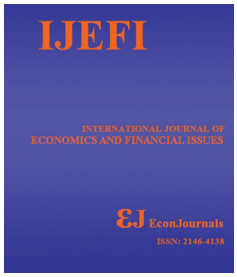

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The Construction of a Portfolio Using Varying Methods and the Effects of Variables on Portfolio Return

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ABSTRACT

This research aims to explore for portfolio construction using vary method which is Markowitz, Elton Gruber, Equal Weighted, Market Cap, and Safety-First Criterion (Roy and Kataoka Criterion). Data was used monthly data of Kompas 100 Index for period of 2015-June 2023. The result found that 53 stocks for using Elton Gruber, Equal weighted, market capitalization, Markowitz Method. There is no difference average return for portfolio of Elton Gruber, Equal weighted, market capitalization, Markowitz Method. The research's findings are as follows Roy and Kataoka as representative Safety-first criterion could be used to construct portfolio with determining achievement of minimum return of 0.797% per month with risk premium of 0.2%. Portfolio return using Roy criterion is vary from 3.973 to 13.397% per month and Kataoka criterion has return vary from 8.861 to 15.48% for equal weighted. Then the equal weighted portfolio return is highest than market capitalization weighted Portfolio return. Elton Gruber method also used to construct portfolio, then this method has highest cumulative return compared to others methods. The Market shock affected all portfolio return and Interest rate has affected portfolio return for equal weighted and Elton Gruber Method. Pandemic Era affect portfolio return for Market Capitalization Weighted portfolio.

Keywords: Portfolio Construction, Portfolio Return, Portfolio Risk, Skewness and Quadratic Programming, Market Capitalization, Safety-First Criterion
JEL Classification: C13, C51, C61, G1, M21

1. INTRODUCTION

Fund Owner have investment to stock market to have expectation the fund increases sharply in the long term. Beside that Stock markets are getting more and more complicated until today. Investor still expect to have funds under management could achieve their target before they get retired. A portfolio containing a variety of various assets will offer the investor a variety of returns while lowering risk (Galankashi et al., 2020). It means that investor always seek a good portfolio to achieve target return.

The various characteristic stock was used to select stock to become member a portfolio which is risk and return, excess return to beta, safety first and others. Numerous techniques have been created to investigate a portfolio that it could achieve their target. Academician did research to set up a good portfolio for investor needs. Markowitz (1952) introduce a good portfolio using risk and return and Quadratic Programming. Elton and Martin (1977), Elton, et al. (1976, 1978, and 2014) introduced a portfolio that it selects from all stocks using excess return to beta. Then, safety first approach developed by some academician, which is Roy (1952), Kataoka (1963) and Telser (1955). This approach has a certain or special criteria to become member a portfolio. Jones (1992) used network analysis to set up a portfolio. Saaty (1980) developed a model hierarchy portfolio to set up a portfolio. Skewness as a tool to select stock to become a member portfolio discussed by Arditti (1967); Levy (1969), Kraus and Litzenberger (1976) and Manurung et al. (2023a). Black and Litterman (1991) proposed an asset allocation based on combining investor view with market equilibrium.

Research on the portfolio has been done mostly using Markowitz Model which is Hanif et al. (2021), Balqis et al. (2021), Manurung and Berlian (2004), Manurung (1997a) and Manurung (1997b). Manurung et al. (2023a), Manullang et al. (2023) used Markowitz Model, Elton Grubel Model to construct a Portfolio for Indonesian stocks. Manurung et al. (2023a) used skewness methods to select stocks for member a portfolio. McNamara (1998), Alghalith (2011) and Dai et al. (2015) used stochastic dominance for construction portfolio. Bey and Howe (1984) used Gini's Mean Difference for Portfolio Selection. Sartono and Setiawan (2009) explored VAR Portfolio Optimal and made comparison between Markowitz Method and Mean Absolute Deviation. Hunjra et.al (2020) discussed portfolio construction by using different risk models with a comparison among diverse economic scenarios.

Based on above explanation, this research wants to construct a portfolio using Roy Criteria that is different from previous research. Roy criteria should have certain return to achieve. Then portfolio return seek factor that affected it that it used macroeconomic variable.

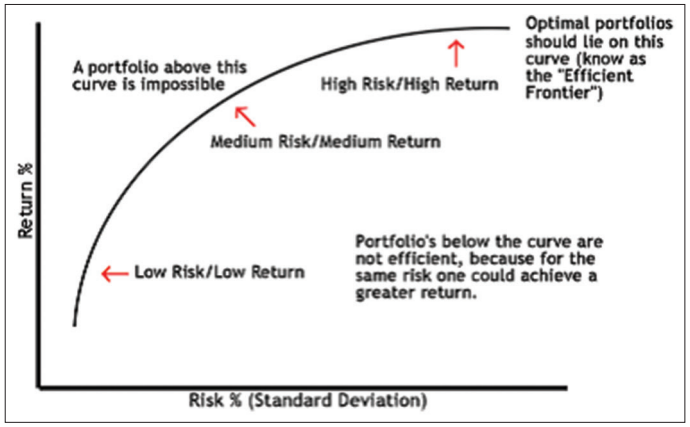
The remainder of this paper is structured as follows. Section 1 goes over the relevant Theoretical background. Section 2 then outlines the methodology. The results are then presented and discussed in Section 3. Finally, in section 4, the conclusions are presented.

