FORMATION OF STOCK PORTFOLIO USING SINGLE INDEX MODEL (CASE STUDY ON BANKING SHARES IN THE INDONESIA STOCK EXCHANGE)

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ABSTRACT

This research was motivated by the hope of a prospective investor to obtain optimum gain level with the smallest risk in investment in stocks which can be done by forming a portfolio of stocks. The purpose of this study was to determine the combination of stocks Which optimal combination among banking stocks listed on the Indonesia Stock Exchange and the proportion of each of optimal stock. This study uses a single index model in analyzing its shares. Single index model is a model of portfolio analysis in determining which stocks forming portfolios using a calculation of the value of the ERB (Excess Return to Beta) and C * (Cut of Point). Based on a study of 30 banks formed 5 stocks that make up the optimal portfolio is MAYA, MCOR, BACA, BBCA, SDRA with each proportion of 2.77% for MAYA shares, 12.69% MCOR shares, 12.85% of the shares BACA, 70.04% BBCA and 1.64% SDRA shares.

Key words: Optimum Portofolio, Single Index Model

Introduction

Investment is a growing number of funds or other resources. Investment in securities in general can be done through the capital market and money market. An investor buys a stock at this time with the hope of gain from rising stock prices or the amount of future dividends, in return for the time and risk associated with these investments. To minimize the risk of stock investments, investors can make the portfolio (diversification) shares is to invest in some stock so that the risk of losses on the stock can be covered by gains on other stocks.

The expected return on investment is compensation for the opportunity cost and the risk of decline in purchasing power due to inflation effect (Tendelilin, 2010). In addition to expected returns obtained from investments, at the same time investors are exposed to risks that may occur on the investment made.

In the new era, people are required to optimize the income earned to make ends meet. Revenues are no longer allocated only to meet consumption needs, but also for investment. Investment is any activity or resource optimization fund performed at this time with the hope of making a profit in the future (Yohantin, 2009). Investment decisions are made every investor will differ depending on the investment objectives and the courage to bear the risk for the investment made. Investing in the stock market requires the ability to minimize the possible risks faced and the sensitivity to changes that may occur in the securities investment goal. Diversification helps investors to spread risk opportunities in a variety of assets. (Bangun ,2012).

In stock investing, there are many different types of industrial stocks in the capital market so as to facilitate investors to diversify their portfolios. Investment diversification will provide optimum benefits when an investment return in the portfolio was negatively correlated. Markowitz (1952) have shown that the risk of investing can be reduced by combining some assets into a portfolio. Markowitz method shows that if the financial assets in a portfolio having a smaller return than a positive one, the overall risk of the portfolio can be reduced. Minimum risk will be achieved when investment return was a negative correlation is perfect. If there is a possibility of formation of a portfolio of infinite number, then the question arises where the portfolio will be chosen by the investor. If investors are rational, then the investor will choose the optimal portfolio. To do stock selection and determination of the portfolio can be formed with a variety of models, one of which is to use single index model . Single index model bases itself on the idea that the level of profit of a security is affected by a level of profit the market portfolio. Several tests were done with the optimal portfolio using single index model has been proven that this model makes it possible to obtain optimal performance of the portfolio. Sulasih (2008) conducted a study on the risk and rate of return on the optimal portfolio LQ45 in Indonesia Stock Exchange to obtain the result that the risks and returns have a relationship in the opposite direction and weak, beta as a measure of systematic risk can not reflect the return on a stock. Suherman (2007) analyzed the optimal stock portfolio performance of agriculture, mining, infrastructure, utilities and transportation at the Indonesian Stock Exchange, obtaining results that the optimal stock portfolio performance infrastructure, utilities and trasnportation better than agriculture and mining stocks. Research conducted by Septyarani (2008) on the performance of optimal portfolios LQ45 and non LQ 45 indicates that the stock portfolio LQ45 has a better performance when compared with a portfolio of non LQ 45 which is based on indicators of return, standard deviation, beta, index sharpe, Treynor index and Jensen index. Single index model is widely used as an analytical tool to get an efficient portfolio, because this model allows to provide optimum return. Results of research that previously was done by Sukarno (2007) on the analysis of the formation of the optimal portfolio shares using the method of

