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Portfolio Formation and Portfolio Return Modeling on Indonesian Capital Market

Renea Shinta Aminda
Program Doktor Ilmu Ekonomi Terapan , Universitas Padjajaran Bandung

renea_shinta@yahoo.com

Abstract. This study aims to find out how many n-size issuers and Portfolio-formation components in a portfolio in the Indonesian capital market to achieve a minimum level of risk with a certain rate of return; and to analyse Portfolio's behavior in Indonesia, related with Portfolios that provide the lowest risk level and certain returns using Autoregression AR(1), GARCH (p, q) and GARCH-M approaches.

The population in this study are all companies listed in Indonesia Stock Exchange during observation period (January 2008 to December 2016) which are 540 emitents from 9 sectors and then 50 issuers are selected as sample based on a proportional combination of 336 issuers which has active transactions and each transaction completed by its price, using purposive sampling technique. Analytical methods used starting from the formation of the portfolio with 9 sector diversification, followed by modeling portfolio return with Autoregression AR(1), GARCH (1,1) and GARCH-M.

The result shows that the optimal n-number of issuers in obtaining diversification benefit in the portfolio in Indonesia is 12 securities in a portfolio where the risk value is lower than the other n-number of issuers. Furthermore, the result of research indicates the combination form of issuers that provide the lowest risk and become the best portfolio in Indonesia, not only from certain sectors but also from a combination of sectors and in each portfolio formation there are financial sector, transport sector, and trade sector within. There is conditional mean and conditional variance in the portfolio return in Indonesia, where using model AR(1) the portfolio-10 is the most significant, while using GARCH (1,1) and GARCH-M model resulted in portfolio G as a good model according to SIA, AIC, and HQ criteria, and model portfolio D has the best modeling prediction accuracy.

Keywords; Diversification, Portfolio Formation, and Portfolio Return Modeling

Introduction

Background Research

One measure in measuring risk is by looking at the volatility of the returns that occur, thus investors in the face of risks and uncertainties in choosing and determining their investment shares, requires rationality based on 1) maximum returns at a certain level of risk or 2) at a minimum risk level with certain returns. (MarkowitzS, 1952). To reduce the risk on investment, theoretically, according to Mao (1970) (Poon, Taylor and Ward, 1992), it is done by diversifying shares through the formation of a stock portfolio, although the nature of the stock portfolio does not eliminate risk but is reducing. Thus to minimize risk and maximize the returns, it must be achieved by forming an optimal portfolio by simulating several available stocks to get the minimum risk value for certain returns, to get the value done by certain calculation procedures

The basic theory of portfolio selection was first coined by Harry M. Markowitz (1952). Portfolio selection discusses the problem of how to allocate funds to bring returns but with the smallest risk. The establishment of a portfolio involves identifying which shares will be selected and what proportion of the funds will be invested in each of these shares. Portfolio selection from many issuers is intended to reduce the risk borne. The first research is to determine how the most ideal number of shares in obtaining optimal diversification benefits is done by Evans and Archer (1968) where it is said in his research that there will be very few benefits of diversification, when the portfolio has reached eight to ten stocks with the same weight, even though randomly diversified. Evans and Archer's opinions above are supported by the results of Fisher and Lorie (1970) and Jacob (1974)

Elton and Gruber (1977) continued similar research with the above research where the results were also almost the same, namely some of the benefits of diversification in the form of a 51% total risk reduction, with a total portfolio share of 10 shares. Furthermore, when the portfolio amounted to 20 shares, the risk decreased to 56% or experienced a decrease of 5% compared to Portfolios with a number of 10. If the portfolio amounted to 30 he was only able to reduce the risk by 2% when compared to portfolio 20. So the benefits of diversification are almost non-existent in the portfolio with 50 shares. While Bloomfield et al (1977) stated that a portfolio of 20 stocks is the minimum required to obtain the benefits of diversification in equity. While Statman (1987) compares the marginal benefits of diversification to marginal costs and concludes that at least 30 stocks are needed optimally for portfolio diversification, investors can calculate the marginal benefits of diversification by comparing the expected results from a portfolio of 30 stocks, to the expected return of a 500-share portfolio , leverage so that the expected standard deviation is equal to the expected standard deviation of the 30 share portfolio.

Some research and other writings, which explain the size of the recommended minimum stock portfolio, can be explained as follows; 1). loy, Jennings, and Stevenson in (1989) stated that a good minimum number of shares was 8 to 16 shares, 2). M.D. Joenk and Gitman (1990) revealed the amount of the minimum number of shares in the portfolio should be as much as 8 to 20 shares to minimize risk, 3). Francis J.C (1991) and Chenney-Moses (1989) state that the recommended size of the minimum number of shares in the portfolio is 10 to 15 shares. 4). Pittalis-Reward (1990) states that the recommended value of the minimum number of shares in the portfolio is represented at least 12 to 15 shares 5). F.K Relly (1992) states that the number of minimum shares in the portfolio is 12 to 18 shares, 6). while 3 research results in the book written by French Dw (1989), G. Alexander. Share (1990) and Myers Sd-Brailey obtained a stock portfolio recommendation of at least 20 shares (quoted from Percy.s and Newbold, 1993), 7). Tandelilin (1998) states that in the Indonesian capital market the minimum number of shares in the portfolio is 15 shares and in the Philippine capital market the minimum number of shares in the portfolio is 14 shares.

