The Influence of Macroeconomic on Optimal Portfolio Returns from Banking Shares

Syarief Fauzie[1], Wahyu Sugeng Imam Soeparno[2,] and Eunika Tampubolon[3]
{syarief_fauzie@usu.ac.id[1]}

[1]Department of Development Economics, University of Sumatera Utara, Dr. Mansur, Indonesia
[2,3]Department of Development Economics, University of Sumatera Utara, Indonesia

Abstract: The purpose of this study is to determine the macroeconomic effect on optimal portfolio returns formed from banking stocks with the Elton-Gruber single index model. The use of banking stocks in the formation of portfolios is due to the many risks inherent in the charged industry caused by the movement of macroeconomic indicators. The test conducted in this study uses the Autoregressive Distributed Lag (ARDL) method to see the long-term and short-term relationship of the independent variables to the dependent variable. The macroeconomic variables used in this study are the BI rate, inflation, money supply and the exchange rate of US Dollar-Rupiah. The results of the study show that there is a long-term and short-term relationship between the BI rate, inflation, money supply, and the US Dollar-Rupiah exchange rate jointly towards optimal portfolio return. This result shows partially only the previous 1-month portfolio return that affects portfolio return growth in long-term relationships. Whereas in the short term, only a change in the BI rate of the previous 3 months and a change in inflation in the previous 1 month which affected the optimal portfolio return growth.

Keywords: Optimal portfolio returns, Single index model, Macroeconomic

1. Introduction

In investing in shares on the stock exchange, investors generally avoid risk (risk-averse) by forming a portfolio consisting of investments in several shares. The purpose of establishing a portfolio is to provide an optimal rate of return with minimal risk, therefore investors will choose the most efficient portfolio, the most optimal portfolio. Optimal portfolios are expected to diversify the non-systematic risks of each share and provide the maximum level of return by studying the pattern of various share returns. Markowitz (1952) has proven that investment risk can be reduced by combining several assets into a portfolio. While the optimal portfolio is a portfolio that an investor chooses from the many choices available in an efficient portfolio collection (Tandelilin, 2010).

One method used in forming a portfolio is the Elton-Gruber method, which is commonly referred to as the Single Index Model. The advantage of the Single Index Model is that it can explain that the level of market profit correlates with market changes (Husnan, 2009). Elton and Gruber (1997) used the Single Index Model to observe that fluctuations of price security are the same as the fluctuations of the market price index. As is well known, the market price index is influenced by macroeconomic indicators, so the fluctuations of single index model's portfolio are the same as the fluctuations of macroeconomic indicators. Elton and Gruber (1997) suggest that investors in investing in shares require research on the effect of economic conditions on market capitalization due to the market index and macro factors affecting securities returns.

ICEMAB 2018, October 08-09, Medan, Indonesia

DOI 10.4108/eai.8-10-2018.2288736

Based on the description, this study wants to know how the influence of macroeconomic indicators on portfolios is formed with a single index model. Portfolio formation with a single index model provides an optimal portfolio. The company's securities used in forming an optimal portfolio is securities in the banking industry. The use of the banking industry in this study was due to the many risks inherent in the bank and influenced by macroeconomic conditions. In other words, the use of banks in this study can better represent observations to see the impact of economic conditions on securities in the capital market.

2. Literature Review

Some studies that have been conducted is research conducted by Cahyadi and Febriwanti (2014) which uses optimal portfolio formation in stocks listed on LQ-45 shows that only the composite stock price index and the dollar-rupiah exchange rate have a significant effect on optimal portfolio returns. Cahyadi and Febriwanti's (2014) study used the least square regression method that has weaknesses because it cannot see the influence of the previous period.

Wardana and Manurung (2014) tested macroeconomic variables on optimal portfolio return consisting of stocks listed on LQ-45 showing the results of inflation, the interest rate, and Hang Seng index had a significant effect on optimal portfolio return. Wardana and Manurung (2014) also use the least squares regression method

Several theoretical reviews to see the effect of each macroeconomic variable on optimal portfolio return such as the BI rate relationship to optimal portfolio return according to Keynes in Wardana and Manurung (2014), the interest rate is determined by the demand and supply of money in the money market. Changes in interest rates will further affect the desire to make investments, for example, where share prices can rise or fall depending on the interest rate at that time (if the interest rate rises, the share go down and vice versa), so there is a possibility that shareholder will suffer capital loss or capital gain. An increase in interest rates can increase the burden on companies (issuers) which will further reduce share prices. This increase also has the potential to encourage investors to divert funds to the money market or savings or time deposits so that investment in the stock market falls and can further reduce share prices.

