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The Analysis of Optimal Portfolio Forming with Single Index Model on Indonesian Most Trusted Companies

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Abstract

This study aims to form the optimal portfolio in trusted company in Indonesia. This research is a descriptive research with quantitative approach and purposive sampling technique. The population is the Indonesian Most Trusted Companies with 33 sample companies, while the total sample of 27 companies. The analysis model is Single Index Model. The results of this research there are eight stocks forming the optimal portfolio, and the respective percentage of shares that UNVR by 23%, PGAS by 29%, JSMR by 24%, ADHI by 11%, NISP amounted to 2%, HMSP by 5%, and WEHA by 1%. Portfolios are formed also generate the expected return of 1.6% with 0,1% systematic risk and 0,1% unique risk and for the total risk is 4%. While the stock formed from the overall sample Indonesian Most Trusted Companies provide expected return of -0.4%, with a greater risk of 5%. Rational investors will choose investments into companies that have a single index model analysis on trusted companies.

Keywords: Cut-off, Optimal Portfolio, Return, Risk, Single Index Model
JEL Classification: G4

1. Introduction

Nowadays, investment has been known in indonesian society, the investment's awareness by society starts increasing with be appreciated of Asean Economic's Community'appearance that has contribution in increasing the business competition and investment in indonesia. Therefore, investment starts becoming a need in indonesian society, according to Wahyono (2011), the investment's needs is a basic needs in regional otonomy and district management indepently. The investment aims to obtain even long term or short term profit.

Generally, the investors want a high return from their investment, therefore the investment financial especially in stock investment becomes one of the good prospect choice because of it gives a high return with easier transacting and investing. Return is also one of factors which motivated the investor to invest and also a reward for their courage to bear the risks of investing that they do. (Tandelilin, 2010). In general, the invested funds usage in stock market generally uses the surplus

funds except primary needs in investing because its developing needs time and process to get a high return so that the investors can not take it with the profit that they want anytime. But on the process, investment gives a higher return than save the money with a good investment decision. An Investment decision is a decision to invest on concrete or abstract asset, investment is also called decision of budgeting asset. (Cahyaningdyah & Ressany, 2012)

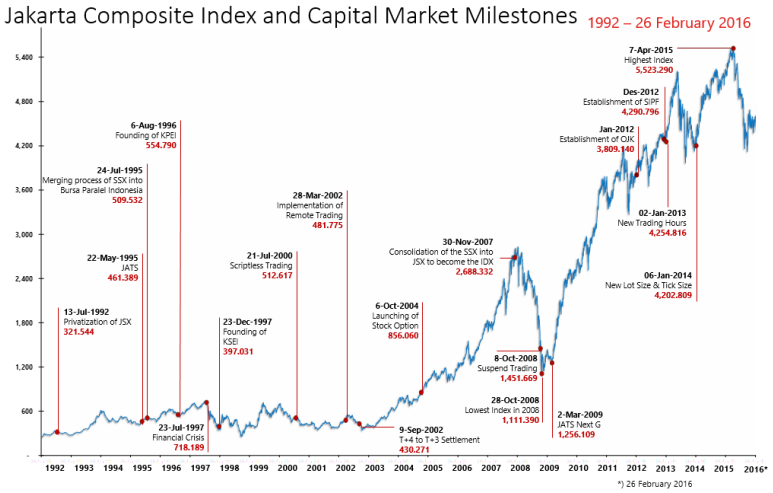
It is important to establish portfolio when you invest in stock market because it will influence the risk and the return that can be obtained. The investment risk can be decreased by investment diversification (Anoraga & Pakarti, 2008). Portfolio forming with diversification is helpful on optimal portfolio because it can decrease the risk if be compared with investing only in one emiten. This statement agree with Markowitz theory which is said "don't put all your eggs in one basket", which means, do not put all your investments in one security because if the security is collapse,then the entire investment is also falling. Based on the theory we need portfolio diversification, and portfolio forming with kinds of analysis.

