MEASURING ISLAMIC STOCK PERFORMANCE IN INDONESIA WITH A MODIFIED SHARPE RATIO

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ABSTRACT - Since the late 1960s, one of the stock performance analysis tools commonly used is Sharpe Ratio. The Sharpe Ratio consists of three components, namely stock return, risk-free returns, and stock risk. Many studies approach risk-free returns with interest rates, including when measuring the performance of Islamic stocks, while interest rates are prohibited in the concept of Islamic finance. Moreover, the stock risk is measured by a standard deviation which assumes returns are normally distributed, while many stock returns are non-normally distributed. This paper intends to measure the performance of Islamic stocks listed on the Indonesian Stock Exchange (IDX) for the period of January 2011 to July 2018 using a modified Sharpe Ratio. The ratio is modified by replacing the interest rate with four approaches: eliminating the interest rate, changing with zakah rates, changing with inflation, changing with the nominal gross domestic product, and replacing the risk measurement from Standard Deviation to Value at Risk (VaR). The findings provide almost the same results as the original measurement and thus, show very high suitability for using these models in other circumstances. Therefore, on the concept of Islamic finance, risk-free returns can be measured using these four approaches, especially inflation and GDP. This study also recommends inflation and GDP to measure risk-free returns in the Sharia's Compliant Asset Pricing Model (SCAPM) or Islamic Capital Asset Pricing Model (ICAPM).

Keywords: Islamic Finance, Islamic Stock Performance, Modification Sharpe Ratio, and Value at Risk

ABSTRAK – Pengukuran Kinerja Saham Syariah di Indonesia menggunakan Sharpe Ratio Modifikasi. Sejak akhir 1960-an, salah satu alat mengukur kinerja saham yang biasa digunakan adalah *Sharpe Ratio*. Model *Sharpe Ratio* terdiri atas tiga komponen, yaitu *return* saham, *return* bebas risiko, dan risiko saham. *Return* bebas risiko diukur mengunakan variabel suku bunga yang digolongkan riba dan dilarang dalam konsep keuangan islam. Sedangkan risiko saham diukur dengan standar deviasi yang mengasumsikan data berdistribusi normal. Paper ini bertujuan untuk mengukur kinerja saham syariah yang terdaftar pada Bursa Efek Indonesia (BEI) untuk periode Januari 2011 sampai Juli 2018 dengan menggunakan Sharpe Ratio modifikasi. Kajian akan memodifikasi model *Sharpe Ratio* dengan mencari variabel alternatif pengganti suku bunga dengan empat pendekatan, yaitu: menghilangkan variabel suku bunga tersebut, mengganti dengan *zakat rate*, mengganti dengan inflasi, dan mengganti dengan produk domestik bruto, serta mengganti standar deviasi dengan *Value at Risk* (VaR) sebagai pengukur risiko saham yang selanjutnya diimplementasikan pada pasar modal syariah di Indonesia periode Januari 2011 - Juli 2018. Hasil kajian menunjukkan kesesuaian yang sangat tinggi untuk hasil pengukuran kelima model tersebut. Dilihat dari kedekatan hasil pengukuran kinerja, kelima model tersebut dapat dikelompokkan menjadi dua, yaitu model dengan tingkat suku bunga, inflasi, dan PDB sebagai kelompok pertama, sedangkan model tanpa suku bunga dan tingkat zakat sebagai kelompok kedua.

Kata Kunci: *Keuangan Islam, Kinerja Saham Syariah, Modifikasi Sharpe Ratio, dan Value at Risk*

INTRODUCTION

Investment, according to Islam, is a *muamalah* activity that is highly recommended. By investing, owned assets become productive so they can bring benefits to themselves and others. In general, investment can be divided into real sector investment and financial sector investment. One form of investment rapidly growing financial sector in line with the development of information technology is investing in stocks on the capital market.

The countries that first implemented Islamic principles in the capital market were Jordan in 1978, followed by Pakistan in 1980. Presently, Islamic mutual funds are operating mainly in Saudi Arabia, UAE, Bahrain, Kuwait, Qatar, Pakistan, Malaysia, Brunei, Singapore, Germany, Ireland, the UK, the USA, Canada, Switzerland, and South Africa (Ayub, 2007; Aulia, Ibrahim, & Tarigan, 2020). In Indonesia, the Islamic capital market started on July 3, 2000, when the Jakarta Stock Exchange (JSX) published a list of Islamic mutual funds, stocks, and bonds in the Jakarta Islamic Index (JII).