Based on the research and the things mentioned above, it can be concluded that portfolios can be diversified in the amount of between 5 to 10 shares, or at least 12 shares to obtain a minimum risk value without reducing the amount of yield. This practice is very common for institutional investors and investment managers who manage equity funds because they can only invest in shares of up to 10%. Likewise the same thing, for institutional investors who manage pension funds or public funds such as insurance companies. But this does not happen to individual investors who hold the most five stocks or less, based on the amount of research that has taken place in the US, Germany, and France markets for three-four decades, investors have a low tendency to diversify perhaps because of the low value of their portfolios. In contrast, with the results of research and Vorkink Mitton (2007), where the average value of the stock portfolio of retail investors is large enough that the portfolio size is not a dominant factor. so it needs to be re-confirmed how many shares in the optimal portfolio in Indonesia can minimize the risk at a certain return

Problem Formulation or Problem Identification

Based on the above, then it can be formulated in the form of questions as follows:

1) What is the number of issuers and components that form portfolios in portfolios in the Indonesian capital market to achieve a minimum level of risk with a certain return?
2) What is the Portfolio behavior in Indonesia, is it linked to a Portfolio that provides the smallest risk level and a certain rate of return using the Autoregression, GARCH (p, q) and GARCH-M approaches?

Research purposes

In accordance with the formulation of the problem, this study has the following objectives:

1) To find out how many issuers and components form the portfolio in the Indonesian Capital Market portfolio to achieve a minimum level of risk with a certain return?
2) To find out how portfolio behavior in Indonesia is associated with portfolios that provide the smallest risk level and a certain rate of return using the AR (1), GARCH (p, q) and GARCH-M Autoregression approaches?

Methodology

Population and Research Sample

The population in this study was the stock price index on the Indonesia Stock Exchange from January 2008 to December 2016. The reason for the selection of 2008 to 2016 in the Indonesia Stock Exchange was because the length of the period (in monthly) research allowed observations of various influences to the next number of samples representing the population issuers on the Indonesia Stock

Exchange will be chosen based on representation Gay and Diehl (1992) in Hill Robin (1998) assumes that the more samples were taken, the more representative and the results can be generalized. But the sample size received will depend on the type of research. The opinion expressed by Gay and Diehl (1992) that descriptive research requires a sample of at least 10% of the population. So in the population consisting of 336, this Issuer required a minimum sample of 34 Issuers to meet 10% but to better represent the representation of all issuers in 9 sectors the researchers completed it into 50 samples of issuers or 14.8% of the population. In accordance with the provisions according to Gay (1976) of 10% if descriptive research can be represented 10 percent of the population (minimum 20% for a very small population) and for research the population represented 30 objects, in this case the number of issuers that exist, meet the qualifications and transaction criteria active company in other words companies or issuers with inactive trading and incomplete prices for the January period 2008 until December 2016 was excluded from the sample, and obtained a daily share price of 336 listed issuers

Return Expected (R_p)

Return expectations of the portfolio can be estimated by calculating the weighted average return of each individual asset in the portfolio, the percentage of portfolio value invested in each individual asset in the portfolio is referred to as the weight of the portfolio symbolized by "W" (Tandelilin 2010: 120)

The formula for calculating the expected return from a portfolio is as follows:

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

In This Case:

$E\ (R_p)$ = Expected *Return* of the portfolio
W_i = The i Emiten Portfolio Weight
$\sum W_i$ = Jumlah total bobot portofolio = 1,0
$E(R_i)$ = Expected *Return* From the i emiten
n = Number of emiten in the portfolio

Portfolio Return Variance (σ_p^2)

The formula for calculating portfolio risk consisting of n-issuers, the measure used is the return variance of the n-issuers in the portfolio mathematically are as follows (Tandeliling, 2010)

Varians *Return* Portfolio (σ_p^2)

$$\sigma_p^2 = \sum_{i=1}^{n} W_1^2\ \sigma_1^2 + \sum_{i=1}^{n}\sum_{j=1}^{n} W_1\, W_j \sigma_{ij} \text{.....(2)}$$

Which:

σ_p^2 = Varian's *return* portfolio
σ_i^2 = Varian's *return* Emiten i
σ_{ij} = Covariance betwenn *return* emiten I and j
W_i = Weight or portion of funds invested in Issuers i
$\sum_{i=1}^{n}\sum_{j=1}^{n} =$ double addition sign, means that n^2 will be added simultaneously (all pairs of I and j that may be paired)