Through this portfolio, the investors are hoped be able to maximize the expected return with the low risk or try to minimize the risk. Tandelilin (2001) argued, there are two portfolio strategies can be done, they are pasive and active strategy, which pasive strategy is investment strategy in passive disposed based on the movement of market index with an assumption that market does not do a mispricing, the goal is to get return as big as market index by minimizing the risk. Meanwhile active strategy included searching and utilizing information by following the times and price stock movement on purpose of getting higher return than passive strategy, which the investors are more active on trading in Stock Market.

Indonesian Most Trusted Companies is an index that composed by business megazine SWA which provide Indonesia trustworthy companies list with a direct survey toward investor, analyst, investment manager, and assesment based on transparency, accountability, responsibility, independence, and justice because the assesment are based on GCG (Good Corporate Governance).

Indonesia Composite Index (IHSG) is one of important instruments on optimal measurement of portfolio which has function as the indicator between market index and the correlation with asset returns. Tandelilin (2010) argued that IHSG is an index which all of stocks registered as component of calculation. This index describes the market movement commonly so that it is used as measurement to define the systematic risks of portfolio. IHSG development has increased since Indonesia Stock Exchange established on 1984 until 2015. In the 1990s IHSG is valued by Rp. 300,00 until in 2015 it reached the highest price Rp. 5.523,29 although at the same year it also decreased significantly 12,13% until the end of the year from the closing price in 2014.

Grafic 1. The development of Indonesia Composite Index or IHSG



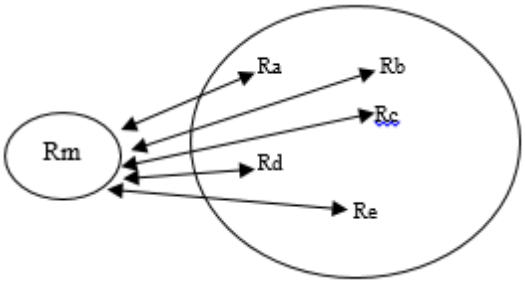
Sources : Indonesia Stocks Exchange 2016

This study noted the whole stocks that ever listed on Indonesian Most Trusted Companies during 2012-2014 based on SWA's survey and never do corporate action such stock split and reverse stock based on SWA's survey. As a candidate determination of calculation this portfolio used Single Index Model method.

According to Bodie, dkk (2014), using single index model have an accuracy rate that almost valid, the model gives appropriate indicator to analyze the security. If we compare to the Markowitz model with covariance matrix will involve risks estimation from a thousand components and may influences error estimation will get consequence for the portfolio which should be smaller than the risks estimation and errors estimation from single index mode.

In the concept of Single Index Model, asset return can be influenced only by the return of market index, the relation between asset returns similar in Markowitz's model is replaced with a relation between asset returns and return of market index (Hartono, 2014). Meanwhile in measuring optimal portfolio we used the best combination between the highest excess return with low risks (Hartono, 2014). Here's the concept that shows Single Index Model, on picture 2.

Picture 2. The relation between asset return and market index

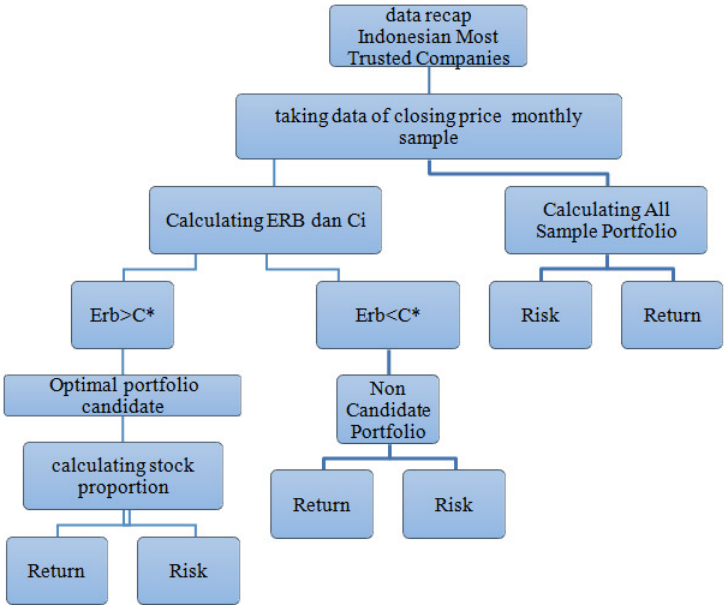


Sources: Hartono (2014)