Since then, the Islamic capital market in Indonesia has experienced significant growth and shows the potential for development from year to year. Based on the State of the Global Islamic Economy (GEI) Report in the last four years (2015/2016, 2016/2017, 2017/2018, and 2018/2019), Indonesia has always been in the top ten countries in the world that have health and development in the field of Islamic Finance. From 2015 - 2018, the number of Islamic stocks in Indonesia increased by 25%, with large capitalization up by around 46%.

Table 1. Indonesian Capital Market 2015 - 2018

Description	Year			
	2015	2016	2017	2018
Number of Stock	521	537	566	619
Number of Islamic Stock	331	345	393	414
Large Stock Capitalization*)	4796,80	5753,61	7052,39	7023,50
Large Islamic Stock Capitalization *)	2600,85	3175,05	3704,54	3666,69

*) in Trillion Rupiah

Source: Otoritas Jasa Keuangan - data processed (2019)

Stock investments in the capital market, including Islamic stocks, are investments with high risk but a high level of profit (high risk-high return), whereas markets with higher returns exhibit high volatility (Rejeb & Arfaoui, 2019; Ibrahim & Rahmati, 2017). Careful consideration is needed before deciding to invest. Muslim investors should understand 'How to choose Islamic

stocks to be invested?'. They do not only expect to gain maximum returns, but their investments are also in harmony with Islamic principles (Yani et al., 2020; Dimitha, Ibrahim, & Ahmadsyah, 2021). Therefore, before deciding to invest, the investors should analyze the performance of the targeted stocks.

Since the late 1960s, one of the stock performance analysis tools commonly used is Sharpe Ratio. The ratio consists of three components, namely stock return, risk-free returns, and stock risk. Research on the performance analysis of Islamic stocks in Indonesia using the Sharpe Ratio has been done and usually combines with Treynor Ratio and Jansen Index (Utami & Nugraha, 2011; Hasbullah et al., 2013; Setiawan & Oktariza, 2013; Andhyka, 2017; Susilo & Najah, 2018). Some studies compare the performance of Islamic mutual funds (stocks) and conventional mutual funds (stocks) (Hanafi & Hanafi, 2012; Hamzah & Yohanes, 2014; Lestari, 2015; Kusumawati, 2016; Huda, 2017). In these studies, risk-free returns in the Sharpe Ratio model are still approached with interest rates, the rate of Bank Indonesia Certificates, or BI Rate.

The concept of interest rates in Islam is classified as *riba,* which is expressly prohibited in the Qur'an (QS. Ali Imran (130)).

<div dir="rtl">يَا أَيُّهَا الَّذِينَ آمَنُوا لَا تَأْكُلُوا الرِّبَا أَضْعَافًا مُضَاعَفَةً ۖ وَاتَّقُوا اللَّهَ لَعَلَّكُمْ تُفْلِحُونَ</div>

'O people who believe, do not eat usury by multiplying and fearing God so that you may have good fortune' (QS. Ali Imran:130)

Some researchers—such as Kurniawan and Asandimitra (2014), Rumintang and Azhari (2015), Tulasmi and Trihariyanto (2016), Lailiyah and Setiawan (2020)—approaching risk-free returns using Bank Indonesia Syariah Certificates (SBIS) or Bank Indonesia Syariah Wadiah Deposits (SWBI). In contrast, numerous studies from various Islamic countries were still conducted studies using the interest rates from their respective countries, such as the Kuala Lumpur Inter-Bank Offered Rate (KLIBOR) (Mansor & Bhatti, 2011; Albaity & Ahmad, 2008), Saudi Inter-Bank Offered Rate (SIBOR) (Merdad et al., 2010; Ashraf, 2013), Karachi Inter-Bank Offered Rate (KIBOR) (Sheikh, Ismail, Ismail, Shamimi, & Shafiai, 2019). Another approach is the Treasury bill rate (Rakhi et al., 2018; Haroon et al., 2019; Ahmed et al., 2020; Trabelsi et al., 2020; Asutay et al., 2021).

