

Use of the Single Index Model in Determining Investment Decisions During the Covid-19 Pandemic (Study on IDX30 Index Stocks on the IDX in 2020-2021)

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Abstract

This study aims to determine stock investment decisions during the COVID-19 pandemic using a single index model. The population in this study is all the shares of companies that are included in the IDX30 market index on the Indonesia Stock Exchange for the 2020-2021 period, namely 40 stocks, while the sample is 39 stocks selected based on purposive sampling technique. Data collection using documentation techniques. Data analysis was carried out using a single index model, starting with collecting the closing stock prices of each to get the optimal portfolio. The results of this study indicate that there are 29 stocks included in the optimal portfolio during the COVID-19 pandemic, namely (ADRO), (ANTM), (ASII), (BBCA), (BBNI), (BBRI), (BBTN), (BMRI), (BRPT), (BTPS), (CPIN), (ERAA), (EXCL), (INCO), (INKP), (JPFA), (KLBF), (MIKA), (PGAS), (PTPP), (PWON), (TBIG), (TINS), (TKIM), (TLKM), (TOWR), (UNTR), and (WSKT).

Keywords: *Single Index Model, Investment, Stocks, IDX30, COVID-19*

1. INTRODUCTION

Economics and technology have experienced many developments to date. Of course, this makes it easy for companies to develop and advance their companies. One alternative that can be done to increase competitiveness is investment. Investment is one of the important instruments in the economic sector. Investment can be interpreted as an activity of delaying current consumption to be used for a certain period of time for efficient production. There are various types of investment in the economic sector, namely investment in tangible assets (real investment) and investment in securities assets (financial investment). Investment activities with the aim of obtaining profits in the future can be carried out in the capital market.

Concretely, the capital market is a place for parties who have excess funds (investors) and those who need funds (companies) to meet. Not only concretely, the capital market also has an abstract meaning (Putri, 2020:2). The capital market from this point of view refers to the market which is the place or media for carrying out transactions or buying and selling of securities (long-term financial instruments).

**Table 1. Close Price IHSG
2020-2021**

Period	Indeks Harga Saham Gabungan (IHSG)			
	Highest	Lowest	Finally	Final Year Growth (%)
2020	6.325,41	3.937,63	5.979,07	5,09
2021	6.581,48	5.862,35	6.581,48	- 3,62

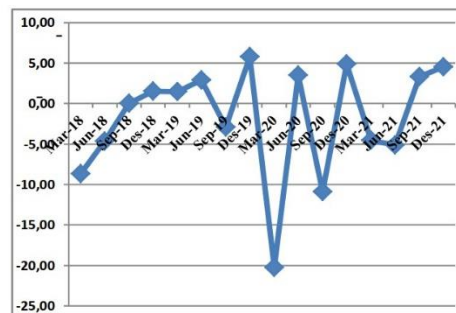
Source: ojk.go.id

Based on table 1 above, it can be concluded that the closing price of the JCI has decreased over the past 2 years. This can be seen from 2020 of 5.09% where in that year the COVID-19 pandemic entered and attacked Indonesia. Furthermore, in the following year, namely 2021, there was another decrease of 3.62%. The condition of the capital market which has decreased (in table 1) shows that in investing, of course, investors cannot avoid the uncertainty factor besides making a profit. This uncertainty is related to the risks that investors may face. The big risk currently being faced by investors is the COVID-19 outbreak.

One of the efforts that can be made to minimize the risk of investing in stocks in the capital market is to create a portfolio or diversify. The accuracy of investors' analysis in reading and observing the market will greatly affect the optimal portfolio chosen later. Optimal portfolio can be formed by doing portfolio management. The determination of a stock portfolio can use a number of portfolio approach models, such as the Markowitz Model and the Single Index Model.

The single index model is a model that is considered easier with fewer calculations and pays close attention to the market condition of the expected return and risk. The characteristic of the single index model is that it relates the calculation of the returns for each asset to the market index returns, with the assumption that a correlation of securities will be formed if the responses of these securities to changes in the market have similarities. Various types of shares that have been listed on the Indonesia Stock Exchange. The various types of stocks on the IDX include a stock index which is generally used as a reference in forming a portfolio, one of which is the IDX30 index. IDX30 index returns fluctuated during the 2020-2021 period.

