to the growth of the Indonesia Stock Exchange (IDX) Composite out of the four classifications of mutual funds.

The comparison of the net asset value (NAV) of sharia and conventional mutual funds over the last 10 years is shown in Figure 1.1. As of October 2020, the NAV of the conventional mutual funds was much higher (IDR 458 Trillion) than the NAV of sharia mutual funds (IDR 72 Trillion). However, in the perspective of NAV performance as measured by the compounded annual growth rate (CAGR), the NAV

growth in sharia mutual funds is much higher at 29.9% per annum compared to 12.3% in conventional mutual funds. The growth in the number of mutual fund investors and NAV in sharia mutual funds, supported by the prospect of Indonesia’s growth in 2021 is a golden opportunity for the asset management industry to offer their mutual fund products to investors.



Note: CAGR Sharia by 29.9%, CAGR Conventional by 12.3%

Source: Indonesia Financial Service Authority (as of October 2020)

Figure 1.1 The comparison of sharia’s NAV and conventional mutual funds

Bahana Icon Syariah, one of Bahana TCW’s sharia mutual fund products, is less preferred by investors due to historical poor performance over the last five years (Figure 1.2) compared to the reference index of Indonesia Sharia Stock Index (ISSI). The performance is not in line with the objective of actively managed investment funds to beat the benchmark index and obtain an optimal rate of return in the long-term through the majority investments in sharia stocks securities. It will be difficult for the company to promote Bahana Icon Syariah to potential investors. Therefore, this study will evaluate and determine the optimal portfolio for Bahana Icon Syariah using the modern portfolio theory concept developed by Harry Markowitz.



Source: PT Bareksa Portal Investasi

Figure 1.2 Bahana Icon Syariah performance

2. Literature Review

An American financial economist, Markowitz (1952) developed the modern portfolio theory in the article of Portfolio Selection, then later refined by Markowitz (1959). Generally, investors have two objectives, namely maximizing the expected value of returns and minimizing the risk. Markowitz explained that to minimize risk and still get a sizeable return, it can be done by forming a diversification of portfolio. On the basis of a return-risk (mean-variance) bi-criterion context and expected utility maximization,

Markowitz introduced a portfolio optimization method. Markowitz attempted to fulfill this by creating two distinct approaches: by maintaining variance (risk) as constant and optimizing the expected return or keeping return as constant and minimizing variance to select the optimal portfolio. In fact, this contributed to the development of the modern portfolio theory (MPT). The concept introduced by MPT is still at the core of many modern approaches in asset allocation, risk management, and investment analysis.

The Markowitz model believes that investors are averse to risk. This implies that investors would choose the less risky one over two assets that deliver the same expected return. Thus, only when compensated by higher expected returns, investors will take on increased risk. The definition of Markowitz's model is based on several assumptions relating to the behavior of investors and financial markets (Lee, Finnerty, & Chen, 2010) :

1. For a given holding period, investors should predict the probability of the distribution of future returns.
2. In the sense of declining marginal utility of wealth, investors have single-period utility functions in which they optimize utility.
3. Investors use uncertainty in terms of potential return values to quantify risk.
4. Investors really think of the means and variance in the returns of their investments over a given period.
5. The first two moments of the probability distribution of returns are determined by the expected return and risk as used by investors-expected value and variance.
6. It is desirable to return, it is important to avoid risk.
7. There are frictionless capital markets.

2.1 Rate of Return

Rate of return is the amount of profit generated by an investment, calculated as a proportion of the amount of the initial investment. Investors depend on the rate of return of various investment options when determining where to invest their capital. The formula of rate of return is equivalent to formula (1) where P_t is the adjusted closing price at time t .

$$r_t = \frac{P_t - P_{t-1}}{P_{t-1}} \quad (1)$$

The adjusted closing price is a measurement adjustment made to the closing price of a stock after accounting for certain corporate actions, such as dividends, stock splits, and right offerings. These adjustments allow investors to acquire an accurate record of the results of the stock.

2.2 Expected Return

The expected returns from an investment are calculated based on recent or historical performance. Due to the volatility of the future, the expected returns will differ considerably from historical returns. Therefore, no guarantee of the calculated expected returns is issued. The expected return (μ_i) on asset i where $i = 1, \dots, n$ is determined by formula (2) where r_t^i is the return on asset i between periods t and $t - 1$ and m reflects the number of periods.

$$\mu_i = E(r^i) = \frac{\sum_{t=1}^m r_t^i}{m} \quad (2)$$

2.3 Variance and Standard Deviation

Variance (σ_i^2) corresponds to a mathematical calculation in a data collection of the spread between numbers. In fact, variance calculates the deviation from the mean of each number in the set and hence from every other number in the set. The variance on asset i is determined using the equation (3):

$$\sigma_i^2 = Var(r^i) = \frac{\sum_{t=1}^m (r_t^i - \mu_i)^2}{m - 1} \quad (3)$$

The standard deviation calculates a dataset's dispersion in comparison to its mean and is measured as the variance's square root. All uncertainty is determined by the standard deviation as risk. The higher risk

between each price and the mean is shown by a high standard deviation. The formula (4) of standard deviation is as follows:

$$\sigma_i = \sqrt{\sigma_i^2} = \sqrt{\frac{\sum_{t=1}^m (r_t^i - \mu_i)^2}{m-1}} \quad (4)$$

