Construction Portfolio Using Elton Gruber Model: COVID-19

**Adler Haymans Manurung[1]*, Nita Yudhaningsih Sinaga[2]
and Amran Manurung[3]**

Abstract

This research aims to examine construction of the portfolio and also to explore factor variable affected on portfolio return. Portfolio stock derived the Elton Gruber model and compared it with portfolio returns calculated using the Equal Weighted and market capitalization weighted. This research used stock that is member of the Sri-Kehati Business Index, and monthly data from January 2015 to June 2022. This research has finding that there are 6 stocks to become member of stocks portfolio using Elton Gruber Model. By using Coefficient of Variation (CV), the equal weighted has the good portfolio because it has lowest of variation. Using t-test, there are no significant differences for three portfolios. Market Shock, Exchange Rate, Interest Rate and COVID-19 significantly affect Portfolio Return of Elton Gruber Model. Equal Weighted and Market Capitalization Portfolio only affect by Market shock. Based on this research results, it has implication that Investors do not need Fund Manager to manage their portfolio if investor use equal weighted or market capitalization weighted mode.

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[1] Professor of Capital Market and Banking, University of Bhayangkara Jakarta Raya, Jakarta, *Correspondence Author.
[2] Student at Faculty Economic and Business, University of Bhayangkara Jakarta Raya.
[3] Lecturer at Faculty Economic and Business, University of HKBP Nomensen, Medan.

1. Introduction

Fund Manager or Investor should set up a portfolio to make his fund growing better. They select from the vary portfolio that it will give optimum of return portfolio. They always change stock in a portfolio when they know the sock will be underperformed. Fund Manager and Investor seek stock good performance in the future. This activity will be done every year especially in the beginning of the year. The Good performance of a portfolio will be getting when the fund manager set up good portfolio consist of good stock. The Selection stock will be done by result of risk and return of stock. Markowitz (1952) does not mention to select stock directly, but the construction of a portfolio become important. Stock selection will be done in the construction portfolio through risk and return.

In the process of portfolio, stock selection become important that it will make good portfolio. The Fund Manager do research to some stock then it selects the good stock. The good stock will have good result by return and risk. Selection stock could be done using Markowitz (1952) by Efficient Frontier. Then Elton and Gruber (1977) and Elton et.al proposed a method to select stock and weighted stock in portfolio. Their method called Elton Gruber model. This research will use in two methods for construction portfolio.

Construction portfolio using Elton Gruber Model will main topic this research. Result of portfolio return using Elton Gruber Model compared to other two portfolios which is equal weighted portfolio and weighted of market capitalization. These two model portfolios do not use portfolio theory but it can do well. This comparing portfolio will give some views to investor for construction portfolio.

Portfolio Return will be also examined that factors will affect it. Market Shock always has a factor fluctuate of Portfolio Return. Market shock will show by Market Index. Besides that, government policy also will affect all economic activity that shows by macroeconomics variable. This research also examined factor economics variable on portfolio return. Exchange rate, interest and oil price will use as macroeconomic variable on portfolio return.

This research used data which has period June 2015 50 June 2022. In this period, Indonesia has COVID-19 Era. It will affect to all economic activity in Indonesia. Dummy variable will use in the model to check Effect of COVID-19. Manurung (2022a) and Gujarati and Porter (2009) stated that model should use dummy to check a factor that could be separated into two period.