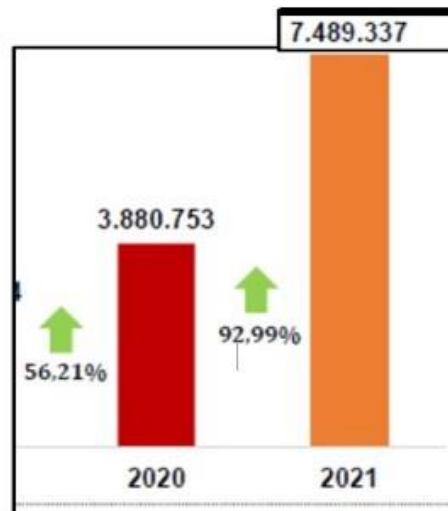
Figure 1. IDX30 Index Return Per Quarter



Source: Share price data from Yahoo Finance per quarter for the 2020-2021 period

The presentation of IDX30 index return data per quarter for the 2020-2021 period in Figure 1 shows fluctuations. This indicates that there are symptoms in the market that have an impact on the returns of the stocks on the index. From the picture above it can be seen that the biggest decline occurred in March 2020 where at that time the COVID-19 pandemic had entered and attacked the Indonesian economy which reached -20.27% in March and -10.90%.

Figure 2. Development of Number of Investors



Source: *ksei.co.id* (2021)

Based on data from PT. The Indonesian Central Securities Depository (KSEI) in figure 3 above, it can be seen that in 2020, namely 56.21%, there were 3,880,753 million investors until 2021 increasing with a total percentage of 92.99% or as many as 7,489,337 million investors. This shows that the number of capital market investors has continued to increase from year to year, which means that the interest of the Indonesian people in investing in general has continued to increase during the COVID-19 pandemic.

Other research that examines the optimal stock portfolio using the single index model includes Rivaldi, Asmirhanto and Azhar (2021), which examined 18 shares of IDX30 index companies for the period February 2016-January 2020. The findings in this study are that there are 5 stocks that are included as candidates. optimal portfolio. Meanwhile, the research conducted by Cindy and Vera (2021), which examined 30 stocks in the LQ45 index for the period December 2017-December 2020, found that in their research, the results found included an optimal portfolio formed by six stocks. This other study used samples of the LQ45 and IDX30 indices without considering the effect of COVID-19 on investment decisions before and after the start of the pandemic so that researchers are interested in analyzing the formation of an optimal portfolio using all stocks that have entered IDX30 during 2018-2021 then compare each optimal portfolio obtained during the pre-pandemic period with post-pandemic COVID-19.

2. IMPLEMENTATION METHOD

2.1. Method Research

Variables can be interpreted as concepts that contain variations in values that are symptoms of research or research objectives (Nasution, 2017: 1). The variable in this study is the Single Index Model in the formation of an optimal portfolio.

This research is quantitative, namely a process of finding knowledge by collecting and analyzing data in the form of something that can be counted (numeric) and is objective (Ma'ruf, 2010:9). Meanwhile, the data used to form an optimal portfolio was collected using a documentary technique which was then analyzed using a single index model.

The object of research in this research is the closing price of IDX30 shares on the Indonesia Stock Exchange in 2020-2021. The population in this study are all company shares included in the IDX30 market index on the Indonesia Stock Exchange for the 2020-2021 period. The population in this study amounted to 40 company shares. The total sample in this study is 39 company shares. Sampling in this study was by using a purposive sampling method, namely choosing a sample by setting certain criteria. The data analysis technique used in this study is by using a single index model which is calculated using the Microsoft Excel program.

2.2. Operational definition

The variables that need to be examined in this model are as follows.

- a. Calculating Stock Return (R_i), Expected Stock Return [$E(R_i)$], Market Return (R_m), Market Expected Return [$E(R_m)$].