2.4 Covariance

The directional relation between returns on two assets is measured by covariance which was determined by multiplying the association between the two variables by each variable's standard deviation. A positive covariance indicates that returns from investments move together, while a negative covariance implies that they move inversely. In the return covariance matrix ($\Omega_{n \times n}$), dimensions of covariance are ordered. In its principal diagonal and covariance, the matrix (5) includes variances among all pairs of securities:

$$\Omega_{n \times n} = \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \cdots & \sigma_{1n} \\ \sigma_{21} & \sigma_2^2 & \cdots & \sigma_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \sigma_{n1} & \sigma_{n2} & \cdots & \sigma_n^2 \end{pmatrix} \quad (5)$$

$$\sigma_{ij} = Cov(r^i, r^j) = \frac{\sum_{t=1}^m (r_t^i - \mu_i)(r_t^j - \mu_j)}{m}$$

2.5 Expected Portfolio Return and Risk

Provided any number of volatile assets and a set of weights defining how the investment in the portfolio is divided, the general formula of expected return for n assets is equivalent to equation (6) where n is the number of shares, w_i is the proportion of the funds invested in security i , r_i and r_p are the return on security i and portfolio p , and the amount of w_i should equal to 1.

$$E(r_p) = \sum_{i=1}^n w_i E(r_i) \quad (6)$$

The variance of the return of a portfolio (formula 7) consists of two elements: the weighted average of individual asset variance and the weighted covariance between individual asset pairs.

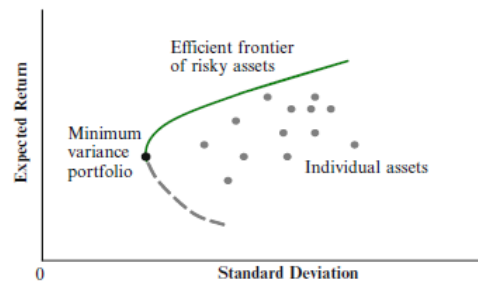
$$Var(r_p) = \sigma_p^2 = \sum_{i=1}^n \sum_{j=1}^n w_i w_j Cov(r_i, r_j) \quad (7)$$

In terms of the correlation coefficient where p_{ij} is correlation coefficient between the rates of return on security i (r_i) and the rates of return on security j (r_j), covariance can also be represented as formula (8).

$$Cov(r_i, r_j) = p_{ij} \sigma_i \sigma_j = \sigma_{ij} \quad (8)$$

2.6 Portfolio Efficient Frontier

The efficient frontier, which is the set of ideal portfolios providing the highest expected return for a certain risk level or the lowest risk for a given expected return level, is represented in Figure 2.1. A minimum variance portfolio (MVP) refers to a well-diversified portfolio composed of individual risky assets that when sold together are hedged, resulting in the lowest possible risk for the expected rate of return. The portfolio that is immediately above it on the upward sloping of the frontier curve dominates every portfolio on the downward sloping portion of the frontier curve since that portfolio has a higher expected return and an equivalent standard deviation (Chen, Chung, Ho, & Hsu, 2010). The best decision would focus on the ability of the investor to trade off risk against the expected return.



Source: Chen et al. (2010)

Figure 2.1 The efficient frontier of risky assets and individual assets

2.7 Sharpe Ratio

Sharpe (1966) implemented a portfolio performance metric that offers the risk premium per unit of overall risk, determined by the standard deviation of return (σ_p). On a portfolio structure, the risk premium (r_p) is the overall portfolio return minus the risk-free rate (r_f). Sharpe ratio (S_p) can be expressed:

$$S_p = \frac{E(r_p - r_f)}{\sigma_p} \quad (9)$$

2.8 Prior Research

The literature review on the implementation of Markowitz's modern portfolio in several developing countries, including Indonesia, Bulgaria, Malaysia, Thailand, and Vietnam is being reviewed. Research by Yuana, Topowijono and Azizah (2016) aims to find optimal portfolio of stocks that are listed in the Jakarta Islamic Index (JII) in the period of June 2013 to November 2015. There are several stocks which result in negative values based on the measurement of the expected rate of return. These stocks are not included in the next calculation because it is not possible to form an optimal portfolio. The results showed that there were seven stocks included in the optimal composition, including PT AKR Corporindo Tbk (AKRA), PT Astra Agro Lestari Tbk (AALI), PT Indofood CBP Sukses Makmur Tbk (ICBP), PT Kalbe Farma Tbk (KLBF), PT Unilever Indonesia Tbk (UNVR), and PT United Tractors Tbk (UNTR).

A practical analysis of the Markowitz model on the Bulgarian Stock Exchange (BSE) during the period from January 2013 to December 2016 is given by Ivanova and Dospatliev (2017). It was found from the data inputs, which are the weekly closing price of 50 shares exchanged on the BSE, the efficient portfolios created by the Markowitz model performed better than any domestic individual security. Investors are able to achieve optimum return on investment, maximum Sharpe ratio or minimum risk by engaging in optimum portfolios that situated on the efficient frontier. It is the force of diversification of Markowitz by seriously taking into consideration of covariance and asset correlation.