Efforts to find a substitute variable for interest rates with other variables that do not conflict with Islamic financial principles have been carried out by Tomkins and Karim (1987), Sheikh (2009), El-Ashker (1987), and Hanif (2011), all of whom modified the Capital Asset Pricing Model (CAPM). Tomkin and Karim eliminated interest rate, Sheikh replaced GDP, El-Ashker replaced zakah rate, and Hanif replaced inflation. Furthermore, these models are known as Sharia's Compliant Asset Pricing Model (SCAPM) or Islamic Capital Asset Pricing Model (ICAPM). Qudratullah (2019) had applied these approaches in measuring the performance of Islamic stocks in Indonesia using the Treynor Ratio.

In addition, the risk of the stock on the Sharpe Ratio is measured by standard deviations that assume returns that are normally distributed. In fact, many stock returns are abnormally distributed (Borowski, 2018). Because Sharpe Ratio is a reward-to-risk ratio, many studies replace standard deviations with other risk measures, such as Sortino & Price (1994) and Ziemba (2005) substituted standard deviations with downside deviations. Down (2000), Gregoriou & Gueyie (2003), and Alexander & Baptista (2003) used Value at Risk (VaR) to measure risk in the Sharpe Ratio. Aloui & Ben Hemida (2015) stated that VaR took great importance since the recommendation of the Basel Committee in 1996 (Elkamiliati & Ibrahim, 2014; Arabi & Abdelmageed, 2018).

Based on the aforementioned facts, this paper intends to measure the performance of stocks listed on the Jakarta Islamic Index (JII) for January 2011 to July 2018 using a modified Sharpe Ratio. The ratio modification includes changing interest rates with four approaches: eliminating the interest rates, changing with zakah rates, changing with inflation, and changing with GDP; plus and changing risk measurement tool from Standard Deviation to Value at Risk (VaR). The results of this study are expected to shed light on the Islamic capital market, particularly on the suitability for the modification.

LITERATURE REVIEW

Jakarta Islamic Index (JII)

On July 3, 2000, the Indonesia Stock Exchange, in cooperation with PT Danareksa Investment Management (DIM), launched a stock index based on Islamic sharia, the Jakarta Islamic Index (JII). This index is expected to be a benchmark for Sharia-based stocks' performance and further develop the Islamic capital market. JII consists of 30 shares selected from stocks following

Islamic sharia, whose shares are conducted by Bapepam-LK in collaboration with the Dewan Syariah Nasional (DSN) every six months through two stages, namely sharia selection and transaction volume value selection.

Sharia Selection
Emitents do not run gambling/game businesses classified as gambling, and trade that is prohibited
Not producing, distributing, and providing goods/services that are morally damaging and harmful
↓
Sharia Selection
This process filters 60 shares with the highest market capitalist value on the Indonesia Stock Exchange (IDX)
↓
Select Value of Transaction Volume
This process filters 30 shares with the highest daily average transaction value on the Indonesia Stock Exchange (IDX)
↓
EVALUATION PROCESS OF STOCKS EVERY 6 MONTHS AT ONCE

Figure 1. Jakarta Islamic Index (JII) Stock Selection
Source: (Sudarsono, 2003)

Return and Expected Return

The actual return on investment, during a certain period, is the income received during the period together with any change in the value of investment (Henderson, 2003; Mailinda, Ibrahim, & Zainul, 2018; Muarif, Ibrahim, & Amri, 2021). There are several types of returns commonly used in calculations, namely simple net return (r_t) and geometric return or log return (R_t).

$$r_t = \frac{P_t + D_t}{P_{t-1}} - 1 \qquad (1)$$

$$R_t = ln\left(\frac{P_t + D_t}{P_{t-1}}\right) \qquad (2)$$

where, r_t is the simple net return for period t, R_t is the geometric return for period t, P_t is the market price at the end period t, P_{t-1} is the market price at the end period t-1, and D_t is the dividends (or interest) received during period t. From equations (1) and (2) can be obtained relation log return and simple net return, i.e.: $R_t = ln(r_t + 1)$.

