International Journal of Innovation, Creativity and Change. www.ijicc.net
Volume 11, Issue 8, 2020

Optimal Portfolio: What or When? Various approaches to "optimal"

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Various approaches can be applied to obtain optimal portfolio, therefore it can produce different "optimal results". The question arises, is the optimal portfolio actually an equilibrium that can be used as a long-term benchmark, or is it only a short-term condition that never has permanent equilibrium? This paper aims to study several approaches to obtain an optimal portfolio by considering several determinants. The study aims to: 1) form an optimal portfolio based on Markowitz's modern portfolio theory (MPT) as a benchmark; 2) develop alternative optimal portfolios based on sectoral, regional and temporal approaches; 3) form an optimal portfolio with moral and information boundary; 4) identify the effects of rebalancing and contrarian strategy to obtain optimal portfolio; and 5) evaluating the concept that makes the most sense to obtain optimal portfolio. Analysis was carried out using several models including the Markowitz model, single index model with the various approach based on sectoral, temporal, and behavioural model. The data used comes from the Indonesia Stock Exchange for the period 2011-2019. The review results show that various approaches and strategies resulting different optimal stock combinations. Sectoral approach produces an optimal combination of higher rates of return and risk. Conversely, portfolios with an Islamic moral bounding can produce portfolios with a combination of lower rates of risk and hand in hand with a lower return. On the other hand, various approaches do not significantly produce Sharpe's ratio difference. However, this study has still not been able to ascertain whether the differences in portfolio resulted from various approaches indicate that the optimal portfolio always moves dynamically without long-term balance or not.

Key words: *Markowitz's Portfolio, Optimal Portfolio, Rebalancing Strategies, Regional Portfolio, Sectoral Portfolio, Sharia Portfolio, Single Index Model, Temporal Portfolio, Ward's Linkage.*

Introduction

Modern Portfolio Theory (MPT) was first developed by Markowitz (1952) which later became an important foundation for financial economics. This theory explains how investors optimise their wealth or assets when investing in an efficient market. Jones (2000) defines a more specific portfolio as a collection of assets invested by buying shares from companies operating in various types of industries. In constructing a portfolio, investors want to maximise the expected return with a certain level of risk that is willing to bear or look for a portfolio that offers the lowest risk with a certain return. These portfolio characteristics are referred to as efficient portfolios (Bodie et al. 2006). Efficient portfolio must be guided by assumptions about how investors behave in making investment decisions to be taken. Sharpe et al. (1997) states that in portfolio theory there are three types of investor references when faced with risk, namely risk seeking investors, risk averse investors and risk neutral investors. Investors like this, if faced with several investment alternatives that offer the same return with different risks, will tend to choose investments with lower risk. But in determining an efficient portfolio, all types of investors can choose alternative investments in portfolios located in an area called the efficient frontier (Elton and Gruber 1995). Efficient frontier shows how to determine the desired portfolio choice with certain returns with minimal risk or certain portfolio risks with maximum returns.

Diversification strategies are carried out with optimal portfolios, which means that benefits obtained by diversification in various investments with certain amount of securities have high yields (Sulistyorini 2009). The optimal portfolio is achieved by simulating a number of securities that are considered efficient using certain calculation procedures (Sartono and Zulaihati 1998). To form one or several portfolios, selected shares are needed to be combined into the portfolio (Sulistyorini 2009). Decision making in terms of asset allocation and selection of portfolio instruments to be selected is a challenge for investors. Investors have their own preferences and / or considerations in making investment decisions. The restrictions imposed by destination preferences are indicated to effectively limit the universal assets available in the portfolio (Schwab 1996). There is the possibility of a biased effect in determining a portfolio that is oriented to maximise the benefits of diversification or to become an efficient portfolio based on preferences.

Various approaches can be applied to obtain an optimal portfolio, and therefore produce a variety of different "optimal results". The question arises, is the optimal portfolio actually a stable balance which in the long run can become a benchmark, or a short-term conditional combination that does not have a permanent balance? This paper is an aggregation writing of the results of a consistent evaluation using several approaches for optimal portfolio formation by considering several factors as determinants. Some approaches taken are sectoral and temporal approaches, approaches based on behavioural theory (measured by moral bounded

and mental accounting), and based on strategies (including contrarian and rebalancing). This study aims to form an optimal portfolio based on Markowitz's modern portfolio it's alternative optimal portfolios based on sectoral, regional and temporal approaches. In addition, this study also composes an optimal portfolio with certain moral and informational restrictions; and also, identifies the effects of rebalancing and contrarian strategies. Finally, this study aims to evaluate the most reasonable concept as an approach to obtain an optimal portfolio.

