PORTFOLIO OPTIMAL ANALYSIS: SIMPLE CAPM TESTING, COMPARING BENCHMARK PERFORMANCE TO MUTUAL FUNDS (EQUITY AND MIXED), AND COMPARING PORTFOLIOS PERFORMANCE THROUGH EX-POST AND BLACK-LITTERMAN MODEL ILLUSTRATION

(A Case Study on Public Companies listed in Indonesia Stock Exchange and 53 mutual funds (equity and mixed) managed in 2010 – 2014)

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ABSTRACT

This study deals with "asset allocation" which aims at finding out the kinds of positivist approach to portfolio choice. There are many kinds of models about portfolio analysis. In this study, the first done is trying to illustrate some models such as single index model, the CAPM and Black's zero-beta CAPM which are models that are often discussed in investment topics. Further analyzes were to see replication of the descriptive part of the equilibrium model by simple test of the CAPM. There is a certain problematic phenomenon found in the model, furthermore the next step is to see the present conditions related to the indication of market efficiency by evaluating the performance of the benchmark to the portfolio managed by the investment manager involving both equity and mixed samples. Furthermore, it also aims about the mean-variance optimized portfolio at evaluating the performance of the portfolios using market data in ex-post.

This study on illustrate portfolio optimization used 10 sample stocks of public companies listed on IDX and the stocks are often in the JII (Jakarta Islamic Index) related to sharia basis and the most liquid stocks traded on IDX. Furthermore, this study also used additional stocks in addition it came up to 40 samples when simple test of the CAPM was conducted. When evaluating the performance of mutual funds, this study used 53 samples (equity and mixed, sharia and conventional based), which have been managed in 2010 to 2014. There are t-statistics that was used to calculate the regression coefficient $\bar{a}$ and $\bar{b}$ in simple test of the CAPM and evaluate the performance of mutual funds. Last, turns out to the Black-Litterman model having positivist approach to portfolio choice is considered as better model from previous empirical results by illustrate the model also it can be taken as one of the alternatives besides other various models.

Keywords: mean-variance, single index model, capital asset pricing model, benchmark performance, Black-Litterman.

INTRODUCTION

Uncertainty condition made investor to think about the concept of risk reduction for their investment. The concept of risk reduction is very important for every investor to be able to manage the risk/reward. A concept was initiated by Harry Markowitz (1952) that suggested to choice an efficient portfolio. It is known as efficient frontier, which combines assets implying efficient portfolio. Markowitz suggested that every investor diversify their efficient portfolio. The concept is also known as the "Mean Variance Analysis". Markowitz (1952), Sharpe (1964), Lintner (1965), and Mossin (1966) are the pioneers in statistical explanation to implement the diversification, which is commonly known as the proverb of "Do not put all the eggs in one basket ".

In this study, the first we tries to illustrate the model, such as single index model and the CAPM. This study tries to able and to know about the model by construct the model. After that, the study tries to look descriptive part of the model by simple test CAPM. The object of analysis looks of descriptive about the model. Furthermore the studies analyze the phenomena which relate the research about performance of mutual funds against the benchmark. Then still relate about before that looking for empirical evidence of performance portfolio against other portfolios which is simulated on past condition. The last is illustrating the model which is as positivist approach from previous empirical evidence and as alternative of other models. Of course, there are many investment strategies in this area and this study we made to scope of the model only in the discussion.

LITERATURE REVIEW

Markowitz framework, according to Focardi and Fabozzi (2004), "Markowitz assumed the investors order their preferences according to utility index, with utility as a convex function that takes into account investor risk-returns preferences. Markowitz assumed that stock returns are jointly normal. As consequence, the return of any portfolio is normal distribution, which can be characterized by two parameter: the mean and the variance."

The single index model, according to Elton, Gruber (2014), "this suggests that one reason security returns might be correlated is because of a common response to market changes, and a useful measure of this correlation might be obtained by relating the return on a stock to the return on a stock market index. The single-index model is used not only in estimating the correlation matrix but also in efficient market test and in equilibrium test."

Zero-beta portfolio, according to Focardi and Fabozzi (2004), "Fischer Black demonstrated that neither the existence of a risk-free asset nor the requirement that investors can borrow and lend at the risk-free rate is necessary for the theory to hold. Black's argument was as follows. The beta of a risk-free asset is zero. Suppose that a portfolio can be created such that it is uncorrelated with the market. That portfolio would then have a beta of zero, and Black labeled that portfolio a "zero-beta portfolio." He set forth the conditions for constructing a zero-beta portfolio and then showed how the CAPM can be modified accordingly.”

