Binus Business Review, 9(1), March 2018, 19-27
DOI: 10.21512/bbr.v9i1.3960
P-ISSN: 2087-1228
E-ISSN: 2476-9053

Do Leading Macroeconomic Factors Impact on Optimal Portfolio Return in Indonesia?

Bayu Adi Nugroho[1]; Edhi Juwono[2]; Inung Wijayanti[3]

[1,2,3]Faculty of Economics and Business, Perbanas Institute
Jl. Perbanas, Jakarta Selatan 12940, Indonesia
[1]bayunugrohomito@gmail.com; [2]edhi.juwono@gmail.com; [3]inung@perbanas.id

Received: 4th September 2017/ **Revised:** 4th January 2018/ **Accepted:** 5th January 2018

How to Cite: Nugroho, B. A., Juwono, E., & Wijayanti, I. (2018). Do Leading Macroeconomic Factors Impact on Optimal Portfolio Return in Indonesia? *Binus Business Review, 9*(1), 19-27. https://doi.org/10.21512/bbr.v9i1.3960

ABSTRACT

There were two objectives in this research. Those were to construct an optimal portfolio and to analyze the impact of inflation, Bank of Indonesia (BI rate), and Rupiah to US Dollars exchange rate to the optimal portfolio return in Indonesia. The constant correlation portfolio model and ordinary least square regression method were implemented. This research used the stocks from the consistently selected stocks in the Bisnis-27 Index from 2012 to 2016. Microsoft Excel 2010 was used to construct an optimal portfolio. Meanwhile, to compute the regression and statistical analysis, SPSS version 20 was utilized. The obtained results show that only the stocks from PT Telekomunikasi Indonesia, PT Kalbe Farma, PT Charoen Pokphand Indonesia, PT Bank Rakyat Indonesia, PT Bank Central Asia, and PT Bank Negara Indonesia are included in the optimal portfolio. In addition, from the three leading macroeconomic indicators, only exchange rate change (Rupiah to US Dollars rate of change) impacts the return of the constant correlation model portfolio in Bisnis-27 Index significantly and negatively.

Keywords: macroeconomic factors, optimal portfolio, inflation rate

INTRODUCTION

The Indonesian Stock Market has been showing growth in the past few years. As reported from The Indonesian Stock Market official website, Indeks Harga Saham Gabungan (IHSG - IDX Composite Index or formerly known as Jakarta Composite Index) had an increased rate of 15,32% in 2016 (Rachman, 2016). The average of the daily transaction in 2016 was valued around Rp7,5 trillion (Masyrafina, 2017). Meanwhile, Quddus and Indrastiti (2016) said it was only valued about Rp5,76 trillion in 2015. In fact, Indonesian Stock Market had the highest IHSG value in the Indonesian capital market history in the first half of the year 2017 which was at 5.910 (Melani, 2017).

Comparing to investing in time deposits and bonds, Indonesian Stock Market offers better returns. In 2016, the average returns of time deposits and government bonds were roughly 7% yearly (Kusuma, 2016). However, the Indonesian Stock Market had 15% of the return (Rachman, 2016). In 2016, Indonesian Stock Market returns were the fifth highest in the world and the highest in the Asia Pacific (Rachman, 2016). Based on the statistics, it is highly likely that investing in Indonesian Stock Market is very profitable.

There are so many stocks traded on Indonesia Stock Exchange. It will not be efficient and effective to buy all the stocks traded. It is also not optimal if the traders buy only one stock. An optimal portfolio by investing in a group of stocks is required to gain positive return and to get diversification (Septyanto & Kertopati, 2014).

The correlation model is used for constructing optimal portfolio. Elton *et al*. (2014) stated that this model relied on excess return to standard deviation (ERS) ratio. The excess return is the difference between the average return of stocks. It is with the return of risk-free rate. The basic assumption for this model is that the correlations between stocks are constant.

This research constructed an optimal portfolio based on the Bisnis-27 Index. It is because the stocks within the Bisnis-27 Index are expected to have a positive return. It can be seen in the research by Mulyono (2015). The result indicated that Bisnis-27 Index return was highly and positively related to IHSG. Moreover, Bisnis-27 Index is one of the indexes in Indonesian Stock Market that consists of 27 selected stocks from various public companies. This index is managed by Harian Bisnis Indonesia in cooperation with PT Bursa Efek Indonesia (Rifaldy & Sedana, 2016). The stocks within the index are rearranged every six months. The new list of the stocks is published at the end of April and October every year. Moreover, the index can be seen at Indonesian Stock Market official website, www.idx.co.id,.