If part of the first equation$\sum_{i=1}^{n} W_i^2\ \sigma_1^2$, we assume that the portfolio weight is the same for each issuer, and then the portion of the funds invested (w)

Will:

$$\sum_{i=1}^{n}((1/n)^2\,\sigma_i^2 = \frac{1}{n}\sum_{i=1}^{n}\sigma_i^2\ /n$$

Next, the equation is simplified to:

$$\sigma_p^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} W_i\, W_j \sigma_{ij}$$

Portfolio Variation Coefficient (CV_p) according to Tandelilin (2010)

This ratio is used to measure risk per unit relative to the level of portfolio return expectations:

$CV_p = \frac{\sigma_p}{E\ (R_p)}$ .....(3)

Where:

CV_p = Covarians Portofolio
σ_p = Portfolio standard varians

$E\ (R_p)$ = Expected *Return* Portfolio

Data analysis method

Data Testing

Stationary Testing

Statistically, the test to determine whether a data series has been stationary or not can be done by unit root test (unit root test). Root unit testing is done with the Augmented Dickey-Fuller Test approach which is formulated as follows:

$\Delta X_t = \alpha + \beta X_{t-1} + \delta_t + u_t$ ..... (4)

Where;

$\Delta X_t = X_t - X_{t-1}$, namely the difference in value between data series in period t with data series in period t-1

$$u_t = disturbance\ term$$
$$t = komponen\ trend$$

Heteroscedasticity Testing

The disturbing factor (error) in a regression model may have problems with violations of assumptions on errors. The heteroscedasticity problem occurs when the variation of the error is not constant for each observation or in other words, violates the var assumption (ut) = σ^2 If the error in a model contains heteroscedasticity problems.

Modeling Method

Stationary Linear Time Series Models

The stationary time series linear models are models that can be used for stationary data. Stationary data is data that has an average value that does not change over time. While the data is not stationary there is a trend or seasonal pattern data pattern (Santoso, 2005). The linear time series model used by the authors in this study is a stationary linear time series model, namely (Hanke et al, 2009):

Autoregressive or AR model (p)

AR (p) is the most basic linear model for stationary processes.
This model can be interpreted as the process of regression results in itself.
Mathematically can be written: (Abraham and Johannes: 199, 2005)

$X_t = \emptyset_0 + \emptyset_1 X_{t-1} + \emptyset_2 X_{t-2} + \cdots + \emptyset_p X_{t-p} + a_t$ .....(5)

Information

X_t = data pada periode *t,t*=1,2,3,....n
X_{t-1}= data pada periode *t-i, i* = 1,2,3,.....p
a_t = error pada periode *t*
$\emptyset_0$ = Konstanta
$\emptyset_1$ = Koefisien AR, *i* = 1,2,3,...,p

Model Autoregres (Autoregressive) Tingkat 1 (AR(1))

Model autoregresi tingkat 1 atau proses AR (1) secara matematis didefenisikan sebagai,

$X_t = \emptyset_0 + \emptyset_1 X_{t-1} + a_t$ .....(6)

Keterangan

X_t = data pada periode *t,t*=1,2,3,....n
X_{t-1}= data pada periode *t-1*
a_t = error pada periode *t*
$\emptyset_0$ = Konstanta
$\emptyset_1$ = Koefisien AR ke 1

Model Generalized Autoregressive Conditional Heteroskedasticity (GARCH)

To determine the true conditional return to NSE, AR (p) in the model's average GARCH (1,1) model is included, thus

$R_t = R_{t-1} + \varepsilon_t$

$\varepsilon_t \sim N\ (0, \sigma_t^2\ )$
Conditonal Mean aq
$R_t = a_0 + a_1\ R_{t-1} + e_t$.....(7)

Conditonal Variance aq
$\tau^2 e_t = b_0 + b_1\ \tau^2 e_{t-1} + b_2\ \tau^2\ e_{t-1+Z_t}$.....(8)

Where: R_t is the monthly rate of return, $R_{t-1}$is AR (p) the term in the equation means to take into account the dependence of the return time; ω is a constant variant that corresponds to the long-term average

Selection of the Best Model
Some criteria for selecting the best model using Akaike Information Criterion Schwarz Information Criterion, Hannan and Quinn Information Criterion

Measuring Accuracy Measures
Accuracy shows how close the value of the dependent / endogenous variable is predicted by the model with actual data. In this study using the Root Mean Square Error (RMSE), Mean Absolute Error (MAE) Mean Absolute Prediction Error (MAPE)

Results and Discussion
Determination of the size of the number of issuers in the establishment of Optimal Portfolios Comparative determination of stock size in the formation of a portfolio can be taken based on a simulation of the value of risk and portfolio return on ranking one combination of stock portfolios at each value of the stock size in the portfolio where the analysis can be seen in table 3 and figure 2 as follows