The Black-Litterman approach is the reverse construction of the portfolio returns from portfolio composition. The model starts from the relationship between the expected return to Markowitz’ model and the CAPM. The Black-Litterman model allows investors to have some of views on some stocks in portfolio. The assets can be taken into the portfolio. As an alternative, if it is not believed that the returns from average historical data can implement Black-Litterman model as this model has different ways allowing investors to view some of the stocks also give opinions.

RESEARCH METHODOLOGY

Case study analysis involve contextual analysis of matters relating to similar situation, useful in understanding certain phenomena, and gathering further theories for empirical testing (Sekaran, 2003:121). This study we illustrate in portfolio analysis by construct the model. After that we try to test the model, and looking for the phenomena relate about portfolio analysis. In addition, this study is exploring model from previous model and the stocks that chosen often in JII index.

The sample of public companies include in the section of JII (Jakarta Islamic Index) that the most active sharia stocks and part of all equities in IDX. The study observed on JII index in five years until 2014. The sample for mutual funds is funds which active and observed by OJK in five years until 2014.

The data selected and have criteria’s are as follows:

1. Public companies which are listed in IDX from 2010 until 2014.
2. Public companies which are often in JII index from 2010 until 2014.
3. In mutual funds, equity and mixed, that active from 2010 until 2014.

Method of data analysis:

1. Individual securities,
   a. Returns, (West, 2004);
   $$r = \ln\left(\frac{Pt}{Pt-1}\right)$$
   Ln = the natural logarithm,
   P_{t-1} = previous price at the day,
   P_t = price at the day.
   b. Mean = average returns (Jones, 2008:153);
   $$average = \frac{1}{N}\sum_{i=1}^{N} ri$$
   c. Variance (σ^2) (Jones, 2008:158);
   $$\sigma^2 = \frac{\sum_{i=1}^{n}(r-\bar{r})^2}{n-1}$$
   r = return,
   $\bar{r}$ = average return,
   n= amount of data.
   d. The standard deviation, $\sigma = \sqrt{\sigma^2}$
   e. Covariance (Fama,1976:49);
   $$\sigma_{ij} = \sum_{l=1}^{n}\frac{[r_{il}-E(r_i)][r_{jl}-E(r_j)]}{n-1}$$
   f. Correlation coefficient (Focardi and Fabozzi, 2004:328);
   $$Correlation_{i,j} = \frac{\sigma_{i,j}}{\sigma_i \, . \, \sigma_j} \; ; j \neq i$$
2. Portfolio;
   a. Expected returns, $E(R_p)$ (Jones, 2008:183);
   $$E(R_p) = \sum_{i=1}^{n} W_i \; E(R_i)$$

$E(R_p)$= the expected return on the portfolio,

W_i = the portfolio weight for the *i*th security,

$E(R_i)$= the expected return on the *i*th security,

n = the number of different securities in the portfolio.

b. The variance of portfolio, (Copeland, et.al, 2005:128);

$$\sigma_p^2 = [w_1 \quad w_2 \quad \cdots \quad w_N] * \begin{bmatrix} \sigma_{11} & \sigma_{12} & \cdots & \sigma_{1N} \\ \sigma_{21} & \sigma_{22} & \cdots & \sigma_{2N} \\ \vdots & & & \vdots \\ \sigma_{N1} & \sigma_{N2} & \cdots & \sigma_{NN} \end{bmatrix} * \begin{bmatrix} w_1 \\ w_2 \\ \vdots \\ w_N \end{bmatrix}$$

3. Mutual Funds;
   a. Fund per-share value (or NAB per unit) (Benninga, 2004);

$$= \frac{fund\ net\ asset\ value\ (NAB)}{number\ of\ share\ in\ fund\ (jumlah\ unit)}$$

   b. Jensen measurement or alpha mutual funds, (Malkiel, 1995);

$$R_{Rd} - R_f = \alpha + \beta\left(R_{MKT} - R_f\right) + \varepsilon_i$$

   c. Sharpe Ratio, (Tandelilin, 2010:494);

$$S_{Rd} = \frac{\bar{R}_{Rd} - \bar{R}_f}{\sigma_{Rd}}$$

   d. Treynor Ratio (Tandelilin, 2010:497);

$$T_{Rd} = \frac{\bar{R}_{Rd} - \bar{R}_f}{\beta_{Rd}}$$

R_{Rd}= return of mutual fund (reksa dana),

R_f = Risk-free, $\bar{R}_f$ = mean risk-free (SBI)

$\bar{R}_{Rd}$ = mean of mutual fund

σ_{Rd} = standard deviation of mutual fund,

β_{Rd} = beta of mutual fund.