There are many researches about portfolio construction in Indonesia. Single Index Model, Constant Correlation Model and Markowitz Model are mainly used for the construction of optimal stock portfolio in Indonesia. For example, Septyanto and Kertopati (2014) found that banking stocks namely Bank Central Asia, Bank Negara Indonesia, and BMRI were included in the optimal portfolio. Meanwhile, Pratiwi and Yunita (2013) also found that banking stocks such as Bank Negara Indonesia, Bank Central Asia, and Bank Rakyat Indonesia were chosen in the optimal portfolio. Similarly, the findings in Paramitha and Anggono (2013), Kewal (2013), and Darmawan and Purnawati (2015) showed that at least one banking stock was selected in the optimal portfolio. In addition, Pratiwi, Dzulkirom, and Azizah (2014) found that PT Unilever Indonesia Tbk (UNVR) had the largest proportion in the optimal portfolio in Jakarta Islamic Index. Recently, Rifaldy and Sedana (2016) constructed an optimal portfolio in Bisnis-27 Index using Markowitz model. They concluded that the Bisnis-27 Index stocks could produce positive return above the market or IHSG.

Macroeconomic factors empirically can affect stock returns. It is as indicated by Artaya, Purbawangsa, and Artini (2014). This research will use leading macroeconomic variables in Indonesia such as inflation, Bank of Indonesia (BI rate), and Rupiah to US Dollars exchange rate (Kalra, 2012). The researchers want to analyze the impact of those factors on optimal portfolio return. However, the researchers cannot find similar research when the researchers use onesearch.id as a search engine. As a result, the researchers use the research that analyzes the impact of macroeconomic factors on stocks indexes in Indonesia. It will be the comparisons for testing the hypotheses.

The interest rate is an important indicator of the macroeconomic condition in a country. The interest rate released and announced by Bank of Indonesia or BI rate is a benchmark rate. It reflects a monetary policy of a country (Rachmawati & Laila, 2015). It is also called as risk-free rate since it is formally released by a government or a country. Thus, it cannot go bankrupt theoretically (Brigham & Houston, 2015). In 2016, the average BI rate was relatively stable around 6%, although it was relatively low (Kusuma, 2016). Baird in Dwivedi (2010) indicated that an increase in interest rate lessened investments but added savings. Moreover, Rachmawati and Laila (2015) found that the risk-free rate did not have significant influence on Indeks Saham Syariah Indonesia (ISSI - Indonesia Sharia Stock Index). Meanwhile, Mulyani (2014) concluded that BI Rate had the negative and significant effect to Jakarta Islamic Index. Based on the explanation, the first hypothesis used is as follows.

H_1 = BI rate affects the portfolio return negatively.

The other important factor that reflects a macroeconomic condition of a country is an exchange rate especially Rupiah to US Dollar exchange rate changes. High depreciation of Rupiah to US Dollars exchange rate negatively affects company's earnings capabilities. It means it takes more Rupiah to buy one Dollar. Some of the negative effects of such high depreciation are the high transportation cost since the majority of fuel supplies in Indonesia are still imported, and high production costs. Thus, it also makes imports more expensive. Then, high depreciation of Rupiah to US Dollars exchange rate affects the financial performance of a company and its stock returns (Kewal, 2012). Moreover, Murtianingsih (2012) indicated that Rupiah to US Dollar exchange rate had the significant and positive effect on IHSG. However, Kewal (2012) suggested that the exchange rate affected IHSG negatively and significantly. Thus, the second hypothesis is as follows.

H_2 = Exchange rate changes affect the portfolio return negatively.

In addition, high inflation is not an ideal macroeconomic condition in a country. It means that prices of domestic goods are going up rapidly. High inflation creates uncertainty for business and increases investment risk. According to Biro Pusat statistik (BPS) or Indonesian Central Bureau of Statistics (Deny, 2017), the inflation rate was 3,02% in 2016. It was the lowest inflation rate in the past five years. The acceptable level rate of inflation is 2-3% annually in developed countries and 4-5% in developing countries (Dwivedi, 2010). There are some negative effects of high inflation on companies' earnings capabilities. The volume of production may decline due to the decreased level of capital inflow from foreign capital. The foreign investment is less profitable because of rising costs. Moreover, it may also prevent businessmen from taking opportunities (Kennedy, 2011). Kewal (2012) found that inflation did not significantly IHSG. However, Haanurat (2013) agreed that inflation significantly and negatively affected the return of sharia stocks. Thus, the last hypothesis used is as follows.

H_3 = Inflation affects the portfolio return negatively.