While for inflation is a macroeconomic variable that can simultaneously benefit and harm a company. Inflation is the tendency of prices to rise in general and continuously. Tandelilin (2010) saw that the increase in inflation was relatively a negative signal for investors in the capital market. This is because an increase in inflation will increase company costs. If the increase in production costs is higher than the price increase that can be enjoyed by the company, then the company's profitability will decrease. Directly, inflation results in falling profitability and purchasing power. Indirectly affects inflation through changes in interest rates. Sirait and Siagian (2002), suggested that an increase in inflation could reduce capital gains obtained by investors. On the company side, an increase in inflation cannot be charged to consumers, so it can reduce the level of income of a company.

According to Samsul (2006), if the money supply increases, the interest rate will decrease and the Composite Stock Price Index (CSPI) will rise so that the market will become bullish, which at that time the buyer is in control of the market. And if the money supply decreases, then the interest rate will rise and the Composite Stock Price Index (CSPI) will decline so that the market will be bearish ie sellers who hold market control.

And finally, the exchange rate of the US dollar against the Rupiah. For investors themselves, the depreciation of the rupiah against the dollar indicates that Indonesia's

economic outlook is deteriorating. Because the depreciation of the rupiah can occur if Indonesia's economic fundamentals are not strong, causing the US dollar to strengthen and ultimately reduce the Composite Stock Price Index on the IDX (Sunariyah, 2011). This certainly adds to the risk for investors if they want to invest in the Indonesian stock exchange. Investors will certainly avoid risk, so investors will tend to sell and wait until the economic situation is felt to improve.

In examining the effect of macroeconomic variables on optimal portfolio returns consisting of banking stocks, this study uses the Autoregressive Distributed Lag (ARDL) regression method. The use of this method is due to seeing the long-term and short-term effects of macroeconomic variables on optimal portfolio return. The use of ARDL can also see the effect of the variable return of optimal portfolio itself from the past period. The economic variables used in this study are the BI rate, inflation, money supply(M2) and the dollar-rupiah exchange rate. Therefore, the hypothesis developed in this research is:

1. $H_0 1$ = There is no long-term relationship between the BI rate, inflation, money supply (M2) and the dollar-rupiah exchange rate against optimal portfolio returns.
2. $H_0 2$ = There is no short-term relationship between the BI rate, inflation, money supply (M2) and the dollar-rupiah exchange rate against optimal portfolio returns

3. Methodology

3.1 Research Data

Determination of the sample in this study uses non-probability sampling. Therefore, it is necessary to have a suitable criterion with the research by used purposive sampling technique. The criteria for the sample in this study are as follows:

1. Banking companies are listed consistently on the Indonesia Stock Exchange in the period 2010-2016.
2. Companies that have daily stock price data during the observation period.

Based on the predetermined criteria for selecting the sample, in this study set time series data as much as 84 months for the optimum portfolio using a single index model. There are 24 bank shares that meet the criteria as the research sample for the optimal portfolio. In determining which share enter the optimum portfolio, it takes several steps as follows:

1. Calculate return, expected return, market return, and variance of each share and market
2. Calculate beta, alpha and error term of each share.
3. Calculate systematic risk and variance of residual errors which are unsystematic risks unique to the company of each share.
4. Calculate *Excess Return to Beta* (ERB) of each share.
5. Calculate *cut off rate* (Ci).
6. Calculate *cut off point* (C*)
7. Determine of shares that are included in the Optimum portfolio candidate (ERB $\geq$ C*)

Shares included in the portfolio candidate are shares that have an excess return to beta (ERB) value greater than or equal to the cut-off point value. And shares that have an ERB value smaller than the cut-off point value are excluded from the portfolio candidate. And the Table below shows a comparison of the ERB value of the shares with the cut-off point

Table 1. Shares that include the Optimum Portfolio

Code	ERB		C*	Portfolio
AGRO	0.0013430	>	0.0001930	Include
BACA	0.0030133	>	0.001930	Include