4. Single index model;
   a. Step by step (Elton, et.al, 2014:30): compute mean return, $\bar{R}_i$; Excess return, $\bar{R}_i - R_f$; Beta β_i ; Unsystematic risk σ_{ie}^2 ; Ratio excess return over beta $\frac{(\bar{R}_i - R_f)}{\beta_i}$, then rearrangement or re-ranking from the highest to lowest value; $\frac{(\bar{R}_i - R_f)\,\beta_i}{\sigma_{ie}^2}$; $\frac{\beta_i^2}{\sigma_{ie}^2}$; $\sum_{j=1}^{i} \frac{(\bar{R}_j - R_f)\,\beta_j}{\sigma_{ej}^2}$; $\sum_{j=1}^{i} \frac{\beta_j^2}{\sigma_{ej}^2}$; Ci.

Cut off Rate (*Ci*) (Elton, et.al, 2014:180);

$$Ci = \frac{\sigma_M^2 \sum_{j=1}^{i} \frac{(\bar{R}_j - R_f)\,\beta_j}{\sigma_{ej}^2}}{1 + \sigma_M^2 \sum_{j=1}^{i} \left(\frac{\beta_j^2}{\sigma_{ej}^2}\right)}$$

σ_M^2 = $variance\ index\ (IHSG)$

$\bar{R}_j$ = the average return of individual share

R_f = risk-free

β_j = individual beta share

σ_{ej}^2 = unsystematic risk, not associated with movement of the market index. Cut off Rate (C*) *without short sales* is taken from the last *Ci* after re-ranking ratio excess return over beta, the last $\frac{(\bar{R}_i - R_f)}{\beta_i} > Ci.$

Calculating Z_i to know numerator (Elton, et.al, 2014:183):

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2}\left(\frac{(\bar{R}_i - R_f)}{\beta_i} - C^*\right)$$

calculate proportion, X_i … X_n

$$X_i = \frac{Z_i}{\sum_{j=1}^{N} Z_j}$$

5. Capital asset pricing model; (Elton, et.al, 2014:83):

$$\bar{R}_e = R_f + \left(\frac{\bar{R}_M - R_f}{\sigma_M}\right)\sigma_e$$

Find the highest value as possible, $\frac{\bar{R}_p - R_f}{\sigma_p}$ which means by quadratic program finding the combination of Sharpe ratio as the highest value as possible, $\frac{\bar{R}_p - R_f}{\sigma_p}$. Formal proved for optimal portfolio by the equation of the SML is as follows (Elton, et.al, 2014:296):

$$E(R_p) = R_f + \frac{Cov\ (R_p\ , R_m)}{Var\ (R_m)}\ [\ E(R_m) - R_f]$$

$$E(R_p) = R_f + \beta_p\ [\ E(R_m) - R_f]$$

Using function - Zero-Beta portfolio (Benninga, 2014:234):

$$x = \frac{S^{-1}\{E(r) - c\}}{Sum\ [S^{-1}\{E(r) - c\}]}$$

The equation of the SML, (Benninga, 2014:226):

$$E(R_x) = E(R_z) + \beta_x[\ E(R_M) - E(R_z)].$$

6. A simple test of descriptive part of the CAPM;

First pass regress for each asset *i* (Elton, et.al, 2014:341):

$$R_i = \alpha_i + \beta_i R_m + \bar{e}_i$$

Second pass (cross-sectional) regression (Benninga, 2014:276):

$$\bar{R}_i = \gamma_0 + \gamma_1 \beta_i$$

7. Black-Litterman Model;

The market (benchmark) expected return (Benninga, 2014:315):

$$\begin{bmatrix} Benchmark \\ Portfolio \\ Return \end{bmatrix} = \begin{bmatrix} Variance \\ Covariance \\ Matrix \end{bmatrix} \begin{bmatrix} Benchmark \\ Portfolio \\ Proportion \end{bmatrix} * \left[\frac{Expected\ Benchmark\ Return - Free\ Risk}{\left(\begin{bmatrix} Benchmark \\ portfolio \\ porportion \end{bmatrix}^T \begin{bmatrix} Variance \\ Covariance \\ Matrix \end{bmatrix} \begin{bmatrix} Benchmark \\ Portfolio \\ Proportion \end{bmatrix} \right)} \right] + Free\ Risk\ Rate$$

Which $\left[\frac{Expected\ Benchmark\ Return - Free\ Risk}{\left(\begin{bmatrix} Benchmark \\ portfolio \\ porportion \end{bmatrix}^T \begin{bmatrix} Variance \\ Covariance \\ Matrix \end{bmatrix} \begin{bmatrix} Benchmark \\ Portfolio \\ Proportion \end{bmatrix} \right)} \right]$ is normalizing factor.