Vo et al. (2019) explores industry-level risk, return and portfolio diversification in four ASEAN member countries for which necessary information is available: Vietnam, Thailand, Malaysia, and Singapore. Market indexes for 10 sectors, covering numerous economic cycles from 2007 to 2016, including 2007-2009 (crisis), 2010-2012 (post-crisis), and 2013-2016 (normal), are analyzed. To measure extreme risk, Conditional value at risk (CVaR) is used. The risk-return method of Markowitz is utilized to assess the optimum weight of the portfolio sectors. Results from this research suggest the best-performing industry ranges across four countries. In Vietnam and Singapore, health care plays a dominant role. Consumer services are in first place in Thailand and Malaysia. This research offers additional evidence for policymakers to devise effective economic strategies that take advantage of the relative strengths of different industries in their economies.

3. Research Methodology

Primary data is the type of data collected directly on a personal level interview with equity analysts, while secondary data is the data that has already been collected through primary sources and made readily available in the forms of previous research, annual reports, and web information from the Indonesia Stock

Exchange, Indonesia Financial Services Authority, Yahoo Finance, Bloomberg, PT Bahana TCW Investment Management, and PT Bareksa Portal Investasi.

The performance of net asset value (NAV) of the Bahana Icon Syariah was evaluated in several market conditions, including overall condition over the last five years (October 2015 – October 2020), sideways (May – October 2018), bullish (October 2018 – February 2019), and bearish (December 2019 – March 2020). Stock screening analysis refers to:

- a. Stocks that have always been recorded at least 80 percent in the Jakarta Islamic Index 30 (JII 30) and Jakarta Islamic Index 70 (JII 70) during the overall research period,
- b. Stocks that are listed on the Indonesia Stock Exchange (IDX) for more than 1 year,
- c. Stocks that have never had a track record of being suspended for more than one trading day,
- d. Non-stocks that have a market value per share of IDR 50,
- e. Stock performance shown by Sharpe ratio is positive and / or higher than the ISSI. The risk-free rate refers to the 1-year Bank of Indonesia rate at 5.25% as of 13 October 2020 (overall), at 7.00% as of 23 October 2018 (sideways), at 7.25% as of 21 February 2019 (bullish), and at 5.75% as of 19 March 2020 (bearish).

The most crucial stage is the transformation of raw data into the concept of modern portfolio theory, invented by Harry Markowitz. In this research, modern portfolio theory was elaborated with active and semi-active investment strategy using Solver tool in Microsoft Excel.

4. Results and Analysis

4.1 Stock Screening Analysis

Based on the prospectus, Bahana Icon Syariah may invest in this investment instruments:

- Minimum 80% and maximum 100% on sharia stocks listed in the Sharia Securities List,
- Minimum 0% and maximum 20% in cash equivalents and / or sharia money market instruments which represented by Bahana Likuid Syariah (BLS), the only company's sharia money market fund product.

The results of the stock screening show that there are 31 stocks that have a better risk-adjusted return presented by Sharpe ratio than the reference index of ISSI during the five years of the research period. Of the 31 stocks, there are 14 stocks that are always in the portfolio of Bahana Icon Syariah with a percentage of more than 80% of the research period, including ASII, BRIS, CTRA, ICBP, INDF, INTP, KLBF, LSIP, PTBA, PWON, SMGR, TLKM, UNTR, and UNVR. The optimal portfolio construction in this condition consists of 31 sharia stocks and BLS.

Historically, Bahana Icon Syariah manages 27 - 30 stocks in a sideways period. As shown in Appendix B, there are 25 stocks that have a higher Sharpe ratio than the reference index and only 14 stocks have a positive Sharpe ratio. Ideally, a company only has to choose stocks that have a positive Sharpe ratio. However, in practical terms, the company manages a minimum of 27 stocks in the sideways period. Therefore, the portfolio construction consists of 27 sharia stocks and BLS. In a bullish condition, Bahana Icon Syariah manages 27 – 31 sharia stocks. There are 42 stocks that have a positive Sharpe ratio as seen in Appendix C, but only 7 stocks that have a better Sharpe ratio than the benchmark index. In this analysis, 31 stocks included in the ideal portfolio construction.

In the last five years, Bahana Icon Syariah has managed 26 - 32 stocks in a bearish situation. Appendix D reveals that there are 34 stocks that have better performance in terms of Sharpe ratio than the benchmark index, but only two stocks have a positive Sharpe ratio, namely KAEF and HRUM. On this occasion, 26 sharia stocks are used to form the most optimal portfolio in bearish conditions.