2. THEORETICAL BACKGROUND

In 1952, Markowitz introduced the Theory of Portfolio for the first time to scientific in Finance. This theory focused on risk and return as factors to select instrument of investments such as stock, bond and other to construct in the optimal portfolio. Markowitz (1952) assumed that most investors are cautious and seek to incur the least amount of risk in order to earn the maximum potential return, optimizing the return to risk ratio. Theory of Portfolio develops a framework in which any expected return is composed of various future outcomes and is thus risky, and this risk-return relationship can be optimized through diversification (Kierkegaard et al., 2007). The portfolio should meet these two conditions is referred to as an efficient portfolio. Markowitz (1959) stated that No other portfolio will produce a higher return at the same degree of risk. Markowitz (1991) mentioned that if it is possible to increase expected return without increasing risk or decrease risk while maintaining the same level of expected return, a portfolio is inefficient.

Markowitz (1952) stated that risk and return could be calculated using Quadratic Programming to estimate the efficient frontier. The efficient frontier is based on the straightforward line risk and return are connected from the smaller to the higher. Kierkegaard et al. (2007) stated that there may be a technique to calculate the level of risk needed to achieve different levels of return. (Markowitz (1959) stated that the efficient frontier is a trade-off graph with expected return on one axis and risk on the other. All portfolios that optimize expected return for a specific amount of risk are represented by Figure 1. The efficient frontier is just a

Figure 1: The Efficient Frontier (Markowitz, 1959)



line drawn from bottom to top, with each point representing the junction of a prospective reward and its matching amount of risk. The portfolio that offers the optimum return for a specific level of portfolio risk is considered to be the most efficient. Based on Efficient Frontier, it found asset allocation through every combination risk and return.

Figure 1 present that there are no portfolios above the efficient frontier, and all portfolios below the border are subpar compared to those on the frontier, as seen in the above graphic. A separate efficient portfolio is represented by each point on the frontier. The risk and return both rise as one moves from lower left to higher right. Each asset in the whole portfolio needs to be weighted in a specific way in order to produce a tangent portfolio on the efficient frontier. A portfolio with equally distributed fractions of each asset will not provide contact with the efficient frontier if only one asset is used. The weighting process is important for achieving a tangent portfolio on the efficient frontier. There is a portfolio that offers the lowest risk for every level of return and a portfolio that gives the highest return for every level of risk. Any portfolio in the line of the curve is efficient, meaning it provides the optimum expected return for a particular level of risk.

Elton, et al. (1976, 1977 and 1978) introduced a construction of portfolio that it selects from all stocks using excess return to beta. Stock that has excess return to beta is higher than a criterion (cut off value), it will become a group portfolio. The Elton, Gruber, and Padberg model is based on stock performance using a reward-to-volatility (RV) approach, which entails dividing excess return by systematic risk. Assets are ranked according to their performance ranking, beginning with the highest and working down to the lowest to determine the Optimal Portfolio. Assets with an RV value greater than the cut-off point are included in the optimal portfolio; assets with a lower RV value are not included in the optimal portfolio. The Elton, Gruber, and Padberg model process is broken down into the following steps: (a) calculating individual stock performance, or RV = (R - Rf)/β) defining the ranking of individual stock performance based on RV ratings; (c) deciding the cut-off point; select the highest cut-off point (C*); (d) deciding the assets that go into the portfolio; and (e) comparing the individual RV with the highest cut-off point. Sometimes this model called single index model to select portfolio.

Cut-off point for each stock is calculated using equation as follows:

$$C_i^* = \frac{\sigma_m^2 \sum_{j=1}^{i} \frac{\left(R_i - R_f\right) * \beta_j}{\sigma_{ej}^2}}{1 + \sigma_m^2 \sum_{j=1}^{i} \left\{ \frac{\beta_j^2}{\sigma_{ej}^2} \right\}} \quad (1)$$

The asset allocation of each stocks is calculated as follows:

$$w_i = \frac{Z_i}{\sum_{i=1}^{n} Z_i} \quad (2)$$

where

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

In Statistics, there is an indicator to measure normality of Bell curve that is called Skewness. Skewness is a measure of the asymmetry of a distribution. A distribution could be stated asymmetrical when its left and right side are not mirror images. A distribution can have right (or positive), left (or negative), or zero skewness. Skewness could be used to set up a portfolio by Fund Owner. Stocks will be selected to become a portfolio through return that has return in right skewness. When the portfolio return is negatively skewed, an extreme left-tail event is more likely than an extreme right-tail event (Kim et al., 2014). Therefore, the typical investor favors return distributions that are more positively biased. For instance, a portfolio that is more favorably skewed has a stronger Sortino ratio and less semi-deviation (Sortino and van der Meer, 1991).