Single Index Model gives an easiness calculation in analyzing portfolio forming. When choosing stock investment, the investors faced two choices, returns and risks. Single Index Model is one of method that used to predict the returns and the risks of stock by comparing excess return to beta (ERB) and Cut-off Rate (Ci).

Procedure of making an optimal Portofolio

Picture 3. Research Design



Method of Research

The method that used in this study is single index model with descriptive analysis, while Population that used is go public companies which are registered in Indonesian most trusted companies, published in SWA magazine during January 2012- December 2014. Technical sampling that used in this study is purposive sampling. Then the criteria of the sample that used are the companies who have been registered in Indonesian most trusted companies since 2012 until 2014. there are 33 companies, the companies who did stock split there are 4 companies, company who ever was not active during monitoring period is 1 company, and the last company who recently publish the stock during monitoring is only 1 company, so total number of sample that used in this study are 22 companies.

Optimal Portfolio

According to Hartono (2014:6) optimal portfolio is portfolio which gives a combination between high return and the lowest cost. The stock will be choosen to be one of candidate of optimal portfolio is the one that will fill the criteria of ERB > C*. Whereas C* (Cut-off Point) is a limit of acceptance for each stock in portfolio. C* obtained from the big value of Ci. In forming the optimal portfolio is need measures in determination. Table 1.1 will explain the measures.

Tabel 1. Definitions of Operational and measuring Variabel

No.	Variable	Note	Equation
1	Individual return	Return of investment (individual stock)	$R_i = \frac{P_t - P_{t-1}}{P_{t-1}}$
2	Expected return Individual and Expected return Portofolio	Expected return from investing in portfolio	$E(R_i) = \frac{\sum_{t=1}^{n} R_{it}}{n}$ dan $E(R_p) = \alpha_p + \beta_p . E(R_M)$
3	Standard Deviation Individual dan Standard Deviation Portofolio	Measuring risk	$\sigma_i = \frac{\sum_{t=1}^{n}[R_{it} - E(R_i)]^2}{n}$ dan $\sigma_p = \left[\sum_{i=1}^{n}\sum_{j=1}^{n} wi.wj.\sigma ij\right]^{\frac{1}{2}}$
4	Excess Return to Beta	Measuring return relative premium stock towards a unit risk which can not be diversified	$ERB_i = \frac{E(R_i) - R_{BR}}{\beta_i}$
5	Cut-off Rate	The result is quotient from market varian and premium return on variance error, with function as determiner of the portfolio candidate limit	$C_i = \frac{\sigma_m^2 \sum_{j=1}^{i} A_j}{1 + \sigma_m^2 \sum_{j=1}^{i} B_j}$ dan $C^* = \frac{\sigma_m^2 \sum_{j=1}^{n} \frac{E(R_j) - R_{BR}}{\sigma_{ej}^2}.\beta_j}{1 + \sigma_m^2 \sum_{j=1}^{n} \frac{\beta_j^2}{\sigma_{ej}^2}}$
6	Stock Proportion	Counter of portfolio candidate percentage	$w_i = \frac{Z_i}{\sum_{j=1}^{k} Zj}$

7	Individual Beta and Portofolio Beta	Systematic risk measuring of security	$\beta i = \frac{\sigma im}{\sigma_M^2}$ dan $\beta p = \sum_{i=1}^{n} wi.\beta i$
8	Alpha Individual and Alpha Portofolio	The expected value of return which is independent towards market return	$\alpha i = E(Ri).\beta i.E(Rm)$ dan $\alpha p = \sum_{i=1}^{n} wi.\alpha i$

Sources: Hartono (2014), Tandelilin (2010), Bodie dkk (2014).