2. Literature Review

Theory of Portfolio introduced by Markowitz (1952) which is stress for Risk and Return as important variable to construct portfolio. Markowitz (1959) collected all stock then calculate risk and return. Then it estimated efficient frontier using Risk and Return through Quadratic Programming (Markowitz, 1952 and 1991). Based on Efficient frontier, it found asset allocation through every combination risk and return. Markowitz shows the efficient frontier for portfolio which is risk in horizontal and return in vertical as follows:

Figure 1: Efficient Frontier of Portfolio Investment
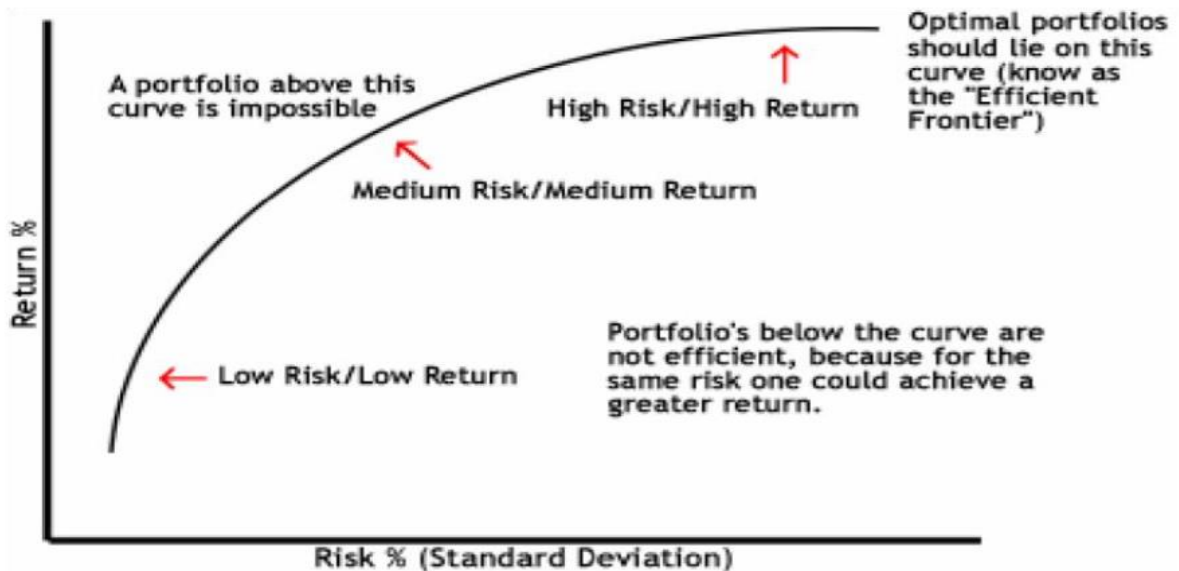
Sources: Markowitz, H. M (1952)

Then, Elton, Gruber and Padberg (1976, 1977 and 1978) introduced a portfolio that it selects from all stocks using excess return to beta (Elton et.al 2014). Stock that has excess return to beta is higher than a criterion (cut off value), it will become a group portfolio. Some researcher said that this model called single index model to select portfolio.

Manurung (1994) used the Markowitz model with Quadratic Programming to analyze an investment portfolio at the Indonesia Stock Exchange. The data used is weekly data derived from the Jardine Flemming Sector Industry Index from August 1992 to June 1994. This study has findings that the correlation coefficient between sectors shifted from one period to the next. Aside from that, the sector's asset allocation is changing.

Galankashi et.al (2020) developed a model for stock selection for construction portfolio. They model used A Fuzzy-ANP Approach. This model is a latest model in construction a portfolio of stock.

3. Methodology

The methodology is used in this research using Quantitative Method. Stock Return (Manurung, 2016; 2022b) is calculated using formula as follows:

$$R_{i,t} = \frac{Adjusted\ Closing\ Price_{i,t}}{Adjusted\ Clossing_{i,t-1}} x100\%$$

(1)

Risk or standard of deviation is calculated as follows:

$$\sigma_t = SQRT(250) * \sqrt{\frac{\sum_{i=1}^{252}\left(ACP_{i,t}-\overline{ACP}\right)^2}{n-1}} \qquad (2)$$

Stock Selection use Elton Gruber Model which is firstly calculate the Excess Return to Beta (ERB) for each stock as follows:

$$ERB = \frac{R_i - R_f}{\beta_i} \qquad (3)$$

Where:

ERB = Excess Return to beta

R_i = stock return for stock i

R_f = risk free return

β_i = Beta for stock i

Elton et.al stated the formula to select stock to become a member of portfolio which have the highest Excess Return to Beta. This formula is known as *cut – off rate* as follows:

$$C_i = \frac{\sigma_m^2 \sum_{j=1}^{i}\frac{(R_i - R_f)\,\beta_j}{\sigma_{e_j}^2}}{1 + \ \sigma_m^2 \sum_{j=1}^{i}\left(\frac{\beta_j^2}{\sigma_{e_j}^2}\right)} \qquad (4)$$

where:

C_i = *Cut – off rate*

σ_m^2 = Variance of stock market

β_j = Beta for stock j

$\sigma_{e_j}^2$ = Variance of error or Unsystematic Risk for stock j

R_i = Stock Return for Stock i

R_f = Risk Free Rate

Then, this research calculated cutoff rate of every stock from member of 25 stock of SRI-KEHATI INDEX. The higher of cutoff rate will choose as member of portfolio stock, that is the stock called "Selected stock" (Wardana and Manurung, 2012). Furthermore, this research calculated weighted every stock in the portfolio from Selected Stock. The Formula calculate weighted in portfolio as follows:

$$w_i = \frac{Z_i}{\sum_{i=1}^{n} Z_i}$$

(5)

with formula Z_i as follows:

$$Z_i = \frac{\beta_i}{\sigma_{e_i}^2}\left(\frac{\overline{R_i} - R_f}{\beta_i} - C^*\right)$$

(6)

This formula will help to get portfolio of Elton Gruber Model.
Besides that, this research also used Quadratic Programming to estimate weighted stock in portfolio which risk minimization (Markowitz 1956) as follows.
Objective Function:

$$Min\ \sigma = \sqrt{\sum_i^n \sum_j^m \{w_i^2 * \sigma_i^2 + 2w_i w_j Cov(i,j)\}}$$

(7)

Subject to

$$w_1 + w_2 + w_3 + \ldots + w_n = 1$$

(8)

$$w_1*R_1 + w_2*R_2 + w_3*R_3 + \ldots + w_n*R_n = R_p$$

(9)

$$w1, w2, w3, \ldots, wn \geq 0$$

(10)

This model also used Markowitz (1952) to estimate Efficient Frontier.

This research also explored impact macroeconomics variable on return portfolio. The model is as follows:

$$RPEG_t = a_0 + b_1\ IHSGt + b_2\ EX_t + b_3\ INT_t + b_4\ OIL_t + b_5\ D_t + \varepsilon$$

(11)

$$RPEW_t = c_0 + d_1\ IHSGt + d_2\ EX_t + d_3\ INT_t + d_4\ OIL_t + d_5\ D_t + \varepsilon$$

(12)

$$RPMC_t = e_0 + b_1\ IHSGt + b_2\ EX_t + b_3\ INT_t + b_4\ OIL_t + b_5\ D_t + \varepsilon$$

(13)

$RPEG_t$ = Portfolio Return of Elton Gruber Model at t
$RPEW_t$ = Portfolio Return of Equal Weighted Model at t
$RPMC_t$ = Portfolio Return of Market Capitalization Model at t
IHSGt = Market Index at t
EX_t = Exchange Rate at t
INTt = Interest Rate at t
OIL = oil price at t
D = Dummy Variable, zero for period of June 2015 to February 2020 and 1 for March 2020 to June 2022.

4. Data

This Research used SRI-KEHATI INDEX that it consists of 25 stocks which is review by May and November every year. This Index set up by Yayasan KEHATI which is called Stock Index of Sustainable and Responsible Investment and issued on 8 June 2009. This Index will choose stocks that has principle of Environmental, Social and Good Governance (ESG). This Research used period data of June 2015 to June 2022. Data collected from the Indonesia Stock Exchange. Manurung (2022a) and Gujarati and Porter (2009) stated that model should use dummy to check a factor that can be separated to two period.