METHODS

This research implements quantitative methods namely the constant correlation model for constructing optimal portfolio. Moreover, the researchers use secondary data from 2012 to 2016. The purposive sampling method is also implemented. All the data are acquired from finance.yahoo.com, www.idx.co.id, and www.bi.go.id. The data used are the stocks that are consistently selected in the Bisnis-27 Index from 2012 to 2016. It can be seen in Table 1. The data are the adjusted monthly close prices of the selected stocks from 2012 to 2016, IHSG from 2012 to 2016, the monthly interest rate of Bank Indonesia (BI Rate) from 2012 to 2016, the monthly inflation rate from 2012 to 2016, and the monthly Rupiah to US Dollars closing exchange rate from 2012 to 2016. To construct an optimal portfolio, the researchers use Microsoft Excel 2010. Meanwhile, to compute the regression and statistical analysis, SPSS version 20 is used. The research model can be seen in Figure 1. The optimal portfolio is the dependent variable, while exchange rate, inflation rate, and risk-free interest rate are the independent variables.

Table 1 The Bisnis-27 Stocks Used As A Sample

1	ADRO	Adaro Energy
2	ASII	Astra International
3	BBCA	Bank Central Asia
4	BBNI	Bank Negara Indonesia
5	BBRI	Bank Rakyat Indonesia
6	BMRI	Bank Mandiri
7	BSDE	Bumi Serpong Damai
8	CPIN	Charoen Pokphand Indonesia
9	INTP	Indocement Tunggal Prakarsa
10	KLBF	Kalbe Farma
11	PGAS	Perusahaan Gas Negara
12	SMGR	Semen Gresik
13	TLKM	Telekomunikasi Indonesia
14	UNTR	United Tractors

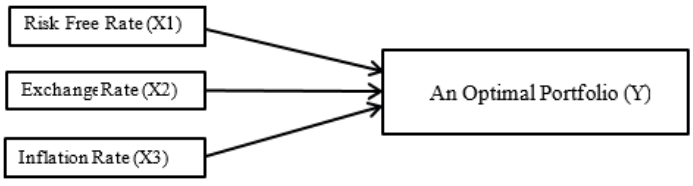

Figure 1 Research Model

There are several steps to calculate the optimal portfolio in constant correlation model. Microsoft Excel 2010 and SPSS version 20 are used to obtain the results. To construct the constant correlation model portfolio as discussed by Elton *et al*. (2014), this research uses the following steps. First, several parameters are calculated in the creation of an optimal portfolio model. Those parameters are as follows:

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

$$E(R_i) = \frac{\sum_{t=1}^{n} R_{it}}{n} \quad (2)$$

$$R_M = \frac{IHSG_t - IHSG_{(t-1)}}{IHSG_{(t-1)}} \quad (3)$$

$$E(R_M) = \frac{\sum_{t=1}^{n} R_M}{n} \quad (4)$$

$$\beta_i = \frac{\sigma_{iM}}{\sigma_M^2} \quad (5)$$

$$\alpha_i = E(R_i) - \beta_i . E(R_M) \quad (6)$$

$$\sigma_{ei}^2 = \frac{\sum_{t=1}^{n} \alpha_i^2}{n-1} \quad (7)$$

$$\sigma_M^2 = \frac{\sum_{t=1}^{n} [R_M - E(R_M)]^2}{n-1} \quad (8)$$

$E(R_i)$ is the average monthly return of each stock, and P_t is the price of the stock at the time (t). Then, $E(R_m)$ is the average monthly return of the market or IHSG. Moreover, σ_i is the standard deviation of each stock. Meanwhile, σ_m is the standard deviation of IHSG returns, and σ^2_m is the variance of IHSG returns. Next, βi is the beta of each stock, and αi is the difference between the average return of each stock and beta of each stocks times the average return of the market or IHSG. Lastly, σ^2_{ei} is a variance of αi.

Second, after those parameters are calculated, the researchers compute ERS. ERS ratio is calculated by the following formula. $\overline{R_i}$ is the expected return of the stock. Moreover, R_f is the risk-free rate (Bank of Indonesia), and σ_i is the standard deviation of the stock.

$$ERS_i = \frac{\overline{R_i} - R_f}{\sigma_i} \quad (9)$$

Third, after finding the ratio, the unique cut-off rate or C^* and C_i are obtained. The calculation for the C_i in the constant correlation model uses the following formula.

$$C_i = \frac{\bar{\rho}}{1-\bar{\rho}+i\bar{\rho}} \sum_{j=1}^{i} \frac{\overline{R_i} - R_f}{\sigma_j} \quad (10)$$

The $\bar{\rho}$ is the correlation between stocks that is assumed to be constant. Then, the $\bar{\rho}$ is calculated as follows.

$$\bar{\rho} = \frac{\left[\left\{\sum_{i=1}^{n}\sum_{j=1}^{n}\rho_{ij}\right\}-n\right]}{(n^2-n)} \quad (11)$$

The recommended stocks to be invested are the stocks that have higher C_i values than their respective ERS ratios. The unique cut-off rate or C^* is the highest C_i value. Fourth, after finding the C_i and unique cut-off rate or C^*, the researchers try to find the weight of each stock or W_i depending on the total weights of the portfolio. The total portfolio weight is always 100%. Then, the W_i for the constant correlation model is calculated with this formula.