The next section presents the hypotheses development in Section 2. This is followed by Section 3 that presents the research methodology. Section 4 presents the results of this study. The last section, Section 5 concludes this study.

Research Hypotheses

Stock returns and risks are moved and influenced by the dynamics of stock prices and overall economic conditions. The dynamic of movement is different between economic sectors, and so suggests sectoral based rebalancing portfolio. Sectoral portfolio rebalancing helps to determine portfolio steady at the level of optimal return and risk and remains in line with investor objectives.

H1: There is a difference between Sharpe's ratio of rebalancing portfolio when sectoral portfolio return and risk change significantly.

Diversified portfolios to international markets theoretically are better than bound under domestic portfolios. International diversification offers greater investment opportunities because of wider markets, higher variations and lower correlations. In lower levels of internal diversification, that is regional diversification, such as under ASEAN market integration with ASEAN Economic Community (AEC) it will give opportunity for more benefits, where the capital costs of regional diversification incurred lowered than before being integrated. Previous study show that performance of international diversification does not take into account the consequences of rebalancing and transaction costs (Kalra et al. 2004). Rebalancing is needed to maintain domestic and international portfolio component targets (Rowland 1999, Laker 2003). Based on these arguments, a comparison of the performance of ASEAN's domestic and regional portfolios is carried out by calculating the effect of rebalancing and transaction costs.

H2: Regional diversification portfolio is superior compared to domestic diversification.

Islamic (sharia) and non-Islamic stock indexes are reported to be responsive to macroeconomic and microeconomic risks (Girrard and Hassan 2008; Albaity and Ahmad

2011).OIn the other hand, according to Ang (1997) weakening of Rupiah against foreign currencies is a negative signal for investors so that it can affect the price of the stock and vice versa. Furthermore, negative signals received by investors can continuously affect investor demand for shares in the capital market. According to Halim (2003), the higher the investor demand for shares, the higher the stock return and vice versa. The impact of the weakening of the exchange rate on stock prices on the capital market can be seen in the movement of stock indices. So, based on the description above the following hypothesis can be composed:

H3: Performance of Islamic portfolios tends to be better when the market conditions are depressed (the weakening of the domestic currency exchange rate).

Islamic financial instruments exist to meet the needs of investors with a preference for compliance with sharia rules. The trend of asset value increases from Islamic investment in the global market Dow Jones Islamic Market (DJIM) which is a market in the United States and the Gulf Country Council (GCC) region reached point 3 371.53 USD in the DJIM global stock index group (December 2018 close price). This trend reflects the implicit tendency of global investor preferences that it is not only investors holding Islamic principles that have begun to shift to Islamic investment. Investor awareness of the value of diversification benefits provided by Islamic stocks also be taken into consideration in the interests of the allocation of future assets (Amanah 2019).

H4: Sharia Compliance has a negative effect due to lowering risk imply lowering returns.

Up and down cycles and falling market during bullish – bearish periods indicate that return and risk of portfolio move is influenced by the cycles. The dynamic movement of bullish – bearish cycles suggests that the portfolio needs to re-balanced. Portfolio rebalancing helps investor to determine the portfolio remaining at the level of optimal return and risk. The bullish and bearish periods are a concern when investing. The two periods are used to see when the market lags up and when the market goes down. This information is needed by investors so that investors have the choice in determining which stock issuers make their investments remain profitable in different market conditions (Respati 2018). Asset reallocation is needed as implications of bullish or bearish condition.

H5: There is a difference between optimal portfolio ratios in the bullish and bearish periods.

Negative beta exists both in bullish and bearish conditions. The existence of negative beta is a signal of existence of a contrarian trend of such stock or sector again the whole industry or market. Negative beta phenomena exist in Indonesia Stock Exchange during bullish as well as bearish conditions. Negative beta stocks is important when composing an optimal portfolio

because its counter trend role is to reduce or eliminate portfolio risks. Based on this, the following hypothesis exists:

H6: There is a difference between Sharpe's ratio of optimal portfolio with negative beta stocks that have significant positive returns in the bullish and bearish period.