Then, there is a suggestion to select a portfolio using safety-first Criterion. This method is concerned only with risk of failing to achieve a certain minimum target return or secure prespecified safety margin. The risk is commonly expressed as

$$Prob\ (r_p \le r_L) \le \alpha \quad (3)$$

where r_p is the return of portfolio p, r_L is a certain desired level return below which the investor does not wish to fall, which is often referred to as the disaster level or the safety threshold, and α is an acceptable limit on the probability of failing to earn the minimally acceptable level of return, r_L. There is 3 criterion that overcome to discuss for portfolio construction which is Roy (1952), Kataoka (1963) and Telser (1955). It will explain following this explanation.

Roy (1952) introduced and developed a safety-first criterion that seeks to minimize the probability of earning a disaster level of return, α in equation (3) which is:

$$\text{Minimize} \qquad \text{Prob}\ (r_p < r_L) \quad (4)$$

Roy's safety-first criterion implies that investors choose their portfolios by minimizing the loss probability for a fixed safety threshold called the floor return. Roy's criterion tries to control risk for a fixed return whereas Markowitz's meanvariance criterion offers a menu of positively related pairs of points having both the maximum local return and minimum local risk. Roy's Safety first criterion is related to the sharpe ratio (Francis and Kim, 2013, p 221). Minimizing Probality of equation (4) is equvalent to

$$Prob\left(\frac{(r_p - E(r_p)}{\sigma_p} < \frac{r_L - E\left(r_p\right)}{\sigma_p} \right)$$

$$\text{Minimize} \quad = Prob\left(z < \frac{r_L - E\left(r_p\right)}{\sigma_p} \right) = Minimize\left(\frac{r_L - E\left(r_p\right)}{\sigma_p} \right)$$

$$= \text{Maximize} \left\{ \frac{E(r_p) - r_L}{\sigma_p} \right\}$$

Sharpe Ratio is as follows: $S_p = \frac{E(r_p) - r_L}{\sigma_p}$ --- $E(r_p) = r_L + S_p\, \sigma_p$

(5)

Equation (5) means that Expected return portfolio depend on r_L and risk tolerance. Roy criterion stated that risk tolerance is product of Sharpe ratio and portfolio risk. Risk Measurement should fulfill Artzner Criteria (Artzner et.al, 1999). Based on equation (5), Roy criterion stated as follows in Figure 2:

Besides Roy, there is an other academician to suggest safety first. Kataoka (1963) also developed a safety-first criterion in which choose the portfolio with an insured return R_L, as high as possible subject to the constraint such as the probability that the portfolio return is no greater than insured return must not exceed a predetermined level, denoted α (alpha). Kataoka criterion stated in Figure 3 at below for $\alpha = 5\%$.

Kataoka stated as follows:

Maximize R_L

$$Prob\ (R_p < R_L) \le \alpha \quad (6)$$

$$E(R_p) = R_L + Z_\alpha * \sigma_p \quad (7)$$

Equation (7) stated that Expected Return Portfolio $E(R_p)$ depend on insured return R_L and portfolio risk (σ_p) and level of tolerance error (α, alpha). If tolerance error is 5%, so the value of Z_α equal to 1.645 which is tolerance level always used by researcher and academician.

3. METHODOLOGY

This study uses monthly stock price information obtained from www.finance.yahoo.com. Data is available January 2015-June

Figure 2: Portfolio return in vary risk and slope

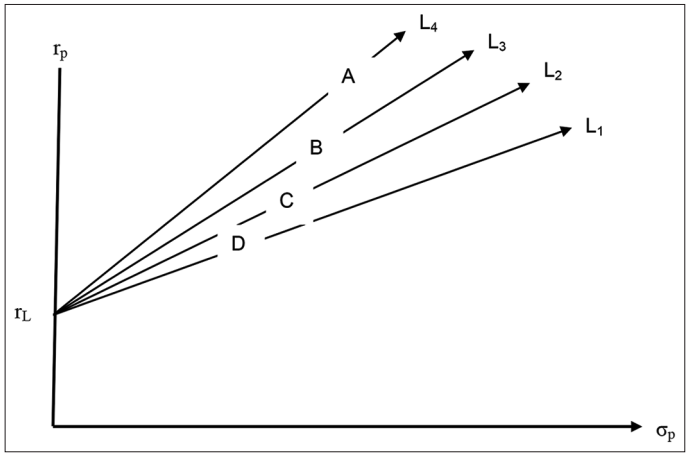
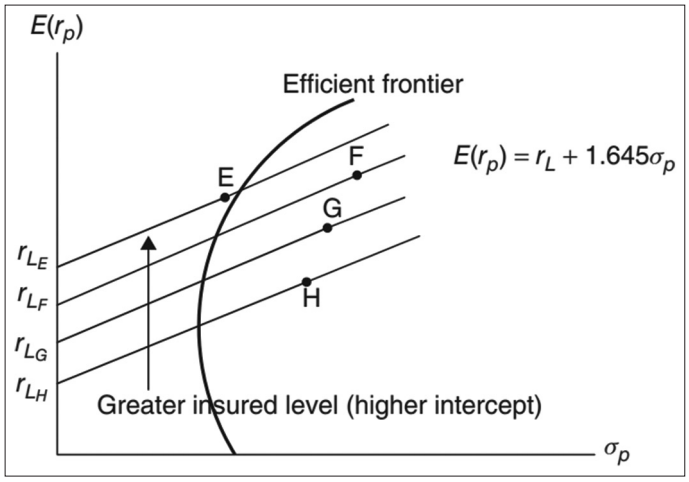


Figure 3: Kataoka's Safety-First Crietrion



2023. This study employed an adjusted price that included dividends, rights issues, and all business activity to stock price into account.