4.2 Active and Semi-active Investment Strategy

Generally, Bahana Icon Syariah is classified as a sharia mutual fund that carries an active investment

strategy. Investment managers will apply various ways to obtain returns that exceed market returns. The objective of an active strategy is to achieve a stock portfolio return that exceeds the stock portfolio return obtained through a passive strategy. After conducting interview with equity analyst, in fact, Bahana Icon Syariah implemented a semi-active strategy which is a combination of active and passive strategy. This strategy involves an enhanced index approach which designed for investors who want to outperform their benchmarks while carefully managing their portfolio's risk exposure. The table 4.1 shows the weighting targets for the active investment strategy:

Table 4.1 The weighting targets for active investment strategy

	Condition	Historical (%)		Target (%)	
		Min	Max	Min	Max
Stocks	Overall	0.45	14.28	0.5	15
	Sideways	0.45	13.31	0.5	15
	Bullish	0.48	14.28	0.5	15
	Bearish	0.51	10.34	0.5	15
BLS	Sideways	8.87	14.72	0	15
	Bullish	7.46	15.02	0	15
	Bearish	16.99	18.41	0	20

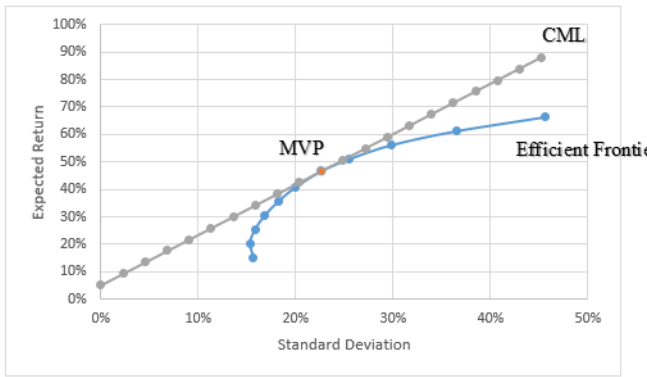
The weighting target in the table 4.1 is also a general target for the semi-active investment strategy, but there are some additional weighting targets for the top 10 stocks with the largest market cap in the Indonesia Sharia Stock Index as of 31 December 2019 which are reflected in the Table 4.2.

Table 4.2 Additional weighting targets for semi-active investment strategy

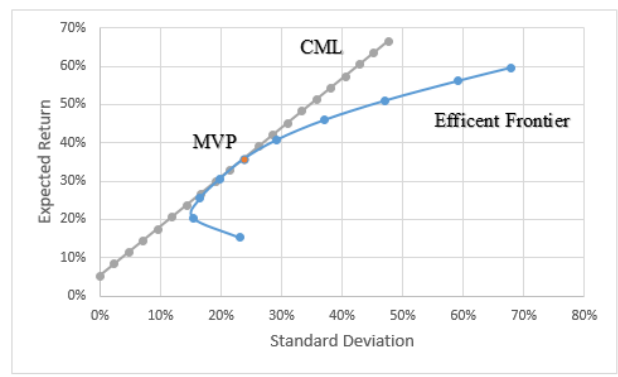
Top 10 Market Cap in ISSI	Normal Weight (%)	Target	
		Min (80% Normal)	Max (120% Normal)
TLKM	10.50	8.40	12.60
UNVR	8.56	6.84	10.27
ASII	7.48	5.99	8.98
TPIA	4.94	3.95	5.93
BRPT	3.59	2.87	4.31
ICBP	3.47	2.78	4.17
CPIN	2.85	2.28	3.41
UNTR	2.14	1.71	2.57
KLBF	2.03	1.62	2.43
SMGR	1.90	1.52	2.28

Both active and semi-active investment strategy uses the mean-variance analysis approach, covariance and correlation analysis, and Sharpe ratio as indicators that can be compared with the performance of the reference index. The difference is that the semi-active strategy always includes risk-adjusted return data for the top 10 constituents in the ISSI which are always listed on JII 30 and JII 70 even though during the period of research their performance was below the reference index and / or had a negative value.