The expected return on investment is merely the weighted average of probably expected return (Sharpe, Investments, 1999). If there is T observation, then expected return $(E(R_t))$ can be expressed as:

$$E(R_t) = \bar{R} = \frac{\sum_{t=1}^{T} R_t}{T} \tag{3}$$

Risk and *Value at Risk* (VaR)

According to Van Horne (2001), the risk is the possibility that the actual return on an investment will be different from the expected return on that investment (Nisak & Ibrahim, 2014); and that it is possible to attach probabilities to these expected outcomes. Rees (1995) further states that: the variability in return is taken to represent the risk of investment to investors since the variability reflects the uncertainty attached to return. Risk can be measured, either by the average (or mean) variance or the standard deviation of returns from their expected values. Standard deviation can be expressed as:

$$\sigma = \frac{\sum_{t=1}^{T} (R_t - \bar{R})^2}{T} \tag{4}$$

But the standard deviations assume returns that are normally distributed, while many stock returns are non-normally distributed.

During the 1990s, a new technology to measure and control financial risk, based on statistical techniques, emerged as the VaR methodology (Allen, 2003). VaR is defined as the maximal loss of a financial position during a given period for a given probability (Jorion, 2006). According to Tsay (2010), VaR is the minimal loss under extraordinary market circumstances.

In formal terms, given a random Loss (L) and a confidence level (α), $VaR_\alpha(L)$ can be defined as the greatest lower bound (infimum) with a probability α on the cumulative distribution function F of any financial position L, expressed as a random variable (BCBS, 2011; Chen, 2014).

$$VaR_\alpha(L) = -inf\{x|F_L(x) \geq \alpha\} \tag{5}$$

As a matter of statistical modeling, parametric VaR is computed as a product of the statistical percentiles/ quantiles of the standard normal distribution

function (Z_α), standard deviation (σ), total investment value (v), and the square root of time (Consolacion, 2016), which can be expressed as follows:

$$VaR_\alpha(L) = -Z_\alpha.\sigma.v.\sqrt{t} \qquad (6)$$

The VaR estimate is simplified when returns are normally distributed, as shown in equation (6). However, the Cornish-Fisher approach can be used when returns are somewhat close to normally distributed but not too close to normally distributed (Chambers & Lu, 2011). Where S is the coefficient of skewness, the Cornish-Fisher approximation is used by determining a critical value (Z_α^*) to be used in place of Z_α within the VaR formula.

$$Z_\alpha^* = Z_\alpha - \frac{1}{6}\left(Z_\alpha{}^2 - 1\right)S \qquad (7)$$

The Sharpe Ratio and its Modifications

The Sharpe Ratio

The predicted performance of a portfolio is described with two measures: the expected rate of return $(\bar{R}_t)$ and the predicted variability (risk), expressed as the standard deviation of return (σ) (Sharpe, 1966). The Sharpe Ratio (SR) is computed as shown in equation 8 (Camilleri & Farrugia, 2018).

$$SR = \frac{\bar{R} - R_f}{\sigma} \qquad (8)$$

where, R_f is the risk-free return rate.

A higher Sharpe Ratio is good, and a lower one is bad. When choosing between two alternatives, the Sharpe Ratio criterion is therefore, to choose the one with the higher Sharpe Ratio (Down, 2000).

The Modification of Sharpe's Ratio

Based on equation (8), Sharpe Ratio (SR) consists of three components, namely the mean return of portfolio (stock) $(\bar{R})$, risk-free return rate (R_f) which is commonly measured using interest rates and portfolio (stock) variability or risk expressed as standard deviations (σ). Down (2000) used VaR instead of

standard deviation as a risk measure. VaR can work when returns are close to normally distributed or not too close to normally distributed. The Modified Sharpe Ratio (MSR) with interest rates can be expressed as:

$$MSR \quad = \frac{\bar{R} - R_f}{VaR_\alpha(L)} \tag{9}$$

Modification of the Sharpe Ratio (MSR_{RF}) in equation (9) still contains interest rates. To avoid conflict with the concept of Islamic finance, the interest rates are replaced by four approaches: eliminating variable interest rates, replacing zakah rates, replacing with inflation, and replacing with the gross domestic product (GDP).