Stock Return calculated as follows:

$$R_{i,t} = \frac{Adjusted\ Clossing\ Price_{i,t}}{Adjusted\ Clossing_{i,t-1}} \times 100\% \quad (8)$$

Risk calculated by standard of deviation as follows:

$$\sigma_t = SQRT(250) * \sqrt{\frac{\sum_{i=1}^{252}\left(R_{i,t} - \bar{R}\right)^2}{n-1}} \quad (9)$$

The return and risk will be used to choose stocks and calculate asset allocation using quadratic programming. In an operational research investigation, the weight of a group for reaching the target function can be solved using quadratic programming which is risk minimization is the goal of portfolio management. Following is the quadratic programming equation:

Objective Function:

$$\left.\begin{aligned} Min\ \sigma &= \sqrt{\sum_i^n \sum_j^m \left[w_i^2 \sigma_i^2 + 2 w_i w_j Cov(i,j) \right]} \\ \text{Subject to} \quad & w_1 + w_2 + \ \ldots \ + w_n = 1 \end{aligned}\right\} \quad (10)$$

$$\sigma = \sqrt{\sum_i^n \sum_j^m \left[w_i^2 \sigma_i^2 + 2 w_i w_j Cov(i,j) \right]} \quad w_1 * R_1 + w_2 * R_2 + \ldots + w_n * R_n = R_p$$

$$w_1, w_2, \ldots, w_n > 0$$

This research uses the quadratic programming method to find weight of every stock in a portfolio (Markowitz, 1952; Manurung, 1997).

Weighted Stock could be calculated as follows as:

$$w_i = \frac{nilai\ stock\ i_{th}}{total\ Portfolio} \quad (11)$$

Weighted stock i_{th} will be calculated for portfolio using Markowitz Model, Elton Gruber Method, market capitalization and Equal Weighted in Portfolio.

The cumulative return is calculated as follows:

$$CR_t = (1 + r_t) * CR_{t-1} \quad (12)$$

Equation (12) will use based year on December 2014 that value of 100.

4. RESULTS AND DISCUSSION

This section will explain research result, that it will be divided into three parts in this section. It begins with descriptive statistics, then moves on to portfolio construction, and finally to causality analysis.

4.1. Statistics Descriptive

The statistics descriptive of risk and return for 53 equities listed on the Indonesia Stock Exchange are explained in Table 1. The 53 stocks come form 100 stock member of Kompas 100 Index. Stock that has negative return was eliminated from 100 stocks, so the results is only 53 stocks to become member of a portfolio which it has positive return. Table 1 explain average return dan standard of deviation the stock for period January 2015-June 2023 which is monthly return.

The highest return is 4,855% per month for BRPT stock, and the lowest stock return of TLKM Stock is 0,5% per month during January 2015-June 2023. The highest of Standard of deviation is 29,8% for AGRO Stock and the lowest of standard of deviation is 6.12% for TLKM stock. The highest of semi-variance is 15,44% for TPIS Stock and the lowest of Semi-variance is 3.52% for TLKM Stoks. The highest of beta is 3.06 for AGRO Stocks and