1	$R_{it} = \frac{(P_{it} - P_{it-1})}{P_{it-1}}$
2	$E(R_m) = \frac{\sum_{t=1}^n R_m}{N}$
3	$R_m = \frac{(IHSG_t - IHSG_{it-1})}{IHSG_{it-1}}$
4	$E(R_m) = \frac{\sum_{t=1}^n R_m}{N}$

- b. Calculating beta (β_i), variance error residual stock (σ^2_i), excess return to beta (ERB), Variance (risk) Market (σ^2_m) and Variance Error Residual Stock (σ^2)

5	$\beta_i = \frac{\sum (R_m - E(R_m))(R_i - ER_i)}{(R_m - E(R_m))^2}$
6	$\sigma^2_i = \frac{\sum (R_i - E(R_i))^2}{N - 1}$
7	$ERB_i = \frac{E(R_i) - R_f}{\beta_i}$
8	$\sigma^2_m = \frac{\sum (R_m - E(R_m))^2}{N - 1}$
9	$\sigma^2_{ei} = \sigma^2_i - (\beta_i^2 \times \sigma^2_m)$

- c. Calculating Cut-Off Rate (C_i) and determining Cut-Off Point (C^*)

$$C_i = \frac{\sigma_m^2 \sum \frac{[(E(R_i)) - R_f] \beta_i}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum \frac{\beta_i^2}{\sigma_{ei}^2}}$$

- d. Calculating the proportion of funds (X_i), expected return [$E(R_p)$] and optimal portfolio risk (σ^2)

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

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2} (E(R_i) - C^*)$$

$$\sigma_p^2 = \beta_p^2 \cdot \sigma_m^2 + \sum (X_i^2 \cdot \sigma_{ei}^2)$$

$$\beta_p = \sum_{i=1}^n X_i (\beta_i)$$

Source: Jogiyanto, 2017

3. RESULTS AND DISCUSSION

3.1 Research result

The formation of an optimal stock portfolio is formed by going through several steps, including: First is to calculate the realized return (R_i), expected return [$E(R_i)$] and the variance of expected return (σ^2_i) during the COVID-19 pandemic

Table 1. $E(R_i)$ and Individual Stock Variances

No.	Stock code	$E(R_i)$	σ^2_i	No.	Stock code	$E(R_i)$	σ^2_i
1	ACES	0.0008	0.0000	21	INTP	0.0037	0.0001
2	ADRO	0.1278	0.1142	22	ITMG	0.1514	0.1605
3	ANTM	0.3022	0.6394	23	JPFA	0.0909	0.0578
4	ASII	0.0601	0.0253	24	KLBF	0.0423	0.0125
5	BBCA	0.0401	0.0112	25	MICA	0.0365	0.0093
6	BBNI	0.0888	0.0552	26	MNCN	0.0200	0.0028
7	BBRI	0.0461	0.0149	27	PGAS	0.1230	0.1059
8	BBTN	0.1187	0.0987	28	PTBA	-0.0042	0.0001
9	BMRI	0.0586	0.0240	29	PTPP	0.1632	0.1863
10	BRPT	0.0595	0.0248	30	PWON	0.0763	0.0408
11	BTPS	0.1046	0.0766	31	SMGR	0.0084	0.0005
12	CPIN	0.0274	0.0053	32	TBIG	0.1758	0.2164
13	ERAA	0.1729	0.2093	33	TINS	0.2157	0.3257
14	EXCL	0.0839	0.0493	34	TKIM	0.1111	0.0864
15	GGRM	-0.0239	0.0040	35	TLKM	0.0641	0.0288
16	HMSP	-0.0412	0.0119	36	TOWR	0.0824	0.0475
17	ICBP	-0.0185	0.0024	37	UNTR	0.0530	0.0197
18	INCO	0.1150	0.0927	38	UNVR	-0.0328	0.0076
19	INDF	0.0155	0.0017	39	WSKT	0.1679	0.1973
20	INKP	0.1274	0.1136				

Based on the table above, it can be seen that Aneka Tambang (Persero) Tbk (ANTM) is the company with the highest expected return of 0.302 and the lowest - 0.041 belongs to HM Sampoerna Tbk (HMSP).

The second step is to calculate the market return (R_m), the expected market return [$E(R_m)$] and the variance of the market expected return (σ^2_m) each individual share pre and post COVID-19 period.