Then obtained four new modifications of the Sharpe Ratio, namely: the modification of Sharpe Ratio without interest rate (MSR_{NRF}) (equation 10), the modification of Sharpe Ratio with zakah rate (MSR_{ZR}) (equation 11), the modification of Sharpe Ratio with inflation (MSR_{INF}) (equation 12), and the modification of Sharpe Ratio with the gross domestic product (MSR_{GDP}) (equation 13).

$$MSR_{NRF} \quad = \frac{\bar{R}_t}{VaR_\alpha(L)} \tag{10}$$

$$MSR_{ZR} \quad = \frac{\bar{R}_t - \bar{R}_{ZR}}{VaR_\alpha(L)} \tag{11}$$

$$MSR_{INF} \quad = \frac{\bar{R}_t - \bar{R}_{INF}}{VaR_\alpha(L)} \tag{12}$$

$$MSR_{GDP} \quad = \frac{\bar{R}_t - \bar{R}_{GDP}}{VaR_\alpha(L)} \tag{13}$$

where, $\bar{R}_{ZR}$ is Zakah Rate which is equal to 2.5% / (1-2.5%) = 2.56%, $\bar{R}_{INF}$ is mean of inflation, and $\bar{R}_{GDP}$ is mean of GDP.

METHODOLOGY

The data used in this study are monthly data from January 2011 - July 2018, which consists of closing prices of stock that are consistently listed in the

Jakarta Islamic Index (JII) during that period, interest rates (BI-Rate), Inflation, and GDP.

There are the following steps for analyzing the data:

1. Calculate the monthly return of selected stock with equation (2).
2. Calculate descriptive statistics of stock returns (mean, standard deviation, skewness, and kurtosis), then calculate the mean of the BI-Rate, Inflation, and GDP.
3. Perform a normality test for stock return data using a 95% confidence level using the Kolmogorov–Smirnov test. If the return is normally distributed, $Z_{0,95} = 1{,}645$, but if the data is non-normally distributed, then $Z_{0,95}$ must be adjusted using Cornish Fisher Expansion.

$$Z_{0,95}^* = 1{,}645 - \frac{1}{6}\left((1{,}645)^2 - 1\right)S \tag{14}$$

4. Calculate $VaR_\alpha(L)$ for the next one period with assuming the total investment value are equal to 1 for each stock
5. Calculate the stock performance using five modifications of the Sharpe Ratio with equations (9), (10), (11), (12), and (13), then determine the stock rank of each model.
6. Perform suitability analysis of 5 (five) modifications of Sharpe Ratio using Kendall's W Concordance test. Statistical test (W) can be expressed as (Qudratullah, 2017):

$$W = \frac{12\sum_{i=1}^{n} R_i^2 - 3n^2\, m(n+1)}{n^2\, m(m^2 - 1)} \tag{15}$$

where R_i is the number of ranks of the i stock, n is the number of stock, and m is the number of models.

Then calculate the Spearman correlation coefficient for each pair of modifications of the Sharpe Ratio, which can be expressed as follows (Qudratullah, 2017):

$$r_s = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n(n^2 - 1)} \tag{16}$$

where, r_s is the Spearman rank correlation coefficient, $d_i = (R_{Ai} - R_{Bi})$, R_{Ai} is the *i*-stock rank of the first model and R_{Bi} is the *i*-stock rank of the second model.

7. Perform cluster analysis for five modifications of the Sharpe Ratio. Cluster analysis is a technique to group similar observations into many clusters based on the observed values of several variables for each individual (models).

Proposed dissimilarity measures can be broadly divided into distance measures and correlation-type measures. The distance measure most commonly used is Euclidean distance (Everitt, Landau, Leese, & Stahl, 2011). The Euclidean distance between these two subjects is given by:

$$d_{AB} = \sqrt{\sum_{i=1}^{n}(x_{Ai} - x_{Bi})^2} \qquad (17)$$

where x_{Ai} and x_{Bi} are respectively the *i*th stock performance for models *A* and *B*. d_{AB} can be interpreted as the physical distance between *A* and *B*.

8. Create a chart of stock performance for five modifications of the Sharpe Ratio.

RESULT AND DISCUSSION

Return and Risk of Sharia Stock

Eleven stocks were consistently listed in JII during January 2011-July 2018, namely AALI, ASII, ASRI, INTP, KLBF, LPKR, LSIP, SMGR, TLKM, UNTR, and UNVR.

Based on table 2, eight stocks have a positive return (profit) and three stocks have a negative return (loss). The three stocks that gave the highest gains were UNVR, TLKM, and KLBF, while the three stocks that gave the highest losses were LSIP, LPKR, and AALI. In terms of volatility, the three stocks that have the lowest volatility are UNVR, TLKM, and KLBF, while the three stocks that have the highest volatility are LSIP, ASRI, and LPKR.

