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Determining the optimum portfolio of shariah stocks using an approach of Shariah Compliant Asset Pricing Model (SCAPM)

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A B S T R A C T

Shariah Compliant Asset Pricing Model (SCAPM) is a modification of the model Capital Asset Pricing Model (CAPM). This research is quantitative descriptive study of theories of optimal portfolio analysis applied to trading stocks, especially in stocks Jakarta Islamic Index. Sampling technique used was purposive sampling and obtained 26 shares. The analysis tool used is MatLab R2010a. The results of this study are not prove the Markowitz portfolio theory. This is explained by the amount of Beta market (β_m) a value beta below 1 indicates that the fluctuation of stocks returns do not follow the movement of market fluctuations. Investors are likely to want a high profit, the investors are advised to choose a second portfolio groups, with rate of 0.176722% and investors are likely to enjoy a substantial risk in the investment portfolio are advised to choose the first group with a great risk of 0.8501%.

A B S T R A K

Shariah Compliant Asset Pricing Model (SCAPM) adalah modifikasi model Capital Asset Pricing Model (CAPM). Penelitian ini merupakan penelitian deskriptif kuantitatif tentang teori analisis portofolio optimal yang diterapkan pada saham perdagangan, terutama pada saham Jakarta Islamic Index. Teknik sampling yang digunakan adalah purposive sampling dan diperoleh 26 saham. Alat analisis yang digunakan adalah MatLab R2010a. Hasil penelitian ini tidak membuktikan teori portofolio Markowitz. Hal ini dijelaskan oleh jumlah beta market (β_m) nilai beta di bawah 1 menunjukkan bahwa fluktuasi return saham tidak mengikuti pergerakan fluktuasi pasar. Investor cenderung menginginkan keuntungan yang tinggi, investor disarankan untuk memilih kelompok portofolio kedua, dengan tingkat 0.176722% dan investor cenderung menikmati risiko yang besar dalam portofolio investasi disarankan untuk memilih kelompok pertama dengan risiko tinggi. 0,8501%.

1. INTRODUCTION

The issue of shariah compliance has become essential for discussion amidst the rapid growth of Islamic financial institutions and the growing severity of the challenge in the competition in the Islamic financial institutions. However, the philosophical and ideological aspects of Islamic financial institutions were established based on Islamic principles. All these are aimed to abolish all forms of ruthlessness, especially usurious transactions, and pioneered the establishment of the economic system based on justice. This is unique and it is the real feature of Islamic financial institutions. Therefore, it is also important to keep the features or the identity of Islamic financial institutions. It is these values, which are then packaged and made important for the sales value. Then this can be offered to the public (Imam & Fenny 2013). As an Islamic financial institution, with the capital market for investment, it is necessary to have the guidance in the areas of risk and return and security prices under Shari'a framework. Risks are accepted (but not gharar) in business that is allowed by law; and experts in business or finance that are in consensus about the positive relationship between risk and return.

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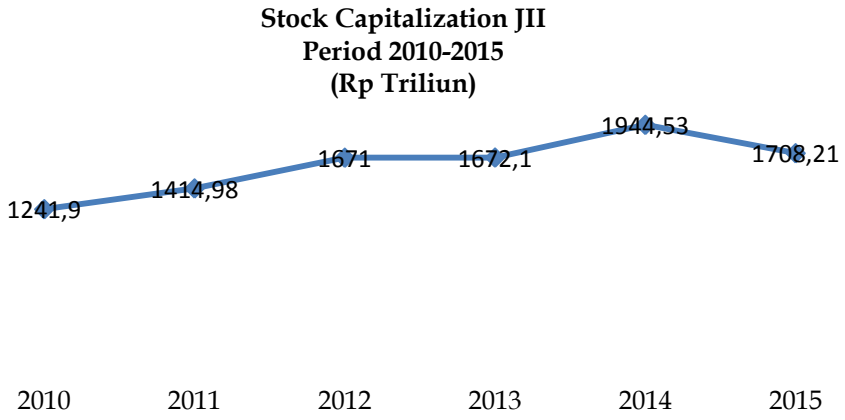

Figure 1
Stock Capitalization JII

Source: Statistics of Capital market Development of Shariah, www.ojk.go.id

Muhammad Hanif (2011, p. 285) tried to formulate risk and return in the shariah framework. He considered that there is a need to analyze the pricing model of the existing securities law which is complied with in the filter, by documenting any incompatibility with the Islamic financial system that suggests necessary alternatives. Further, he technically seeks to analyze the asset pricing model (Capital Asset Pricing Model and the Arbitrage Pricing Theory), based on the behavior of the stock market and macroeconomic factors, the validity test through filters compliance law (shariah compliance filter) and suggest modifications if necessary. One of the components in the Capital Asset Pricing Model (CAPM), which is not complied, with Islamic Shari'a is the risk free return. In this, there are two compositions: a real risk free return and cost inflation. Real risk free return represents the time value of money (time value of money) which is a rent of money and this is forbidden in Islamic Law.

Now that, a new problem arises when the shares of shariah is transferred into a portfolio. In that case, there are many possibilities of portfolios that can be formed from a combination of risky assets available in the market. This combination can reach an unlimited number. If there is a possibility of a portfolio of infinite number, then the question will arise which will be selected by the investor. If investors are rational, then they will choose the optimal portfolio (Jogiyanto 2013). Optimal portfolio is a portfolio with a combination of the expected return and risk that is best.

The statistics of Islamic stock capitalization, especially in Jakarta Islamic Index for 2015, decreased due to the economic slowdown that occurred in Indonesia (see Figure 1). Seeing this phenomenon, investors should be quite keen in looking at any capital market instruments, which can be used as an investment. Investors are worth paying attention to the use of certain investment strategies in order to achieve optimal investment, ie investments that can provide specific expected return with the risk-embedded that can be minimized. One strategy that can be used is by using a portfolio strategy.