5. Result and Discussion

Portfolio Manager and Investor always seek model of stocks portfolio to get good return. This research discussed three topic which is selection stock and construction using Elton Gruber and effect of macroeconomics to return portfolio.

6. Descriptive statistics

This sub-section will explain statistics descriptive of stock return that selected as member portfolio. Table 1 shows that 6 stocks selected to become member of portfolio by using Elton Gruber Model. The 6 stocks are PT Japfa Comfeed Indonesia Tbk (JPFA.JK), PT Charoen Pokphand Indonesia Tbk (CPIN.JK), PT Industri Jamu dan Farmasi Sido Muncul Tbk (SIDO.JK), PT Bank Tabungan Negara (Persero) Tbk (BBTN.JK), PT Vale Indonesia Tbk (INCO.JK), and PT AKR Corporindo Tbk (AKRA.JK).

The average return for the period of 2015 to June 2022 has range average return from 0.71% to 2.27%.   The highest return got by PT Japfa Comfeed Indonesia Tbk (JPFA.JK) and the lowest return of 0.71% by PT AKR Corporindo Tbk (AKRA.JK). The standard of deviation has range from 7.17% to 15.46%.   The highest of standard of deviation is by PT Vale Indonesia Tbk (INCO.JK) and the lowest by PT Industri Jamu dan Farmasi Sido Muncul Tbk (SIDO.JK).

Table 1: Descriptive Statistics of Selected Stocks

	JPFA	CPIN	SIDO	BBTN	INCO	AKRA
Minimum	-32.14%	-26.23%	-9.32%	-50.48%	-31.31%	-25.47%
Maximum	48.15%	28.65%	26.73%	63.82%	41.42%	22.38%
Average	2.27%	1.45%	2.11%	1.35%	1.89%	0.71%
Standard of Deviation	14.79%	10.62%	7.17%	14.27%	15.46%	10.01%
Skewness	0.679703	0.351362	1.10985	0.550138	0.135074	-0.05396
Kurtosis	0.80188	0.519471	1.798053	5.063274	-0.18637	-0.22049
Jarque Bera	23.65733	23.54092	22.56659	19.3648	36.21696	36.77382
CV	6.519186	7.301334	3.397668	10.59257	8.201011	14.11339

Sources: Writer Process

There is a tool to state variation return for comparing stocks which is called Coefficient of Variation (CV). The Coefficient of Variation has range of 3.40 to 14.11. The lowest of the coefficient of variation is 3.40 by PT Industri Jamu dan Farmasi Sido Muncul Tbk (SIDO.JK) and the highest of 14.11 by PT AKR Corporindo Tbk (AKRA.JK).

7. Portfolio

Then, this research set up tree portfolio which is the Elton Gruber Model, Equal Weighted Model and based on market capitalization. Table 2 show the descriptive statistics of three portfolio.

**Table 2: The descriptive statistics of three portfolio**

	ELGRU	EQUAL W	MARKET CAP
Minimum	-31,31%	-23,02%	-17,78%
Maximum	26,79%	18,28%	15,84%
Average	1,30%	1,629%	1,628%
Standard of Deviation	8,45%	7,14%	7,20%
Skewness	-0,25023	-0,31107	-0,323111406
Kurtosis	2,325794	0,930054	0,025117326
Jarque Bera	2,496929	16,54574	32,82250508
CV	6,488197	4,381403	4,421967088

Sources: Writer Process

Based on Table 2, Average return of portfolio has range from 1,3% to 1.69%. The lowest of average return portfolio is 1.3% by Elton Gruber Method and the highest by Equal Weighted Portfolio. There is no difference of average return between Equal Weighted Portfolio and Market Capitalization Weighted Portfolio in term of average return. The standard of deviation of return portfolio has range from 7.14% to 8.45%. The highest of Standard of deviation is 8.4% by Elton Gruber Model and the lowest by Equal Weighted Portfolio.