This means that UNVR, TKLM, and KLBF are the three most efficient Islamic stocks during that period because they have high returns and low volatility compared to other stocks.

Table 2. Descriptive Statistics of Stock Returns

No.	Stock	Mean	Std. Dev	Skewness	Kurtosis
1	AALI	-0.00380	0.09258	0.25383	0.22914
2	ASII	0.00579	0.06647	-0.61964	0.35356
3	ASRI	0.00323	0.11692	-0.36251	0.88152
4	INTP	0.00289	0.09266	-0.37337	1.04592
5	KLBF	0.00927	0.06622	-0.10148	0.98370
6	LPKR	-0.00419	0.10645	0.29967	-0.04430
7	LSIP	-0.00450	0.12478	-0.03704	0.23869
8	SMGR	0.00225	0.07788	-0.14287	-0.07650
9	TLKM	0.01065	0.06325	0.03285	0.22968
10	UNTR	0.00727	0.08159	-0.28606	0.36664
11	UNVR	0.01273	0.06176	-0.00093	2.11869

Source: Processed data (2021)

Before calculating VaR with equation 6, the normality test is done for the return of each stock. From table 3, seven shares are normally distributed and three of them have non-normally distribution. This result is in line with findings by Borowski (2018) that the higher the data compression (from daily to yearly), the fewer rejections of Ho hypothesis (return is a normal distribution).

Table 3. Distribution of Return and Value at Risk (VaR) of Stock

No.	Stock	Distribution of Return	$|VaR_{95\%}|$
1	AALI	Normal	0.15229
2	ASII	Abnormal	0.12106
3	ASRI	Abnormal	0.20438
4	INTP	Normal	0.15242
5	KLBF	Normal	0.10893
6	LPKR	Normal	0.17511
7	LSIP	Normal	0.20526
8	SMGR	Normal	0.12811
9	TLKM	Normal	0.10404
10	UNTR	Normal	0.13421
11	UNVR	Abnormal	0.10161

Source: Processed data (2021)

After VaR calculation at a confidence level of 95%, the three stocks with the lowest VaR are UNVR, TKLM, and KLBF, while the three stocks with the highest VaR are LSIP, ASRI, and LPKR.

The Performance Analysis of Sharia Stocks using Modification of Sharpe Ratio

In table 4, five modifications of the Sharpe Ratio, namely MSR, MSR-NRF, MSR-ZR, MSR-INF, and MSR-GDP rank almost the same for all stocks for measuring the performance of Islamic stocks in Indonesia. Four models (MSR, MSR-ZR, MSR-INF, and MSR-GDP) resulted in the same ranking, from the first UNVR, TLKM, KLBF, UNTR, ASII, ASRI, INTP, SMGR, LSIP, LPKR, and lastly AALI. Slightly different is the MSR-NRF model, which places the shares of INTP, SMGR, and ASRI ranked 6th, 7th, and 8th, while the other four models rank 7th, 8th, and 6th.

The five models equally place UNVR, TLKM, and KLBF in the top three sharia stocks with the best performance. This result aligns with the statement above that the three stocks are the three most efficient Islamic stocks. The five models also place AALI, LPKR, and LSIP in the bottom three ranks.

Table 4. Value and Ranking of Stock Performance with Modification of Sharpe Ratio

Stock	MSR Value	Rank	MSR - NRF Value	Rank	MSR - Z R Value	Rank	MSR - INF Value	Rank	MSR - GDP Value	Rank
AALI	-0.06165	11	-0.02494	11	-0.03897	11	-0.05284	11	-0.04991	11
ASII	0.00162	5	0.04780	5	0.03015	5	0.01270	5	0.01638	5
ASRI	-0.01154	6	0.01581	8	0.00536	6	-0.00498	6	-0.00280	6
INTP	-0.01770	7	0.01898	6	0.00496	7	-0.00890	7	-0.00597	7
KLBF	0.03374	3	0.08506	3	0.06544	3	0.04606	3	0.05014	3
LPKR	-0.05583	10	-0.02390	10	-0.03610	10	-0.04816	10	-0.04562	10
LSIP	-0.04917	9	-0.02194	9	-0.03235	9	-0.04264	9	-0.04047	9
SMGR	-0.02610	8	0.01754	7	0.00086	8	-0.01563	8	-0.01215	8
TLKM	0.04860	2	0.10234	2	0.08180	2	0.06150	2	0.06578	2
UNTR	0.01252	4	0.05418	4	0.03826	4	0.02252	4	0.02584	4
UNVR	0.07025	1	0.12526	1	0.10424	1	0.08345	1	0.08784	1