$$W_i = \frac{Z_i}{\sum_{j=1}^{N} Z_j} \quad (12)$$

$$Z_i = \frac{1}{(1-\bar{\rho})\sigma_i}\left[\frac{\overline{R_i}-R_f}{\sigma_i}\right] - C^* \quad (13)$$

Last, it is to compute the expected portfolio return and standard deviation. The expected return calculation for the constant correlation model used the following formula.

$$E(R_p) = \sum_{i=1}^{n} w_i(R_i) \quad (14)$$

Moreover, the standard deviation for the constant correlation model is calculated with the following formula.

$$\sigma_p^2 = \sum_{i=1}^{n} w_i^2\sigma_i^2 + \sum_{i=1}^{n}\sum_{\substack{j=1 \\ i\neq j}}^{n} w_i w_j \sigma_{ij} \quad (15)$$

After constructing the efficient portfolio based on the model, the next step is to analyze the effect of macroeconomic factors on the model. Three leading macroeconomic indicators are used. Those are BI rate, Rupiah to US Dollar exchange rate, and inflation. This research uses the ordinary least squares model. Levine, Stephan, and Szabat (2014) stated that the necessary assumptions for this regression are linearity, independence of errors, the normality of errors, and equal variance. Moreover, Ghozali (2013) stated several methods to test the assumptions. The methods could be the Durbin-Watson test, Glejser test, variance inflation test, and one-sample Kolmogorov-Smirnov test. The ordinary least square regression model of this research was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e_i \quad (16)$$

The description is:

Y = Optimal portfolio of 60 monthly returns from 2012 - 2016
β_0 = Constant
β_1 to β_3 = Regression coefficients from the first to the third independent variables
X_1 = Monthly risk-free interest rate (BI Rate) from 2012 to 2016
X_2 = Monthly changes in Rupiah to US Dollar exchange rate from 2012 to 2016
X_3 = Monthly inflation rate from 2012 to 2016
e_i = Residuals

As stated in Levine, Stephan, and Szabat (2014), the overall F-test will be implemented. It is to check whether the relationship between the dependent variable and the entire set of independent variables exist. The null and alternative hypotheses are as follows.

H_0: $\beta_1 = \beta_2 = \cdots = \beta_k = 0$ (There is no linear relationship between the dependent variables and the independent variables)

H_1: At least one $\beta_j \neq 0$, j = 1, 2, …, k (There is a linear relationship between the dependent variables and at least one of the independent variables)

H_0 is rejected at the α level of significance if $F_{STAT} > F_\alpha$.

It can be stated that H_0 is rejected at the α level of significance of $F_{STAT} > F_\alpha$. If it is the other way around, it does not reject H_0.

RESULTS AND DISCUSSIONS

This portfolio model relies heavily on the ERS ranking as the stocks selection process. Table 2 shows that three stocks have negative ERS values. Thus, UNTR, INTP, and SMGR stocks will be omitted. Only 11 stocks out of 14 stocks will be included in the next calculation to construct an optimal portfolio because they have positive ERS values. The portfolio model is constructed based on the assumption of constant correlation between each stock. Table 3 shows that the values of $\bar{\rho}$ are 2,3125.

Then, Table 4 indicates that only 6 stocks out of 11 stocks can be selected in the portfolio creation. Those stocks are TLKM, KLBF, CPIN, BBRI, BBCA, and BBNI. The selection is based on C_i and C^* values. The C^* value is 0,10474. Table 5 shows that the expected portfolio return is 2,47% monthly. Meanwhile, the standard deviation is 6,79%. The optimal portfolio weights are TLKM (61,90%), KLBF (24,90%), CPIN (7,10%), BBRI (2,60%), BBCA (2,60%), and BBNI (0,90%). The expected return on the portfolio is 2,47% monthly or 29,64% yearly. It is above the expected market return (0,61%). According to Rifaldy and Sedana (2016), the standard deviation of optimal portfolio is 3,437%. Meanwhile, the standard deviation of portfolio on this research is 6,79%. Although the standard deviation of this portfolio is higher than Rifaldy and Sedana (2016), the expected return of this portfolio (2,7% monthly) is better than the result by Rifaldy and Sedana (2016) which has about 1,645% monthly. In addition, the stocks in the

portfolio constructed by Rifaldy and Sedana (2016) consist of AKR Corporindo, Indofood CBP Sukses Makmur, Lippo Karawaci, Surya Citra Media, and Media Nusantara Citra. Then, the portfolio in this research consists of Telekomunikasi Indonesia, Kalbe Farma, Charoen Pokphand Indonesia, Bank Rakyat Indonesia, Bank Central Asia, and Bank Negara Indonesia. Therefore, this result shows that constant correlation model can be used as an alternative model in constructing a profitable portfolio in Bisnis-27 Index.