The problem formulated in this study as how the process of forming the optimal portfolio with Shariah Compliant Asset Pricing Model (SCAPM) is, How big the proportion of each Islamic stocks forming the optimal portfolio is and How large the expected return and risk of the portfolio given in the analysis of the optimal portfolio is formed ?

Based on the problem above, this study has its purposes as follows: to see the process of forming the optimal portfolio with Shariah Compliant Asset Pricing Model (SCAPM), to see that a large proportion of their respective shares of shariah forming optimal portfolio, and also to see the degree of the mean return and portfolio risk given in the analysis optimal portfolio formed.

The researchers try to provide a thorough overview to make it easier to understand the discussion of the study. This study, therefore, provides an outline the systematic writing consists of Introduction, background of the problem, formulation of the problem and research objectives. It also provides the theory basis of risk and return stock, returns and portfolio risk, Asset Pricing Models and Optimal Portfolio and previous research and theoretical framework. Furthermore, the methods, population and samples, types and sources of data, methods of data are also provided.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

Stock Risk and Return

Return is the result obtained from the investment. Return can be a return realization (Tirrenus return) that has already occurred in the form of expected return, which has not happened yet. However, it is expected to occur in the future (Najmuddin 2011). Next, it is the risk that is often associated with irregularities or deviation, accepted with the outcome as expected. To calculate the risk, Jogiyanto (2010, pp. 227-228) provides a method is widely used that is the standard deviation. It which measures the absolute deviation value that has occurred.

1. Stock Return

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

Where:

P_t = Price of present investment

P_{t-1} = Price if the previous investment

And, the *expected return can be measured using the following:*

$$E(R_i) = \sum_{j=1}^{n} (R_{ij} \ . \ p_j) \ . \quad (2)$$

2. Stock Risk

Variance of stock is defined as follow:

$$Var(R_i) = \sum_{j=1}^{n} ([R_i - E(R_i)]^2 . p_j) \ . \quad (3)$$

Standard deviation is the root and variance such this:

$$\sigma = \sqrt{Var(R_i)} \ . \quad (4)$$

Risk and Portfolio Return

1. Portfolio Return

Portfolio is asset composite that is the investor's choice. Such assets may include financial assets such as equities (stocks), bonds, and option as well as real assets such as land, buildings, vehicles, and companies. The funds are intended for investment so that it can be invested into these assets in certain proportion (Arifin, Zaenal 2007).

Return realization portfolio (portfolio Tirrenus in return) is the weighted average of the return realization of single individual securities in the portfolio. Mathematically, return realization of the portfolio can be written as follows (Jogiyanto 2013):

$$R_p = \sum_{i=1}^{n} (w_i \ . \ R_i) \ . \quad (5)$$

Where:

R_p = *return* realization portfolio

w_i = portion of securities i toward the whole securities in portfolio

R_i = *return* realization of security of -i

n = total of single security

The portfolio expected return is the weighted average of the expected returns of single individual securities in the portfolio. The expected return can be expressed mathematically as follows:

$$E(R_p) = \sum_{i=1}^{n} (w_i \ . \ E(R_i)) \ . \quad (6)$$

Where:

$E(R_p)$ = Portfolio expected return

w_i = portion of security i towards the whole securities in portfolio

$E(R_i)$ = return realization of security of -i

n = amount of single security.

2. Portfolio Risk.

The concept of portfolio risk was formerly introduced by Harry M. Markowitz in 1950s. He pointed out that the overall risk can be reduced by combining some single securities in the portfolio. The main requirements to reduce the risk in the portfolio are that the return for each of the securities does not correlate positively and perfectly.

In addition, portfolio risk is the sum of the variance and covariance in accordance with the proportion of each asset in it. Then, this risk can be written in the form of a matrix multiplication between the matrixes of variance-covariance with the matrices of the proportion in each asset.

$$\sigma_p{}^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_i . w_j . \sigma_{ij} \ . \quad (7)$$

Asset Pricing Models

1. Capital Asset Pricing Model (CAPM)

It is essential to have an ability to estimate the return of an individual security. Such an ability is needed by the investors. To be able to estimate the return of a security requires an estimation model. For that reason, the presence of Capital Asset Pricing Model (CAPM), which can be used to estimate the return of a security is also important in the financial sector (James 2010). The standard form of the CAPM was firstly developed separately by Sharpe, Lintner, and Mossin in the mid 1960s that this model is often called the Shape-Lintner CAPM shape-Mossin. Due to this, Sharpe later won the Nobel Prize in economics.

The shape of the CAPM (Capital Asset Pricing Model) is as follows (Jogiyanto 2010):

$$E(R_{i,t}) = R_{BR,t} + \beta_{i,t} . [E(R_{M,t}) - R_{BR,t}] \ . \quad (8)$$

Where:

$E(R_{i,t})$ = the profit level of expectation feasible for the security of -i at the period of estimation-t

$R_{BR,t}$ = the profit level dof free-risk investment-t

$\beta_{i,t}$ = bheta (risk measurement) of security -i

at the period-t

$R_{M,t}$ = the profit level market portfolio at the period -t which can be calculated with the formula of $IHSG$ that is Index of composite Stock Price.