Code	ERB		C*	Portfolio
BBCA	0.0005927	>	0.001930	Include
BBNI	0.0005330	>	0.001930	Include
BBRI	0.0004908	>	0.001930	Include
BEKS	0.0037597	>	0.001930	Include
BKSW	0.0117564	>	0.001930	Include
BNBA	0.0001646	>	0.001930	Include
BPTN	0.0031077	>	0.001930	Include
MCOR	0.0054403	>	0.001930	Include
MEGA	0.0033264	>	0.001930	Include
NISP	0.0104354	>	0.001930	Include
SDRA	0.0020512	>	0.001930	Include
BBNP	0.0032222	>	0.001930	Include
BABP	0.0004359	>	0.001930	Include
BBKP	0.0004027	>	0.001930	Include
BBTN	0.0004545	>	0.001930	Include
BMRI	0.0004004	>	0.001930	Include
BNGA	0.0002683	>	0.001930	Include
BNII	0.0003660	>	0.001930	Include
PNBN	0.0004306	>	0.001930	Include
BDMN	0.0000478	<	0.001930	No Include
BVIC	0.0000533	<	0.001930	No Include

3.2 Variable and Definition

Variables and definitions in this study are as follows:

Table 2. Research Variable and Definition

Variable	Definition
Dependent Variable:	
Return portfolio optimum (RetP)	Average daily optimal portfolio returns every month.
Independent Variable:	
BI rate (BI)	The interest rate for monetary policy published by Bank Indonesia.
Inflation (INF)	Percentage increase in the prices of goods generally.
The money supply (M2)	Amount of currency, demand deposits, savings, time deposits, and small mutual funds.
Dollar-rupiah	The dollar exchange rate

exchange rate against the rupiah (ER)			

3.3. Method of Analysis

The regression model used in this study is Autoregressive Distributed Lag (ARDL). This model assumes a variable is influenced by the variable itself in the previous period (Ekananda, 2016). In using the ARDL method, several testing steps are needed which will be explained as follows:

3.3.1 Unit Root Test

Ekananda (2016) explained that the unit root test is not needed in the ARDL method because ARDL is not needed to get the same difference level between variables. Based on this, this study did not use the unit root test.

3.3.2 Determination of Maximum Lag

Determination of maximum lag is used by cointegration test with the Akaike Information Criteria (AIC) model, where the determination is based on the smallest AIC value.

3.3.3 Bound Testing Cointegration

This test is used to see the long-term relationship of the independent variable to the dependent variable with the following equation:

$$\Delta RetP_t = \pi r^2 = \alpha + \beta_1 RetP_{t-1} + \beta_1 BI_{t-1} + \beta_1 INF_{t-1} + \beta_1 M2_{t-1} + \beta_1 ER_{t-1} + \sum_{i=1}^{p} \delta_{1i} \Delta RetP_{t-1} + \sum_{i=0}^{q} \delta_{2i} \Delta BI_{t-i} + \sum_{k=0}^{q} \delta_{3k} \Delta INF_{t-k} + \sum_{m=0}^{q} \delta_{4m} \Delta M2_{t-m} + \sum_{n=0}^{q} \delta_{5n} \Delta ER_{t-n} + \epsilon_t \quad (1)$$

Where RetP is a Monthly Portfolio Return, BI is the BI rate, INF is inflation, the M2 is the money supply (M2) and ER is the dollar exchange rate against the rupiah.

Hypothesis testing is carried out using the Wald Test where the coefficients β1, β2, β3, β4, and β5 describe the long-term relationship. Based on this, the hypothesis of a long-term relationship is as follows:

H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ (there is no long-term relationship)

H_1: One of the β coefficients ≠ 0 (there is a long-term relationship)

3.3.4 Estimation of Long-Term Coefficient

Long-term coefficient estimates are needed to determine the Error Correction Model to obtain an Error Correction Term that will be used in the short-term estimation. Model for Long-term estimation as follows:

$$RetP_t = \alpha + \beta_1 BI_t + \beta_2 INF_t + \beta_3 M2_t + \beta_4 ER_t + \mu_t \quad (2)$$

3.3.5 Estimation of Short-Term Coefficient

After getting an Error Correction Term in a long-term coefficient test, the model can be determined for the short term as follows:

$$\Delta RetP_t = \alpha + \sum_{i=1}^{p} \delta_{1i}\, \Delta RetP_{t-i} + \sum_{j=1}^{q} \theta_{1j}\, \Delta BI_{t-j} + \sum_{j=1}^{q} \theta_{2j}\, \Delta INF_{t-j} + \sum_{j=1}^{q} \theta_{3j}\, \Delta M2_{t-j} + \sum_{j=1}^{q} \theta_{4j}\, \Delta ER_{t-j} + \gamma ECT_{t-1} + \epsilon_t \quad (3)$$