Table 6 shows the descriptive statistics of this research. Based on the data, the average optimal portfolio returns from 2012 to 2016 is 2,47% monthly. It is with the maximum value at 29,1%. Meanwhile, the minimum optimal portfolio return is -11,49 % a month. It means that this portfolio can be expected to yield around 29,6% yearly. Furthermore, the average monthly BI rate is 0,5656% or 6,78% yearly, while the minimum of BI Rate is 0,48% or 5,76% yearly. The average monthly inflation rate is 0,4455% or 5,3% yearly. This result conforms with the theory stated by Dwivedi (2010). The acceptable level rate of inflation is 2-3% annually in developed countries and 4-5% in developing countries. Moreover, the average monthly depreciation of Rupiah to US Dollars is 0,6893% or 8,27% yearly. Based on this statistics, the research is conducted in the relatively stable macroeconomic condition in Indonesia.

Table 2 The ERS Ratio Rank

	$E(R_i)$	$E(R_i) - R_f$	σ_i	$E(R_i) - R_f/\sigma_i$	Rank
TLKM	0,02927	0,02363	0,07329	0,32236	1
KLBF	0,01907	0,01343	0,07087	0,18954	2
CPIN	0,01506	0,00942	0,07276	0,12950	3
BBRI	0,01474	0,00910	0,07938	0,11460	4
BBCA	0,01361	0,00797	0,07018	0,11350	5
BBNI	0,01179	0,00615	0,05740	0,10712	6
BSDE	0,01577	0,01013	0,10024	0,10103	7
BMRI	0,01338	0,00774	0,08367	0,09250	8
ASII	0,01097	0,00533	0,14669	0,03632	9
ADRO	0,00693	0,00129	0,10441	0,01234	10
PGAS	0,00638	0,00073	0,14412	0,00510	11
UNTR	0,00295	-0,00269	0,12734	-0,02110	12
INTP	0,00330	-0,00234	0,07113	-0,03294	13
SMGR	0,00133	-0,00431	0,10090	-0,04271	14

Table 3 Average Correlation

	STOCKS	TLKM	KLBF	CPIN	BBRI	BBCA	BBNI	BSDE	BMRI	ASII	ADRO	PGAS
1	TLKM	1,000	0,457	0,206	0,340	0,386	0,289	0,206	0,472	0,184	0,010	0,248
2	KLBF	0,457	1,000	0,207	0,516	0,400	0,487	0,454	0,550	0,277	0,094	0,255
3	CPIN	0,206	0,207	1,000	0,256	0,277	0,313	0,410	0,347	0,443	0,022	0,236
4	BBRI	0,340	0,516	0,256	1,000	0,606	0,776	0,576	0,797	0,492	0,103	0,225
5	BBCA	0,386	0,400	0,277	0,606	1,000	0,603	0,430	0,689	0,465	0,042	0,306
6	BBNI	0,289	0,487	0,313	0,776	0,603	1,000	0,567	0,722	0,426	0,168	0,244
7	BSDE	0,206	0,454	0,410	0,576	0,430	0,567	1,000	0,639	0,341	(0,051)	0,132
8	BMRI	0,472	0,550	0,347	0,797	0,689	0,722	0,639	1,000	0,512	0,116	0,273
9	ASII	0,184	0,277	0,443	0,492	0,465	0,426	0,341	0,512	1,000	0,249	0,183
10	ADRO	0,010	0,094	0,022	0,103	0,042	0,168	(0,051)	0,116	0,249	1,000	0,063
11	PGAS	0,248	0,255	0,236	0,225	0,306	0,244	0,132	0,273	0,183	0,063	1,000
The Average Correlation 0,23125												

Table 4 C_i Values with Constant Correlation Model

No.	Stocks	$E(R_i)$	$E(R_i) - R_f$	σ_i	$E(R_i) - R_f/\sigma_i$	$\rho/(1 - \rho + i\rho)$	Cum.	Ci	Decision
1	TLKM	0,02927	0,02363	0,07329	0,32236	0,23125	0,32236	0,07455	In
2	KLBF	0,01907	0,01343	0,07087	0,18954	0,18782	0,51191	0,09615	In
3	CPIN	0,01506	0,00942	0,07276	0,12950	0,15812	0,64140	0,10142	In
4	BBRI	0,01474	0,00910	0,07938	0,11460	0,13653	0,75601	0,10322	In
5	BBCA	0,01361	0,00797	0,07018	0,11350	0,12013	0,86951	0,10445	In
6	BBNI	0,01179	0,00615	0,05740	0,10712	0,10725	0,97663	0,10474	In
7	BSDE	0,01577	0,01013	0,10024	0,10103	0,09686	1,07767	0,10438	Out
8	BMRI	0,01338	0,00774	0,08367	0,09250	0,08831	1,17017	0,10333	Out
9	ASII	0,01097	0,00533	0,14669	0,03632	0,08114	1,20650	0,09790	Out
10	ADRO	0,00693	0,00129	0,10441	0,01234	0,07505	1,21884	0,09148	Out
11	PGAS	0,00638	0,00073	0,14412	0,00510	0,06981	1,22394	0,08545	Out