Yi-Cheng et al. (2014) conducted a survey on the evolution of Capital Asset Pricing Model (CAPM). They classified CAPM model into the following (1) Merton's intertemporal CAPM, (2) Consumption-based intertemporal CAPM, (3) Production-based intertemporal CAPM, (4) CAPM with supply-side effect, (5) International Equilibrium CAPM with heterogeneity Beliefs and Investors, (6) Equilibrium with heterogeneity CAPM Investment Horizon, (7) CAPM with Dividend and Taxation Effect, (8) CAPM with Skewness Effect, and (9) Behavioral Finance, and (10) Liquidity-based CAPM. Yi-Cheng et al. explained that the relationship between theory and CAPM perspective needs further research both theoretically and empirically. They particularly described the relationship between the type of skewness CAPM and theoretical perspectives. All these need to be investigated carefully.

Oghenovo, Jacob & Blessing (2014) found the asset pricing model consisting of a market portfolio, bias (skewness) market or factor co-skewness and portfolio volatility factor, describing the risk-return portfolio at the Nigerian Stock Exchange (NSE),. It was in accordance with the study Nigeria stock market efficiency. The findings in this study suggest that asset pricing model that consists of a portfolio of market tends to be underestimated against the risk of the portfolio which means one factor CAPM is not feasible to test the efficiency of Nigerian Stock Market. David, Eric & Pim (2013) explained that if the effects of volatility are due to the biased behavior of investors, it is likely to think about how to overcome the influence of irrational investors behavior tendencies. It can start by creating more awareness for the investor to invest, getting good information, more systematic and more holistic efforts.

2. Shariah Compliant Asset Pricing Model (SCAPM)

Mona A. Elbannan (2015, pp. 22-23) explained that CAPM has been criticized in some studies due to its limited assumptions regarding risk-free lending. Investors maximize the investment of the period and focus only on the risk and return of the one-period portfolio. Mike (2013) argued that the pricing model of CAPM fails in serving as a paradigm.

January F. Jacobs (2004) also criticized the CAPM, stating that the discrete levels used in CAPM is not a level. Consequently, if all the calculations are not done (the risk of) the addition of discrete rates will not match. Thus, CAPM proved invalid. Roger (2012) also criticized the CAPM is not rational for investors to avoid risk rationally related discount rate, Graham (2012) also criticized that empirically CAPM fails when applied in industry in estimating the cost of equity industries.

Traditional CAPM is developed in an environment based on the interest (*riba*) that is not in accordance with Islamic financial system. Under Shari'a (Islamic law), the risk and the return mechanism is slightly different from that in the conventional business environment. It is due to the risk-free investment, which is not allowed in Islam. For that reason, the original equation of risk and return cannot be applied.

Muhammad Hanif (2011, p. 288) described the important question; Should there be a minimum compensation (as in conventional) to investors under Shari'a compliant financial system? To answer this question, it is necessary to look into the composition and justification of the conventional framework. Nominal consists of two things: (1) it is real and (2) it is the cost of inflation. Being real represents the time value of money. This is a lease to use the money. It is clear that (interest) is *Riba* that is prohibited by law. Thus, there is no question of its existence under Shari'a compliant financial system. The second component is the cost of inflation. Inflation reduces the purchasing power of the currency and the owner of the lost wealth. It is the primary responsibility of the Islamic state to protect its citizens along with a wealth of life, faith, and honor the next generation or that we are familiar with the term maqasid shariah.

Under the financial system adherent towards shariah, CAPM modification is required. An investor who is willing to invest in the business, his main priority is to preserve the capital and then profit. In order to accommodate for the study, the following equation is formulated by Muhammad Hanif (2011) for a Shariah Compliant Asset Pricing Model:

$$[\mathrm{R}_i = \mathrm{N} + \beta_i(\mathrm{R}_\mathrm{m} - \mathrm{N})] \,. \qquad (9)$$

Where R_i is the *return* is the security; N is the inflation cost, ; R_m is the average return of market portfolio, and β_i is the security. For the proxy of inflation, it uses the price of consumers' stock (IHK).

The Shariah Compliant Asset Pricing Model (SCAPM) is a modification of the model Capital

Asset Pricing Model (CAPM). In addition, the basic assumption of CAPM is no inflation. Thus, in this study, the researchers did not use inflation but replace its factor to the rate of return on Bank Indonesia Certificates Shariah (SBIS). Randolph, Christopher & Tuomo (2004 p.16) explained that the CAPM was allegedly said to fail when using inflation proved by CAPM, having failed to precisely control the risk compensation required by investors.

According to Bank Indonesia Regulation No.10/11/PBI/2000 about Bank Indonesia Certificates of Shariah (Bank Indonesia Regulation 2000), it is described that Bank Indonesia Certificates of Shariah is hereinafter referred to SBIS are the securities based on Shariah principles in the short-term of Rupiah currency issued by Bank Indonesia. SBIS is issued by Bank Indonesia as one of the instruments in open market operations in the framework of monetary policy implementation based on Shariah Principles. SBIS issued by Bank Indonesia using *Ju'alah* contract.

In the National Shariah Board decree (Fatwa) No: 64/DSN-MUI/XII/2007, it describes the SBIS *Ju'alah*,. In this case, Bank Indonesia acts as *ja'il* (employer); Islamic Bank acts as *maj'ullah* (recipient of the work); and object/underlying *Ju'alah* (*mahall al-'aqd*) is the participation of Islamic Bank to assist in the task of Bank Indonesia monetary control. It is through the absorption of liquidity from the public and placing it in Bank Indonesia in the amount and time frames.

Therefore, the researchers propose the equation as follows:

$$\left[R_i = rSBIS + \beta_j (R_m - rSBIS)\right] . \quad (10)$$

Where $R_i$the security is *return*; $rSBIS$ is the return level of Bank Certificate of Bank Indonesia Syariah (SBIS); R_m is the average return of market ortofolio, and β_i is the Beta of security.