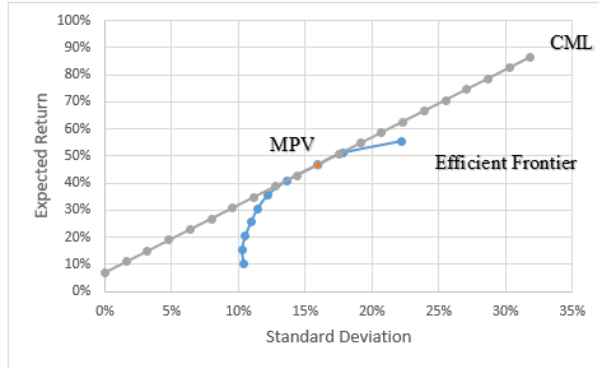
4.3 Portfolio Optimization Construction



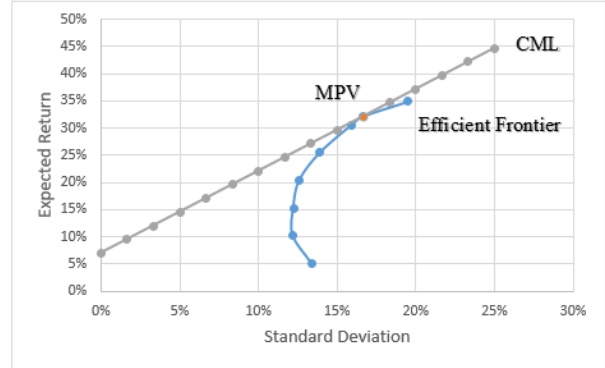
Overall with active investment strategy



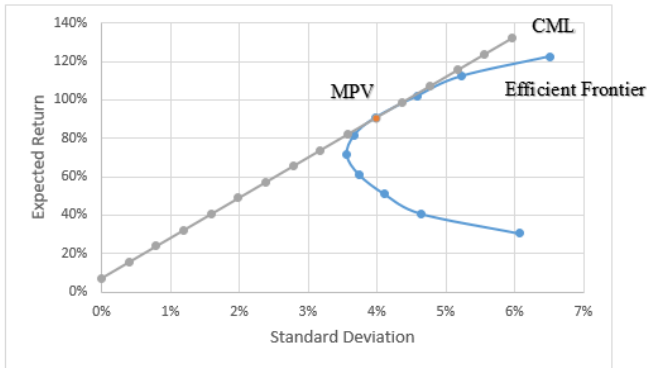
Overall with semi-active investment strategy



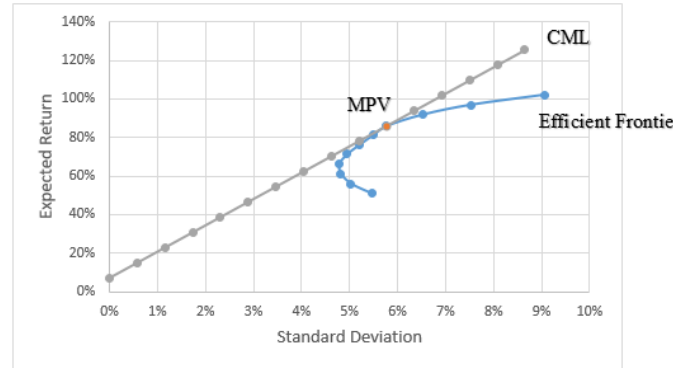
Sideways with active investment strategy



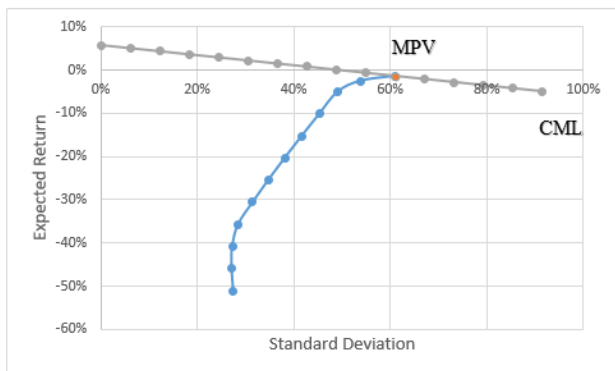
Sideways with semi-active investment strategy



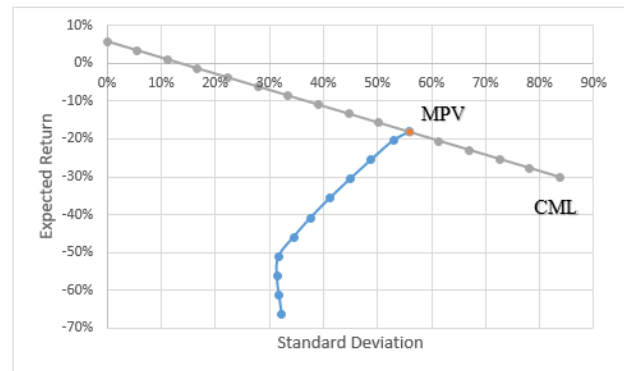
Bullish with active investment strategy



Bullish with semi-active investment strategy



Bearish with active investment strategy



Bearish with semi-active investment strategy

Figure 4.1 Portfolio optimization construction

The MVP is not the predominant point to be used by investment managers, but the MVP will be the minimum point of reference that investment managers can select and consider. The investment manager

may select all points in the efficient frontier area according to the targets and objectives of the investors. However, what needs to be considered is that the higher the expected return, the higher the risk (standard deviation) that follows. The results of optimal portfolio construction using Markowitz's Modern Portfolio Theory are summarized in Table 4.3.

Table 4.3 Summary of portfolio optimization construction

Market Conditions		Expected Return		Standard Deviation		Risk-free (1Y BI Rate)	Sharpe Ratio
		Weekly	Yearly	Weekly	Yearly		
Overall (Oct '15 – Oct '20)	Active	0.91%	46.60%	3.17%	22.60%	5.25%	1.83
	Semi-Active	0.70%	35.90%	3.34%	23.80%	5.25%	1.29
	ISSI	0.07%	3.49%	2.21%	15.76%	5.25%	-0.11
Sideways (May '18 – Oct '18)	Active	0.92%	46.80%	2.23%	15.90%	7.00%	2.49
	Semi-Active	0.63%	32.10%	2.33%	16.70%	7.00%	1.51
	ISSI	-0.03%	-0.47%	2.29%	16.32%	7.00%	-0.46
Bullish (Oct '18 – Feb '19)	Active	1.78%	90.50%	0.56%	4.00%	7.25%	20.95
	Semi-Active	1.69%	86.00%	0.81%	5.80%	7.25%	13.64
	ISSI	0.61%	31.07%	1.10%	7.88%	7.25%	3.02
Bearish (Dec '19 – Mar '20)	Active	-0.03%	-1.40%	8.53%	60.90%	5.75%	-0.12
	Semi-Active	-0.36%	-18.10%	7.82%	55.80%	5.75%	-0.43
	ISSI	-2.14%	-105.01%	5.28%	37.72%	5.75%	-3.05