Table 5 Portfolio Weights, Expected Return, & Standard Deviation of the Model

No.	Stocks	$E(R_i) - R_f/\sigma_i$	$1/(1 - \rho)*\sigma_i$	z_i	x_i	No.	Stocks	$x_i*E(R_i) - R_f$
1	TLKM	0,32236	17,74908	3,86258	61,90%	1	TLKM	0,01462
2	KLBF	0,18954	18,35524	1,55658	24,90%	2	KLBF	0,00334
3	CPIN	0,12950	17,87895	0,44264	7,10%	3	CPIN	0,00067
4	BBRI	0,11460	16,38799	0,16163	2,60%	4	BBRI	0,00024
5	BBCA	0,11350	18,53492	0,16240	2,60%	5	BBCA	0,00021
6	BBNI	0,10712	22,66370	0,05403	0,90%	6	BBNI	0,00006
			Sum	**6,23985**	**100%**		**Total**	**0,01908**
							E(Rp)	**2,47%**
							σ_p	**6,79%**

Table 6 Descriptive Statistics

	N	Minimum	Maximum	Mean
Portfolio Return	60	-11,491%	29,114%	2,47787%
BI Rate	60	0,48%	0,65%	0,5656%
Exchange Rate	60	-6,57%	6,25%	0,6893%
Inflation	60	-,45%	3,29%	0,4455%
Valid N (listwise)	60			

The result of linearity, independence of errors, the normality of errors, and equal variance tests of the regression model is in Table 7. The Durbin-Watson test shows that the D value is 2,419, while the Du from the Durbin Watson is 1,69 (Levine, Stephan, & Szabat, 2014). This regression model conforms with the independence of errors assumption since the D > Du. The table also shows the result of VIF calculation. All calculated VIF values from BI Rate, exchange rate changes, and inflation variables are below 5. Thus, this model is in line with the linearity assumption. Moreover, The Glejser test shows that the significance values of all independent variables are above the $\propto$ value which is 5%. It means that the model is in accordance with the equal variances assumption. Lastly, the one-sample Kolmogorov-Smirnov test shows that the Asymp. significance (2-tailed) value (0,329) is also above the $\propto$ value which is 5%. It implies that the model conforms with the assumption whose residuals are normally distributed. The regression equation result is as follows.

$$Y = 0{,}1442 - 21{,}2515X_1 - 0{,}9829X_2 + 1.6894X_3$$

The result of regression analysis can be seen in Table 8. Using 0,05 level of significance, the critical value of the *F* distribution with 3 and 56 degrees of freedom is approximately 2,84 (Levine, Stephan, & Szabat, 2014). From Table 8, the F_{STAT} test statistic in the ANOVA summary table is 3,89. Since 3,89 > 2,84 or the p-value is 0,0135 < 0,05, the H_0 is rejected.

It can be said that at least one of the independent variables (BI rate, exchange rate changes, inflation) is related to portfolio return. The adjusted R-Square is only 12,82%. It means that approximately 77% of other variables are affecting the portfolio returns.

The result also shows that the BI rate affects the portfolio return negatively. However, the negative effect of BI rate on the portfolio return is not significant. It is based on its p-value (0,1053). It is higher than the confidence level of 5%. Thus, H_1 is rejected. This result is not in line with findings by Mulyani (2014), Nugroho and Trinandari (2017), and Silim (2013). They concluded that risk-free rate had the negative and significant effect.

Then, the variable of exchange rate changes affects the portfolio return significantly and negatively. It is based on its p-value (0,0068). It is significantly lower than the confidence level of 5%. Thus, H_2 is accepted. This result is consistent with finding by Nugroho and Trinandari (2017). They analyzed the effect of Rupiah on US Dollars exchange rate changes, BI rate, and inflation rate to the optimal portfolio return of Jakarta Islamic Index Stocks in 2012-2016. Additionally, Kewal (2012), Silim (2013), and Rachmawati and Naila (2015) also indicated that the exchange rate changes affected IHSG negatively and significantly. However, it contradicts with Murtianingsih (2012) who suggested that Rupiah to US Dollar exchange rate had a significant and positive effect on IHSG.

Moreover, the inflation factor has a positive effect on the portfolio return. However, it is not significant that its p-value is 0,2162. It is significantly higher than the confidence level of 5%. Thus, H_3 is rejected. This result is not in line with Haanurat (2013). Haanurat (2013) said that inflation affected the return of sharia stocks significantly and negatively. Nevertheless, this result is similar to Murtianingsih (2012) who stated that inflation had the positive and insignificant effect to IHSG.