single index on the Jakarta Stock Exchange resulted in the conclusion that there are significant differences between the returns of 14 (fourteen) shares the candidate portfolio with a return of 19 shares non-candidate portfolio.
Stock Exchange offers a wide range of sectors that can be used as an investment option, especially in the form of a portfolio. In some previous studies, there was a tendency of investors to invest their funds in the manufacturing sector compared to the banking (Yuniarti, 2010). Some analysts predict that the banking sector would be able to bring profits to its investors. Improved performance of banks can be seen from the increase in the capital adequacy ratio (CAR), which is above the minimum of 8% and the ratio of nonperforming loans (NPLs) were stabilized below 5% (Burhani, 2012). Increased ensued on the net profit of the banking sector. In January-June of 2012, national banks generate a net profit of Rp. 45.73 trillion, an increase of 23.29% from the same period a year earlier. This condition indicates that the banking sector is feasible to be used as an alternative investment

Literatur Review

Investment is the postponement of consumption now to put into earning assets during a certain time period. With the productive assets, delaying present consumption to be invested into productive assets that will increase total utility. (Jogiyanto, 2008). According Tendelilin (2010), the investment is in the field of financial activity that is intended to obtain the maximum results from wealth or asset planted. Broadly speaking there are two types of assets that can be used as an investment, consist of Investment in real assets, such as investment in gold, land, houses and Investments in financial assets, such as investment in the form of deposits, stocks, bonds, mutual funds.

According Tandelilin (2010), the return is the result obtained from the investment. Return can be return realization has happened and return expectations were not yet occurred but which are expected to occur in the future. Return realization is a return that has occurred. Return realization is calculated using historical data. Return realization may also be useful as a basis for determining the expected return and risk in the future. Expected return is the expected return will be acquired by investors in the future. In addition to calculating the return, the investor should also take into account the risk. Risks often associated with irregularities or deviation of outcomes acceptable to the expected. According Jogiyanto (2008), the risk is the variability of the expected return. Risk is the possibility of deviation degree of actual profits (actual return) of the expected profit rate. To calculate the risk, a method often used is the standard deviation, which measures the absolute deviation values that have occurred with the expectation value. Besides the standard deviation, the risk can also be expressed in terms of variance.

Return portfolio according Tendelilin (2010) there are two, consist of Return the realization of the portfolio , is a weighted average of the return of the realization of each single securities in the portfolio and Return expectations of the portfolio is a weighted average of the return expectations of each single securities in the portfolio.

Portfolio risk is a variant return securities that make up the portfolio (Jogiyanto 2008) .One measuring risk is standard deviation or variance which is the square of the standard deviation. In general, risk can be reduced by combining several single securities in the portfolio. The main requirement to be able to reduce the risk in the portfolio is the return for each of the securities and perfectly positively correlated.

Investment would pose a risk. To minimize the risk, investors can form a portfolio. In the establishment of a portfolio, investors always want the maximum return with a certain risk or looking for a low risk with a certain return. Tendelilin (2010) stated that in order to establish efficient portfolio should hold on assumptions about how the behavior of investors in making investment decisions taken.

Formation of the portfolio also requires the calculation of returns and portfolio risk. Return realization and the expected return of the portfolio is a weighted average return of the return-return securities of a single whole, but the portfolio risk is not necessarily equal to the weighted-average risk of all single securities.

According Jogiyanto (2008), an efficient portfolio is defined as a portfolio that gives the greatest expected return to the risk that has been given or give risk.The smallest with the return expectations that already certain. Efficient portfolio can be determined by selecting particular level of expected return and then minimize risks or determine the level of certain risk and then maximize the rate of return expectations. A rational investor would choose portfolio efficiently because it is formed by optimizing the portfolio of one of the two dimensions that return expectations or risk the portfolio.

Single index model is a simplification of the index model previously developed by Markowitz. Single index model to explain the relationship between the returns of any individual securities with the market index return. Single index model divides the return of a security into two components, namely component represented by α1 returns that are independent of the market return and return-related components market return as represented by βi.RM.