The Optimal Portfolio

1. Determining the Optimal portfolio

Optimal portfolio can be determined by an efficient portfolio. All the optimal portfolios are the efficient ones. It is due to each investor for having different curves. The optimal portfolio will be different for each investor. Investors who prefer taking risk will choose the portfolio with high returns by paying it even higher than the investors who do not like risk. If the asset is not risky, this asset can change the optimal portfolio that may be selected by the investor (Rifki 2014).

Determining the portfolio can be done in several ways, namely optimal portfolios based on investor preferences, the optimal portfolio based on the Markowitz model, the optimal portfolio with a risk-free asset, the optimal portfolio with their savings and risk-free lending. In this study, the researchers use optimal portfolios for determining, based on the investor's preferences.

2. Determining the Proportion of Stock in Portfolio

The researchers use mathematical techniques f Lagrange to get the proportion of shares and variance of the portfolio on a specific expected return on efficient set. Lagrange technique will produce a proportion of shares and minimum variance of portfolio for a variety of desired expected return (Zubir 2011).

Minimum variance portfolio is

$$\left(\sigma^2{}_p\right) = \sum_{i=1}^{n} \sum_{j=1}^{n} w_i \, w_j \sigma_{ij} \ . \quad (11)$$

Condition or Constraint to be fulfilled as follows:

$$\sum_{i=1}^{n} w_i \bar{R}_i - \bar{R}_p = 0 \ . \quad (12)$$

Constraint in this case states that the total multiplication of the proportion and the *expected return* for each stock in portfolio are the same with the portfolio return.

$$\sum_{i=1}^{n} w_i - 1 = 0 \ . \quad (13)$$

The constraint states that the total proportion of all stocks in the portfolio are the same that is one. By combining the third equation above, the *objective function* of the Lagrange equation can be stated as the following.

$$\text{Minimum Var} = \sum_{i=1}^{n} \sum_{j=1}^{n} w_i w_j \sigma_{ij} + \lambda_1 \left(\sum_{j=1}^{n} w_i \bar{R}_i - \bar{R}_p\right) + \lambda_2 \left(\sum_{i=1}^{n} w_i - 1\right). \quad (14)$$

The degree of λ_1 and λ_2 is the Lagrange *multiplier*. Lamda 1 (λ_1) is the risk price per unit for each unit as it is the *expected return*. For example, if the *expected return* increases one unit, the risk variance will increase to λ_1. Accordingly, Lamda 2 (λ_2) is the risk price for per unit for each the *expected return* which is related to the changes of the stock proportion in the portfolio. The change of the value λ_1 and λ_2 is the fixed for the change of portfolio return proportion.

The variance function has $(n + 2)$ variable which is not known that is $w_1, w_2, \ldots \ldots . w_n, \lambda_1$ andλ_2. By finding the derivation of the variance function toward $w_1, \lambda_1, \lambda_2$ and equating it with zero, it will result in $(n + 2)$ equation that provides a solution for $(n + 2)$ variable, which is not known in the variance function. The partial derivation of the variance function towards $w_1, \lambda_1, \lambda_2$ is as follows:

$$\frac{\partial Var}{\partial w_1} = 2w_1\sigma_{11} + 2w_1\sigma_{11} + \cdots + 2w_n\sigma_{1n} + \lambda_1\bar{R}_p + \lambda_2 = 0 \ . \quad (15)$$

$$\frac{\partial Var}{\partial w_2} = 2w_2\sigma_{12} + 2w_2\sigma_{22} + \cdots + 2w_n\sigma_{2n} + \lambda_1\bar{R}_p + \lambda_2 = 0 \ . \quad (16)$$

$$\frac{\partial Var}{\partial w_n} = 2w_n\sigma_{1n} + 2w_2\sigma_{n2} + \cdots + 2w_n\sigma_{nn} + \lambda_1\bar{R}_p + \lambda_2 = 0 \ . \quad (17)$$

$$\frac{\partial Var}{\partial \lambda_i} = w_1\bar{R}_1 + w_2\bar{R}_1 + \cdots + w_n\bar{R}_n - \bar{R}_p = 0 \ . \quad (18)$$

$$\frac{\partial Var}{\partial \lambda_2} = w_1 + w_2 + \cdots + w_n - 1 = 0 \ . \quad (19)$$

The above equation can be solved by linear equation using the matrices as follows:

$$\begin{pmatrix} 2\sigma_{11} & 2\sigma_{12} & 2\sigma_{n1} & \dots & 2\sigma_{1n} & \bar{R}_1 & 1 \\ 2\sigma_{21} & 2\sigma_{22} & 2\sigma_{n1} & \dots & 2\sigma_{2n} & \bar{R}_2 & 1 \\ 2\sigma_{31} & 2\sigma_{32} & 2\sigma_{n1} & \dots & 2\sigma_{3n} & \bar{R}_3 & 1 \\ \vdots & \vdots & \vdots & & & \vdots & \vdots \\ 2\sigma_{n1} & 2\sigma_{n2} & 2\sigma_{n3} & \cdots & 2\sigma_{nn} & \bar{R}_n & 1 \\ \bar{R}_1 & \bar{R}_2 & \bar{R}_3 & \dots & 2\sigma_{2n} & 0 & 0 \\ 1 & 1 & 1 & \dots & 1 & 0 & 0 \end{pmatrix} \times \begin{matrix} w_1 \\ w_2 \\ w_3 \\ \vdots \\ w_n \\ \lambda_1 \\ \lambda_2 \end{matrix} = \begin{matrix} 0 \\ 0 \\ 0 \\ \vdots \\ 0 \\ \bar{R}_p \\ 1 \end{matrix}$$

$$(M) \quad (w) \quad (k) \quad (20)$$

The matrix equation above, can be stated as $Mw = k$, so that $w = M^{-1}k$. Thus, the value of w can be attained by multiplying the matrix inversion of the variant-covariant with the vector of$k$. The solution for the matrices will result in the following:

$$w_1 = a_1 + b_1\bar{R}_p$$
$$w_2 = a_2 + b_2\bar{R}_p$$
$$w_3 = a_3 + b_3\bar{R}_p$$
$$\vdots$$
$$w_n = a_n + b_n\bar{R}_p$$
$$\lambda_1 = a_{n+1} + b_{n+1}\bar{R}_p$$
$$\lambda_2 = a_{n+2} + b_{n+2}\bar{R}_p \quad (21)$$