This study used secondary data and the method of data collecting with documentary method from idx statictic, yahoo finance, SWA magazine, and sites of the companies. Descriptive analysis is used in this study. In addition the method of the study is single index model and using toolback on Ms. Excel.

Result and Discussion

Return is the main goal of investors in investing, in stock portfolio is needed an expected return calculating in order to determine the prospect of investment. Beside the return, the other calculation like Standard deviation is needed to measure the level of risks in investing. The result of calculating expected return and each individual risks can be seen on table 2.

Table 2. The result of calculation of standard deviation and expected return

No	Nama Perusahaan	KODE	σi	E(Ri)
1	PT Adhi Karya (Persero) Tbk.	ADHI	0,1624	0,0359
2	PT Agung Podomoro Land (Persero) Tbk.	APLN	0,1066	-0,0067
3	PT Aneka Tambang (Persero) Tbk.	ANTM	0,1313	-0,0194
4	PT Bank Central Asia Tbk.	BBCA	0,0614	0,0118
5	PT Bank Danamon Indonesia Tbk.	BDMN	0,0865	-0,0009
6	PT Bank Mandiri (Persero) Tbk.	BMRI	0,0756	0,0101
7	PT Bank Negara Indonesia (Persero) Tbk.	BBNI	0,0722	0,0105
8	PT Bank OCBC Tbk.	NISP	0,0640	0,0060
9	PT Bank Rakyat Indonesia (Persero) Tbk.	BBRI	0,0858	0,0115
10	PT Bumi Resources Minerals Tbk.	BRMS	0,2239	-0,0377
11	PT Bumi Resources Tbk.	BUMI	0,1926	-0,1116
12	PT Gajah Tunggal Tbk.	GJTL	0,1146	-0,0270
13	PT Garuda Indonesia (Persero) Tbk.	GIAA	0,0760	0,0016
14	PT Gudang Garam Tbk.	GGRM	0,0782	-0,0036
15	PT HM Sampoerna Tbk.	HMSP	0,0692	0,0132
16	PT Indo Tambang Raya Megah Tbk.	ITMG	0,1104	-0,0320
17	PT Indocement Tunggal Prakasa Tbk.	INTP	0,0778	0,0075
18	PT Indofood Sukses Makmur Tbk.	INDF	0,0496	0,0093
19	PT Indosat Tbk.	ISAT	0,0947	-0,0137
20	PT Jasa Marga (Persero) Tbk.	JSMR	0,0545	0,0128
21	PT Panorama Transportasi Tbk.	WEHA	0,0854	0,0089
22	PT Perusahaan Gas Negara (Persero) Tbk.	PGAS	0,0671	0,0152
23	PT Semen Indonesia (Persero) Tbk.	SMGR	0,0724	0,0070
24	PT Tambang Batubara Bukit Asam Tbk.	PTBA	0,1096	-0,0148
25	PT Trikomsel Oke Tbk.	TRIO	0,1277	0,0024
26	PT Unilever Indonesia Tbk.	UNVR	0,0665	0,0128
27	PT United Tractors Tbk.	UNTR	0,0865	-0,0152

Sources: The data processed in 2016

Table 2 explains that from 27 stock samples of companies there are 16 stocks that have positive value of expected return and 11 stocks have negative value of expected return, it means 11 stocks that have negative value cannot give return for the portfolio. Although expected return with positive value can give a return for the portfolio. Individual standard deviation showed in table 2 explains that many stocks which have the biggest standard deviation, BRMS, has a value 22,4% which means BRMS's stock has the higher level of risks among 27 stock samples of companies. It followed by BUMI's stock 19,4%, ADHI's stock 16,2%, ANTM's stock 13,1%, and the last TRIO's stock 12,8%. The five stocks are stocks with the biggest risks. Then stock with the lowest standard deviation is INDF with 5% which means it showed the lowest risk of entire sample.