Then, this research draw graph of cumulative return the three portfolios as shown on Figure 2. This figure use December 2014 as 100 and then calculate cumulative return until June 2022.

Figure 2: Graph of cumulative return of three portfolio
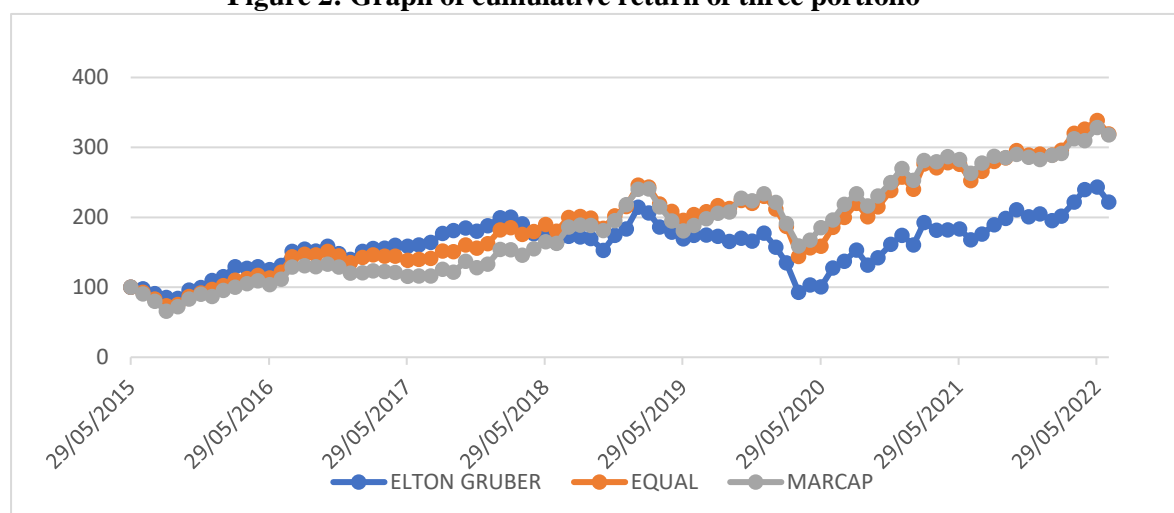
Based on the Figure 2, the cumulative return of three portfolio has similar trend for period of December 2014 to June 2022. Return of portfolio for Equal Weighted and Market Capitalization have trend and slightly similar return and there are no differences. Portfolio Return of Elton Gruber Model has the lowest return compared to two other portfolios. When the Covid-19 announced in the Indonesia which is started March 2023, the portfolio return dropped to the new lowest. The portfolio Return slightly increased until May 2022. In this research also test the differences three portfolios using t-test.   There are no significant differences between three portfolios.

This research support previous research by Manullang et.al (2023), Manurung et.al (2023), Manurung (1997a, 1997b), Manurung and Berlian (2004), Sartono and Setiawan (2009), Chandra and Hapsari (2014), Bawazier and Sitanggang (1994). This research has conclusion that there are no differences for three portfolios even equal weighted portfolio has the highest coefficient of variation.