Table 3
Ranking One Value Risk and Return Portfolio at various sizes n in N 50 Establishment of Optimal Portfolios

No	Portfolio Combination Size	Portfolio Risk	*Return* Portfolio
1	Size n shares = 10 from N = 50 shares	0.0448791	0.0059531
2	Size n shares = 12 from N = 50 shares	**0.0278567**	**0.0055077**
3	Size n shares = 14 from N = 50 shares	0.2772008	0.019227
4	Size n shares = 12 from N = 50 shares	0.2457016	0.0179054
5	Size n shares = 12 from N = 50 shares	0.1981391	0.0164481

From table 3 and Figure 2 the value of risk and optimal portfolio return on various sizes of issuers in the portfolio with the lowest risk value in each portfolio category is the lowest portfolio risk is found in the size of the issuer as many as 12 shares of 50 existing issuers with a risk value (standard deviation of) 2.78% then for the second optimal portfolio size with a stock size of 10 shares out of 50 shares in the portfolio with a risk value of 4.48%, then the third portfolio that has the smallest risk is n size size n = 18 with the magnitude of portfolio risk 19.81% so that it also proves that the more value n in the portfolio, the smaller the risk faced by the analysis will be different from the research conducted by Tandelilin regarding the size of the optimal portfolio in Indonesia as many as 14 shares in its portfolio.

Modeling Portfolio Returns n = 12 from N = 50 Issuers.
Portfolio return modeling as many as 12 Optimal Portfolio Combinations can be seen from the risk value (the smallest standard deviation), looking for the value of return per month for each of the best portfolio combinations starting from January 2008 to January 2016 or 108 months, where the return value from the portfolio combination per month for the 10 optimal portfolios (A - J) of the optimal N portfolio the minimum risk can be seen in the table as follows

Table 3 shows the combination of the optimal portfolio selected with the best stock combination results and produces the lowest risk value with a certain return value so that it becomes an option and information for investors in trading on the stock market. Statistical Description 10 Return Optimal Portfolios (Portfolio A - J) Value description of portfolio return data statistics during January 2008 to December 2016 consists of, among others, average values for 10 portfolio returns (mean), median values for 10 portfolio returns, maximum values and minimum 10 portfolio returns, variance statistical values portfolio return for 10 portfolio returns (Return Portfolio A - J)

Table 3 Issuer Combination in 10 Optimal Portfolios (A-J) (n = 12 from N = 50)

Portfolio	----------	Stock Combination	----------
A	BTON ALMI ETWA SQBB	MCOR NISP CMNP SMMT	IKBI MPPA PANR INTD
B	BTON TRST ALMI ETWA	MCOR HMSP NISP CMNP	IKBI TIRA MYRX PANR
C	BTON ALMI INCI ETWA	MCOR NISP TRUB CMNP	IKBI MPPA MYRX TURI
D	BTON TRST ALMI INCI	MCOR HMSP NISP TRUB	IKBI TIRA MYRX SDPC
E	BTON TRST SQBB MERK	MCOR HMSP SMMT BUMI	IKBI PNSE BHIT INTD
F	PICO ALMI ETWA SQBB	ABDA NISP CMNP SMMT	IKBI COWL TIRA INTD
G	BTON ALMI ETWA MERK	MCOR NISP CMNP BUMI	IKBI MPPA PANR TURI
H	BTON TRST ALMI SDRA	MCOR HMSP NISP ENRG	IKBI TIRA BHIT PANR
I	BTON TRST SQBB WOMF	MCOR HMSP SMMT SMSM	IKBI PNSE SDPC INTD
J	PICO TRST ALMI ETWA	ABDA HMSP NISP CMNP	IKBI MDLN TIRA MYRX

Data Source: data analysis process data 13

Data Analysis and Modeling Returns on Optimal Portfolios (Portfolio A - J)
Stationary Testing Returns 10 Optimal Portfolios (A-J Portfolio)

Based on stationary testing using Augmented Dickey-Fuller Test on Intercept return ten optimal data portfolios presented in table 5 above shows the results that the ten observed portfolio return data have been stationary. This is because the results of the absolute value of the ADF test statistics the ten optimal portfolio returns show a value greater than the absolute value of the critical value (critical value) at the 5% significance level in other words on the stationary test, the entire test results reject H_0, which means it is not there is a unit root in the data of 10 optimal portfolio returns observed at a 5% significance level, but in portfolio I has a root unit at 1% significance of -3.493747 greater than the ADF Statistics Test -3.067016 value

Table 4 Testing Results The optimal portfolio return data stationarity (Portfolio A-J) using Augmented Dickey-Fuller Test