3.3.5 Test of Model Stability

Test of stability models is used to avoid errors in conclusions. Testing uses CUMSUM and CUSUMQ Plot

4. Empirical Result And Discussion

4.1 Akaike Information Criteria Result

The results of the AIC test to determine the maximum lag is ARDL (1,4,3,0,0) for each of the five variables. The results of the AIC testing are as follows:

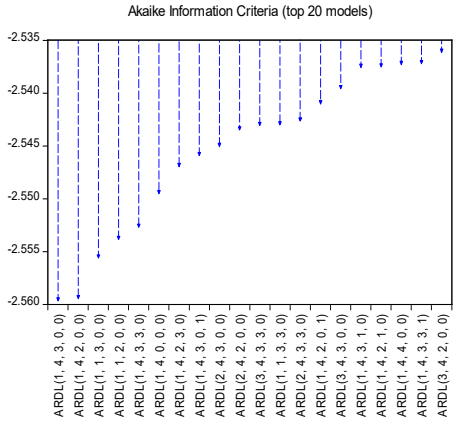

Fig. 1. Akaike Information Criteria Result

From the figure above shows that ARDL (1,4,3,0,0) has the smallest value approaching -2,560

4.2 Results of Cointegration ARDL Test

In seeing the long-term relationship between BI rate, inflation, the money supply (M2) and the exchange rate on the optimal portfolio return, a cointegration test is needed with the following results:

Table 3. ARDL Error Correction Regression

Variables	Coefficient
ΔBI	-0.092783**
ΔBI(-1)	4.64E-05
ΔBI(-2)	0.020848
ΔBI(-3)	-0.096261
ΔINF	-0.008421***
ΔINF(-1)	0.020961*
ΔINF(-2)	0.016880
ConintEq(-1)*	-1.280192***

Variables	Coefficient
No. Of Obs	84
Adj. R^2	0.663494

***,**, and * indicate statistical significant at 1,5 and 10 percent, respectively.

The existence of long-term and short-term relationships can be seen from the Bound Test Cointegration with the following results:

Table 4. F-Bounds Test

Test Stat	Value	Sign	I(0)	I(1)
F-Stat	21.59607	10%	2.2	3.09
	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

The Bounds Test results show that the F-Statistic value is greater than I (0) and I (1) so that it can be said that there is a long-term and short-term relationship between the independent variables and the dependent variable. In seeing the existence of a long-term relationship, the results need to be strengthened by doing the Wald test as follows:

Table 5. Wald Test

Test Stat	Value	df	Probability
F-Statistic	2.752933	(5.67)	0.0254
Chi-square	13.7647	5	0.0172

The results of the Wald Test show that the probability is below 5% so that the hypothesis H_0 is rejected and H_1 is accepted which means that there is a long-term relationship between the independent variables simultaneously with the dependent variable.

4.3 Results of the Long Run and Short Run ARDL

The estimated effect of the independent variable on the dependent variable can be seen from the ARDL Long Run Form Test result as follows:

Table 6. Estimated Long Run Coefficient using ARDL Approach

Variables	Coefficient	T Ratio
RetP(-1)	-1.280192	-11.23976***
BI(-1)	0.007415	0.471407
INF(-1)	-0.005001	-0.596035
M2	-0.007289	-0.351539
ER	-3.60E-06	0.736265

***,** and * indicate statistical significant at 1,5 and 10 percent, respectively.

ARDL The Long Run Test provides the following short-term relationship estimation results:

Table 7. Estimated Short Run Using ARDL Approach

Variables	Coefficient	T Ratio
ΔBI	-0.092783	-2.225473
ΔBI(-1)	4.6E-05	0.001119

Variables	Coefficient	T Ratio
ΔBI(-2)	0.020848	0.498809
ΔBI(-3)	-0.096261	-2.268079**
ΔINF	-0.008421	-0.699475
ΔINF(-1)	0.020961	1.679294*
ΔINF(-2)	0.016880	1.307746
EC = RetP – (0.0058*BI – 0.0039*INF - 0.0057*M2 + 0.0000*ER + 0.0249)		

***,** and * indicate statistical significant at 1,5 and 10 percent, respectively.

4.4 Model Stability Test

Model stability testing for this ARDL model uses CUSUM and CUSUMQ. Hasi; from CUSUM is described as follows:

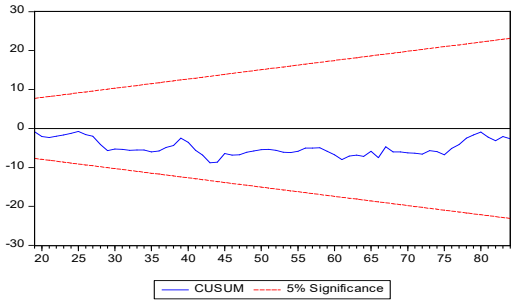

Fig. 2. CUSUM PLOT

From the CUSUM Figure above shows that the tested model has been stable during the observation period, as well as the CUSUMQ image where the CUSUM and CUSUMQ plots still enter the critical interval below 5%.

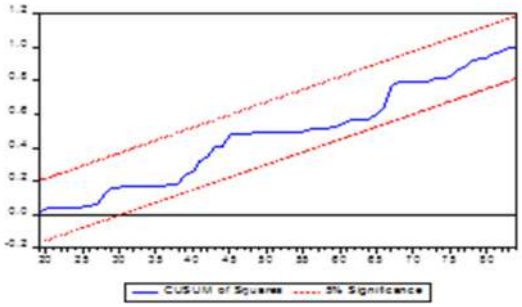

Fig. 3. CUSUMQ PLOT

5. Conclusions

The results of the Wald test show that there is a long-term relationship of all variables to the optimal portfolio return where only the previous month's portfolio return has a statistically significant effect on the level of 1%. From short-term relationships, changes in BI 3 months earlier had a statistically significant effect on the level of 5% on changes in optimal portfolio return and changes in inflation had a statistically significant effect on the level of 10%.

towards optimal portfolio return changes. From this study it can be seen that in the short term changes, the BI Rate and inflation initially had a negative influence, but then gave a positive influence in the following months due to the increase / decrease in changes in the BI rate and inflation will cause a decrease / increase in stock offerings due to the expected return against banking shares, but in the following months market adjustments were made so as to provide a positive influence.

Acknowledgments

Thanks to the University of Sumatra Utara for their support for this research by providing the data and funds needed, so that this research can be completed.

References

[1] Akaike, H. (1974). A new look at the statistical model identification. *IEEE Transactions of Automatic Control, 19*(6), 716-723.

[2] Cahyadi, B. and Febriwanty, A. (2014*). Pengaruh variabel makro terhadap portfolio optimal dengan single index model pada Bursa Efek Indonesia*. *Journal of Capital Market and Banking, 2*(1).

[3] Ekananda, Mahyus. (2016). *Analisis ekonometrika time series.* Jakarta: Mitra Wacana Media

[4] Elton, E. J, and Gruber, M. J. (1997). Modern portfolio theory, 1950 to date. *Journal of Banking &Finance, 21*(11-12)*,* 1743-1759.

[5] Engle, R. F., and Granger, C. W. J. (1987). Cointegration and Error Correction Representation, Estimation and Testing. *Econometrica, 55*(2), 251-276.

[6] Husnan, Suad. (2009). *Dasar-Dasar Teori Portofolio Dan Analisis Sekuritas*. Yogyakarta: UPP STIM YKPN.

[7] Keynes, J. M. (1936). The General Theory of Employment Interest and Money. Harcourt: Brace and World.

[8] Markowitz, H. (1952). Portfolio Selection*. Journal of Finance. 7*(1), 77-91.

[9] Samsul, Mohammad, (2006). *Pasar Modal dan Manajemen Portofolio*. Surabaya: Erlangga.

[10] Sirait and Siagian, D. (2002). *Analisis Keterkaitan Sektor Riil, Sektor Moneter dan Sektor Luar Negri dengan Pasar Modal Studi Empiris di Bursa Efek Indonesia*. *Jurnal Ekonomi Perusahaan, 9*(2).

[11] Sunariyah. (2011). *Pengantar Pengetahuan Pasar Modal*. Yogyakarta: UPP STIM YKPN

[12] Tandelilin, E. (2010). *Portofolio dan Investasi Teori dan Aplikasi*. Yogyakarta: Kanisius.

[13] Wardana G. W and Maurung, A, H. (2014). *Pembentukan portofolio saham optimum dengan eetode ELTON-GRUBER dan variabel makro yang Mempengaruhinya. Journal of Capital Market and Banking, 2*(3).