Suppose there is a portfolio containing 10 assets: stock A, stock B, stock C, .., stock J. Adjusted return from given opinions (Benninga, 2014:320):

$$\begin{bmatrix} r_{stock\ A\ ,market} \\ r_{stock\ B\ ,market} \\ \vdots \\ \vdots \\ \vdots \\ \vdots \\ r_{stock\ J\ ,market} \end{bmatrix} + \begin{bmatrix} 1 & \frac{\sigma_{stock\ A,stock\ B}}{\sigma^2_{stock\ A}} & \cdots & \frac{\sigma_{stock\ A,stock\ J}}{\sigma^2_{stock\ A}} \\ \frac{\sigma_{stock\ A,stock\ B}}{\sigma^2_{stock\ B}} & 1 & \cdots & \frac{\sigma_{stock\ B,stock\ J}}{\sigma^2_{stock\ B}} \\ \vdots & \vdots & & \\ \frac{\sigma_{stock\ A,stock\ J}}{\sigma^2_{stock\ J}} & \frac{\sigma_{stock\ B,stock\ J}}{\sigma^2_{stock\ J}} & \cdots & 1 \end{bmatrix} * \begin{bmatrix} \delta_{stock\ A} \\ \delta_{stock\ B} \\ \vdots \\ \vdots \\ \delta_{stock\ J} \end{bmatrix} = \begin{bmatrix} r_{stock\ A,opinion\ adjusted} \\ r_{stock\ B,opinion\ adjusted} \\ \vdots \\ \vdots \\ r_{stock\ J,opinion\ adjusted} \end{bmatrix}$$

RESULT AND DISCUSSION

1. The MPT Optimization.

Firstly, let's suppose that the investor agrees to have the statistical calculation and tries to illustrate the model.

The Single Index Model:

Table 1
The Result for Optimal Portfolio by Single Index Model

Code	Optimal without short sales	GMVP without short sales	GMVP
AALI.JK	0%	13.03%	12.35%
ASII.JK	**15.05%**	3.63%	6.75%
INDF.JK	0%	10.29%	14.59%
INTP.JK	0%	8.69%	10.62%
KLBF.JK	**46.70%**	7.19%	9.45%
PGAS.JK	0%	12.14%	12.91%
SMRA.JK	0%	0.00%	-12.64%
TLKM.JK	**14.04%**	13.88%	14.08%
UNTR.JK	0%	6.14%	8.60%
UNVR.JK	**24.22%**	25.01%	23.29%
Total weight	100%	100%	100%
Expected Return	**2.95%**	1.60%	1.46%
variance	0.0026	**0.0015**	**0.0013**
σ	5.14%	3.86%	3.65%
Sharpe ratio	**0.43**	0.23	0.20

Source: data processed, 2015

The Single Index Model on tangency portfolio if it goes with risk-free asset of 0.72% from SBI based on the average monthly percentage.

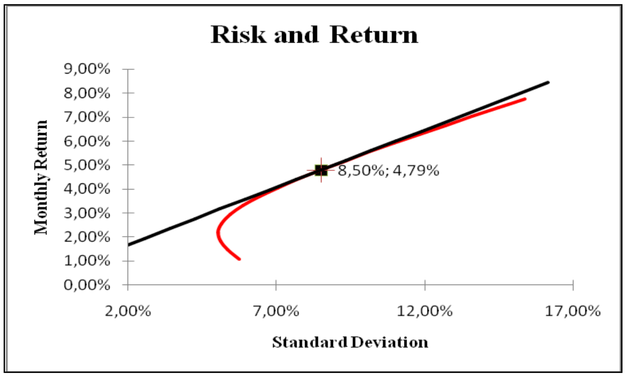
The standard capital assets pricing model (CAPM) and Zero-beta portfolio:

Table 2
The Results, Optimal Portfolio

	Optimal Portfolio	GMVP	Optimal Portfolio without short sales	GMVP without short sales
AALI	3.25%	11.40%	0.00%	14.97%
ASII	53.10%	-2.17%	18.45%	0.00%
INDF	-23.73%	14.50%	0.00%	8.02%
INTP	-19.60%	8.96%	0.00%	2.98%
KLBF	82.69%	13.05%	48.55%	7.43%
PGAS	-5.53%	13.60%	0.00%	15.67%
SMRA	2.76%	-13.26%	0.00%	0.00%
TLKM	15.42%	11.74%	7.74%	11.85%
UNTR	-38.73%	14.67%	0.00%	10.07%
UNVR	30.38%	27.52%	25.25%	29.01%
Total weight	100.00%	100.00%	100.00%	100.00%
Expected Return	4.79%	1.38%	2.99%	1.51%
variance	0.007229	0.001173	0.002752	0.00131
σ	8.50%	3.43%	5.25%	3.62%
Sharpe Ratio	0.48	0.19	0.43	0.22