Table 2. R_m , $E(R_m)$ and Stock Risk Variance

Year	Month	JCI	Rom
2020	March	4360	0
	June	4905	0.125
	September	4879	-0.00530071
	December	5979	0.225456036
2021	March	6166	0.031276133
	June	5985	-0.02935452
	September	6286	0.050292398
	December	6609	0.051384028
$E(r_m)$			0.05609417
σ^2_m			0.000449508

Source: Processed data

Furthermore, calculating the Risk free Rate (R_f), can be seen in table 4 below.

Table 3. Risk Free Rate (R_f)

Year	Month	BI Rate (%)
2020	March	4.50
	June	4.25
	September	4.00
	December	3.75
2021	March	3.50
	June	3.50
	September	3.50
	December	3.50
		30.50
Annual Average		3.8125
R_f		0.038125

Source: Processed data

Table 3 above shows that the average interest rate on risk-free assets set by Bank Indonesia during the pandemic was 3.81%. Investors when investing in SBI have 0% risk because investing in SBI carries no risk at all.

Table 4. Beta, Stock Residual Variance Error and Excess Return to Beta (ERB)

No	During the Occurrence of COVID-19			
	Stock code	β	σ^2_i	ERB
1	ACES	0.0177	0.0000	-1.2948

2	ADRO	2.8465	0.1142	0.0365
3	ANTM	6.7338	0.6394	0.0414
4	ASII	1.3385	0.0253	0.0271
5	BBCA	0.8927	0.0112	0.0183
6	BBNI	1.9791	0.0552	0.0329
7	BBRI	1.0279	0.0149	0.0218
8	BBTN	2.6454	0.0987	0.0359
9	BMRI	1.3050	0.0240	0.0267
10	BRPT	1.3253	0.0248	0.0270
11	BTPS	2.3304	0.0766	0.0347
12	CPIN	0.6113	0.0053	0.0060
13	ERAA	3.8528	0.2093	0.0387
14	EXCL	1.8702	0.0493	0.0322
15	INCO	2.5633	0.0927	0.0356
16	INDF	0.3462	0.0017	-0.0237
17	INKP	2.8385	0.1136	0.0365
18	INTP	0.0823	0.0001	-0.2436
19	ITMG	3.3739	0.1605	0.0378
20	JPFA	2.0251	0.0578	0.0332
21	KLBF	0.7537	0.0125	0.0246
22	MICA	0.6502	0.0093	0.0196
23	MNCN	0,3568	0,0028	-0,0105
24	PGAS	2,1928	0,1059	0,0453
25	PTPP	2,9086	0,1863	0,0479
26	PWON	1,3607	0,0408	0,0386
27	SMGR	0,1502	0,0005	-0,1020
28	TBIG	3,1344	0,2164	0,0485
29	TINS	3,8455	0,3257	0,0499
30	TKIM	1,9808	0,0864	0,0441
31	TLKM	1,1428	0,0288	0,0353
32	TOWR	1,4689	0,0475	0,0399
33	UNTR	0,9448	0,0197	0,0310
34	WSKT	2,9932	0,1973	0,0482

Source: Processed data

There are 5 (five) companies that have negative ERB values including companies (ACES), (ICBP), Indocement Tungal Prakarsa Tbk (INDF), (INTP), (MNCN), (SMGR).

Table 5. Cut Off Rate (Ci) and Cut Off Point (C*)

No.	Stock Code	ERB	ci	Portfolio
1	ADRO	0.0365	0.0010	in

2	ANTM	0.0414	0.0012 C*	in
3	ASII	0.0271	0.0008	in
4	BBCA	0.0183	0.0005	in
5	BBNI	0.0329	0.0009	in
6	BBRI	0.0218	0.0006	in
7	BBTN	0.0359	0.0010	in
8	BMRI	0.0267	0.0007	in
9	BRPT	0.0270	0.0007	in
10	BTPS	0.0347	0.0010	in
11	CPIN	0.0060	0.0002	in
12	ERAA	0.0387	0.0011	in
13	EXCL	0.0322	0.0009	in
14	INCO	0.0356	0.0010	in
15	INKP	0.0365	0.0010	in
16	ITMG	0.0378	0.0011	in
17	JPFA	0.0332	0.0009	in
18	KLBF	0.0246	0.0004	in
19	MICA	0.0196	0.0003	in
20	PGAS	0.0453	0.0008	in
21	PTPP	0.0479	0.0009	in
22	PWON	0.0386	0.0007	in
23	TBIG	0.0485	0.0009	in
24	TINS	0.0499	0.0009	in
25	TKIM	0.0441	0.0008	in
26	TLKM	0.0353	0.0006	in
27	TOWR	0.0399	0.0007	in
28	UNTR	0.0310	0.0006	ln
29	WSKT	0.0482	0.0009	in