Data Return	ADF Test Statistic	5% Critical Value	Information
Portfolio A	-8.613482	-2.888669	Data Stasioner
Portfolio B	-8.180973	-2.888669	Data Stasioner
Portfolio C	-7.345209	-2.888669	Data Stasioner
Portfolio D	-3.678010	-2.888669	Data Stasioner
Portfolio E	-8.760170	-2.888669	Data Stasioner
Portfolio F	-8.100301	-2.888669	Data Stasioner
Portfolio G	-7.819288	-2.888669	Data Stasioner
Portfolio H	-7.619516	-2.888669	Data Stasioner
Portfolio I	**-3.067016**	**-2.888669**	**Data Not Stasioner***
Portfolio J	-6.953746	-2.888669	Data Stasioner

Source: www.icmd.co.id Data processed with Eviews 9

Portfolio A - J Heteroscedasticity Testing

Furthermore, to prove the indication, a statistical testing pattern was used using Heteroskedasticity Test to observe the problem of heteroscedasticity on ten portfolio returns. In this statistical test, the condition of heteroscedasticity occurs when the results of the white heteroskedasticity test show that the probability value (p-value) of Obs * R-squared is smaller than the significance level of 5%. White Heteroskedasticity Test Results on return 10 optimal portfolios were observed and presented in table 5 as follows;

From the results of testing heteroscedasticity statistically using White Heteroskedasticity test, obtained results there are 4 portfolios of returns that have heteroscedasticity problems in error, namely portfolio return C, portfolio return D, portfolio return G and portfolio return H, It is seen from the results of the probability (p-value) of the Obs * R-Squared return data for each of these portfolios whose value is significance level of 10%. Whereas for some other stock portfolios, namely portfolio returns A, portfolio return B, return E-portfolio, portfolio return F, portfolio return I and portfolio return have had homoskedasticity or in other words the variance of errors in stock portfolio returns already constant all the time. This is an indication of the Obs * R-squared of the eight stock portfolios which have a value greater than the significance level of

5%. So it can be concluded that the modeling of the modeling process can be continued with Autoregression Models on Portfolio A, Portfolio B, Portfolio E, Portfolio F, Portfolio I and Portfolio which do not have heteroscedasticity problems, then return modeling with GARCH (1, 1) and GARCH- Can be done on portfolio C, portfolio D, portfolio G and portfolio H because it has heteroscedasticity problems

Table 5 Heteroscedasticity Test Results Returns 10 Optimal Portfolios using White Heteroscedasticity Test

Data *Return*	Obs*R-Squared	Probability	Information
Portfolio A	0.878011	0.3534	Homokedastis Data
Portfolio B	0.147608	0.7041	Homokedastis Data
Portfolio C	**9.481911**	**0.0080**	**Heteroskedastis Data**
Portfolio D	**5.067856**	**0.0802**	**Heteroskedastis Data**
Portfolio E	0.368039	0.8360	Homokedastis Data
Portfolio F	0.469353	0.7956	Homokedastis Data
Portfolio G	**9.636677**	**0.0074**	**Heteroskedastis Data**
Portfolio H	**5.053645**	**0.0808**	**Heteroskedastis Data**
Portfolio I	3.107079	0.2160	Homokedastis Data
Portfolio j	0.774642	0.6853	Homokedastis Data

Source: www.icmd.co.id Data processed with Eviews 9

Comparison of GARCH (1.1) and GARCH-M Modeling Based on the Best Modeling Criteria and Model Forecasting Accuracy

To get the best return modeling from 10 optimal portfolios, GARCH (1,1) and GARCH-M analysis will be compared to the best value of each modeling method and seen in the following table

Table 6
Comparison of 2 Model GARCH (1.1) and GARCH-M Portfolios
Based on the best modeling criteria
(Smallest SIC, AIC and HQ values)

Variable	AIC	SIC	HQ
Portofolio G (GARCH (1,1))	**-2.602990**	**-2.478092**	**-2.552358**
Portofolio H (GARCH (1,1))	**-2.654268**	**-2.529370**	**-2.603636**
Portofolio G (GARCH-M)	-2.723389	-2.573510	-2.662630
Portofolio C (GARCH-M)	-2.728913	-2.579035	-2.668155

Data Source: Data Analysis analysis Eviews 9

From Table 6 above it can be concluded that the best portfolio return volatility modeling according to the modeling criteria is G Portfolio with GARCH (1,1) having AIC (-2.602990), SIC (-2.478092) and (HC -2.552358) while for modeling return volatility according to forecasting accuracy best can be seen in the following table;

Table 7
Comparison of 2 Model GARCH (1.1) and GARCH-M Portfolios
Based on forecasting accuracy criteria
(Smallest RSME, MAE and MAPE values)