Research Methodology

Data

To fulfill most of the objectives, the data used are yield data from shares listed on the Indonesian Stock Exchange, which consists of 560 listed companies. The data used are share price data from 2011 to 2019 from the page http://www.idx.co.id, stock price data obtained from TICMI and IHSG data taken from http://yahoo.finance.com.

According to the second implementation of the Regional Portfolio, we make ASEAN Economic Community (AEC) as a regional in this study. We will examine the effectiveness of ASEAN regional diversification in the presence of periodic rebalancing and associated transaction costs. The object of study is the composite index of six ASEAN countries in the five years from 2010 to 2015. The data used in this study are secondary data taken within a period of five years starting from January 1, 2009 to December 31, 2015. The six-nation stock index in this research is Indonesia, Malaysia, Singapore, Philippines, Thailand and Vietnam.

To meet the approach based on the rupiah exchange rate, weekly stock return data from 1 December 2017 to 31 May 2019. Risk-free return data that will be used in portfolio performance measurement, based on Bank Indonesia interest (BI Rate) taken on the official website Bank Indonesia www.bi.go.id.

To fulfill the approach based on the bounded approach, the data used constitutes an Annual Financial Report of 650 listed companies listed on the Stock Exchange in the last quarter of 2018. A total of 402 issuers from 650 listed companies on the IDX have a Sharia label based on PT Bursa Efek Indonesia Announcement No.: Peng-00006 / BEI.OPP / 01-2019 dated January 7, 2019. The time period in the sample data is weekly return data from Sharia stock reports on March 23 2014 to March 17 2019, or a total of 261 weekly data returns.

Methods

The development of MPT can be divided into two parts. The first part is about the attitude of investors in terms of avoiding rational risk in order to optimise asset returns. The second part is the pioneering direction of Sharpe's work (1964), Treynor (1962), Lintner (1965), Mossin

(1966), and Black (1972) which ultimately leads to the CAPM theory, assuming that investors are assumed to act homogeneously according to the pattern of analysis means-variance Markowitz. Rielly (1992) recommends the minimum number of shares in an optimum portfolio of 12 to 18 shares.

Return, Risk and Portfolio Beta

Holding Period Return (HPR) is the level of profit obtained from an investment in a certain period. Bodie et al. (2011) formulate mathematically as follows:

$$R_{it} = \frac{P_t - P_{t-1}}{P_{t-1}}$$

R_{it} **:** *return of stock i for a period of time t*
P_t : Stock price in period *t*
P_{t-1} : Stock price in period *t-1*

Bodie et al. also formulate the expected return or the weighted average return (return rate) at each observation. If the data is historical data with n observations, then the probability for each observation is n^{-1}. The expected average value can be calculated by the formula as follows:

$$E(R_i) = \sum_{t=1}^{n} p_{it} R_{it} = \frac{\sum_{t=1}^{n} R_{it}}{n}$$

$E(R_i)$: expected return of stock *i*
p_{it} : probability of stock *i* in the period *t*
R_{it} : *return of stock i for a period of time t*
n : Amount of sample

Risk is a measure that is equivalent to the standard deviation from the level of yield. In a series of various historical data and standard deviations can be used to measure the uncertainty of results. Variant formulations and standard deviations for calculating historical data are as follows:

$$\sigma_i^2 = \frac{\sum_{t=1}^{n} (R_{it} - E(R_i))^2}{n-1} \; dan \; \sigma_i = \sqrt{\sigma_i^2}$$

σ_i^2 : Variety of stocks *i*
R_{it} : *Return of stock i for a period of time t*
$E(R_i)$: Expected return of stock *i*
σ_i : Standard deviation of stock *i*
n : Amount of sample

In the context of portfolio management, there needs to be a measure that states the variable tendency to move together. The variables that are intended are returns and securities. This value can be obtained by using covariance:

$$Cov\ (R_A, R_B) = \frac{\sum_{t=1}^{n} \quad (R_{At} - E(R_A))(R_{Bt} - E(R_B))}{n}$$

R_{At} : Return of stock *A* for a period of time *t*
$E\ (R_A)$: Expected return of stock *A*
R_{Bt} : Return of stock *B* for a period of time *t*
$E\ (R_A)$: Expected return of stock *B*
n : Amount of sample