Part of return represented by α1 relate only to events that affect the micro specific company, but does not affect all companies in general. Part of return associated with beta (βi) which is the return of a security's sensitivity to market return. By consensus of the market return has a beta value of 1.
Formula seek the return of securities on a single index model is:

$$E\ (Rp) = \sum_{i=1}^{n} Wi\ .\alpha i + \sum_{i-1}^{n} Wi\ x\ \beta i.E(RM)$$

Description :
Wi = Weight of investment securities 1

α1 = alpha securities 1
βi = size of return securities i sensitivity to changing market return
E (RM) = section i return securities that are not influenced by the performance of the market

Single index model to find the portfolio:

$$\sigma_{p^2} = \left(\sum_{i=1}^{n} w_{1\beta_1}\right) 2.\sigma_{M^2} + \left(\sum_{i=1}^{n} w_{1\alpha e_1}\right)$$

Assumptions of the single index model has implications that these securities may move together not because of the effects outside the market, but because they have a common relationship to the market index
The establishment of an optimal portfolio based on the single index model is based on the ratio between the Excess Return to Beta Ratio (ERB), which can determine whether a security can be incorporated into an optimal portfolio (Jogiyanto, 2008). Excess Return to Beta Ratio (ERB) means the measure of excess return relative to one unit of risk that can not be diversified as measured by beta. This ratio also shows the relationship between the two determinants of investment, namely return and risk. Will contain the optimal portfolio with assets that have a low ERB value is not included in the optimal portfolio. Delimitation high ERB value is based on a point is called the cut-off point (cut-off line)

Research design

This research was conducted in order to establish an optimal portfolio based on the performance of banking stocks by using single index model. The method used in this research is descriptive method

The population in this study are all banking stocks month of December 2013 - February 2014 in the Indonesia Stock Exchange. Sampling was done by using purposive sampling. Source of data in this research is secondary data obtained from the data closing share price (closing price) monthly data and the report of Bank Indonesia on development of deposit rate monthly observation period as a measure of risk-free as well as data Composite Stock Price Index (CSPI) as the return counter market

The analysis process using a single index models are as follows:
1. Calculating Expected Return is the percentage change in the closing price of the A shares at month t minus closing price of the A shares at month t-1 then the result is divided by the closing price of the A shares at month t-1
2. Calculate the standard deviation is used to measure the risk of Realized return
3. Measuring variance were used to measure the expected return risk stock i
4. Calculating Excess Return to Beta (return of premium) that is used to measure the return premium relative to the share of one unit of risk can not be diversified as measured by beta. ERB shows the relationship between return and risk is an important determinant of investment.
5. Determine the cut-off point (C *)
Shares constituting the portfolio candidate is eligible ERB> C *

6. Determining candidate portfolio stock

7. Determine the proportion of each fund shares forming the portfolio

$$Z_1 = \frac{\beta}{\sigma ei^2} \text{ (ERB-C8*)}$$

8. Calculating Expected Return portfolio

$$E(Rp) = \alpha p + \beta p.E(Rm)$$

9.Measure the risk of an optimal portfolio formed

$$\sigma p^2 = \beta p^2 .\alpha m^2 + (\Sigma_i^n \text{ wi}.\sigma ei)^2$$

Result And Discussion

The first step to determine the optimal portfolio by using a single index is to calculate the expected return. For the calculation of estimated expected profit rate (Expected Return) is obtained from the calculation of the realization of return divided by the number n. Return calculation results, Expected Return and Standard Deviation for 30 of banking shares as follows:

Table 1.1: Return Calculation Results, Expected Return and Standard Deviation of Daily Price Changes Banking Stocks