Source: Processed data (2021)

These results are similar to Qudratullah's report (2019) which uses the Treynor Ratio to measure the performance of Islamic stocks in Indonesia, explanatory that UNVR, TLKM, and KLBF are the three Islamic stocks that have the best performance and the bottom three are AALI, LSIP, and LPKR. There is a slight difference in the ranking of several stocks such as LPKR which in this study was ranked 10th while the Treynor ratio placed it in 9th.

The Suitability Analysis for the Modification of Sharpe Ratio

The suitability analysis of the measurements of five modifications of the Sharpe Ratio can use Kendall's Concordance test. In table 5, it is found that the suitability coefficient is very high, which is 0.991.

Table 5. The Result of Kendall's Concordance Test

Kendall's Coef. of Concordance	Chi-Square	Asymp. sig	Note
0.991	49.564	0.000	very high

Source: Processed data (2021)

While the suitability between models can be seen from the Spearman correlation coefficient in Table 6, it appears that all pairs have robust (very high) correlation coefficients.

Table 6. Coefficient Correlation between Modification of Sharpe Ratio

Pair	Spearman Coef.	Note
MSR - MSR NRF	0.973*	very high
MSR - MSR ZR	1.000*	very high
MSR - MSR INF	1.000*	very high
MSR - MSR GDP	1.000*	very high
MSR NRF - MSR ZR	0.973*	very high
MSR NRF - MSR INF	0.973*	very high
MSR NRF - MSR GDP	0.973*	very high
MSR ZR - MSR INF	1.000*	very high
MSR ZR - MSR GDP	1.000*	very high
MSR INF - MSR GDP	1.000*	very high

) Significant at 99% confidence level

Source: Processed data (2021)

The statement above proves that the four models (MSR, MSR-ZR, MSR-INF, and MSR-GDP) are in the same ranking (Spearman coefficient = 1.000) and the one with a slight difference is MSR-NRF (Spearman coefficient = 0.973). However, based on the results of Kendall's Concordance Test, the four modified Sharpe ratio models can be used to measure the performance of Islamic stocks.

The Cluster Analysis for the Modification of Sharpe Ratio

Cluster analysis aims to group five modifications of the Sharpe Ratio into several groups, based on the proximity of the measurement results. Looking at the dendrogram in figure 2, the five models can be grouped into two clusters: the first group is MSR, MSR-INF, and MSR-GDP, the second group is MSR-NRF and MSR-ZR. This result is in line with findings by Qudratullah (2019).
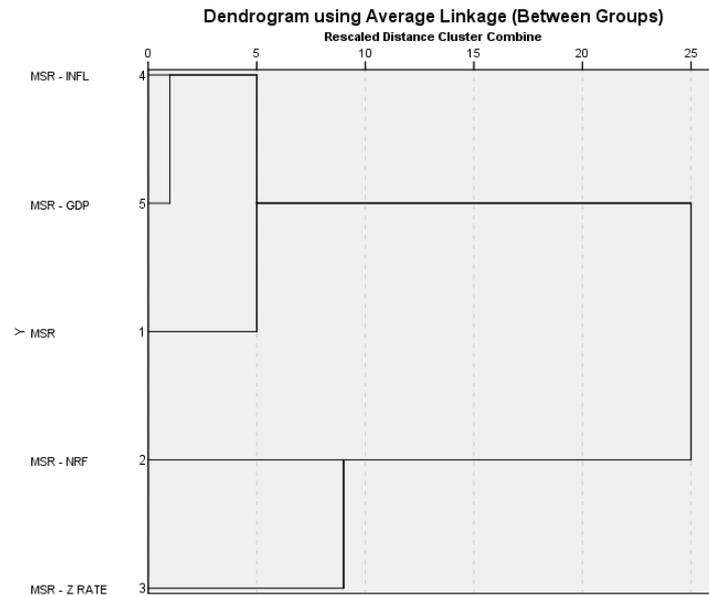
Figure 2. Cluster Analysis Dendrogram for Modification of Sharpe Ratio
Source: Processed data (2021)