Beta coefficients are defined by the covariance of stock returns with market returns as part of a market portfolio variant. Beta can be calculated using the formula as follows:

$$\beta_i = \frac{Cov\ (R_i, R_M)}{{\sigma_M}^2} = \frac{\sum_{t=1}^{n} \quad (R_{it} - E(R_i))(R_{Mt} - E(R_M))}{\sum_{t=1}^{n} \quad (R_{Mt} - E(R_M))^2}$$

β_i : Beta of stock *i*
$Cov\ (R_i, R_M)$: Covariance between stock returns *i* and market returns
${\sigma_M}^2$: Variety of market return
R_{it} : *Stock return i for the period t*
$E\ (R_i)$: Expected return of stock *i*
R_{Mt} : Return market
$E\ (R_i)$: Expected market return

Karush Kuhn Tucker's condition (KKT) for single index model

Specifically, if observed, most stocks will experience a tendency to increase in price if the stock price index in the market goes up, so should we. Elton et al. (2014) formulate this model mathematically, namely:

$R_i = \alpha_i + \beta_i R_m$
R_i : *Return* stocks *i*
R_m: The rate of return from the market index.
α_i : A random variable that indicates the component of the return on security of securities which is independent of market performance
β_i : Coefficient that measures changes in R_i as a result of changes in R_m.
Assumption: $cov\ (e_i, e_j) = 0$
$cov\ (e_i, R_m) = 0$

The unique risk conditions modelled by incorporating KKT conditions into a single index model will produce a cut-off path for stocks whose value of excess return to beta i is more than C_j as an indicator of the cut-off point. The formulation is as follows:

$$w_i = \frac{Z_i}{\sum_{i=1}^{n} Z'_i}$$

with : $Z_i = \frac{\beta_i}{\sigma_{ei}^2} [ERB_i - C_j]$;

$ERB_i = \frac{E(R_i) - R_{br}}{\beta_i}$;

$C_j = \sigma_m^2 \frac{\sum_{j \in k} A_j}{1 + \sigma_m^2 \sum_{j \in k} B_j}$;

$A_j = \frac{[E(R_i) - R_{br}]\beta_j}{\sigma_{ej}^2}$; and

$B_j = \frac{\beta_j}{\sigma_{ej}^2}$

Agglomerative Clustering (Ward Linkage)

Alan H. Fielding (2007) simplifies the interpretation of euclidean distance as a phytagorous theorem that is adjusted to the number of dimensions. Euclidean distance puts progressively greater weight on far apart objects, defined:

$$d_{ij} = \sum_{k=1}^{p} \left[(x_{ik} - x_{jk})^2\right]^{\frac{1}{2}}$$

d_{ij} : *Distance between object i and object j*
x_{ik} : The value of the *i*-object in the *k*-variable
x_{jk} : The value of the *j*-object in the *k*-variable
p : The number of variables observed

It should be noted that in the use of euclidean distances, the measurement unit of observation must be the same, so that the goal to minimise diversity is achieved. As explained in Jolliffe (2002) if the unit of measurement of data is not the same, it is necessary to transform it into a standard form before the calculation is carried out.

Ward's method is one method of hierarchical cluster analysis with agglomerative observations. Fielding (2007) explained that this method would take into account the

composition of cluster membership by calculating the sum square error (SSE) of the cluster average. If AB is a cluster obtained by combining groups A and B, then the sum of distances in a cluster is defined as:

$$SSE_A = \sum_{i=1}^{n_A} (y_i - \underline{y}_A)'(y_i - \underline{y}_A),$$

$$SSE_B = \sum_{i=1}^{n_B} (y_i - \underline{y}_B)'(y_i - \underline{y}_B),$$

$$SSE_{AB} = \sum_{i=1}^{n_{AB}} (y_i - \underline{y}_{AB})'(y_i - \underline{y}_{AB}),$$

With $\underline{y}_{AB}$ = ($n_A\underline{y}_A$ + $n_B\underline{y}_B$) / (n_A + n_B) and n_{AB} is the sum of the results of nA and nB. The number of indices is the number of points for each A, B, and AB (denoted by SSE_A, SSE_B, and SSE_{AB}). The Ward method will combine groups A and B so that the smallest increase in SSE is obtained, defined as:

$$I_{AB} = SSE_{AB} - (SSE_A + SSE_B)$$

Thus the Ward method is often the best alternative in hordes, because it forms a cluster with a small observation distance so that the size of the cluster formed is almost equal.

