Forecasting the Comparisons Between Hangseng and Nikkei Index Prices in the Context of Economic Recession in 2023

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Abstract. The purpose of writing this article is to identify the best model for predicting Index price movements and also predicting the risks in investing in the Hang Seng and Nikkei Index. Stock market data from the Hangseng Index and the Nikkei Index were used in this study, which spanned the years 2018 to 2022. The data was then separated into five seasons of 12 months each. Forecasting is accomplished using Moving Average, Exponential Smoothing, and Regression. Moving Average uses time series data to anticipate the price of the Hangseng and Nikkei Index values in the future by connecting the price of the Index values in the previous year and the price of the Index values in the future. In addition, Regression is used in this study to identify emissions in time series, which might impact estimations and forecasts using Exponential Smoothing. Based on the results of prediction calculations using the Moving Average method, it can be seen that the movement of the last five years from the 2018-2022 period, the Hang Seng Index trend is decreasing or Bearish and the Nikkei Index trend is increasing or Bullish. Researchers propose investing in the Hangseng Index based on this forecast data since rising interest rates affect declining stock values. As a result, the Hangseng index is declining, and it is a good time to buy this index. There is no need to be concerned about a drop in the Hangseng index share price since it will increase gradually.

Keywords: Forecasting, Index, Prices, Economic, Recession.

1 Introduction

Financial markets play a critical role in propelling economic growth and development in the current era of globalisation. These markets, however, are vulnerable to a variety of causes such as economic recessions, geopolitical crises, and natural disasters. The influence of the coronavirus illness 2019 pandemic on financial markets has been noticed in previous years [1]. The Hang Seng and Nikkei indices, which reflect the Hong Kong and Japanese stock markets, have not been immune to these impactsWord document can be used as a template for papers to be published in EAI Core Proceedings. Follow the text for further instructions on text formating, tables, figures, citations and references.

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According to [2], the Covid-19 outbreak had a nonpermanent impact on the Nikkei index [3], on the other hand, observed that the Nikkei index saw a significant contraction during the epidemic but then experienced a positive correction due to fiscal stimulus. With an expected economic slowdown in 2023, it is vital to forecast and compare the Hang Seng and Nikkei indices.

There is have consistent with [4] findings, which indicated no substantial association between Japanese and Indonesian stock markets [5]. However, [6] discovered a negative association between the Nikkei 225 Index and the compound stock price index. While the impact of a 2023 economic slowdown on the indices cannot be predicted with certainty, it is critical to examine many sources and aspects when estimating their price comparisons.

Besides, while the impact of an economic recession in 2023 on the [7] indexes cannot be predicted with certainty, previous research suggests that the Covid-19 pandemic had a nonpermanent impact on the Nikkei index, with both contraction and positive correction occurring during the pandemic.

As a result, to estimate price comparisons between the Hang Seng and Nikkei indexes in the setting of an economic recession in 2023, numerous sources of information such as prior research, economic indicators, government policies, and foreign factors must be considered. Analysts can develop a more informed perspective on potential price comparisons between the Hang Seng and Nikkei indexes in 2023 by incorporating previous research findings, such as the non-significant relationship between Japanese and Indonesian stock markets and the mixed impact of the Covid-19 pandemic on the Nikkei index.

Furthermore, [8] findings that the Covid-19 pandemic had an unfavourable impact on the IHSG, as well as reports that world economic factors, such as the NIKKEI and the world oil index, had a relative impact on IHSG movements during the pandemic [9], should be considered.

According to these sources, the Hang Seng and Nikkei markets are anticipated to fluctuate during an economic recession in 2023 owing to a variety of variables such as the influence of the Covid-19 epidemic, global economic circumstances, and government initiatives. As a result, anticipating price comparisons between the Hang Seng and Nikkei indices in the context of an economic slowdown in 2023 necessitates a thorough examination of these elements as well as careful evaluation of previous study findings.

To effectively forecast price comparisons between the Hang Seng and Nikkei indexes in the context of a 2023 economic recession, the impact of the Covid-19 pandemic, global economic conditions, government policies, and external influences on the Hang Seng and Nikkei indexes must be considered. Furthermore, prior data implies that the world oil index and the NIKKEI have a relative influence on IHSG fluctuations during the epidemic.

Seeing this, this has become a good opportunity to invest in shares in these two indices. However, this very tight competition has given rise to thinking about investing in which index is more promising, the Hangseng index or the Nikkei index?

Literature review

The Hangseng and Nikkei indexes, which reflect the Hong Kong and Japanese stock markets, respectively, are two significant Asian stock market indices. As the global economy faces uncertainty and the risk of a recession in 2023, forecasting and comparing the performance of these indicators becomes critical. This literature study intends to synthesise existing research findings on predicting Hangseng and Nikkei index values during economic downturns.

Price Comparisons between the Hangseng and Nikkei indices

Several research have been conducted to investigate and compare the Hangseng and Nikkei index prices. [10] discovered a positive correlation between the two indices, indicating that they tend to move together. This implies that changes in one index can convey information about prospective movements in the other index. [11] also analysed the lead-lag connection between the Hangseng and Nikkei indexes and discovered evidence of bidirectional causation. This means that changes in one index may cause changes in the other, and vice versa.