The calculation of the proportion of these shares may produce a positive value and/or negative of w. The proportion of negative stock means the shares short sale or purchased with borrowed funds (leverage portfolio). Another possibility that is encountered is a value of w greater than one, for example 1.25. This means that the funds used to buy the stock at 1.25 times of its own funds.

It is based on the risk profile and investment strategy of the optimal portfolio grouping. It is as follows: low return and low risk, low return but high risk, high return but low risk and high return but high risk (Ayoub 2007).

Literature Review

Muhammad Hanif (2011 p.283-292) discussed the technical assessment model of assets used under the conventional framework and its application within the framework of Islam. Islamic finance work within the framework of law and certain restrictions, including investing in legitimate business, the prohibition against predetermined fixed costs on capital and share, which is the result of the underlying project. There are models of technical equity prices that are more applicable under Shari'a frame. It is slightly modified return-risk free rate as under the Islamic financial system risk. Traditional CAPM is converted into SCAPM by eliminating the risk free rate and including the costs of inflation.

Rabeea & Sumera (2014 p. 194), empirically, evaluated Shariah Compliant Asset Pricing Model by using the data from Islamic stocks on the Karachi-Meezan Index. It was done by comparing the results of the rate of return for each model of Islamic Capital Asset Pricing Model (IACPM). For example the rate of return was done using risk free rate, rate of return without using a risk free rate and the rate of return by changing the risk free rate with inflation. The analysis showed that the rate of return was approximately the same when using the risk-free rate or the rate of inflation. However, the trend shows a constant when evaluated without using a risk free rate or the rate of inflation.

Muhammad Hanif & A. Dar (2012 p. 13) tested the CAPM and SCAPM at the Karachi Stock Exchange-Pakistan to document the results and findings by explaining more variation in stock returns. The finding was attractive because there were no significant results found to be higher and lower than the capitalization of the portfolio on each model. But, the result was statistically significant for medium-capitalization portfolio and strength SCAPM slightly better than the CAPM.

Tarek (2008, p. 128) described the application of Islamic financing methods based on Musharaka directly to the Capital Asset Pricing Model conventionally. It produced some interesting hypotheses. Their contracts would produce beta-sharing investment risk that is lower compared to the market.

Abdulaziz, Maysam and Hussein (2015) conducted an empirical study by comparing the model of Fama and French and the Capital Asset Pricing Model (CAPM) to Saudi Arabia Stock Market. It showed that the model of Fama and French has a clearer power and could explain the changes in stock returns than the CAPM. Larasati, Irwanto and Permanasari (2013) conducted a study on Optimizing Strategy Analysis Stock Portfolio LQ 45 (on the Indonesia Stock Exchange 2009-2011),

showing that Single Index Model is a good model selected as the optimal method of generating profit. Jay (2012) examined the Capital Asset Pricing Model (CAPM) which is the most widely used to make investment decisions on the National Stock Exchange.

Euginia, Darminto & Wi Endang (2014) conducted a study determining the Optimal Stock Portfolio with Markowitz Model as the Basis for Determining Investment (Studies in Food and Beverage Listed in Indonesia Stock Exchange in 2012). They described that obtaining the minimal risk was done before calculating the optimal portfolio. Investors can choose according to their preferences and determine which of the nine stocks such shares that would be an option to invest.

3. RESEARCH METHOD

Selection of Data

This is descriptive quantitative research conducted to determine the value of independent variables, either one or more variables (independent) without making comparisons or connecting it with other variables. It is then a quantitative descriptive that does not aim to test the hypothesis. It merely describes or simply identifies the data (Bungin 2005). The population consists of the stocks listed in the Jakarta Islamic Index (JII) at the Indonesian Stock Exchange (BEI). It used a purposive sampling for getting the sample with certain criteria (Nur & Bambang 2012). The criteria are: first, selected stocks that are always consistent entry in stocks JII and second, based on the stock consistent entered JII ,selected stocks have a mean value of a positive return.

The types of the data are the secondary ones taken from the websites of www.yahoo.finance.com and www.ojk.go.id. The data are from the shariah stocks listed in Jakarta Islamic Indeks (JII) in the Indonesia Stock Exchange (ISE) period of June 2013- May 2015. Data analysis is the SCAPM model. In model calculation, SCAPM is used with the help of Microsoft Excel, SPSS and Matlab R2010a.

Normality Test

Normality test is used to determine whether the data in the study has a normal distribution (Prayitno 2009). In this study, the test data normality for stock returns used the Jarque-Bera test statistic, performed by calculating skewness and kurtosis. Normal distribution of the residual data has a coefficient value of skewness =0 and kurtosis <3. If the value of skewness≠ 0 and kurtosis value= <3 this means that residual data is not normally distributed and showed the phenomenon of time varying volatility (Alghifari 2003).