Result and Discussion

Optimal Portfolio based on Markowitz's Modern Portfolio Theory as a Benchmark

The approach taken by classical theory is carried out under conditions that are adapted to the model. But in fact a portfolio formed to meet the diversity of investor needs and preferences. Then the optimal portfolio should be dynamic and that can adapt to various approaches to investor needs. In this study, the author tries to create an optimal portfolio with a variety of approaches applied, and therefore produces a variety of different "optimal results". This is the writing of an aggregation of the results of a consistent evaluation using several approaches to optimal portfolio formation by considering several factors as determinants. Some of the approaches taken are sectoral and temporal approaches, approaches based on behavioural theory (measured by moral boundaries and mental accounting), and based on strategies (including love and rebalance).

Sectoral based optimal portfolio

Market changes and dynamic time changes require investors to form sectoral portfolios. The purpose of establishing the portfolio is to obtain the optimal asset composition of the

portfolio based on the industrial sector in the IDX. The first stage in forming a sectoral portfolio is to form a portfolio of each industry sector. The second stage of forming sectoral portfolios is that the results of forming a portfolio of each sector will represent the formation of sectoral portfolios. The portfolio provides an average return of 30.13% per year, while the market yield is lower at 5.52% per year. The risk of sectoral portfolio investment is 1.87% per year, lower than the market risk of 14.61% per year. The sectoral portfolio Sharpe ratio is 12.82 higher than the market Sharpe ratio of -0.05. Based on these results it is concluded that the sectoral portfolio is a portfolio that is more effective and optimal compared to the market (Prawatiningsih 2016).

The highest average yield is the six-month reialinctng strategy in 2012 at 33.76% per year and the lowest average yield for the six-month rebalancing strategy in 2015 was 21.86% per year. The highest average yield for the strategy without rebalancing in 2012 was 33.62% per year and the lowest average yield in 2015 was 22.92% per year. Based on these data, the average rebalancing strategy yields compared to without rebalancing provided the value is significantly different.

Optimal Portfolio under Regional Approach

Capital markets in one regional region tend to have the same movement and have a high contagion effect, so the potential for integration between capital markets is high (Wibowo 2009). Asia is dominated by developing countries, where economic growth is more dependent on external demand than other developed and developing countries (Rungcharoenkitkul & Unteroberdoerster 2012). This market openness has implications for the increasingly integrated stock market between the member countries of the Association of Southeast Asian Nations (ASEAN) and the global stock market (Endri 2009). Kose et al. (2007) assert that wider market openness increases risk sharing among developed industrial countries, but not developing countries.

Consistent with Kalra et al. (2004), the ASEAN regional portfolio is formed with six variations in domestic and regional weights, namely 90:10, 80:20, 70:30, 60:40, 50:50 and 40:60. As a modification, the authors add an optimal portfolio component in the simulation. The optimal portfolio formed is based on index data from 2009 to 2010. Optimal regional portfolio of ASEAN markets using the Markowitz model, Olien (2016) describes the weight of the largest asset allocation in Malaysia, at 32.45% while the lowest weight in Vietnam is 3.08%. The amount of weight in each country is determined by the risk-return performance and the index return correlation coefficient of each country. The lowest correlation occurs in indexes in Malaysia, Thailand and the Philippines with the Indonesian index. Therefore, the weight of the three indices is quite high in the optimal portfolio (Olien 2016).

The highest average yields are found in less diversified portfolios. Portfolios with a dominant weight composition on domestic assets have higher average yields than regionally diversified portfolios. The domestic portfolio produces the highest average yield, which is 14.10%. The highest average regional portfolio yield is generated from a diversified portfolio of 90% for domestic investment and only 10% for non-rebalanced regions, which is 13.82% at the lowest level of transaction costs (0.5%, 2%). A portfolio that has high average yields is not yet certain that its performance is also good. The risks inherent in the portfolio need to be taken into account, therefore Sharpe ratio is used as a benchmark for portfolio risk-return performance. The higher Sharpe ratio shows the better performance of a portfolio (Kalra et al. 2004). Regional portfolios have a higher Sharpe ratio than domestic portfolios.