Table 4.3 provides a summary of the top 10 stocks in the optimal portfolio construction with a stock weight of more than the minimum weighting of 0.5 percent:

Table 4.3 The top 10 stocks in the optimal weight-based portfolio

Overall	Active	BRPT, TPIA, BTPS, ACES, HRUM, PTBA, CPIN, JPFA, BRIS, MAPI
	Semi-Active	ACES, BTPS, HRUM, TLKM, UNVR, ASII, PTBA, TPIA, BRPT, ICBP
Sideways	Active	BTPS, CPIN, TLKM, LSIP, KAEF, ICBP, JPFA, PTBA
	Semi-Active	BTPS, JPFA, LSIP, TLKM, PTBA, KAEF, UNVR, ASII, TPIA, CPIN
Bullish	Active	BRPT, WTON, AKRA, RALS, TLKM, ICBP, INCO, MIKA, TPIA, CPIN
	Semi-Active	AKRA, WTON, MIKA, RALS, TLKM, UNVR, ASII, TPIA, BRPT, EXCL
Bearish	Active	HRUM, ICBP, INDF, KAEF, BRPT
	Semi-Active	HRUM, KAEF, TLKM, UNVR, ASII, ICBP, INDF, TPIA, EXCL

4.3.1 Overall Condition Overview

BRPT, TPIA, BTPS, ACES, and HRUM are always in two optimal portfolios on two different strategies. The five stocks are also not the 14 stocks that are always in the Bahana Icon Syariah portfolio with a percentage of more than 80% during the observation period. On the other hand, the stocks of BTPS, ACES, HRUM, PTBA, CPIN, JPFA, BRIS, and MAPI are eight stocks outside of ISSI's top 10 market cap, but their performance is able to be present in the top 10 stock allocations in the active investment strategy.

4.3.2 Sideways Condition Overview

In this condition, BTPS, TLKM, LSIP, KAEF, JPFA, and PTBA always exist in both investment strategies. Only BTPS, JPFA, and KAEF are not the 14 stocks that always exist in the Bahana Icon Syariah portfolio with a percentage of more than 80% during the observation period.

4.3.3 Bullish Condition Overview

In the bullish condition, almost all stocks during the observation period performed well. BRPT, WTON, AKRA, RALS, and TLKM shares are always in the top 10 share allocations in two different investment strategies. Only TLKM is always in the Bahana Icon Syariah portfolio during the research period with a percentage of 100%.

4.3.4 Bearish Condition Overview

In this condition, almost all stocks experienced a significant contraction, only two stocks posted positive performance, namely KAEF and HRUM.

5. Conclusion and Recommendations

There are two things that can be concluded in this study:

1. The concept of Markowitz's Modern Portfolio Theory can be applied to any type of market conditions because it always generates higher expected return and Sharpe ratio than the reference index.
2. In any type of market conditions, the active investment strategy is always superior to the semi-active investment strategy based on the Sharpe ratio.

The output of this research is to provide recommendations to investment managers using Markowitz's Modern Portfolio Theory. Recommendations are based on three criteria, *in* (stocks that are worthy of being included in the portfolio), *watch list* (stocks that are worth considering), and *out* (stocks that are worthy of being removed from the portfolio). *In* based on only top 10 stocks in overall condition, *watch list* based on top 10 stocks that are always listed in two strategies in bullish, sideways, and/or bearish conditions, and *out* based on the stocks that are not included in the 31 stock screening results in the overall condition.

In	BRPT, TPIA, BTPS, ACES, HRUM, CPIN, JPFA, MAPI
Watch list	AKRA, KAEF, RALS, WTON
Out	ADHI, ASRI, BSDE, IPCC, INTP, MIKA, PTPP, WIKA, WSBP

The recommendations above are only based on the results of research using the Modern Portfolio Theory concept in a specific time frame. Furthermore, investment managers are required to review these stocks using fundamental and technical approaches before deciding on an investment policy.