Tabel 7 Regression Assumptions Test

Autocorrelation Test (Durbin-Watson)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0,415[a]	0,173	0,128	6,339016%	**2,419**

a. Predictors: (Constant), Inflation, BI Rate, Exchange Rate

b. Dependent Variable: Portfolio Return

Multicollinearity Test (Variance Inflation Factor)

Model		Collinearity Statistics	
		Tolerance	**VIF**
1	(Constant)		
	BI Rate	0,996	**1,004**
	Exchange Rate	0,988	**1,012**
	Inflation	0,984	**1,016**

a. Dependent Variable: Portfolio Return

Heteroscedasticity Test (Glejser)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
1. (Constant)	11,141	4,868		2,288	0,026
BI Rate	-11,505	8,480	-0,178	-1,357	**0,180**
Exchange Rate	0,099	0,229	0,057	0,430	**0,669**
Inflation	-0,336	0,887	-0,050	-0,379	**0,706**

Normality Test (One-Sample Kolmogorov-Smirnov Test)

	Unstandardized Residual
N	60
Kolmogorov-Smirnov Z	0,949
Asymp. Sig. (2-tailed)	**0,329**

a. Test distribution is Normal.

b. Calculated from data.

Table 8 Regression Statistics

Multiple R	0,4153				
R Square	0,1725				
Adjusted R Square	**0,1282**				
Standard Error	0,0634				
Observations	60				
ANOVA	**Df**	**SS**	**MS**	**F**	**Significance F**
Regression	3	0,0469	0,0156	3,8915	0,0135
Residual	56	0,2250	0,0040		
Total	59	0,2719			
	Coefficients	**Standard Error**	**t Stat**	**P-value**	
Intercept	0,1442	0,0741	1,9462	0,0567	
BI Rate	-21,2515	12,9094	-1,6462	0,1053	
Exchange Rate	-0,9829	0,3494	-2,8133	0,0068	
Inflation	1,6894	1,3508	1,2507	0,2162	

CONCLUSIONS

The optimal portfolio of Bisnis-27 stocks consists of the following stocks along with their respective optimal weights. There are TLKM (61,90%), KLBF (24,90%), CPIN (7,10%), BBRI (2,60%), BBCA (2,60%), and BBNI (0,90%). The expected return on the portfolio is 2,7% monthly. It is above the expected market return (0,61%). This result indicates that constant correlation model can be used to construct the optimal portfolio with the positive return above the market return.

This research also shows that at least one of the three leading macroeconomic indicators, (Rupiah to US Dollars exchange rate changes, BI rate, and inflation) is related to the constant correlation model in portfolio return. However, out of the three leading macroeconomic indicators, only Rupiah to US Dollars exchange rate changes affect the portfolio return negatively and significantly.

Since this research is analyzing the impact of only three macroeconomic factors on the portfolio, it is suggested that further research can use other macroeconomic variables. The researchers can analyze the impact of other macroeconomic variables on the portfolio returns. For example, those can be stocks indexes of other countries, money supplies, and fuel prices.

ACKNOWLEDGEMENT

The authors are indebted to the Center for Research and Community Development of Asian Banking Finance and Informatics (ABFI) Institute of Perbanas which provided a grant to assist this research.

REFERENCES

Artaya, M., Purbawangsa, I. B. A., & Artini, L. G. S. (2014). Pengaruh faktor makroekonomi resiko investasi dan kinerja keuangan terhadap return saham perusahaan di Bursa Efek Indonesia (BEI). *E- Jurnal Ekonomi dan Bisnis Universitas Udayana, 3*(12), 689-701.

Brigham, E. F., & Houston, J. F. (2015). *Fundamentals of financial management* (Concise, 9th ed.). Canada: Cengage Learning.

Darmawan, I. P. P. A., & Purnawati, N. K. (2015). Pembentukan portofolio optimal pada saham-saham di Indeks LQ 45 dengan menggunakan model indeks tunggal. *E–Jurnal Manajemen Unud, 4*(12), 4335-4361.

Deny, S. (2017). *Inflasi 2016 mencapai 3,02 persen*. Retrieved from http://bisnis.liputan6.com/read/2694582/inflasi-2016-mencapai-302-persen

Dwivedi, D. N. (2010). *Macroeconomics theory and policy* (3rd ed.). New Delhi: Tata McGraw-Hill Publishing Company Limited.

Elton, E., Gruber, M., Brown, S., & Goetzmann, W. (2014). *Modern portfolio theory and investment analysis* (9th ed.). USA: John Wiley and Sons.

Ghozali, I. (2013). *Aplikasi analysis multivariate dengan program SPSS*. Semarang: Badan Penerbit Universitas Diponegoro.