Table 1: Return, Standard of Deviation, Semi Variance, Beta and Skewness

No.	Tick Name	Return	Standard of deviation	Semi-Variance	Beta	Skewness
1.	BRPT	0.0485576	0.20517485	0.0664297	2.0138246	2.104367
2.	AGRO	0.0464072	0.29776778	0.08745564	3.0613358	1.979294
3.	ASSA	0.0363135	0.19013606	0.08714184	2.1138464	1.7041
4.	INDY	0.0361551	0.2531701	0.0763902	2.4942628	3.12441
5.	TKIM	0.0340212	0.17744627	0.08443307	1.9156371	0.786335
6.	RAJA	0.0329988	0.25554551	0.08499967	1.8115163	3.673539
7.	INKP	0.0324582	0.16288259	0.07109337	1.5381081	1.298705
8.	HRUM	0.0311211	0.20353529	0.07792359	1.3854118	2.043166
9.	DOID	0.0305834	0.24799994	0.08522221	2.9699921	1.916996
10.	TPIA	0.026387	0.18595088	0.15445548	1.0657915	-0.39402
11.	BFIN	0.0243199	0.12079703	0.0726548	1.2122391	0.564544
12.	SMDR	0.0243074	0.1893609	0.06772955	1.7645512	1.741446
13.	ESSA	0.0238278	0.19131054	0.08319348	1.6655025	1.309972
14.	ISAT	0.0215338	0.19210841	0.08192737	1.7996324	3.271093
15.	ERAA	0.0213903	0.17214388	0.08188323	1.4856909	0.83013
16.	AMRT	0.0207707	0.09946206	0.04403337	0.3809565	1.112297
17.	APIC	0.020268	0.10193328	0.05062496	0.1809898	2.62095
18.	ANTM	0.019884	0.16640645	0.07223481	2.066259	1.403776
19.	MEDC	0.0197678	0.19492027	0.09869172	2.2773199	0.887334
20.	MAPI	0.0188347	0.11767465	0.07420435	1.4991557	-0.07675
21.	INCO	0.0156621	0.1443227	0.07862792	1.581411	0.188111
22.	ITMG	0.0156354	0.15873123	0.0818223	1.7953356	0.78978
23.	ADRO	0.0149978	0.12438993	0.07324672	1.4937356	0.417892
24.	BSSR	0.0147136	0.12469095	0.07813871	0.4120222	0.724682
25.	MYOR	0.0140901	0.07800707	0.0392941	0.2131259	0.927863
26.	TOBA	0.0139702	0.14166746	0.06983009	0.3794367	2.042842
27.	BBCA	0.0136002	0.05086381	0.0325195	0.9809301	-0.36856
28.	JPFA	0.0132922	0.14470912	0.07255755	1.8513638	0.647952
29.	MPMX	0.0124006	0.14054063	0.08044639	1.075722	0.636731
30.	SIDO	0.0114257	0.07600908	0.03879684	0.360532	0.730121
31.	BBRI	0.0112935	0.0766037	0.055873	1.4710014	-0.0.43325
32.	AKRA	0.0103	0.09980329	0.05894035	1.4539078	-0.04747
33.	SRTG	0.0100521	0.11121184	0.05083979	0.1654541	2.519033
34.	BBTN	0.0099204	0.1345758	0.09000145	2.2577089	0.584036
35.	BABP	0.009679	0.16164471	0.80828162	0.3402786	3.514439
36.	BBNI	0.009313	0.09963206	0.05727757	1.1958948	1.948062
37.	BMRI	0.0092606	0.07253645	0.08073264	2.0254043	-0.75685
38.	ENRG	0.0084836	0.21892299	0.06120532	1.4118157	-1.14059
39.	CPIN	0.0083323	0.10201489	0.11790277	1.5995879	1.471529
40.	EMTK	0.0082861	0.14054944	0.05941119	0.8615054	0.3808
41.	PNLF	0.0082158	0.13754691	0.07976072	0.7697717	1.1168
42.	PTBA	0.0082012	0.12457601	0.06290506	0.9603607	1.076053
43.	TINS	0.0078835	0.15692967	0.06667307	1.3491941	0.420706
44.	PNBN	0.0072802	0.12795544	0.06657381	2.2886805	1.263085
45.	ICBP	0.0072298	0.06119924	0.6763656	1.4965965	0.40257
46.	LSIP	0.0071253	0.13687616	0.03760048	0.2925422	0.046475
47.	ABMM	0.0070192	0.12526481	0.06275881	0.2313446	1.876034
48.	BMRS	0.0069884	0.18488063	0.11106927	0.764348	1.941062
49.	UNTR	0.0069827	0.09197415	0.05012568	0.9091147	0.46974
50.	TBIG	0.0063648	0.11526442	0.0518912	0.8876457	1.434984
51.	TOWR	0.006309	0.09223553	0.04471108	0.6126548	1.216391
52.	CTRA	0.0062122	0.11988823	0.08165378	2.0700528	-0.29444
53.	TLKM	0.0051219	0.06119963	0.03518786	0.8317113	0.140499

Table 2: Statistics descriptive of the 53 stocks

	Return	Risk	Markowitz	Equal	EG Portfolio	Mar-Cap
Minimum	0.0051219	0.05086381	-0.0728996	-0.184956	-0.20098	-0.19847
Maximum	0.0485576	0.29776778	0.6368563	0.1949277	0.147979	0.138477
Average	0.0168972	0.14458386	0.01149944	0.0168972	0.017703	0.013135
Standard of Deviation	0.0108172	0.05396512	0.02682734	0.0629689	0.054698	0.047428
Skewness	1.1859169	0.60685965	-0.3633557	0.1845305	-0.48424	-0.96361
Kurtosis	0.7808875	0.24415866	0.03697073	0.9993343	1.889121	3.218751
Jarque Berra	23.29804	20.0246721	39.5575204	17.590194	9.231026	15.9887