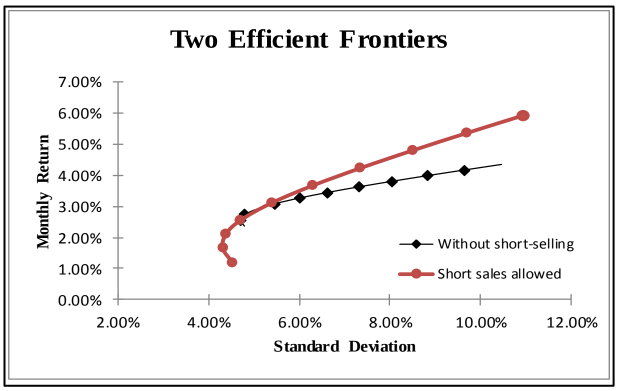
Source: data processed, 2015

The market portfolio M is the highest slope or the tangency of a set of optimal portfolio which can be found by computing the market portfolio *M* or it is done by finding the highest slope or highest Sharpe ratio for risky assets.



Source: data processed, 2015

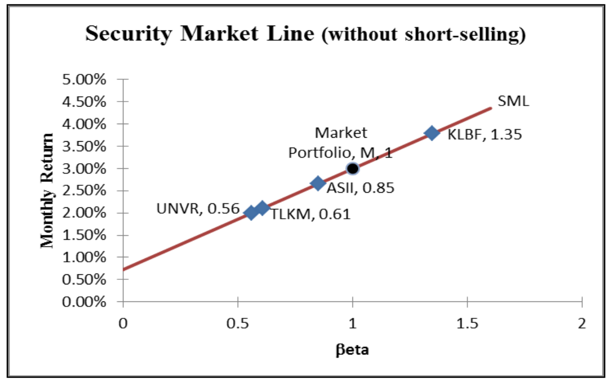
Figure 1: Efficient frontier (short sales allowed)



Source: data processed, 2015

Figure 2: Comparing two efficient frontiers

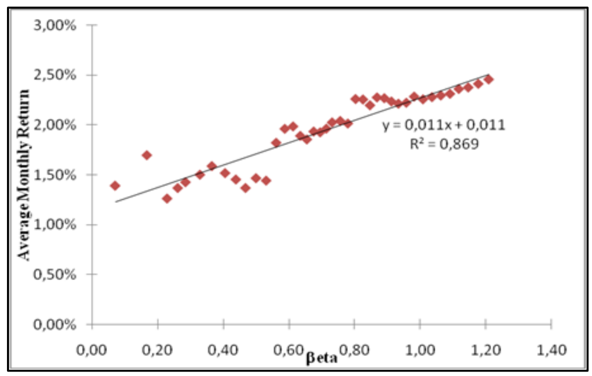
Figure 2 shows the efficient frontiers with short-sales constrain. It shows the inside part of efficient frontier with short-sales but both of the portfolios set have the proportional sum of 1. This happens because of the restriction of algebra calculation regarding the portfolio with short-sales constrain. It is then moved to convex curve also it becomes restricted.



Source: data processed, 2015

Figure 3: Security Market Line

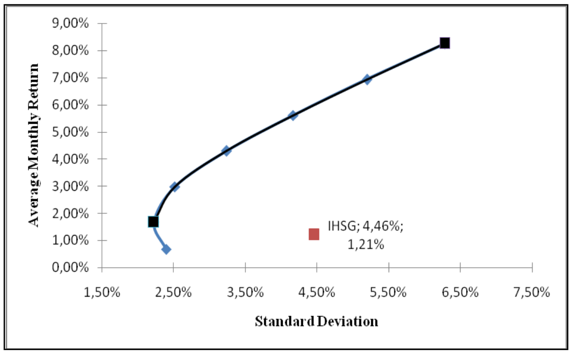
2. Empirical Tests of the CAPM.



Source: data processed, 2015

Figure 4: Average returns vs. betas

T-test of intercept and its slope has a relation $\bar{R}_i = 0.0115 + 0.0112\beta_i$. In figure shows 87% variation in expected return as it is explained by beta differences. Seeing from its r-square, it shows that the linearity. Although it is linear, but the relationship of the SML test is still considered failed.