Variable	RSME	MAE	MAPE
Portfolio D (GARCH(1,1))	**0.063634**	**0.045677**	**153.6321**
Portfolio C (GARCH(1,1))	0.076240	0.047713	217.9216
Portfolio H (GARCH-M)	**0.064562**	**0.046098**	**346.5980**
Portfolio C (GARCH-M)	0.065265	0.047260	248.9908

Data Sources: Data Analysis Eviews

From table 7 above, it is known that modeling returns according to the accuracy of size forecasting, Portfolio D of GARCH method (1.1) has the smallest value for RSME size of 0.03634, MAE of 0.045677 and MAPE

of 153.6421 compared to H Portfolio of GARCH-M method which occupies the second position for accuracy. forecasting, with GARCH analysis method (1,1) obtained the accuracy value of the best model. This means that the D Portfolio model that is formed is able to have good forecasting accuracy

Discussion of Amount Analysis n Issuers and Components Forming Portfolios in portfolios in the Indonesian Capital market to achieve minimal risk levels with certain returns

From the results of research conducted through a series of processes and procedures in the formation of portfolios in accordance with Markowitz portfolio theory including calculation of returns, correlation between issuers, portfolio deviation standards, portfolio variance and covariance, the optimal number of shares available in the portfolio through technical and fundamental analysis can be concluded as much as 12. In theory, almost all investors understand the benefits of diversification in reducing risk, in practice, many investors as transactors in the Indonesian capital market do not implement it. After simulating the various sizes of issuers in one portfolio (with sizes N = 10, N = 12, N = 14, N = 16 and N = 18), out of 50 samples of issuers that are available, the results show that the smallest risk value is in line with the objectives of portfolio formation by (Poon, Taylor and Ward, 1992) which states, that to avoid risk to investment is done through diversification of shares by forming a portfolio, from the value of the distribution of value risk to see the lowest risk in the portfolio that is formed obtained the lowest risk is in the size of 12 issuers in one portfolio, the hypothesis that was formed was in accordance with the results of The Rewards and Pitfalls of High Dividends Stocks, The Wall Street Journal, August 2, 1990, was 12-15 shares, then FK Reilly, Investment Analysis and Portfolio Management, 3rd ed., Chicago, IL, The Dryden Press pad in 1992 for 12-18 shares and J. Bamford, J. Blyskal, E. Card, and A. Jacobson, Complete Guide To Managing Your Money, Mount Verrnon, NY, Consumers Union in 1989 was 12 or more.

The results in the above studies are very different from the findings of this study, which turns out that with the number of shares as many as 10 in the portfolio, the risk faced by investors is in the second position with a risk of 4.48%. in portfolios represented by all sectors in the capital market in Indonesia or the sector rotation strategy is not an assumption of the approach in calculating and forming portfolios in previous research.

Meanwhile, Bloomfield et al (1977) stated that 20 shares were needed to get the benefits of diversification in equity. Statman (1987) argues that no less than 30 shares are needed to obtain optimal benefits from diversification. Furthermore, according to Campbell et all (2001), the perception that most non-systematic risks can be eliminated when the portfolio contains 10 or 100 shares, according to him is meaningless without understanding the benefits and costs of diversification. Campbell also believes that it is almost the same as Statman that the optimal number of shares is around 50 shares. According to Statman, the decline in the correlation coefficient between shares on the stock exchange, increasing the benefits of diversification, can also be seen in the correlation values between issuers forming portfolios in 10 optimal portfolios the size of N-12 in a portfolio which have weak and negative correlation values

Then the combination of N portfolio shares with the smallest risk on size N = 12 is a portfolio on NPK (929), which consists of issuers of BTON (Basic Industry) - ALMI (Basic Industry) - ETWA (Basic Industry) - SQBB (Consumer Good) - MCOR (Finance) - NISP (Finance) - CMNP (Infrastructure) - SMMT (Minning) - IKBI (Misscelenous) is a combination of n sizes of 12 issuers per portfolio, obtained from 8 industrial sectors, with the largest percentage of basic industry sectors represented by 3 issuers resumed with the financial sector represented 2 issuers in the second place, with a large risk of 2.78%. so that the combination of several portfolio sectors in the formation of optimal portfolios is in accordance with what Evan and Archer conveyed in 1968 in making portfolios from one industry or one sector no problem in calculating risk reduction, but the impact on returns will face things if economic growth rates experiencing a decline will have direct implications for the returns obtained by investors.