$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right]. \quad (22)$$

Where:

Skewness $(S) = \frac{1}{ns^3}\sum_{i=1}^{n}(x_i - x)^3$

Kurtosis $(K) = \frac{1}{ns^4}\sum_{i=1}^{n}(x_i - x)^4$

With the: n : banyak data

s : Data of standard deviation

Hypothesis

Ho : The data were taken from the normal distribution from the population with normal distribution as well.

H1 : The data were taken from the population which is not normal distribution.

The judgment: Ho is rejected when the value of $JB > \chi^2$ db=2 for the certain value of α (significance level), or when the value of$P - value < \alpha$. Didier (2012) explained when the dtata is not normal, correction should be done towards α by using Cornish Fisher Expansion (α').

$$\alpha' = \alpha - \left(\frac{1}{6}(\alpha^2 - 1)\varepsilon\right). \quad (23)$$

Where:

α = Degree of Trust $\left(Z_{(1-\alpha)}\right)$

ε = Value of skewness.

The next steps are:

1. Determining Mean of the Return. This mean is used to view the average value of each stock and market index.
2. Determining the Varian of Stock Market. This is used to see the degree of the risk of each stock.
3. Determining the covariance of Stock Market Index. Covariance value is used to see the degree of the closeness between stocks with market indices. Covariance is a multiplication of stocks with a correlation coefficient variance.
4. Determining Beta, to see the degree of volatility between stocks and market indices.
5. Determine the Expected Return (Mean Return). Expected return value is determined by using a model of Shariah Compliant Asset Pricing Model (SCAPM).
6. Determining the Proportion that is the amount of the percentage of each stock included in the optimal portfolio.
7. Determining the Mean of Return Portfolio that is the amount of returns by the large proportion of each stock in the optimal portfolio.
8. Determining Portfolio Risk that is the sum of the variance and covariance in accordance with

Table 1
List of the Mean and Variances of Stock Returns

No	Kode	Names of Emittent	Mean	Variance
1	IHSG	Index of Composite Stock Price	0.243697750	0.006900573
2	UNVR	Unilever Indonesia Tbk	0.102767738	0.004694784
3	ITMG	Indo Tambangraya Megah Tbk	0.102767738	0.003302789
4	INTP	Indocement Tunggal Prakarsa Tbk	0.100323204	0.004445219
5	AALI	Astra Agro Lestari Tbk	0.098173849	0.004444113
6	SMGR	Semen Indonesia (Persero) Tbk	0.097813199	0.004174463
7	UNTR	United Tractors Tbk	0.096834641	0.004508561
8	ICBP	Indofood CBP Sukses Makmur Tbk	0.094414521	0.004746909
9	PTBA	Tambang Batubara Bukit Asam (Persero) Tbk	0.093884866	0.004174463
10	TLKM	Telekomunikasi Indonesia Tbk	0.093413686	0.003582475
11	INDF	Indofood Sukses Makmur Tbk	0.089024556	0.004844969
12	ASII	Astra International Tbk	0.088607829	0.044877719
13	AKRA	AKR Corporindo Tbk	0.086656132	0.004046724
14	PGAS	Perusahaan Gas Negara (Persero) Tbk	0.086305219	0.004080382
15	CPIN	Charoen Pokphand Indonesia Tbk	0.084969905	0.00097469
16	HRUM	Harum Energy Tbk	0.082623009	0.004429641
17	MNCN	Media Nusantara Citra Tbk	0.080630629	0.004231148
18	BMTR	Global Mediacom Tbk	0.078240460	0.00361789
19	BSDE	Bumi Serpong Damai Tbk	0.075958899	0.003824746
20	LSIP	London Sumatra Indonesia Tbk	0.075229409	0.003660627
21	LPKR	Lippo Karawaci Tbk	0.074899709	0.003264027
22	KLBF	Kalbe Farma Tbk	0.072654297	0.003154832
23	ANTM	Aneka Tambang (Persero) Tbk	0.071308988	0.00291776
24	ASRI	Alam Sutera Realty Tbk	0.069275579	0.002035443
25	ADRO	Adaro Energy Tbk	0.067912215	0.001753379
26	BKSL	Sentul City Tbk	0.056869754	0.003387153
27	EXCL	XL Axiata Tbk	0.022568903	0.003106399

Source: Processed data.

the proportion of each of the securities that make up the portfolio.

4. DATA ANALYSIS AND DISCUSSION

Descriptive Analysis

Table 1 shows the mean return of the stocks and the variance of 26 stocks selected and the market indexes (IHSG). Based on a list of 26 stocks that are always consistent in the list JII that has a positive return mean.

Based on Table 1, the mean value obtained is the largest stock return that is the stock with ITMG and UNVR with their same return means that is 0.102767738 and stocks that have the smallest mean of stock returns that is stock of EXCL that is equal to 0.022568903. Meanwhile, the stock whose the largest value of variance is equal to 0.004844969 for INDF stocks. The stocks those having the smallest variance value is the stocks of EXCL that is equal to 0.00097469. The stock of EXCL, besides having the smallest mean value of the return, it also has the smallest variance value. This indicates that the stock of EXCL does not only provide the smallest return, but also provides the smallest risk compared to that of other stocks or with another term of low return and low risk.

Based normality test, the significance level of P-value $\alpha = 5\%$, it yields the values for all stock returns that is less than 5%, so that all stock returns are not normally distributed. If the data is not normal, the correction is done using Cornish Fisher Expansion and the result is shown in Table 2.