Alpha, Beta, and Variance Error of Each Stock

Alpha, beta and variance error also have important role in forming optimal portfolio which is alpha is the part of security return without get any influence from market. Whereas beta that used as a measure of systematic risks is coefficient of switch measure of Ri as the effect from Rm changes (Tandelilin, 2010), beta is also used as one of variance error. The variance error can be concluded as unique risks, it can be counted from total risks minus individual beta and multiplied by market risk (Hartono, 2014).

Table 3. Alpha , Beta, Variance Error.

No.	Codes	αi	Bi	$\sigma\varepsilon i^2$
1	ADHI	0,0130	2,8687	0,0151
2	APLN	-0,0238	2,1407	0,0051
3	ANTM	-0,0332	1,7286	0,0132
4	BBCA	0,0025	1,1589	0,0019
5	BDMN	-0,0118	1,3669	0,0049
6	BMRI	-0,0030	1,6481	0,0020
7	BBNI	-0,0015	1,4946	0,0022
8	NISP	0,0046	0,1704	0,0041
9	BBRI	-0,0033	1,8457	0,0027
10	BRMS	-0,0650	3,4177	0,0341
11	BUMI	-0,1355	3,0005	0,0247
12	GJTL	-0,0410	1,7498	0,0089
13	GIAA	-0,0004	0,2487	0,0057
14	GGRM	-0,0086	0,6184	0,0056
15	HMSP	0,0042	1,1328	0,0030
16	ITMG	-0,0325	0,0626	0,0122
17	INTP	0,0008	0,8435	0,0051
18	INDF	0,0043	0,6273	0,0019
19	ISAT	-0,0251	1,4293	0,0062
20	JSMR	0,0070	0,7201	0,0023
21	WEHA	0,0039	0,6213	0,0068
22	PGAS	0,0118	0,4297	0,0042
23	SMGR	-0,0061	1,6481	0,0015
24	PTBA	-0,0200	0,6594	0,0114
25	TRIO	-0,0096	1,4956	0,0132
26	UNVR	0,0104	0,2997	0,0043
27	UNTR	-0,0223	0,8828	0,0064

Sources: Data processed in 2016

Excess Return to Beta (Erbi) and Cut-Off Point (C*) From (Ci)

Excess return to beta is such an important component in making the optimal portfolio with index single method. According to Hartono (2014) ERB is a measure of the excess of relative return to one unit of risks that cannot be divercificated by beta. ERB also shows the value of the assets, it is the relation between excess returns and risks. Cut-off (Ci) is C value for the first asset that counted from

accumulation of the A1 values until Ai and B1 until B1 values until B1 (Hartono, 2014). Cut-off point (C*) is the biggest value of C1 which has fuction as the limit and determining the optimal portfolio candidates. Cut-off point (C*) explains the determination of the optimal portfolio candidates.