8. Macroeconomics Effect Factors

In this sub-section will explain how market factor and macroeconomic variables affect return portfolio. This research use market Index as market factor and Exchange rate, Interest and Oil price as macroeconomics variables.

$$RPEG_t = -0{,}102 + 1{,}492 \, IHSG_t - 0{,}711 \, EX_t + 0{,}210 \, INT_t - 0{,}049 \, OIL_t + 0.045 \, D_t \qquad (14)$$
$$\phantom{RPEG_t = -0{,}102 +} (8{,}32) \qquad (-2{,}688) \qquad (2{,}151) \qquad (-1{,}280) \qquad (2{,}2)$$

$R^2 = 70.74\%$, F = 38.19
t-test in brackets

Based on Equation (14), this model has coefficient of determination of 70.74% and F-Value of 38.19. It means, four variables could explain variation of Portfolio return using Elton Gruber Model by 70.74% and the rest by others factor. This model could use to predict portfolio return. Market Shock and Exchange Rate Shock significantly affect to Portfolio Return using Elton Gruber Model that it used level significantly of 1%. Interest rate and Dummy significantly affect to Portfolio Return using Elton Gruber Model that it used level significantly of 5%. Market shock, interest rate and dummy (COVID-19) have positively impact on Portfolio return using Elton Gruber Model. Exchange Rate has negatively effect to Portfolio Return by Elton Gruber Model. The Oil Price did not affect Portfolio Return using Elton Gruber Model.

$$RPEW_t = -0{,}053 + 1{,}249 \, IHSG_t - 0{,}452 \, EX_t + 0{,}126 \, INT_t - 0{,}0297 \, OIL_t + 0.024 \, D_t \quad (15)$$
$$\phantom{RPEW_t = -0{,}053 +} (7{,}29) \qquad (-1{,}792) \qquad (1{,}358) \qquad (0{,}804) \qquad (1.20)$$

$R^2 = 62.63\%$, F = 26.48
t-test in brackets

Equation (15) also shows that this model has coefficient of determination of 62.63% and F-Value of 26.48. It means, four variables could explain variation of Portfolio return using Equal Weighted Model by 62.63% and the rest by others factor. This model could use to predict portfolio return. Market Shock significantly affect to Portfolio Return using Equal Weighted Model that it used level significantly of 1%. Market shock has positively effect on Portfolio return using Elton Gruber Model. Exchange rate, Interest, Oil Price and COVID-19 did not affect significant on Portfolio Return using Equal Weighted Model.

$$RPMC_t = -0{,}033 + 1{,}074 \, IHSG_t - 0{,}194 \, EX_t + 0{,}089 \, INT_t + 0{,}013 \, OIL_t + 0.13 \, D_t \qquad (16)$$
$$\phantom{RPMC_t = -0{,}033 +} (4{,}97) \qquad (-0.608) \qquad (0{,}758) \qquad (0{,}282) \qquad (0.509)$$

$R^2 = 41.64\%$, F = 11.28
t-test in brackets

Equation (15) shows similar result with equation (14), that this model has coefficient of determination of 41.64% and F-Value of 11.28. It means, four variables could explain variation of Portfolio return using Equal Weighted Model by 41.45% and the rest by others factor. This model could use to predict portfolio return. Market Shock significantly effect to Portfolio Return using Equal Weighted Model that it used level significantly of 1%. Market shock has positively effect on Portfolio return using Elton Gruber Model. Exchange rate, Interest, Oil Price and COVID-19 did not affect significant on Portfolio Return using Equal Weighted Model.

This research found that market shock has effect on Portfolio Return on the Indonesia Stock Exchange. This research support research by Kartika and Manurung (2020), Setiawan et.al (2022) and Manurung et.al (2023).

9. Conclusion

Based on the previous explanation, this research has conclusion as follows:
1. There is 6 stocks to become member of stocks portfolio using Elton Gruber Model.
2. By using Coefficient of Variation (CV), the equal weighted has the good portfolio because it has lowest of variation.
3. Using t-test, there are no significant differences for three portfolios.
4. Market Shock, Exchange Rate, Interest Rate and COVID-19 significantly affect Portfolio Return of Elton Gruber Model.
5. Equal Weighted and Market Capitalization Portfolio only affect by Market shock.
6. Based on this research results, it has implication that Investors do not need Fund Manager to manage their portfolio if investor use equal weighted or market capitalization weighted model.

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