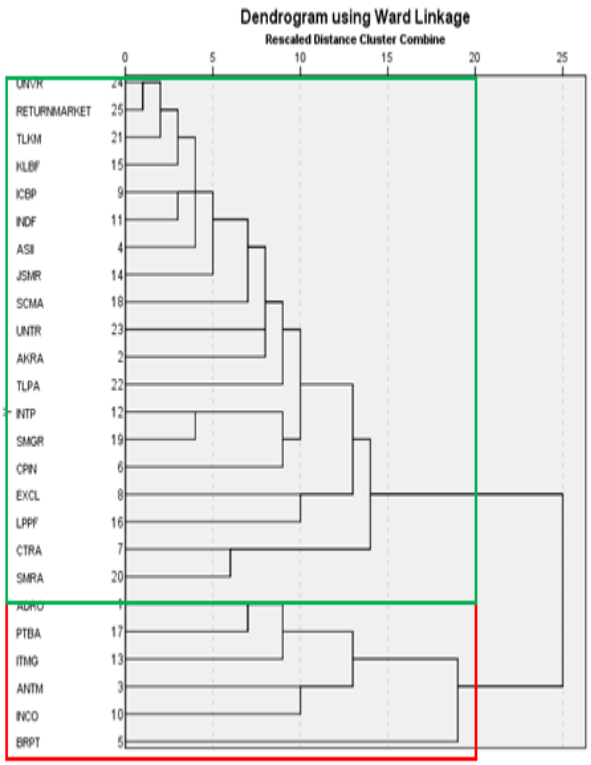
Optimal Portfolio with Certain Moral and Informational Restrictions

Islamic financial instruments increasingly receive special attention from users of global financial instruments because of the potential for protection generated by moral bounded sharia. Moral Bounded is a refreshment of the theory of conscious bounded rationality. Bounded rationality emphasises aspects of the rational limitations of every human being in managing information and solving problems (Wayland 2006). These bounded morals exist not because of limitations in terms of information absorption, but because of the awareness to limit themselves from activities that are not justified according to the moral (beliefs) of the individual. Amanah (2019) specifically moral bounded will be measured based on morals in the context of both the activities and financial products in accordance with Islamic rules. The financial industry with the principle of shariah compliance has grown rapidly in almost all countries in recent years. Sharia Capital Market is an important segment of sharia financial development. The Islamic capital market must adhere to the moral principles of Islam, which are free from *interest* (riba), *masyir* (gambling) which automatically avoids things that lead to *gharar* (uncertainty). Islamic rules clearly forbid such conditions, so that the allocation of assets to Sharia stocks in the Islamic capital market tends to be bounded based on sharia moral principles. Indonesia's Islamic capital market publishes Sharia Effect List (SEL) twice a year in developing roadmap efforts.

The 402 shari'a stocks that the ISSI group tested were compliant based on fatwa number: 40 / DSN-MUI / X / 2003 which is also contained in the Financial Services Authority Regulation Number 35 / POJK.04/2017. So that there are 24 issuers that are assumed to be obedient to moral boundary sharia, then they will be candidates for portfolio formation namely. First is the limitation on the value of interest debt and other income that is not halal divided by total assets not more than 45% (we call AP1). Second is the limitation on the value of interest income and other income that is not halal divided by total income should not be more than 10% (we call AP2). The Distance to default point of each AP1 and AP2 called DDAP1 and DDAP2 will be an indicator of compliance value. The weighted average of AP1 & AP2

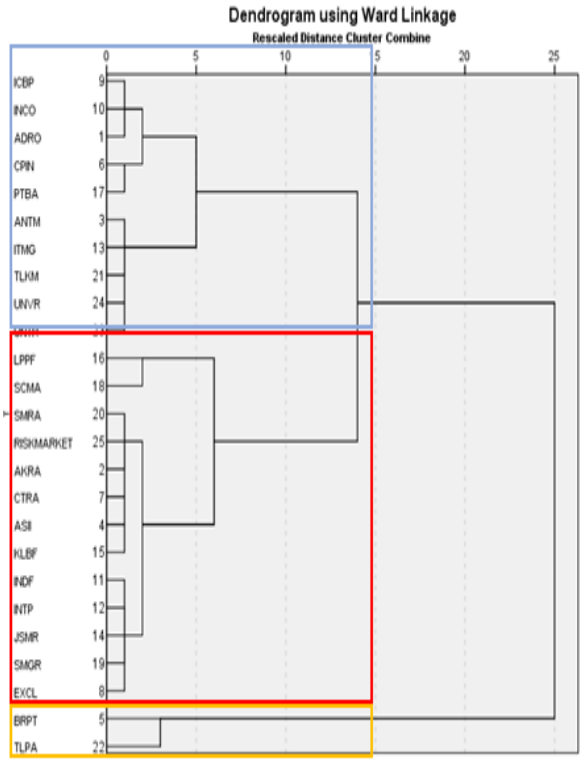
19.32% (will be a margin and default point), the bigger distance spare from weighted average point value of the portfolio shows the better the compliance as we called Distance of Shari'a Compliance to Default (DSCD).