Table 3: Asset Allocation Of Portofolio

	Elton Gruber	Market Capitalization	Equal Weighted	Markowitz Method
TLKM	1.078%	8.527%	1.887%	7.852%
CTRA	0.887%	0.423%	1. 887%	0.000%
TOVVR	0.621%	1.158%	1. 887%	7.018%
TBIG	0.457%	0.980%	1. 887%	0.002%
UNTR	0.937%	1.868%	1. 887%	1.183%
BMRS	0.197%	0.415%	1. 887%	0.178%
ABMM	0.364%	0.182%	1. 887%	3.658%
ICBP	1.716%	2.842%	1. 887%	20.331%
PNBN	0.642%	0.748%	1. 887%	0.000%
TINS	0.645%	0.142%	1. 887%	0.003%
PTBA	0.776%	0.664%	1. 887%	0.000%
PNLF	0.533%	0.196%	1. 887%	0.001%
EMTK	0.485%	0.936%	1. 887%	3.282%
CPIN	1.009%	1.862%	1. 887%	0.453%
ENRG	0.250%	0.113%	1. 887%	0.000%
BMRI	5.022%	10.445%	1. 887%	0.000%
BBNI	3.265%	3.672%	1. 887%	0.000%
LSIP	0.888%	0.147%	1. 887%	0.000%
BABP	0.431%	0.057%	1. 887%	1.525%
BBTN	1.385%	0.399%	1. 887%	0.000%
SRTG	0.942%	0.488%	1. 887%	1.047%
AKRA	2.069%	0.613%	1. 887%	0.000%
BBRI	5.850%	17.694%	1. 887%	0.000%
SIDO	2.629%	0.471%	1. 887%	9.715%
MPMX	0.990%	0.102%	1. 887%	0.000%
JPFA	1.311%	0.388%	1. 887%	0.000%
BBCA	16.425%	24.274%	1. 887%	16.322%
TOBA	0.998%	0.068%	1.887%	2.695%
MYOR	3.281%	1.256%	1. 887%	8.145%
BSSR	1.395%	0.189%	1. 887%	3.872%
ADRO	1.937%	1.535%	1. 887%	0.000%
ITMG	1.244%	0.587%	1. 887%	0.000%
INCO	1.466%	1.518%	1. 887%	0.000%
MAPI	2.954%	0.604%	1. 887%	0.000%
MEDC	1.134%	0.481%	1. 887%	0.000%
ANTM	1.599%	1.008%	1. 887%	0.000%
APIC	3.095%	0.277%	1. 887%	8.968%
AMRT	3.446%	2.306%	1. 887%	3.744%
ERAA	1.380%	0.163%	1. 887%	0.000%
ISAT	1.158%	1.497%	1. 887%	0. 000%
ESSA	1.297%	0.215%	1. 887%	0. 006%
SMDR	1.364%	0.135%	1. 887%	0. 000%
BFIN	3.352%	0.491%	1. 887%	0. 000%
TPIA	1.389%	3.910%	1.887%	0. 000%
DOID	1.175%	0.068%	1. 887%	0. 000%
HRUM	1.442%	0.413%	1. 887%	0. 000%
INKP	2.534%	1.001%	1.887%	0. 000%
RAJA	0.995%	0.088%	1.887%	0. 000%
TKIM	2.379%	0.414%	1.887%	0. 000%
INDY	1.227%	0.214%	1.887%	0. 000%
ASSA	2.262%	0.098%	1.887%	0. 000%
AGRO	1.184%	0.204%	1.887%	0. 000%
BRPT	2.522%	1.503%	1.887%	0. 000%

Table 4: Roy model for equal weighted portfolio

Description	S_p			
	0.5	1	1.5	2
R_L	0.00797	0.00797	0.00797	0.00797
Risk	0.063	0.063	0.063	0.063
R_p	0.03972	0.07097	0.10247	0.13397

Sources: Researcher process

Table 5: Roy model for market cap weighted portfolio

Description	S_p			
	0.5	1	1.5	2
R_L	0.00797	0.00797	0.00797	0.00797
Risk	0.0474	0.0474	0.0474	0.0474
R_p	0.03167	0.05537	0.07907	0.10277

Sources: Researcher process

Table 6: Kataoka model for equal weighted portfolio

Description	Risk tollerance		
	α=1% ($Z_{1\%}$=2,33)	α=5% ($z_{5\%}$=1,645)	α=10% ($z_{10\%}$=1,28)
R_L	0.00797	0.00797	0.00797
Risk	0.063	0.063	0.063
R_p	0.15476	0.111605	0.08861

Sources: Researcher process

Table 7: Kataoka model for market capitalization weighted portfolio

Description	Risk tollerance		
	α=1% ($Z_{1\%}$=2,33)	α=5% ($z_{5\%}$=1,645)	α=10% ($z_{10\%}$=1,28)
R_L	0.00797	0.00797	0.00797
Risk	0.0474	0.0474	0.0474
R_p	0.118412	0.085943	0.06864261