Tabel 4. Determination the candidate of optimum portfolio, ERB>C*

No	Code	ERBi	Ci	Ket
1	UNVR	0,02876	0,0008	Portfolio candidate
2	PGAS	0,02575	0,00217	Portfolio candidate
3	JSMR	0,01199	0,00437	Portfolio candidate
4	ADHI	0,01107	0,0067	Portfolio candidate
5	NISP	0,01078	0,00672	Portfolio candidate
6	INDF	0,00822	0,00689	Portfolio candidate
7	HMSP	0,00797	0,0071	Portfolio candidate
8	WEHA	0,00757	0,00711	Portfolio candidate
9	BBCA	0,00657	0,00698	Non portfolio candidate
10	BBNI	0,00422	0,00627	Non portfolio candidate
11	INTP	0,00396	0,00619	Non portfolio candidate
12	BBRI	0,00396	0,00567	Non portfolio candidate
13	BMRI	0,00363	0,00526	Non portfolio candidate
14	SMGR	0,00173	0,00452	Non portfolio candidate
15	TRIO	-0,0012	0,00441	Non portfolio candidate
16	BDMN	-0,0037	0,00407	Non portfolio candidate
17	APLN	-0,0051	0,00325	Non portfolio candidate
18	GIAA	-0,0103	0,00323	Non portfolio candidate
19	BRMS	-0,0123	0,00272	Non portfolio candidate
20	ISAT	-0,0125	0,00225	Non portfolio candidate
21	GGRM	-0,0126	0,00215	Non portfolio candidate
22	ANTM	-0,0136	0,00183	Non portfolio candidate
23	GJTL	-0,0178	0,00123	Non portfolio candidate
24	UNTR	-0,0219	0,00099	Non portfolio candidate
25	PTBA	-0,0287	0,00089	Non portfolio candidate
26	BUMI	-0,0386	-0,0003	Non portfolio candidate
27	ITMG	-0,5768	-0,0003	Non portfolio candidate

Sources: Data processed 2016

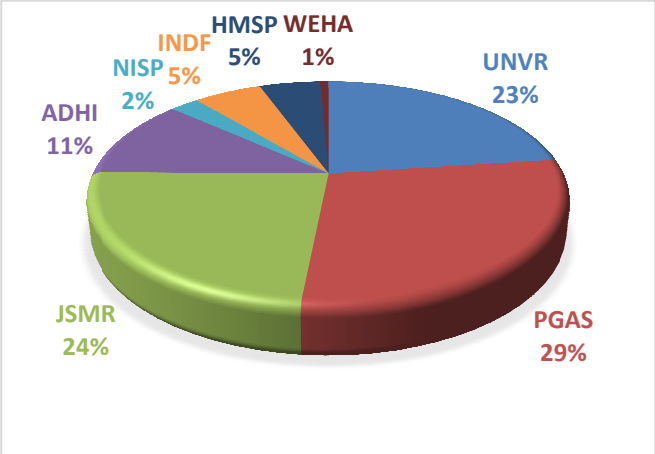
Based on the table, with the candidates portfolio determination that can seen with measuring ERBi value and C* 0,000711 as stock candidates determiners where the stocks which has ERBi value more than C* value, it means that the stock can be clasified as portfolio candidates stock . Based on the result, there are 8 assets of stocks of portfolio candidates, UNVR, PGAS, JSMR, ADHI, NISP, INDF, HMSP, WEHA, while the others 19 stocks are not included in portfolio candidates because the values of ERB > C*. Besides that the values of ERBi are not more than the individual values of Ci. The previous study from Quranitasari, Rustam and Sulasmiyati (2016), there are 29 stocks of portfolio candidates in indexs of LQ-45. Then according to Setyoningsih, Suhadak and Topowijoyo (2015), there are 12 stocks of candidates in 100 compass indexs. The others researchs from Pardosi and Wijayanto (2015) with Krismeidyan, Topowijoyo and Nuzula (2014), the result of both studies, there are 7 candidates stocks for the optimal portfolio. On the other side, Khotim, Darminto and Topowijoyo (2014) explain that there are 6 stocks of candidates in the sri kehati index. The others, Wisambudi, Sudjana and Topowijoyo (2014) found 4 stocks candidates in the JII index. And the last is the previous study from Agmiviolya, Dzulkirom and Hidayat (2014) which found 9 stocks of portfolio candidates on basis food and beverages sectors.

Stocks Proportion of the Candidates Optimal Portfolio

Calculating the proportions of each stock is important things to form portfolio because stocks proportions affect the level of risks and along total returns that can be gained in the future after the

portfolio is formed. In this calculation, only Stock proportion of portfolio candidate which will be calculated because these stocks will be selected and formed as optimal portfolio. This Stocks calculation symbolized by wi with a scale of each stock and zi as a component that included to wi. Picture 4 shows the percentage of each stocks of optimal portfolio. The percentage is the best optimal composition based on the calculation of single index model. If the percentage is changed then it will affect the performance of portfolio including the returns and the risks.