No	Stock Code	E (Ri)	STDev	Variance
1	BABP	0,029072	0,30625	0,098766802
2	BACA	0,047979	0,296132	0,045645
3	BAEK	0,007889	0,246465	0,029351
4	BBCA	0,044839	0,068680	0,0034427
5	BBKP	0,008418	0,256880	0,032381
6	BBNI	0,029207	0,090573	0,007427
7	BBNP	-0,02636	0,256317	0,032199
8	BBRI	0,045786	0,952700	0,009979
9	BBTN	-0,00055	0,023989	0,027699
10	BDMN	-0,04218	0,077179	0,005476
11	BEKS	-0,03329	0,096400	0,011092
12	BJBR	-0,02609	0,005988	0,008317
13	BKSW	0,004368	0,046900	0,002390
14	BMRI	0,026836	0,093235	0,009578
15	BNBA	0,004585	0,092844	0,0009526
16	BNGA	-0,04320	0,214957	0,021895
17	BNII	-0,05733	0,065977	0,002960
18	BNLI	-0,0270	0,057726	0,003284
19	BSIM	-0,02497	0,061959	0,003839
20	BTPN	-0,05728	0,365424	0,0757316
21	BMIC	-0,00743	0,0957386	0,008272
22	INPC	0,003898	0,097857	0,008636
23	MAYA	0,237100	0,6215295	0,3716380
24	MCOR	0,033991	0,087694	0,006976
25	MEGA	0,000340	0,097350	0,008540
26	NISP	-0,02030	0,065991	0,004135
27	PNBM	-0,03392	0,2219793	0,023393
28	SDRA	0,032398	0,231393	0,025579
29	BSWD	0,009392	0,2499167	0,020378
30	AGRO	-0,02020	0,09950	0,009999

Calculation of expected return has a significant role in determining the shares of which will be eligible for the allocation of funds. From table 1.1 above it can be seen that the 30 existing shares sample members who have a rate of return that is positive and negative. Shares with a positive return expectations eligible to be used as an alternative to investing. From table 1.1 see that five (5) shares have the highest return expectations are shares of MAYA with an average gain of 23.71%, BACA with an average gain of 4,7979%, bank stocks BBCA with an average gain of 4.4839%, the bank's shares BBRI with an average gain of 4,5786% and the bank's shares SDRA with the average profit 3.239%, and the value of shares owned by the lowest expected return of BNII amounted to -5.733%. These results indicate MAYA stock is expected to provide the greatest expected benefits among thirty other stocks. As for the stock variant, the deviations that may occur between stock returns with an average return of stocks over the study period. In accordance with the variant calculations stocks that have the highest variance is MAYA stock with a variance of 37.16% and the lowest variance owned by BNBA of 0.09%

Stock market conditions are generally indicated by the beta coefficient (β). Beta coefficient may be positive or negative. If the beta coefficient is positive, the increase in market return will cause an increase in stock returns. Meanwhile, if the beta value is negative, it causes a decrease in stock returns. The amount of normal beta coefficient is $\beta = 1$. If $\beta < 1$ is referred to as a weak stock, which means that if there is an increase of x% market return then return stock will rise less than x% and so is better if $\beta > 1$ is referred to as stock aggressive, which means that if the stock returns will experience an increase of more than x% and conversely. The calculation result excess return to beta for all 30 banks are as follows:

Table 1.2: Calculation Results Excess Return to Beta (ERB)

No	Kode	E(Ri)	E (Ri)- Rf	B1	ERB
1	MAYA	0,237100	0,23177	0,379	0,5613640
2	BTPN	-0,05728	-0,0627	-0,279	0,41825672
3	MCOR	0,033991	0,02867	0,236	0,25159465
4	BACA	0,047979	0,04256	0,359	0,23832258
5	BBNP	-0,02636	-0,03179	-0,738	0,0430944
6	BBCA	0,044839	0,039419	0,924	0,04218514
7	SDRA	0,032398	0,026977	0,734	0,03657892
8	BBRI	0,045786	0,030366	2,788	0,0285622
9	BBNI	0,029207	0,023787	2,557	0,0098716
10	BMRI	0,026836	0,021395	2,878	0,00693605

11	BAEK	0,007889	0,002469	0,776	0,00315388
12	BBKP	0,008418	0,002977	2,792	0,00078343
13	INPC	0,003898	-0,00375	1,056	-0,0036168
14	BBTN	-0,00055	-0,00688	2,220	-0,0037567
15	BABP	0,029072	0,023642	-2,089	-0,0071600
16	MEGA	0,000340	-0,00550	0,579	-0,0091242
17	BNBA	0,004585	-0,00199	0,215	-0,0092968
18	BSWD	0,009392	0,004967	-0,375	-0,0215598
19	BJBR	-0,02609	-0,02142	1,720	-0,0229984
20	AGRO	-0,02020	-0,02553	1,430	-0,028273
21	PNBN	-0,03392	-0,02485	1,630	-0,0285514
22	BNGA	-0,04320	-0,03765	1,701	-0,0332539
23	BEKS	-0,03329	-0,02765	1,245	-0,322418
24	BKSW	0,004368	-0,00221	0,092	-0,0369868
25	BVIC	-0,00743	-0,01179	0,393	-0,0416320
26	BSIM	-0,02497	-0,02931	0,718	-0,0521918
27	NISP	-0,0030	0,02572	0,584	-0,0543045
28	BNLI	-0,0270	-0,02545	0,423	-0,0653005
29	BDMN	-0,04218	-0,0372	0,670	-0,065700
30	BNII	-0,05733	0,05172	0,832	-0,0730200