Sources: Researcher process

Figure 4: Markowitz Efficient Frontier

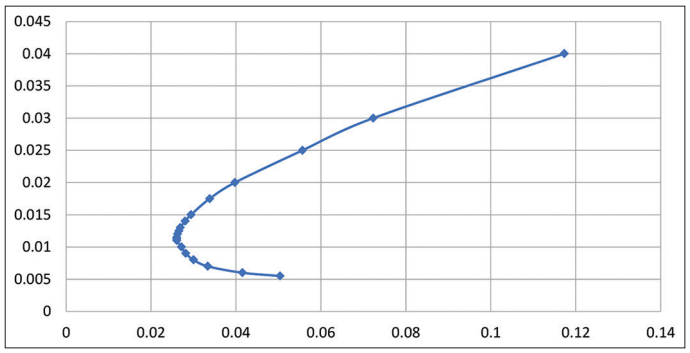
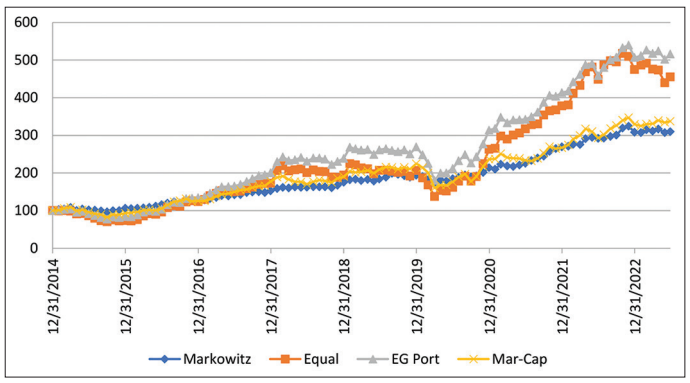


Figure 5: Cumulative return for vary portfolio



the lowest of Beta is 0.1654 for SRTG stocks. The highest of skewness of stock return is 3,67 for RAJA stocks and the lowest of skewness is −1.14 for ENRG stocks. There is a consistency

Table 8: Multifactor model for portfolio

No.	Portfolio description	Constant	Market	exchange rate	Oil price	Interest rate	Pandemic	R^2
1.	Equal weighted	1.2375	1.2655 (12.46)	−0.1132 (−1.32)	−0.0205 (−1.37)	−0.1412 (−3.011)	0.00014 (0.011)	69.05%
2.	Market capitalization	0.02395	1.202654 (28.38)	0.00346 (0.097)	−0.0077 (−0.122)	−0.03225 (−1.65)	−0.01317 (−2,53)	90.50%
3.	Elton Gruber method	0.0191	1.2487 (18.11)	−0.0728 (−1.25)	−0.0196 (−1.92)	−0.1009 (−3.17)	−0.0088 (−132)	80.05%
4.	Markowitz method	−0.0684	0.513883 (9.59)	0.009833 (0.217)	−0.0032 (−0.397)	0.00801 (−0.324)	0.002151 (0.327)	52.51%

Sources: Compiled by the authors

result for TLKM stocks that the lowest for return, standard of deviation and semi-variance.

Table 2 consist of descriptive statistics for 53 stocks about return, risk and weighted by equal weighted, market capitalization weighted, Elton Gruber Method and Markowitz method.

The average return of 53 stocks is 1.69% per month and risk of 1.08% (Table 2). Then, risk (standard of deviation) of 53 stocks is calculated which has minimum of 5.08%, maximum of 29,78% dan average of standard of deviation of 5,39%. The portfolio return is 1,15% per month for Markowitz method, 1,69% for Equal Weighted, 1,77% for Elton Gruber method and 1,3% for Market Capitalization Weighted. The risk of portfolio (calculated by Standard of Deviation) is 2,68% per month for Markowitz Method, 6,3% for Equal Weighted, 5,47% for Elton Gruber Method and 4,74% for Market Capitalization Weighted. This research also tested comparing return portfolio that there is no difference portfolio return. Based on Jarque Berra, return stock and Portfolio and standard of Deviation stock have normal distribution. It means that using return to a model does not violate model assumption in normality distribution.

4.2. Construction Portfolio

4.2.1. Construction portfolio using varying method

As mentioned previously, this research will construct a portfolio using varying method which is Equal Weighted, Market Capitalization Method, Markowitz Method, Elton Gruber Method and Safety-First Criterion (Roy Criterion and Kataoka Criterion). The method of construction portfolio has focus for asset allocation stocks in a portfolio (Fahmy, 2014). Brinson et al. (1986, 1991) stated that asset allocation is important in construction portfolio to achieve portfolio return target. The Equal weighted method is 1.8867% (1/53) for each stock as member of portfolio. The weighted stocks in portfolio using Market capitalization use equation (9). This research is firstly to estimate asset allocation stocks using Markowitz Method whish results is called efficient frontier. The efficient frontier of 53 stocks shows by Figure 4.

Then, next step is to construct a portfolio using Elton Gruber Method which it coincident similar to 53 stocks. Fahmy (2014) stated that Asset allocation was very important in construction. The allocation stock show by Table 3 at below.

Based on Table 3, there is a different asset allocation for using varying method. The BCA Stocks has highest allocation asset using Elton Gruber Method, Markowitz Method and Market Capitalization. The second highest allocation is BBRI Stocks and the third is BMRI stocks using Elton Gruber Method and Market Capitalization.

4.2.2. Portfolio construction using safety-first criterion

As mentioned previously, this paper wants to use Roy Criterion for construction portfolio. It will use equation (5), the paper will firstly determine value of slope equation (5) then it got portfolio return. Value of S_p is determined 0.5 for portfolio D, 1 for Portfolio C, 1.5 for portfolio B and 2 for portfolio A. Then we determine value of RL at least government bond of 10 years which is rate of 7.164% pa, then rate of government bond yield is rate of 0.597% per month. Risk premium is rate of 0.2% per month. So, RL become sum of rate of Government Bond yield and risk premium (0.597% + 0.2%) that is equal to 0.797%. Rate of 0.2% per month is risk premium. Result portfolio return using Equation (5) appear in Tables 4 and 5 at below. This portfolio return is calculated for equal weighted allocation for portfolio.