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Appendix A

Overall stock screening result

No.	Stock's Code	Company's Name	Sharpe Ratio	No.	Stock's Code	Company's Name	Sharpe Ratio
1	BRPT	PT Barito Pacific Tbk	1.38	18.	ITMG	PT Indo Tambangraya Megah Tbk	0.28
2.	TPIA	PT Chandra Asri Petrochemical Tbk	1.38	19.	INDF	PT Indofood Sukses Makmur Tbk	0.27
3.	BTPS	PT Bank BTPS Syariah Tbk	0.8	20.	UNTR	PT United Tractors Tbk	0.26
4.	JPFA	PT Japfa Comfeed Indonesia Tbk	0.68	21.	RALS	PT Ramayana Lestari Sentosa Tbk	0.23
5.	ACES	PT Ace Hardware Indonesia Tbk	0.66	22.	PWON	PT Pakuwon Jati Tbk	0.19
6.	KAEF	PT Kimia Farma Tbk	0.65	23.	CTRA	PT Ciputra Development Tbk	0.17
7.	PTBA	PT Bukit Asam Tbk	0.65	24.	SMGR	PT Semen Indonesia Tbk	0.14
8.	BRIS	PT Bank BRISyariah Tbk	0.62	25.	ASII	PT Astra International Tbk	0.13
9.	CPIN	PT Charoen Pokphand Indonesia Tbk	0.58	26.	KLBF	PT Kalbe Farma Tbk	0.12
10.	ADRO	PT Adaro Energy Tbk	0.56	27.	UNVR	PT Unilever Indonesia Tbk	0.11
11.	HRUM	PT Harum Energy Tbk	0.55	28.	EXCL	PT XL Axiata Tbk	0.04
12.	ANTM	PT Aneka Tambang Tbk	0.52	29.	INTP	PT Indocement Tunggul Prakarsa Tbk	0.01
13.	DMAS	PT Puradelta Lestari Tbk	0.44	30.	LSIP	PT PP London Sumatra Indonesia Tbk	0.01
14.	MAPI	PT Mitra Adiperkasa Tbk	0.44	31.	TLKM	PT Telekomunikasi Indonesia Tbk	0.01
15.	SMBR	PT Semen Baturaja Tbk	0.41	-	ISSI	Indonesia Sharia Stock Index	-0.11
16.	ICBP	PT Indofood CBP Sukses Makmur Tbk	0.38	-	BLS	Bahana Likuid Syariah	1.62
17.	INCO	PT Vale Indonesia Tbk	0.34				

Appendix B

Sideways stock screening result

No.	Stock's Code	Company's Name	Sharpe Ratio	No.	Stock's Code	Company's Name	Sharpe Ratio
1	CPIN	PT Charoen Pokphand Indonesia Tbk	2.56	17.	PWON	PT Pakuwon Jati Tbk	-0.13
2.	BTPS	PT Bank BTPS Syariah Tbk	1.55	18.	KLBF	PT Kalbe Farma Tbk	-0.23
3.	JPFA	PT Japfa Comfeed Indonesia Tbk	1.49	19.	MAPI	PT Mitra Adiperkasa Tbk	-0.25
4.	PTBA	PT Bukit Asam Tbk	1.06	20.	INDF	PT Indofood Sukses Makmur Tbk	-0.29
5.	ASII	PT Astra International Tbk	0.94	21.	ADRO	PT Adaro Energy Tbk	-0.47
6.	KAEF	PT Kimia Farma Tbk	0.91	22.	CTRA	PT Ciputra Development Tbk	-0.48
7.	LSIP	PT PP London Sumatra Indonesia Tbk	0.83	23.	BRIS	PT Bank BRISyariah Tbk	-0.50
8.	ICBP	PT Indofood CBP Sukses Makmur Tbk	0.77	24.	AALI	PT Astra Agro Lestari Tbk	-0.52
9.	ACES	PT Ace Hardware Indonesia Tbk	0.69	25.	HRUM	PT Harum Energy Tbk	-0.54
10.	TLKM	PT Telekomunikasi Indonesia Tbk	0.56	26.	UNTR	PT United Tractors Tbk	-0.57
11.	EXCL	PT XL Axiata Tbk	0.41	27.	BRPT	PT Barito Pacific Tbk	-1.01
12.	SMGR	PT Semen Indonesia Tbk	0.40	28.	UNVR	PT Unilever Indonesia Tbk	-1.28
13.	PGAS	PT Perusahaan Gas Negara Tbk	0.29	29.	TPIA	PT Chandra Asri Petrochemical Tbk	-1.65
14.	INCO	PT Vale Indonesia Tbk	0.15	-	ISSI	Indonesia Sharia Stock Index	-0.57
15.	INTP	PT Indocement Tunggul Prakarsa Tbk	-0.08	-	BLS	Bahana Likuid Syariah	-9.10
16.	ITMG	PT Indo Tambangraya Megah Tbk	-0.09				