This is supported by Figure 3, especially in the measurement results at ASRI, INTP, and SMGR. It appears that MSR, MSR-INF, and MSR-GDP gave a negative performance while MSR-NRF and MSR-ZR gave a positive performance.
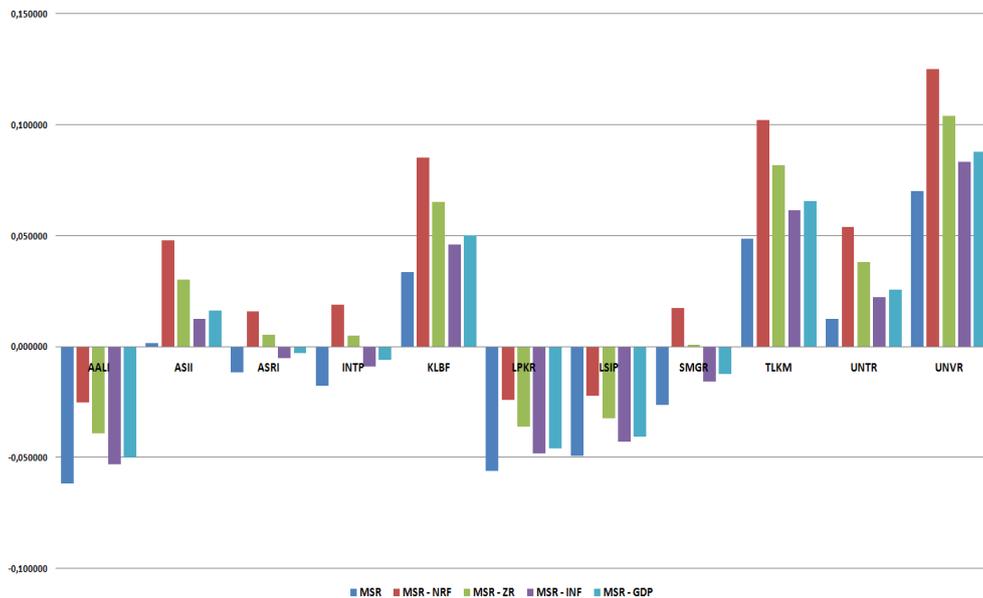

Figure 3. Islamic Stock Performance for Modification of Sharpe Ratio
Source: Processed data (2021)

Based on the results of the cluster analysis, the risk-free return component in the modifications Sharpe Ratio can be replaced with inflation or GDP in measuring the performance of Islamic stocks. This is acceptable because inflation and GDP have values that depend on the economic conditions of a country at a certain period while eliminating the risk-free return component or replacing it with the zakah rate has a constant value. So this result is in line with Hanif (2011) who replaced risk-free return with inflation and Sheikh (2009)who replaced it with GDP in SCAPM.

CONCLUSIONS

The modification of Sharpe Ratio with interest rate and Value at Risk (VaR) (MSR) with four other modifications of Sharpe Ratio, namely models that eliminate interest rates (MSR-NRF), models that replace them with zakah-rate (MSR-ZR), models that replace them with inflation (MSR-INF), and models that replace them with gross domestic products (GDP) (MSR-GDP) gives almost the same results or has a very high level of suitability in measuring the performance of Islamic stocks in Indonesia in the period January 2011 - July 2018.

Judging from the closeness of the results of performance measurement, the five models can be grouped into two, namely models with interest rates, inflation, and GDP as the first group, while models without interest rates and zakah-rate as the second group. This means, on the concept of Islamic finance, risk-free returns can be measured using these four approaches, especially inflation and GDP. Therefore, this study also recommends inflation and GDP to measure risk-free returns in the Sharia's Compliant Asset Pricing Model (SCAPM) or Islamic Capital Asset Pricing Model (ICAPM).

This study used a fairly long period (January 2011 - July 2018), the sample used is Islamic stocks that consistently listed the Jakarta Islamic Index (JII) during that period, and 11 stocks samples were obtained. The sample size of 11 stocks is relatively small, this is a limitation in this study. For further research, a larger sample can be used, such as Islamic stocks that consistently listed Indonesian Sharia Stock Index (ISSI) for a certain period. Further research can also apply this modification Sharpe Ratio by considering special events such as the 2013 economic crisis, 2015 economic crisis, or the 2020 crisis (Covid-19), namely evaluating the performance of Islamic stocks before, during, and after the crisis.

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