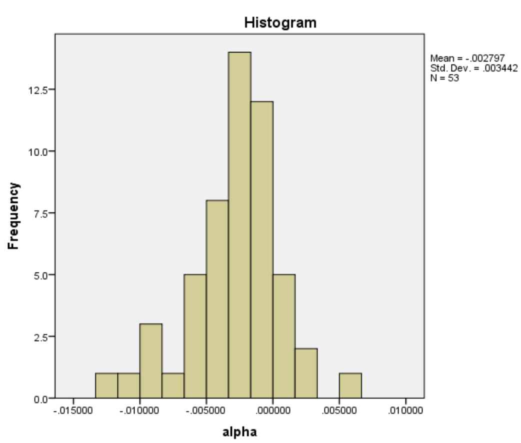


Source: data processed, 2015

Figure 5: Efficient portfolios (40 Stocks)

The CAPM shows the equilibrium telling us that the betas and average returns (of risky assets) will have linear if the market (of risky assets) at the mean-variance efficient portfolio. On the other hand, the market (market proxy of risky assets or benchmark used as market portfolio) shows inefficient ex-post (figure 5) but the market portfolio *M* is unobservable because it talks about all risky assets in the economy.

3. Comparing performance of Benchmark to Mutual funds.



Source: data processed, 2015

Figure 6: Alpha mutual Funds

There are many mutual funds that underperform than IHSG and the average turns out to have negative value (-0.002797).

Table 3
T-statistics for Jensen Measurenment

IHSG as Benchmark Portfolio		
Average α	-0.002797	
Amount of Mutual Fund	53	
Amount of mutual funds		
α's positive	8	15.09%
α's negative	45	84.91%
Total	53	
Amount of α statistically significant	21	
α's positive and statistically significant	0	
α's negative and statistically significant	21	

Source: data processed, 2015

During 5 years period that is from 2010 until 2014, there are 8 mutual funds or 15.09% from 53 mutual funds which are considered to be able to beat the benchmarks (IHSG). On the other hands, there is around 84.91% or there are 45 mutual funds which are considered to have negative performances or have the performance under the levels suggested by the benchmark (IHSG). It means that the market has the difficulty to get the abnormal return than the benchmark around five years.

Table 4
Compare on average

Average return, IHSG (monthly)		:	**1.21%**
Risk, Standard deviation, IHSG (monthly)		:	**4.46%**
Excess return, IHSG (monthly)		:	**0.48%**
53 Mutual Funds	average return	:	**0.90%**
	Risk, standard deviation	:	**4.63%**
Average excess return of 53 mutual funds		:	**0.17%**
	average beta	:	0.9344
	average α, Jensen	:	-0.002797
	average r-squared	:	0.8249

Source: data processed, 2015

The performance of mutual funds and the benchmark as it is found out to be difficult to perform exceeding the benchmark.

4. Optimal vs. 1/N Strategy vs. Benchmark. (ex-post portfolio performances).

In this study made 8 portfolios and divided them into 3 class.

I. Optimal, without short-sales, long term - 3 stocks(from 2009),
1/N Strategy, long run - 10 stocks (from 2009),
Benchmark, long run - 10 stocks (from 2009).

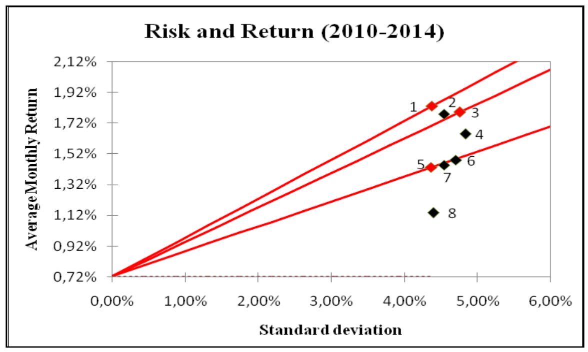
II. Optimal, without short-sales, long term - 3 stocks (from 2009),
1/N strategy, long run - 3 stocks from optimal (from 2009),
Benchmark, long run - 3 stocks from optimal (from 2009).

III. Optimal without short-sales(rebalanced)
1/N Strategy (rebalanced, follow stocks from optimal)
Benchmark (rebalanced, follow optimal stocks).