Appendix C

Bullish stock screening result

No.	Stock's Code	Company's Name	Sharpe Ratio	No.	Stock's Code	Company's Name	Sharpe Ratio
1	BRPT	PT Barito Pacific Tbk	5.41	24	KAEF	PT Kimia Farma Tbk	1.51
2	DMAS	PT Puradelta Lestari Tbk	3.73	25	KLBF	PT Kalbe Farma Tbk	1.33
3	AKRA	PT AKR Corporindo Tbk	3.56	26	UNVR	PT Unilever Indonesia Tbk	1.31
4	WIKA	PT Wijaya Karya Tbk	3.42	27	WSBP	PT Waskita Beton Precast Tbk	1.29
5	WTON	PT Wijaya Karya Beton Tbk	3.22	28	SCMA	PT Surya Citra Media Tbk	1.29
6	SMGR	PT Semen Indonesia Tbk	3.08	29	BMTR	PT Global Mediacom Tbk	1.25
7	INDF	PT Indofood Sukses Makmur Tbk	3.02	30	PGAS	PT Perusahaan Gas Negara Tbk	1.20
8	RALS	PT Ramayana Lestari Sentosa Tbk	2.81	31	ASRI	PT Alam Sutera Realty Tbk	1.16
9	ACES	PT Ace Hardware Indonesia Tbk	2.76	32	INTP	PT Indocement Tunggak Prakarsa Tbk	1.11
10	ANTM	PT Aneka Tambang Tbk	2.46	33	MNCN	PT Media Nusantara Citra Tb	1.02
11	SMRA	PT Summarecon Agung Tbk	2.41	34	CTRA	PT Ciputra Development Tbk	1.01
12	APLN	PT Agung Podomoro Land Tbk	2.41	35	LPPF	PT Matahari Department Store Tbk	0.88
13	MIKA	PT Mitra Keluarga Karyasehat Tbk	2.23	36	TLKM	PT Telekomunikasi Indonesia Tbk	0.70
14	ADHI	PT Adhi Karya Tbk	2.12	37	JPFA	PT Japfa Comfeed Indonesia Tbk	0.63
15	MAPI	PT Mitra Adiperkasa Tbk	2.11	38	LPKR	PT Lippo Karawaci Tbk	0.55
16	BTPS	PT Bank BTPS Syariah Tbk	2.07	39	AALI	PT Astra Agro Lestari Tbk	0.49
17	PTPP	PT Pembangunan Perumahan Tbk	2.07	40	BRIS	PT Bank BRI Syariah Tbk	0.14
18	PWON	PT Pakuwon Jati Tbk	2.06	41	LINK	PT Link Net Tbk	0.10
19	TPIA	PT Chandra Asri Petrochemical Tbk	2.05	42	LSIP	PT PP London Sumatra Indonesia Tbk	0.06
20	INCO	PT Vale Indonesia Tbk	1.96	43	ASII	PT Astra International Tbk	-0.43
21	CPIN	PT Charoen Pokphand Indonesia Tbk	1.80	44	UNTR	PT United Tractors Tbk	-1.56
22	ICBP	PT Indofood CBP Sukses Makmur Tbk	1.74	-	ISSI	Indonesia Sharia Stock Index	3.02
23	BSDE	PT Bumi Serpong Damai Tbk	1.53	-	BLS	Bahana Likuid Syariah	-14.47

Appendix D

Bearish stock screening result

No.	Stock's Code	Company's Name	Sharpe Ratio	No.	Stock's Code	Company's Name	Sharpe Ratio
1	KAEF	PT Kimia Farma Tbk	0.74	20	UNTR	PT United Tractors Tbk	-1.98
2	HRUM	PT Harum Energy Tbk	0.32	21	ANTM	PT Aneka Tambang Tbk	-2.16
3	BRPT	PT Barito Pacific Tbk	-0.41	22	TPIA	PT Chandra Asri Petrochemical Tbk	-2.16
4	ADRO	PT Adaro Energy Tbk	-0.74	23	APLN	PT Agung Podomoro Land Tbk	-2.25
5	ICBP	PT Indofood CBP Sukses Makmur Tbk	-0.75	24	SMGR	PT Semen Indonesia Tbk	-2.28
6	INCO	PT Vale Indonesia Tbk	-1.02	25	PWON	PT Pakuwon Jati Tbk	-2.29
7	INDF	PT Indofood Sukses Makmur Tbk	-1.09	26	WTON	PT Wijaya Karya Beton Tbk	-2.40
8	ACES	PT Ace Hardware Indonesia Tbk	-1.09	27	ADHI	PT Adhi Karya Tbk	-2.41
9	PTBA	PT Bukit Asam Tbk	-1.19	28	SMBR	PT Semen Baturaja Tbk	-2.50
10	ITMG	PT Indo Tambangraya Megah Tbk	-1.22	29	LPKR	PT Lippo Karawaci Tbk	-2.57
11	LSIP	PT PP London Sumatra Indonesia Tbk	-1.29	30	INTP	PT Indocement Tunggak Prakarsa Tbk	-2.57
12	KLBF	PT Kalbe Farma Tbk	-1.29	31	BMTR	PT Global Mediacom Tbk	-2.62
13	MIKA	PT Mitra Keluarga Karyasehat Tbk	-1.39	32	AKRA	PT AKR Corporindo Tbk	-2.65
14	UNVR	PT Unilever Indonesia Tbk	-1.48	33	WIKA	PT Wijaya Karya Tbk	-2.84
15	BRIS	PT Bank BRI Syariah Tbk	-1.56	34	MNCN	PT Media Nusantara Citra Tb	-2.90
16	CPIN	PT Charoen Pokphand Indonesia Tbk	-1.59	35	ASII	PT Astra International Tbk	-3.05
17	JPFA	PT Japfa Comfeed Indonesia Tbk	-1.67	36	ISSI	Indonesia Sharia Stock Index	-3.47
18	EXCL	PT XL Axiata Tbk	-1.78	37	BLS	Bahana Likuid Syariah	-12.78
19	TLKM	PT Telekomunikasi Indonesia Tbk	-1.82				