Based on Table 4, the portfolio return using equation (5) is vary from 3.973 to 13.397% that Sp is also vary from 0.5 to 2. Then, this research also calculated portfolio return using Roy Criterion (equation 5) for market capitalization weighted portfolio. The result is showed in Table 5 at below.

Based on Table 5, the portfolio return using Roy Criterion is vary from 3.167 to 10.277% that Sp is also vary from 0.5 to 2.

Based on Tables 4 and 5, it means that the return portfolio for equal weighted is higher than the return portfolio of market capitalization weighted portfolio. The difference return is caused by risk market capitalization below than equal weighted portfolio.

Based on Table 6, the portfolio return using equation (7) is vary from 8.861 to 15.48% that risk tolerance is also vary from 1 to 10%. If the risk tolerance become smaller, return become higher. It supported portfolio theory which is proposed by Markowitz (1952).

Based on Table 7, the portfolio return using equation (7) is vary from 6.866% to 11.8412 that risk tolerance vary from 1 to 10%.

4.2.3. Cumulative return

Fund manager always do compare portfolio that it managed them using cumulative return. Academician also compare portfolio using statistical analysis. Cumulative return use to see portfolio that has growing along research period. Fund manager also set

the based year for calculating cumulative return. This research used base year on 2015. The next cumulative return is calculating by Equation (12). The figure of cumulative return will show in Figure 5 at below.

On Figure 5 above, Portfolio return of Elton Gruber weighted is always higher than other portfolio returns which is Markowitz Method, market capitalization and equal weighted Portfolio over the period 2015-2022. This result stated that owner fund should put in his money in Elton Gruber Method. Elton Gruber Method is a method that it used mathematical method especially in Quadratic Programming. This knowledge should be owned by fund manager. It means that fund owned by Investor should be put in professional of fund manager. This result support previous research which is Manurung et al. (2023c).

4.3. Causality

This section will describe how macroeconomics variable affected portfolio return. A multifactor model is used to investigate some portfolio return factors. The factors that affect portfolio return include market return, exchange rate, oil price, and pandemic era. The multifactor model's coefficients are shown in Table 8.

Based on Table 8, there four portfolio was affected by macroeconomics variables. In equal weighted portfolio, market and interest rate significantly affected at level significant of 1% to portfolio return. The other macroeconomic variable did not affect portfolio return. Interest rate negatively significant affect portfolio return at level of significant of 1%. This result follows the relationship of theory interest rate and return stock including portfolio return. Exchange rate, oil price and pandemic variables did not significant affect portfolio return. Macroeconomic variable and pandemic variable could explain fluctuation of portfolio return by 69.05% and the rest by others variable.

On market capitalization weighted, the market return and Pandemic Era significant affect portfolio returns at level of significant of 1%. Exchange rate, Oil price, and Interest rate variable did not significant affect portfolio return. Macroeconomics Variable and Pandemic Era could explain fluctuation of portfolio return by 90.5% and the rest by others variable.

Then, the market return and interest rate significant affect portfolio return at level of significant of 1% and Oil price significantly affect return portfolio at level significant at 6% for Elton Gruber weighted Method. Exchange Rate and Pandemic variables did not significant affect portfolio return. Macroeconomics Variable and Pandemic era could explain fluctuation of portfolio return by 80.05% and the rest by others variable.

On Markowitz Method constructing portfolio, only Market return affect portfolio return at level of significant of 1%. The other variable did not significant affect portfolio return. Macroeconomics Variable and Pandemic era could explain fluctuation of portfolio return by 52.51% and the rest by others variable.

This results mostly support previously research Manullang et al. (2023), Manurung (2023a), Manurung (2023b), Manurung (2023c). Investor could have self-decision to hire fund manager to manage their fund. Investor also should consider his time if they want to manage their money.

5. CONCLUSIONS

This study have some objective to investigate the effects of stock selection to construct portfolio return for varying method. The research's findings are as follows: First, there found 53 stocks for using Elton Gruber, Equal weighted, market capitalization, Markowitz Method. Second, there is no difference average return for portfolio of Elton Gruber, Equal weighted, market capitalization, Markowitz Method. Third, Roy and Kataoka as representative Safety-first criterion could be used to construct portfolio with determining achievement of minimum return of 0.797% per month with risk premium of 0.2%. Portfolio return using Roy criterion is vary from 3.973 to 13.397% per month and Kataoka criterion has return vary from 8.861 to 15.48% for equal weighted. Fourth, the equal weighted portfolio return is highest than market capitalization weighted Portfolio return. Fifth, Elton Gruber method also used to construct portfolio, then this method has highest cumulative return compared to others methods. Sixth, The Market shock affected all portfolio return and Interest rate has affected portfolio return for equal weighted and Elton Gruber Method. Pandemic Era affect portfolio return for Market Capitalization Weighted portfolio.

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