Table 5
The Results of ex-post performances

IHSG		0.1082
Average Sharpe ratio, from monthly returns		0.1848
#	**Sharpe**	**Ex-Post Performances**
1	0.25285	**Benchmark, long run - 10 stocks (from 2009)**
2	0.23274	1/N Strategy, long run - 10 stocks (from 2009)
3	0.22422	**Benchmark (rebalanced, follow stocks from optimal)**
4	0.19145	Optimal without short sales (rebalanced)
5	0.16249	**Benchmark, long run - 3 stocks from optimal (from 2009)**
6	0.16092	1/N Strategy (rebalanced, follow stocks from optimal)
7	0.15948	Optimal without Short sales, long run - 3 stocks(from 2009)
8	0.09391	1/N strategy , long run - 3 stocks from optimal (from 2009)

Source: data processed, 2015



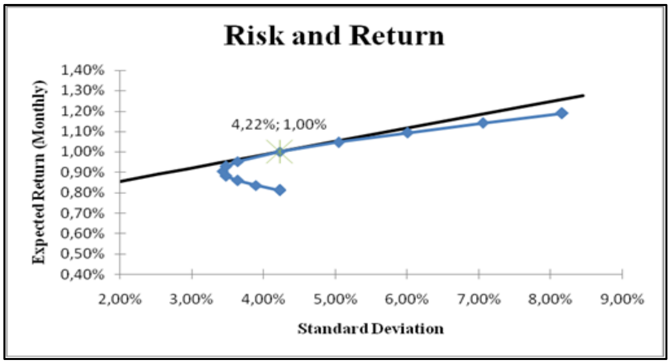
Source: data processed, 2015

Figure 7: Ex-post performance, risk and return

Table 5 is sorted portfolio of Sharpe ratio value and this is to put us at ease in describing of the slope which can be seen in figure 7. From the results, the performances of the benchmark proportions look better. The conclusion from the result is it is hard to beat the benchmark.

5. The Black-Litterman Model.

Suppose there is an investor who wants to invest 10 stocks like what we have discussed previously discuss. Step I "*what does the market think? Assume that the benchmark is optimal and derives the expected returns of each asset under this assumption*."



Source: data processed, 2015

Figure 8: Illustrate on the graph

It will generate all assets returns and it can also be used as anticipated return of each asset. The returns are derived from optimal portfolios.

Table 6
Expected Assets Returns

Securities	Expected Benchmark Return
AALI	0.83%
ASII	1.11%
INDF	0.98%
INTP	0.99%
KLBF	0.99%
PGAS	0.92%
SMRA	1.22%
TLKM	1.01%
UNTR	0.94%
UNVR	0.93%

Source: data processed, 2015

In Step II allows the investors to give opinion which might contributes a lot in improving the good performance in the future compared to the previous one. It means that there will be an overweight in those assets.

Table 7 Adjusted opinion for all returns

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8
Securities	Opinions of expected return	Expected Return of Benchmark	Analyst opinion , δ	Expected Return Adjusted	Opinion adjusted optimized Portfolio	Benchmark Proportions	Proportions Adjusted (Final)
UNVR	**1.10%**	0.93%	0.17%	**1.08%**	38.24%	18.35%	30.28%
KLBF	**1.00%**	0.99%	0.01%	**0.97%**	5.81%	6.39%	6.04%
TLKM	**1.00%**	1.01%	-0.01%	**1.04%**	17.38%	21.50%	19.03%
ASII	**1.00%**	1.11%	-0.11%	**1.02%**	10.45%	22.38%	15.22%
AALI	0.83%	0.83%	0.00%	0.77%	4.96%	2.84%	4.11%
INDF	0.98%	0.98%	0.00%	0.94%	0.49%	4.41%	2.06%
INTP	0.99%	0.99%	0.00%	0.98%	4.73%	6.85%	5.58%
PGAS	0.92%	0.92%	0.00%	0.88%	10.42%	10.83%	10.58%
SMRA	1.22%	1.22%	0.00%	1.20%	3.49%	1.63%	2.75%
UNTR	0.94%	0.94%	0.00%	0.87%	4.02%	4.82%	4.34%

total weight	100.00%
γ opinion confidence	0.6

Source: data processed, 2015

From table 7, it can be seen that investors think that opinions of the returns will influence all parameters. It happens because it has a correlation to each other in variance-covariance, moreover it is done by calculating the deviation from what the market think, in column 4. Then, it is followed by calculating adjusted opinion of the expected returns, in column 5. When giving opinions in one or some assets, it will turn out to be overweight or vice versa and it is applied to all assets in the portfolio. After that, the expected returns will be adjusted then the portfolio optimization will be computed as the result is shown in column 6. The last is adjusting the proportions from the opinion return taken from the proportion and the benchmark proportion. This calculation is considered as simple approach as it is adjusted from what the investor believe in opinions which is 60% and the result in shown in column 8.