Table 2
The Calculation of Cornish Fisher Expansion (α')

No	Code	Z-Score	Skewness	Z Correction	Criteria
1	UNVR	1.96	1.3263	1.2797	Normal
2	ITMG	1.96	17.3320	-3.6717	Normal
3	INTP	1.96	3.0326	0.7519	Normal
4	AALI	1.96	0.5529	1.5190	Normal
5	SMGR	1.96	0.1943	1.6299	Normal
6	UNTR	1.96	15.4625	-3.0933	Normal
7	ICBP	1.96	18.5011	-4.0333	Normal
8	PTBA	1.96	1.1838	1.3238	Normal
9	TLKM	1.96	2.3401	0.9661	Normal
10	INDF	1.96	7.3087	-0.5709	Normal
11	ASII	1.96	0.1538	1.6424	Normal
12	AKRA	1.96	1.7718	1.1419	Normal
13	PGAS	1.96	15.4822	-3.0994	Normal
14	CPIN	1.96	20.7090	-4.7163	Normal
15	HRUM	1.96	0.4065	1.5642	Normal
16	MNCN	1.96	20.0373	-4.5085	Normal
17	BMTR	1.96	14.3708	-2.7556	Normal
18	BSDE	1.96	0.1367	1.6477	Normal
19	LSIP	1.96	0.2673	1.6073	Normal
20	LPKR	1.96	1.2678	1.2978	Normal
21	KLBF	1.96	0.1643	1.6392	Normal
22	ANTM	1.96	0.5376	1.5237	Normal
23	ASRI	1.96	14.8509	-2.9041	Normal
24	ADRO	1.96	18.2351	-3.9510	Normal
25	BKSL	1.96	0.6956	1.4748	Normal
26	EXCL	1.96	0.8482	1.4276	Normal

Selection of the Portfolio

Based on a sample selection of JII stocks, which have a mean value of a positive return, the optimal portfolio analysis is done for the four-portfolio analysis. Selection of this portfolio uses typology analysis. This typology analysis is used to determine the description of the pattern and structure of economic growth in a region, known as the Klassen typology. Klassen Typology is basically divided into the areas based on two main indicators, namely economic growth and per capita income of the regions. Based on that idea, this uses two main indicators, namely return and risk for the issuer split into four groups of investment, namely low return and low risk, low return but high risk, high return but low risk and high return and high risk (see Table 3).

Determining the Optimal Portfolios with Shariah Compliant Asset Pricing Model

The CAPM model bases on the beta value as a factor considered able to make a major contribution to the risk of each of the securities on the market. It was the adoption of the model of Shariah Compliant Asset Pricing Model (SCAPM). The contribution of each security risk can be expressed by the degree covariance of the return of each stock with a market return σ_{iM}. Since the beta value is a measure of the relative risk to market risk, it can be formulated by being divided by the variants of the market returnσ_M^2.

Table 4 shows the mean value of beta and return of each stock that is based on the SCAPM model. Beta value is a measure of the degree of systematic risk, largest beta values of UNVR stocks, with the value of 0.107, while the smallest one is on a beta value of CPIN stocks, with the value of 0.01. The value of beta shows a high stock returns against market fluctuations. Based on the above analysis in Table 4, the beta value is below 1, this indicates that the fluctuation in return stocks does not follow the movement of market

Table 3
Selection of Portfolio

Portfolio	Code	Portfolio Stocks
High return and high risk	UNVR	Unilever Indonesia Tbk
	INDF	Indofood Sukses Makmur Tbk
	SMGR	Semen Indonesia (Persero) Tbk
	ASII	Astra International Tbk
	ICBP	Indofood CBP Sukses Makmur Tbk
	AALI	Astra Agro Lestari Tbk
	UNTR	United Tractors Tbk
	INTP	Indocement Tunggal Prakarsa Tbk
	ITMG	Indo Tambangraya Megah Tbk
	AKRA	AKR Corporindo Tbk
	PTBA	Tambang Batubara Bukit Asam (Persero) Tbk
	PGAS	Perusahaan Gas Negara (Persero) Tbk
	CPIN	Charoen Pokphand Indonesia Tbk
Low return but high risk	TLKM	Telekomunikasi Indonesia Tbk
	HRUM	Harum Energy Tbk
Low return and low risk	LSIP	London Sumatra Indonesia Tbk
	MNCN	Media Nusantara Citra Tbk
	BSDE	Bumi Serpong Damai Tbk
	BMTR	Global Mediacom Tbk
	KLBF	Kalbe Farma Tbk
	LPKR	Lippo Karawaci Tbk
	ANTM	Aneka Tambang (Persero) Tbk
	ASRI	Alam Sutera Realty Tbk
	ADRO	Adaro Energy Tbk
	BKSL	Sentul City Tbk
	EXCL	XL Axiata Tbk

fluctuations, or in other words the risk level is lower than the stock portfolio.

Considering the mean of return for the SCAPM model, UNVR stocks have the largest mean of return that is 0.02636922, and the stocks that have the smallest value of the return mean is CPIN stocks, with the value of -0.002104955. The degree of the return mean of UNVR stocks can be seen from its beta value. Likewise the CPIN stocks, CPIN stock has the smallest beta value compared to the other stocks, this is because the value of beta is a measure of systematic risk of each stock.

The list of of major proportions, the mean return and portfolio risk portfolio of each group can be seen in Table 5. Table 5 shows the degrees of each proportion, mean return and portfolio means based on each group of portfolio. The portfolio means of return are those of the second portfolio, with a mean return of portfolio 0.176722%, in addition to the portfolio groups, both have the largest mean return but also those with the smallest portfolio risk value of 0.0075%.

In Table 5, the selection of the portfolio will depend on investor preferences will. Investors are likely to want a high profit, the investors will tend to choose the second portfolio groups, with rate of 0.176722%. For investors who are likely to enjoy a substantial risk in the investment portfolio will tend to choose the first group with a great risk of 0.8501%.