Picture 4. The presentages of optimal portfolio

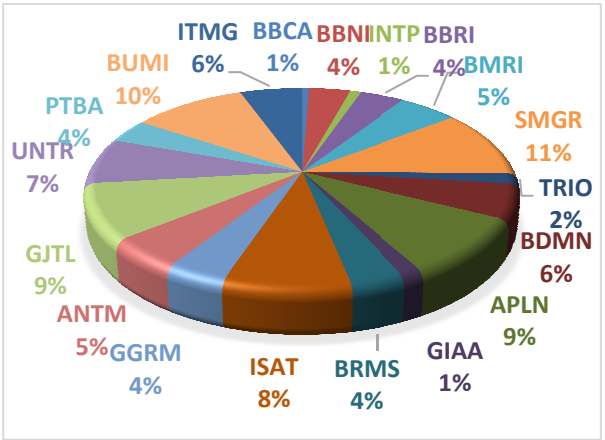


Sources: Data processed in 2016

The Proportion of Non-Candidates Portfolio

The aim of calculating non-stock candidates is to compare the optimal portfolio performance as prove that the stocks are selected based on the criteria of ERB>C* have better performance than non cancidates stocks. The proportion of non-candidate portfolio uses the best composition that is calculated using wi and zi, similar with candidates of optimal portfolio.

Picture 5. The presentages of non-candidate optimal portfolio



Sources: Data processed in 2016

The Result of Optimal Portfolio, Non-Candidate Portfolio and Samples

The result of forming portfolio based on selected candidate are sistematic risks, unique risks, total risks, expected return portfolio, and alpha and beta that used so that help investor calculating returns and risks. The portfolio should be calculated in order to compare the performance of optimal portfolio, both candidate optimal portfolio and non-candidate optimal portfolio are using single index model, the

stocks are registered in IMTC. The portfolio establishment used the same proportions for each individuals stock. IMTC get the same proportion, 1/27 stock or 0,037 or 3,7%, it can be seen on table 5.

Tabel 5. Result of portfolio forming with single index model and samples

Portfolio Result	Optimal SIM	Non Candidate	Entirement
Alpha Portfolio (αp)	0,0095	-0,0321	-0,0141
Beta Portoflio (βp)	0,7877	1,6215	1,2707
Systematic Risk ($\beta p^2 \sigma m^2$)	0,1%	0,4%	0,2%
Unique Risk ($\sigma \varepsilon p^2$)	0,1%	0,1%	0,0%
Risk Total (σp)	4,2%	6,5%	5,0%
Expected Return Portofolio E(Rp)	1,6%	-1,9%	-0,4%

Sources: Data processed in 2016

There are different results between optimal portfolio and portfolio that formed by IMTC on both portfolio and market. Portfolio that formed by single index model gives a high return and low risk on the composition. Different with non-candidate portfolio and IMTC, the risks that should be guaranteed by optimal portfolio is 4,2% equals with market risk. Whereas the result of the risks for whole stocks of IMTC is 5% and the high risks guaranteed by non-candidate portfolio is 6,5%. The return produced from optimal portfolio 1,6% is bigger than from market 0,8%. Whereas IMTC gives return -0,4%. Non-candidate portfolio give a return -1,9% means that it gives the biggest low cost than others. From the result it can be concluded that optimal portfolio is most profitable, whose calculation based on ERB>C*.

Conclusion

Generally, the performance of optimal portfolio is formed better than market, non-candidate portfolio, even IMTC. There are 8 stocks of candidate optimal portfolio, UNVR (23%), PGAS (29%), JSMR (24%), ADHI (11%), NISP (2%), INDF (5%), HMSP (5%), WEHA (1%). It is hoped that the proportions of funds realizing the performance of optimal portfolio. 8 stocks from Indonesian Most Trusted Companies are the best candidates from 27 stocks of IMTC.

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