CONCLUTION

1. Using historical data, optimized portfolio typically produces negative position (short-selling), although it can be found without short sales by restriction. Efficient frontier with short-sales constrain becomes inside of efficient frontier with short-sales allowed.
2. The descriptive part of the CAPM from 40 stocks using market proxy (IHSG). An equally weighted portfolio is described as the portfolios with higher risk (beta) have, roughly, a higher level of returns. The portfolios are roughly linier between betas and returns, 86 %, increase in beta is not considered perfect if it is associated with the returns. From the equation, the importance is looking at the equation which is still considered as a failure. In the ex-post, there found the efficient portfolio from 40 stocks. Meanwhile, the index of IHSG (benchmark) falls into the category of inefficient compared to efficient mean-variance portfolio of 40 stocks. The CAPM talks about all risky assets in the economy and those which are lacking of theoretical or empirical clarity on what constitutes the market portfolio.
3. In evaluating the performance of mutual funds compare to IHSG index. IHSG Index serves as the benchmark and the result shows that it is hard to beat the benchmark.
4. In ex-post performance of portfolio. By doing rebalance every year, the optimal portfolio do better. However, whether it is rebalanced or not, portfolios which have equal weight as its market capitalization tend to have good performance and lower risk shown by their standard deviation of returns. The results from performance show that the weight of portfolio standard (equal with market cap.) is hard to beat.
5. The Black-Litterman model allows investor to have some views of the stocks that will be turned into portfolio. The first assumption on the market is ex-ante efficient without the opinion. By giving the benchmark proportions and current risk-free rate, it is found that the expected return under this approach can directly as prediction or anticipation of the result. By giving the opinion of returns and confidence opinions, it results to derive an optimal portfolio from an adjustment of benchmark. Thus, it can be concluded that Black-Litterman model has more positivist approach to portfolio choice. However, the implemention of Black-Litterman models, is derived from the previous theories.

BIBLIOGRAPHY

Benninga, S. 2014. *Financial Modeling* (4th ed.). Cambridge: The MIT Press.

Black, F. 1972. Capital Market Equilibrium with Restricted Borrowing. *Journal of Business*, Vol. 45(3): 444-455.

Black, F., and Litterman, R. 1992. Global Portfolio Optimization. *Financial Analysts Journal*, 48: 20-43.

DeMiguel, V., Garlappi, L., and Uppal, R. 2007. Optimal Versus Naive Diversification: How Inefficient is the 1/N Portfolio Strategy? *The Review of Financial Studies*.

Edwin J Elton, M. J. G., Stephen J Brown, William N Goetzmann. 2014. *Modern Portfolio Theory and Investment Analysis 9 Ed*. New York: Wiley.

Elton, E. J., and Gruber, M. J. 1997. Modern Portfolio Theory, 1950 to date. *Journal of Banking and Finance*, 21: 1743-1759.

Fama, E. F., and French, K. R. 2004. The Capital Asset Pricing Model: Theory and Evidence. *Journal of Economic Perspective*, Volume 18 (No.3): 25-46.

Focardi, S. M., and Fabozzi, F. J. 2004. *The Mathematics of Financial Modeling and Investment Management*. New Jersey: Wiley.

Malkiel, B. G. 1995. Returns from Investing in Equity Mutual Funds 1971 to 1991. *Journal of Finance*, Vol 50(2): 549-572.

Malkiel, B. G. 2005. Reflection on the Efficient Market Hypothesis: 30 Years Later. *Financial Review*: 1-9.

Markowitz, H. M. 1959. *Portfolio Selection: Efficient Diversification of Investments*. New York: Wiley.

Peake, C. F. 2005. The summary of "The Capital Asset Pricing Model: Theory and Evidence". University of Maryland.

Roll, R. 1977. A Critique of the Asset Pricing Theory's Test, Part I: On Past and Potential Testability of the Theory. *Journal of Financial Economics*: 129 - 176.

Sharpe, W. F. 1963. A Simplified Model for Portfolio Analysis. *Management Sciene*, Vol. 9(2): 277-293.

Sharpe, W. F. 1964. Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *Journal of Finance*, Vol. 19(3): 425-442.

Tandelilin, E. 2010. *Portofolio dan Investasi: Teori dan Aplikasi*. Yogyakarta: Kanisius.

West, G. 2004. An Introduction to Modern Portfolio Theory: Markowitz, CAP-M, APT and Black Litterman. University of the Witwatersrand.