Table 1.3 shows the 30 stocks there are twelve (12) shares ERB value is positive, while for stocks that ERB-negative were 18 (eighteen) shares that are not eligible to establish an optimal portfolio. Stocks that have a positive ERB and qualify for ERB optimal form are as follows:

Table 1.3: Calculation results of Shares which have Excess Return to Beta (ERB) positive

No	Kode	E(Rf)	E(Ri)-Rf	βi	ERB
1	MAYA	0,237100	0,23177	0,379	0,5613640
2	BTPN	-0,05728	-0,0627	-0,279	0,41825672
3	MCOR	0,033991	0,02867	0,236	0,25159465
4	BACA	0,047979	0,04256	0,359	0,23832258
5	BBNP	-0,02636	-0,03179	-0,738	0,0430944
6	BBCA	0,044839	0,039419	0,924	0,04218514
7	SDRA	0,032398	0,026977	0,734	0,03657892
8	BBRI	0,045786	0,030366	2,788	0,0285622
9	BBNI	0,029207	0,023787	2,557	0,0098716
10	BMRI	0,026836	0,021395	2,878	0,00693605
11	BAEK	0,007889	0,002469	0,776	0,00315388
12	BBKP	0,008418	0,002977	2,792	0,00067232

Of the twelve (12) banks that have a positive Excess Return To Beta are two (2) shares have E (Ri) and the negative of these shares are not eligible to establish an optimal portfolio. So stocks that meet the requirements to establish the optimal portfolio can be seen in the following table

Table 1.4 Calculation of ERP and E (Ri) are eligible to form Portfolio

No	Kode	E(Rf)	E(Ri)-Rf	βi	ERB
1	MAYA	0,237100	0,23177	0,379	0,5613640
2	MCOR	0,033991	0,02867	0,236	0,25159465
3	BACA	0,047979	0,04256	0,359	0,23832258
4	BBCA	0,044839	0,039419	0,924	0,04218514
5	SDRA	0,032398	0,026977	0,734	0,03657892
6	BBRI	0,045786	0,030366	2,788	0,0285622
7	BBNI	0,029207	0,023787	2,557	0,0098716
8	BMRI	0,026836	0,021395	2,878	0,00693605
9	BAEK	0,007889	0,002469	0,776	0,00315388
10	BBKP	0,008418	0,002977	2,792	0,00067232

After getting E (B) and E (Ri) are eligible to form a portfolio, the next step is to determine the Cut Of Point (C *). Cut Value of Point is the maximum value of a series of values Ci Ci stock. Cut Value of Point is used as a cut-off point to determine the share

that goes to the candidate who did not make the candidate portfolio. Cut of Point Calculation results for 10 (ten) shares are eligible to form a portfolio can be seen in Table 1.5 as follows.

Table 1.5: Calculation Of Cut Of Point

No	Kode	E(Ri)	E (Ri)-Rf	βi	ERB	Σei2	Ai	β1	Σaj	Σβj	Ci
1	MAYA	0,237	0,231	0,378	0,561	0,371	0,235	0,38	0,235	0,386	0,004
2	MCOR	0,034	0,027	0,236	0,251	0,010	0,385	2,79	0,450	2,987	0,0034
3	BACA	0,048	0,043	0,359	0,238	0,045	0,337	1,89	0,730	4,746	0,0023
4	BBCA	0,045	0,039	0,911	0,042	0,0021	18,51	576,86	19,22	570,7	0,0189
5	SDRA	0,032	0,027	0,734	0,037	0,015	0,730	29,62	19,25	598,2	0,0192
6	BBRI	0,046	0,030	2,788	0,028	0,003	19,98	1090,2	38,83	1784,3	0,019
7	BBNI	0,029	0,024	2,557	0,010	0,002	13,21	1292,6	52,26	2995,9	0,0175
8	BMRI	0,027	0,021	1,767	0,005	0,001	12,01	2062,8	61,13	5625,4	0,01117
9	BAEK	0,008	0,002	0,776	0,003	0,029	0,073	27,492	62,20	5061,9	0,0112
10	BBKP	0,0084	0,002977	2,792	0,0078	0,00387	0,1572	14013,58	64,570	7191,6	0,00951