Source: Processed data

Table 6. Proportion of Portfolio Beta Funds, Expected Return Portfolio, and Risk Portfolio

Post-COVID-19 (2020-2021)					
No.	Stock code	xi(%)	$X_i.\beta$	$X_i.ER(i)$	$X_i2.\sigma^2e_i$
1	ADRO	2.7965	0.0796	0.0036	0.0001
2	ANTM	1.3377	0.0901	0.0040	0.0001
3	ASII	4.4185	0.0591	0.0027	0.0000
4	BBCA	4.4633	0.0398	0.0018	0.0000
5	BBNI	3.6200	0.0716	0.0032	0.0001
6	BBRI	4.6177	0.0475	0.0021	0.0000
7	BBTN	2.9569	0.0782	0.0035	0.0001

8	BMRI	4.4559	0.0581	0.0026	0.0000
9	BRPT	4.4335	0.0588	0.0026	0.0000
10	BTPS	3.2432	0.0756	0.0034	0.0001
11	CPIN	2.1521	0.0132	0.0006	0.0000
12	ERAA	2.1891	0.0843	0.0038	0.0001
13	EXCL	3.7495	0.0701	0.0031	0.0001
14	INCO	3.0271	0.0776	0.0035	0.0001
15	INKP	2.8026	0.0795	0.0036	0.0001
16	ITMG	2.4434	0.0824	0.0037	0.0001
17	JPFA	3.5671	0.0722	0.0032	0.0001
18	KLBF	4.5974	0.0346	0.0019	0.0000
19	MICA	4.2420	0.0276	0.0015	0.0000
20	PGAS	2.9087	0.0638	0.0036	0.0001
21	PTPP	2.3220	0.0675	0.0038	0.0001
22	PWON	4.0020	0.0545	0.0031	0.0001
23	TBIG	5.6167	0.1761	0.0099	0.0007
24	TINS	1.8291	0.0703	0.0039	0.0001
25	TKIM	3.1376	0.0622	0.0035	0.0001
26	TLKM	4.3549	0.0498	0.0028	0.0001
27	TOWR	3.8305	0.0563	0.0032	0.0001
28	UNTR	4.6180	0.0436	0.0024	0.0000
29	WSKT	2.2672	0.0679	0.0038	0.0001
			1.9120	0.0945	0.0026
			$\beta_{p.s}$	1.9120	
			$E(R_p)$	0.0945	
			$\sigma^2_{p.s}$	0.0761	

Source: Processed data

3.2 Discussion

Based on table 6, it can be seen that during the COVID-19 pandemic, the above shows that of the 34 stocks that make up the optimal portfolio, there are 13 stocks that have an individual risk that is smaller than the risk in the portfolio. The expected return of the portfolio is greater than the expected return of the 13 stocks. . From some of the existing data exposure, it can be concluded that diversification plays a role in minimizing stock risk, not eliminating it.

4. CONCLUSION

Several companies that have proven capable of surviving and being included in the optimal portfolio during the COVID-19 pandemic that attacked the Indonesian economy include (ADRO), (ANTM), (ASII), (BBCA), (BBNI), (BBRI), (BBTN) , (BMRI), (BRPT), (BTPS),(CPIN), (ERAA), (EXCL), (INCO), (INKP), (JPFA), (KLBF), (MIKA), (PGAS), (

PTPP), (PWON), (TBIG), (TINS), (TKIM), (TLKM), (TOWR), (UNTR), and (WSKT). The 29 stocks above can be an alternative for investors because these companies have proven to be able to survive and fill optimal portfolio compositions even after 2 years of COVID-19 attacking Indonesia.

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