Figure 1. Dendogram Agglomerative Cluster Analysis (Return Based)



Source: Data on return value of issuers (2014-2019); Data processed (2019).

Figure 2. Dendogram Agglomerative Cluster Analysis (Risk Based)



Source: Data on return value of issuers (2014-2019); Data processed (2019).

Potential shari'a stocks that are compliant will be modeled in a portfolio group based on the proximity of the character of the return and risk. Figures 4 and 5 are dendograms of cluster analysis results on 24 potential shari'a stocks with fulfillment of return-based characteristics (figure 1) and risk-based (figure 2). The cut of the dendogram is done by cutting the longest connecting line and considering the equal number of members of each group. Figure 4 shows the dendogram based on return based characters can be divided into two groups.

Table 1: Weighted average of AP1 & AP2, Return and Risk for each portfolio resulting from the ward's linkage

Mean of Compliance, Return and St. dev Syari'ah stock return									
Based	Aspek	Cluster = Portfolio			Based	Aspek	Cluster = Portfolio		
		1	2	3			1	2	3
Return Based	Compliance	31.25 %	34.64 %	-	Risk Based	Compliance	10.08 %	35.56%	32.60 %
	Return	0.58%	0.87%	-		Return	1.28%	0.38%	0.32%
	Risk	0.08%	0.27%	-		Risk	0.28%	0.05%	0.01%
	∑ member	18 emiten	6 emiten	-		∑ member	2 emiten	12 emiten	10 emiten

Source: data processed (2019).

Table 1 is an attempt to expose investor preference constraints to Portfolio 1 risk and return from ward's linkage (return based) results that have compliance values of 31.25%, smaller than portfolio 2 with compliance values of 34.64%. We can say that the shari'a stock group forms portfolio 1, more compliant than the stock group forming portfolio 2. However, the risk value of portfolio 2 is still higher than portfolio 1, which is 0.27%> 0.08%. Portfolio 2 of ward's linkage (risk-based) results have compliance values of 10.08%, smaller than portfolios 2 and 3 with respective compliance values of 35.56% and 32.60%. Can we say that shari'a stock groups form portfolios 2 and 3 are more compliant from portfolio groups forming portfolios 1. The risk values of portfolios 3 and 2 look much smaller than portfolio 1 which is 0.01% <0.05% <0.28% (Amanah 2019). This result is also continuous with Purwanto's study (2019) which states that sharia compliance can reduce portfolio risk but is followed by a decrease in the rate of return too, and vice versa, the less compliance can increase the rate of return and is accompanied by an increase in risk.

Hardono (2019) finds that the optimal portfolio formed at the stage of weakening and strengthening the exchange rate of the rupiah against the USD has a difference in terms of expected yields and risks. In general, the expected rate of return on sharia portfolio is greater than the expected rate of return on a general portfolio and so are the risks contained therein.

Table 2: Sharia and general portfolio performance measurement results

Condition	Portfolio	Sharpe's Ratio
Forex depreciation	Sharia stocks market	0.39
	General stock market	0.31
Forex appreciation	Sharia stocks market	0.63
	General stock market	0.76

In Table 2 it can be seen that the Sharpe ratio produced by the general portfolio is greater when compared to the Islamic portfolio. Nevertheless, the Sharpe ratio value of the two types of portfolios has the greatest value when the condition of the rupiah exchange rate has strengthened. These results provide evidence, that there are similarities in the movement of performance in the two types of portfolios. In addition, the results of the measurement of portfolio performance also prove that the large level of expected returns on the portfolio is not necessarily followed by good portfolio performance.