Haanurat, A. I. (2013). Pengaruh karakteristik perusahaan dan ekonomi makro terhadap return saham syariah yang listing di Jakarta Islamic Index. *Jurnal Manajemen dan Bisnis, 3*(2), 115-134.

Kalra, S. (2012). Leading macroeconomic indicators: International experience in calculating & using these indicators. In *Economic Committee of the National Assembly Hanoi*.

Kennedy, M. M. J. (2011). *Macroeconomic theory*. New Delhi: PHI Learning Private Limited.

Kewal, S. S. (2012). Pengaruh inflasi, suku bunga, kurs, dan pertumbuhan PDB terhadap indeks harga saham gabungan. *Jurnal Economia, 8*(1), 53-64.

Kewal, S. S. (2013). Pembentukan portofolio optimal saham-saham pada periode bullish di Bursa Efek Indonesia. *Jurnal Economia, 9*(1), 81-91.

Kusuma, D. R. (2016). *Suku bunga deposito perbankan turun jadi 6,67%*. Retrieved from https://finance.detik.com/moneter/3209820/suku-bunga-deposito-perbankan-turun-jadi-667.

Levine, D. M., Stephan, D. F., & Szabat, A. K. (2014). *Statistics for managers using Microsoft Excel* (7th ed.). New Jersey: Pearson Education Inc.

Melani, A. (2017). *Faktor ini bikin IHSG cetak rekor baru di 5.910*. Retrieved from http://bisnis.liputan6.com/read/3009799/faktor-ini-bikin-ihsg-cetak-rekor-baru-di-5910

Mulyani, N. (2014). Analisis pengaruh inflasi, suku bunga, nilai tukar Rupiah, dan produk domestik bruto terhadap Jakarta Islamic Index. *Jurnal Bisnis dan Manajemen Eksekutif, 1*(1).

Mulyono, M. (2015). Analisa korelasi return indeks–indeks saham terhadap indeks harga saham gabungan pada Bursa Efek Indonesia. *Binus Business Review, 6*(2), 330-339.

Murtianingsih. (2012). Variabel ekonomi makro dan indeks harga saham gabungan. *Jurnal Management dan Akuntansi, 1*(3), 1-12.

Nugroho, B. A., & Trinandari. (2017). Optimalisasi portofolio saham di Jakarta Islamic Index dan determinan faktor makroekonomi. In *Konferensi Ilmiah Akuntansi 4, di Universitas Pancasila, Jakarta, 2 – 3 Maret 2017*.

Paramitha, F., & Anggono, A. H. (2013). Performance analysis and optimal portofolio diversification of fourteen stocks of LQ-45 Index period 2007-2012 using Markowitz modern portofolio theory. *Journal of Business and Management, 2*(1), 29-38.

Pratiwi, E. A., Dzulkirom, M., & Azizah, D. F. (2014). Analisis investasi portofolio saham pasar modal syariah dengan model Markowitz dan model indeks tunggal (Studi pada saham perusahaan yang terdaftar dalam Jakarta Islamic Indeks di Bursa Efek Indonesia Periode Mei 2011 sampai dengan November 2013). *Jurnal Administrasi Bisnis, 17*(1), 1-10.

Rachman, V. (2016). *Pertumbuhan IHSG di BEI tertinggi kelima di dunia*. Retrieved from https://swa.co.id/swa/capital-market/pertumbahan-ihsg-di-bei-tertinggi-kelima-di-dunia

Rachmawati, M., & Laila, N. (2015). Faktor makro ekonomi yang mempengaruhi pergerakan harga saham pada Indeks Saham Syariah Indonesia (ISSI) di Bursa Efek Indonesia (BEI). *Jurnal Ekonomi Syariah Teori dan Terapan, 2*(11), 928-942.

Rifaldy, A., & Sedana, I. B. (2016). Optimasi portofolio saham indeks Bisnis 27 di Bursa Efek Indonesia (Pendekatan model Markowitz). *E-Jurnal Manajemen Unud, 5*(3), 1657-1689.

Septyanto, D., & Kertopati, B. (2014). Analisa pembentukan portofolio dengan menggunakan model Markowitz dan single index model pada saham yang masuk dalam indeks LQ45 di Bursa Efek Indonesia tahun 2009 – 2013. *Finance and Banking Journal, 16*(2), 140-168.

Silim, L. (2013). Pengaruh variabel ekonomi makro terhadap Indeks Harga Saham Gabungan pada Bursa Efek Indonesia periode 2002-2011. *Jurnal Mahasiswa Universitas Surabaya, 2*(2), 1-18.

Yunita, I., & Pratiwi, D. A. (2013). Optimal portfolio construction (A case study of LQ45 Index in Indonesia Stock Exchange). *International Journal of Science and Research, 4*(6), 2525-2530.