Portfolio behavior discussion in Indonesia is associated with a portfolio that provides the lowest risk level and a certain return level using the AR (1), GARCH (p, q) and GARCH-M Autoregression approaches

The modeling of the return ten portfolios was carried out using three models, namely the AR (1) autoregression model, Generalized Autoregressive Conditional Heteroscedasticity (GARCH) (p, q) and GARCH-Mean models. In the aim of making forecasted portfolio returns, first autoregression is done on the next 6 optimal portfolio results, where the autoregression equation prediction results can be seen in the summary of the results of the autoregression equation for return modeling can be seen in table 8 as follows;

Table 8
AR Autoregression Model (1)
Optimal Formation Return Portfolio

Portfolio	Konstanta	T Statistik	Koefisien	T Statistik	R-*squared (%)*
A	0.023***	3.222	0.170*	1.768	2.9
B	0.019***	3.125	0.222**	2.339	4.9
E	0.021***	3.172	0.152	1.577	2.3
F	0.024***	3.336	0.230**	2.428	5.3
I	0.028 ***	3.794	0.242**	2.550	5.8
J	0.017***	2.868	0.371***	4.103	13.8

Source: Data transmission Eviews 9 (attachment)
α =0.01*** 0.05** 0.10*

From table 8 above obtained the value of optimal portfolio return modeling that is the best and has the accuracy of the model specification and forecasting is portfolio 10 with a regression coefficient of 13.8 percent meaning that the ability of past yield variables explain the current return / return of 13.8% with the value of cost and a significant coefficient at a confidence level of 0.000, followed by portfolio I with the value of the contribution of the magnitude of the effect of the independent variable can explain the magnitude of the current yield of 5.8%.

Table 9
Estimated Model GARCH (1,1)
In Portfolios with (α + β) <1
and the smallest SIC, AIC, and HQ values

Variable	α	β	$\alpha + \beta$	AIC	SIC	HQ
Portofolio C	0.863	0.102	0.965	-2.662293	-2.537394	-2.611661
Portofolio D	1.053	-0.052	1.001	-2.911216	-2.786317	-2.860583
Portofolio G	**0.809**	**0.164**	**0.973**	**-2.602990**	**-2.478092**	**-2.552358**
Portofolio H	0.734	0.254	0.989	-2.654268	-2.529370	-2.603636

Source of data: Operate data eviews 9

Table 10
GARCH - M Model Estimates
In Portfolios with (α + β) <1 and
The smallest SIC, AIC and HQ values

Variable	α	β	$\alpha + \beta$	AIC	SIC	HQ
Portfolio C	0.896	0.059	0.956	-2.728913	-2.579035	-2.668155
Portfolio D	0.940	0.019	0.959	-2.931507	-2.781627	-2.870748
Portfolio G	**0.871**	**0.088**	**0.960**	**-2.723389**	**-2.573510**	**-2.662630**
Portofolio H	0.895	0.069	0.965	-2.729341	-2.579463	-2.668583

Source of data: Operate data eviews 9

From table 9 and table 10 the estimation of GARCH (1,1) and GARCH-M modeling above has a value of α + β almost close to 1 or its value <while Portfolio G in GARCH method (1,1) and for GARCH-M the entire portfolio has value less than 1, From the value of the best modeling criteria, that the G Portfolio value with GARCH (1.1) has AIC (-2.602990), SIC (-2.478092) and (HC -2.552358) small compared to the values of AIC, SIC and HC other Portfolios . So it can be concluded that with the Autoregression method, Portfolio J is obtained as a portfolio with the equation with the best yield forecast seen from the mineralized coefficient and T statistic value and with GARCH (p, q) and GARCH-M methods, the G portfolio and D portfolio can be used as the best recommendation. in determining the volatility modeling portfolio return seen from the Best Modeling Criteria, Model Forecasting Accuracy Criteria with Jargue values with good normal distribution and the highest Log Likelihood.

Conclusion

This research is based on the formation of optimal portfolios, which are obtained from selected stocks in the 9 existing industrial sectors in the Indonesian securities market, followed by modeling the return portfolio formed and assessing the performance of the portfolio resulting from the formation. Based on the results of the analysis, several conclusions can be made as follows;

1. In the portfolio in the Indonesian capital market to achieve a minimum level of risk with a certain return is as many as 12 issuers in one portfolio where the formation combination consists of 6 industrial sectors, while the conventional issuer's portfolio size is 10 in its portfolio, with a combination of portfolio formers consists of 3 industrial sectors,
2. Portfolio Behavior in Indonesia, associated with Portfolios that provide the smallest risk level and a certain rate of return using the Autoregressive AR approach (1) obtained by the best Portfolio J, and with GARCH (p, q) and GARCH-M Approaches obtained that the portfolio G and D portfolio can be used as the best recommendation in determining portfolio return modeling seen from the best modeling criteria and model forecasting accuracy

References

[1] Arikunto Suharsimi. (2006), "Prosedur Penelitian; Suatu Pendekatan Praktek", Yogyakarta: Rineka. Cipta

[2] Arago, Vicent- Nieto Luisa (2005), "Heteroskedasticity in the return of the main world stock exchange indices": Volume versus GARCH Effect', International financial, market, institution and money volume 15 page 271-284

[3] Ariefianto, Moch. Doddy. 2012." Ekonometrika esensi dan aplikasi dengan menggunakan EViews. Jakarta: ERLANGGA

[4] Brailsford, T.J., (1996), " Empirical Relationship between Trading Volume, Returns, and Volatility," Journal of Accounting and Finance, Vol.35, 89-111.