The Role of Negative Beta

The separation of bullish and bearish market conditions by Maheu and McCurdy (2000) proposes the Markov displacement model as a tool to identify bullish and bearish periods. The results obtained from this study are that this model can capture a declining market movement and an upward correction in the market. Referring to the research conducted by Maheu and McCurdy (2000) researchers used the Markov displacement model to distinguish the bull and bear markets. Separation of bullish and bearish market conditions which was also carried out by Kusneri (2002) found that there was a significant difference between beta stocks in bullish conditions and beta stocks in bearish conditions. Beta stocks in bullish conditions have an average value that is greater than beta stocks in bearish conditions. Respati (2018) finds that in bullish market conditions, stocks tend to be more aggressive (have a beta coefficient greater than 1) and are sensitive to changes in the stock market whereas in bearish conditions, stocks tend to be defensive and not sensitive to changes in the market stock. Respati (2018) show that the Sharpe ratio in all periods of portfolio with a negative beta yield superior possitive, which means that portfolio performance is better performing on a portfolio that adds issuers to the beta stock negative positive returns. Portfolios that add beta stocks negative positive yields have better portfolio performance with lower portfolio risks in all periods of bullish and bearish. Portfolios that do not add beta stocks to negative positive returns have a low portfolio performance with higher portfolio risk in all bullish periods and bearish (Table 6).

Rebalancing Strategies of Optimal Portfolio

Respati (2018) finds results from the historical data that in the future investors should not hesitate to add stocks that have negative beta positive returns with careful selection. Therefore, investors are expected to not be static in responding to the dynamics that occur in the market and only choose to invest but still also oversee stock movements. Investors are expected to know market dynamics information to predict their portfolio investment in order to remain optimal and be able to adjust to changes that are occur in the exchange.

Table 3: Comparing rebalancing and non-rebalancing strategies

Strategy	average yield (%)	Risk	Sharpe Ratio
Without Rebalancing	27.19	5.99	3.52
1 -month Rebalancing	26.57	1.81	11.27
6 -month Rebalancing	27.34	3.34	6.35
12 -month Rebalancing	25.17	3.78	5.04

Table 4: Compare rebalancing and non-rebalancing strategies when the market is bearish

Strategy	average yield (%)	Risk	Sharpe Ratio
Without Rebalancing	25.98	7.17	2.67
1 -month Rebalancing	22.49	1.61	9.69
6 -month Rebalancing	21.86	5.34	2.81
12 -month Rebalancing	22.09	5.53	2.76

Table 3 shows that the highest Sharpe ratio value is strategy monthly rebalancing of 11.27, with an average yield of 26.57% and investment risk of 1.81% per year, so that the monthly rebalancing strategy forgets an effective investment strategy. The rebalancing simulation results show that the rebalancing strategy reduces investment risk compared to without rebalancing. The risk value of each rebalancing strategy shows a lower value than the risk value without rebalancing. However, the rebalancing strategy does not show an increase in the average value of higher yields compared to the non-rebalancing strategy. Table 3 shows that there is a balancing strategy in bearish market conditions in 2015 that gave a yield of 22.15%, a risk level of 4.16% and a Sharpe ratio of 3.68%. rebalancing strategy performance when the market is bearish and is lower than rebalancing performance when the market is not bearish (Prawatiningsih 2016).

Wilcoxon signed rank test between rebalancing strategies and without rebalancing during bearish conditions in 2015 against risk shows value lower than the significance level (0.05). Original hypothesis rejected and there is a significant risk difference between rebalancing and non-rebalancing strategies when market conditions are bearish. Wilcoxon signed rank test between rebalancing and non-rebalancing strategies in the bearish market convention in 2015 to Sharpe's ratio shows that the value is higher than the level of significance (0.05). Prawatiningsih (2018) concludes that there is no significant difference in Sharpe's ratio between rebalancing strategy and without rebalancing on the condition of the bearish market (Prawatiningsih 2016).

Conclusion

Various approach and strategies with a long enough market evaluation that have been applied in search of a better optimal portfolio, show that there are different optimal portfolio exist.

The sectoral approach produces an optimal combination with higher rates of return and risk. Conversely, portfolios with Islamic moral constraints can produce portfolios with a combination of lower rates of return and risk. But in terms of the Sharpe ratio, various variations of the approach do not produce portfolios that significantly different from Markowitz's portfolio as a benchmark. However, this research has not been able to ascertain whether the differences in the results indicate that the optimal portfolio always moves dynamically without long-term balance or not. This study has still not ascertained yet whether these optimal portfolio differences indicate that the optimal portfolio always moves dynamically without long-term equilibrium or because the optimal portfolio should be obtained conditionally. More advanced modelling with such a level of complexity is needed to conduct adequate research to solve this paradox.

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