The result above is interesting because it does not prove the portfolio theory by Markowitz which argues that when investors add an asset to the investment portfolio, the total risk of the portfolio will be reduced but the expectation of the return will also remain at the weighted average of the expected return of each asset in the portfolio. The reason of being not proved, because the Markowitz portfolio theory in this study is described

Table 4
Estimation of Value β_i and R_i for SCAPM Model

Code	$\beta_i = \frac{\sigma_{iM}}{\sigma_M^2}$	$R_i = rSBIS + (R_m - rSBIS)\beta_i$
UNVR	0.107	0.026369220
ITMG	0.094	0.023205422
INTP	0.101	0.024909006
AALI	0.101	0.024909006
SMGR	0.094	0.023205422
UNTR	0.097	0.023935529
ICBP	0.094	0.023205422
PTBA	0.091	0.022475315
TLKM	0.080	0.019798256
INDF	0.089	0.021988577
ASII	0.089	0.021988577
AKRA	0.083	0.020528363
PGAS	0.084	0.020771732
CPIN	-0.010	-0.002104955
HRUM	0.072	0.017851304
MNCN	0.075	0.018581411
BMTR	0.073	0.018094673
BSDE	0.076	0.018824780
LSIP	0.074	0.018338042
LPKR	0.072	0.017851304
KLBF	0.073	0.018094673
ANTM	0.064	0.015904352
ASRI	0.063	0.015660983
ADRO	0.068	0.016877828
BKSL	0.045	0.011280341
EXCL	0.020	0.005196115

Source: Processed data.

well by the market beta (Table 5). It is a measure of systematic risk, systematic risk which is the risk that cannot be diversified.

This risk occurs because of the events outside the company's activities, such as inflation, recession, and so forth. If looking at the period of research undertaken i.e. June 2013 to May 2015, the cause of the systematic risk in this study was due to the economic slowdown experienced by Indonesia in 2015 that was during which JCI was being consolidated. The rate hike the central bank United States (US) foreign investors divert some funds out of the instrument portfolio in Indonesia marked by net sales value (net selling) foreign investors in the domestic capital market amounted to Rp 22.58 trillion.

Two or three portfolio seems that there is only one stock in the portfolio, because when formatting the last proportions it was negative. The negative proportion will be eliminated and the proportion will be carried over because when there is a negative proportion it will potentially shorten the selling in which it is not allowed in Islam. This is similar to the research conducted by Massimo Guidolin and Francesca Rinaldi (2013) which stated that only under ambiguity, there might be an interval of prices at which the agent is not buying or short selling risk assets. By doing so, the equilibrium that failed can push asset prices outside. Finally, there will be no trade.

Stocks forming the first portfolio consist of four stocks, forming the portfolio, namely stocks INDF, AKRA, PGAS and CPIN. CPIN stocks have the highest return mean to the same level of risk, this is in accordance with the proportion of the portfolio held for those stocks, namely 37.32%, as well as with AKRA stock. The AKRA stock, which has a return mean, is very low. It is because these

Table 5
The List of Proportion, Mean Return and Portfolio Risks

Portfolio	Stocks	Portfolio Proportion	Portfolio Mean Return	Portfolio Risks
Portfolio 1	INDF	21.09%	0.086407%	0.0252%
	AKRA	10.17%		
	PGAS	31.41%		
	CPIN	37.32%		
Portfolio 2	HRUM	213.89%	0.176722%	0.0075%
Portfolio 3	EXCL	534.34%	0.120600%	0.8501%

Source: Processed data.

stocks have a very small proportion of the portfolio with the proportion of the stocks forming the other portfolio, which is up to 10.17%.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

Shariah Compliant Asset Pricing Model (SCAPM) is a modification of the Capital Asset Pricing Model (CAPM). It analyzes nominal value of R_f which consists of two aspects: (1) one is the real R_f, and (2) the the other is cost of inflation. The real R_f represents the time value of money and real R_f that is eliminated in the SCAPM and it only uses the cost of inflation. However, one of the basic assumptions of the CAPM is there is no inflation so that in this study, the researchers did not use the cost of inflation but replacing inflation with the rate of return on Shariah Bank Indonesia Certificates (SBIS).

The optimal portfolio analysis used a model of Shariah Compliant Asset Pricing Model (SCAPM) carried on the stock of shariah which has a mean value of a positive return. The stocks analyzed are grouped into three (3) groups of optimal portfolio using Klassen typology, which compares risk and return. The first portfolio analysis performed on portfolios that is formed in groups of high risk high return portfolios, among others are UNVR, INDF, SMGR, ASII, ICBP, AALI, UNTR, INTP, ITMG AKRA, PTBA, PGAS, and CPIN. The second portfolio analysis conducted on two stocks were included in the group of low risk and high return that TLKM HRUM. The third portfolio analysis conducted on stocks included in the group of low risk low return, namely stock LSIP, MNCN, BSDE, BMTR, KLBF, LPKR, ANTM, ASRI, ADRO, BKSL and EXCL.

Based on the degree of the return mean and portfolio risk, the portfolio groups are both in the category of low risk but high return. The first group of portfolio is categorized into low risk and low return portfolio. The third group falls into the category of high risk and high risk. Investors are likely to prefer a high return with low risk in which they tend to choose both the portfolio groups that is low risk but high return, with rate of 0.176722% risk level of 0.0075%.

Markowitz portfolio theory was not proved because the market beta was below one $(\beta < 1)$, in which the risk cannot be diversified as it is a measure of systematic risk, systematic risk This risk occurs because of events outside the company's activities, such as inflation, recession, and so forth. When viewing the period of research undertaken that was in June 2013 to May 2015, it can be drawn that the study can only explain the conditions of risk and return in the short term but cannot explain the project for the long-term risk and return.

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