[5] Campbell, John Y., Martin Lettau, Burton G. Malkiel, and Yexiao Xu, (2001), "Have individual stocks become more volatile? an empirical exploration of idiosyncratic risk", The Journal of Finance 56, 1–43.

[6] Chan and Fong, (2000), "Trade Size, Order Imbalance and Volatility-Volume Relation," Journal of Financial Economics, Vol. 57, No.2, 247-273.

D. Hamadu, (2010) "Modelling and Forecasting the Volatility of the Daily Returns", *International Business Research*, Vol. 3 No. 2 106-116

[7] David Mcmillen and Alan Speight, (2002), "Return-Volume Dynamics in UK Futures," Applied

[8] De Vassal, Vladimir, (2001), "Risk Diversification Benefits of Multiple-Stock Portfolio", Journal of Portfolio Management 27, 32-39.

[9] Eldon S. Hendriksen, Michael F Van Breda, 2000. Teori Akunting, Jilid Dua.Batam: Interaksara.

[10] Elton dan Gruber, 2010:55 Elton, Edwin J., and Martin J. Gruber. 1995. "Modern Portfolio Theory and Investment Analysis". Toronto: John Wiley & Sons

[11] Fabozzi, Frank J., (1999), " Investment Management" 2nd Edition (Prentice Hall), Englewood Cliffs

[12] Fabozzi, Farank J (2001) "Investing in Commercial Mortgage-Backed Securities "ISBN: 978-1-883-24988-5 Dec 2000 269 pages

[13] Gay, L.R. and Diehl, P.L. (1992) Research Methods for Business and Management. Mc. Millan Publishing Company, New York

[14] Husnan, Suad. 2006 Dasar - Dasar Teori Porotofolio dan Analisis Sekuritas Edisi Revisi. Yogyakarta: AMP YKPN

[15] Hartono, Jogiyanto. (2003).Teori Portofollio dan Analisis Investasi Edisi kelima. Yogyakarta: BPEE

[16] Hartono, Jogiyanto, (2008)," Teori Portofolio dan Analisis Investasi', Yogyakarta BPFE Yogyakarta

[17] Hsee, Christoper dan ElkeU. Weber, (1998)" Cross-cultural Differences in Risk Perception, but Cross-cultural Similarities in Attitudes Towards Perceived Risk", Management Science, Vol. 44, No. 9, September, pp. 1205 – 1217

[18] Jogiyanto Hartono, 2013. "Teori Portofolio dan Analisis Investasi", BPFE Yogyakarta, Edisi Kedelapan, Yogyakarta

[19] Kaluo, Eminike (2014), " The Relationship Between Stock Return Volatility and Trading Volume in Nigeria", Verslo Sistimos ir Ekonomika Business System And Economic Vol 4 (2)

[20] Mwamba IA, Pretorius J Cornis, (2011)," Challenges of Executive Information systems in Listed Johannesburg Stock", Research report final, University of the Witwatersra

[21] Mao, James, C.T (1970) "Essential of Portfolio Diversification Strategi", Jurnal Bussines and Economic Volume 25 page 236

[22] Notoatmodjo, Soekidjo (2010), " Metodologi Penelitian Kesehatan," Rineka Cipta, Jakarta, 2010
[23] Ross, StephenA., Randolp W. Westerfield, Bradford D. Jordan, and Gordon S, Roberts, (2002)," Fundamental of Corporate Finance", Fourth Canadian Edition (McGraw-Hill Ryerson, Toronto, Ontario)
[24] Reilly, Frank K., and Keith C.brown, (2000)," Investment Analysis and Portfolio Management, Sixth Edition, (Harcourt College Publisher, Orlando, FL).
[25] Roshandi (2015) " Investasi di pasar modal" Market bisnis.com
[26] Sharpe, William F., Gordon J. Alexander, Jeffery V. Baily, David J. Fowler, and Dale L. Domian, (2000) 54
[27] Statman, M. (2004), "The Diversification Puzzle", Financial Analysts Journal, 60, 44-53.
[28] Tandelilin, Eduardus (2010), " Portofolio dan Investasi teori dan aplikasi" Penerbit Kanisius (Anggota IKAPI) ISBN 978-979-21-2478-1
[29] Tse., Daisy S.L. (2002)," Portfolio Diversification For Long Holding Periods: How Many Stocks Do Canadian Investors Need?", The University of Saskatchewan.
[30] Wijanarko, Yuganur (2015)," Rekomendasi Jumlah Saham dalam Portofolio", HD Capital
[31] Winarno,W.W. 2011. Analisis Ekonometrika dan Statistika dengan Eviews Edisi Ketiga, Cetakan pertama.UPP STIM YKPN.Yogyakarta