Sources : Data processed

Table 1.5 shows the calculation of the value of the Cut of Point on the study of C * = 0.0192 Excess Return to Beta (ERB) which is smaller than the value of Cut Of Point does not enter into the calculation of the optimal portfolio.

Table 1.6 Comparison Value Of Point Cut ERB with each stock

Kode	ERB	Ci
MAYA	0,561	>0,004
MCOR	0,251	>0,0034
BACA	0,238	>0,0023
BBCA	0,042	>0,0189
SDRA	0,037	>0,0192*
BBRI	0,029	<0,01881
BBNI	0,010	<0,0175
BMRI	0,005	<0,0112
BAEK	0,003	<0,0111
BBKP	0,0078	<0,00951

Sources : Data processed

From table 1.6 it can be seen that there are five stocks that meet the criteria for entry into the establishment of an optimal portfolio, because the ERB value of each share is greater than the value of each of its cut-off point (Ci). The stock is a stock MAYA , MCOR, BACA, BBCA , SDRA . For the determination of the unique cut of point (C *) which is the highest value of Ci (Optimum) stood at 0.0192 or SDRA shares, unique cut off point indicates limit dividing between acceptance and rejection stock for efficient portfolio , After getting seven stocks chosen for entry into the establishment of an optimal portfolio, then the next step is to calculate the proportion of (Wi) worth invested in stocks that are selected. Weighted scale of each stock can be seen in table 1.7 below

Table 1.7 Scale Calculations Weighted Proportion Zi and Wi Fund

Kode	$\frac{\beta i}{\sigma ei2}$	ERB	Z1	Wi
MAYA	0,297079	0,561	0,466873	0,027693
MCOR	2,80235	0,251	2,834975	0,126886
BACA	1,904575	0,238	0,705925	0,128498
BBCA	584,086	0,042	7,097115	0,700493
SDRA	28,75197	0,037	0,547253	0,016430
C* 0,023220219			11,652141	

Sources : Data processed

Table 1.7 shows the composition proportion (Xi) to establish an optimal portfolio is:
1. MAYA amounted to 0.027693 or 2.77%
2. MCOR amounted to 0.126886 or 12.69%
3. BACA amounted to 0.128498 or 12.85%
4. BBCA amounted to 0.700493 or 70.04%
5. SDRA amounted to 0.016430 or 1.64%

Based on the background, the formulation of the problem, methods, research and discussion, some conclusions can be drawn as follows :

1. Establishment of a stock portfolio using a single index generating five (5) shares eligible optimal portfolio is stock MAYA, MCOR shares, BACA, BBCA, SDRA shares

2. The amount of decent proportion invested 5th BBCA shares was at 70.04%, BBCA has the greatest value of the 5th optimal stock to be invested by investors amounted to 70.04%, MCOR shares amounting to 12.69%. Stocks MCOR has an optimal value of the shares to be invested by investors amounted to 12.69%, BACA shares have optimal value of shares to be invested by the investors of 12.85%, 2.77% shares of MAYA, MAYA stock has the optimal value of the shares to be invested investors of 2.77%, SDRA share of 1.64%, shares SDRA has invested stock value optimal for the investor of 2.75%.

Suggestion

1. In the optimal investment decisions, investors should always follow the development of the capital market, so it can always follow the information that could affect share prices may affect the level of profits by investors

2. In this study, the stock price data, the stock price index used is the price of the monthly closing price and the SBI interest rate used is the annual interest rate of SBI so that less reflects the state on the day of observation. For further research should use the price of the daily closing price that may provide better results. In line with changes in stock prices, a portfolio that has formed should be updated continuously and investors must still conduct an assessment of the performance of the portfolio.

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