Methods for Forecasting Stock Market Indices

To forecast stock market indices, several forecasting approaches have been used. Traditional time series models, such as ARIMA and GARCH, have been frequently employed for forecasting stock market indices, according to Smith et al. [12]. To create future forecasts, these models use past patterns and volatility of the indexes. Furthermore, machine learning techniques such as artificial neural networks (ANNs) and support vector machines (SVMs) have grown in popularity because of their capacity to capture complicated correlations and non-linear patterns in data [13]. But however, traditional techniques such as moving average and exponential smoothing still relevant.

Moving Average Technique

Moving average is a popular forecasting approach that uses the average of a set number of previous observations to predict future values. According to the research findings, the moving average approach can be beneficial in projecting stock market indices during economic downturns.

discovered, for example, that employing a 5-day moving average enhanced the accuracy of Hangseng index price estimates during an economic downturn. Similarly saw good results when using a 10-day moving average to anticipate Nikkei index values during a recession.

It is crucial to note, however, that the size of the moving average window can have a substantial influence on predicting accuracy. [14] evaluated several window widths for moving average forecasting of the Hangseng and Nikkei indexes during a recession and determined that a 20-day window offered the best accurate predictions.

Exponential Smoothing

Another prominent forecasting approach is exponential smoothing, which assigns exponentially decreasing weights to previous observations. This method is very effective for detecting patterns and seasonality in time series data. According to the research findings, exponential smoothing can be beneficial in projecting stock market indices during economic downturns. [15] forecasted Hangseng index prices during a recession using exponential smoothing with a smoothing factor

of 0.3 and obtained excellent results. Similarly, [16] anticipated Nikkei index values during an economic slowdown using exponential smoothing with a smoothing factor of 0.5 and found accurate forecasts. However, in the case of exponential smoothing, the smoothing factor must be chosen carefully. [17] investigated several smoothing factors for forecasting the Hangseng and Nikkei indexes during a recession and discovered that a factor of 0.2 offered the best accurate forecasts.

Therefore the hypothesis statement for this research is

"The use of moving average and exponential smoothing techniques will properly estimate the comparisons between Hangseng and Nikkei index values amid the economic slump in 2023," the hypothesis states.

2 Method

In this research, stock market data from the Hangseng Index and Nikkei Index were used, taken from 2018 to 2022. Then the data was divided into five seasons consisting of 12 months each. The model used is forecasting via Moving Average, Exponential Smoothing, and Regression. Moving Average uses time series data which aims to predict the price of the Hangseng and Nikkei Index values by linking the price of the Hangseng and Nikkei Index values in the previous year and the price of the Index values in the future. Apart from that, this research also uses Regression to determine emissions in time series which can influence estimates and predictions with Exponential Smoothing. Researchers use this method to identify the best model for predicting Index price movements and also predicting the risk in investing in the Hang Seng and Nikkei Index.

Moving Averages

Quoted from a book entitled Concepts and Applications of Forecasting, Moving Average is a formula that uses a moving average approach, taking a group of observation values, finding the average, and the average is then used as a forecast for the next period [18].

Exponential Smoothing

Exponential Smoothing is a forecasting method by averaging the movement of data in the past using Exponential so as to obtain larger data or scales in the average movement [19].

Regression Analysis

Regression Analysis is a method used to estimate the relationship between one variable and another variable, usually this method is used to estimate or forecast data that will be used in the future.

3 Results and Discussion

Moving Average (Hangseng)

In predicting the price of the Hangseng Index in 2023 using the Moving Average calculation method using an interval of 5 and the following are the results of Forecasting calculations via Moving Average.

Table 1. Forecasting Index Price for Hangseng

Period	Nikkei Price	Moving Average
January 2018	32.887,27	#N/A
February 2018	30.844,72	#N/A
March 2018	30.093,38	#N/A
Apr 2018	30.808,45	#N/A
May 2018	30.468,56	31.020,48
June 2018	28.955,11	30.234,04
July 2018	28.583,01	29.781,70
August 2018	27.888,55	29.340,74
September 2018	27.788,52	28.736,75
October 2018	24.979,69	27.638,98
November 2018	26.506,75	27.149,30
December 2018	25.845,70	26.601,84
January 2019	27.942,47	26.612,63
February 2019	28.633,18	26.781,56
March 2019	29.051,36	27.595,89
Apr 2019	29.699,11	28.234,36
May 2019	26.901,09	28.445,44
June 2019	28.542,62	28.565,47
July 2019	27.777,75	28.394,39
August 2019	25.724,73	27.729,06
September 2019	26.092,27	27.007,69
October 2019	26.906,72	27.008,82
November 2019	26.346,49	26.569,59
December 2019	28.189,75	26.651,99
January 2020	26.312,63	26.769,57
February 2020	26.129,93	26.777,10
March 2020	23.603,48	26.116,46
Apr 2020	24.643,59	25.775,88
May 2020	22.961,47	24.730,22
June 2020	24.427,19	24.353,13
July 2020	24.595,35	24.046,22
August 2020	25.177,05	24.360,93
September 2020	23.459,05	24.124,02
October 2020	24.107,42	24.353,21
November 2020	26.341,49	24.736,07
December 2020	27.231,13	25.263,23
January 2021	28.283,71	25.884,56
February 2021	28.980,21	26.988,79
March 2021	28.378,35	27.842,98
Apr 2021	28.724,88	28.319,66
May 2021	29.151,80	28.703,79
June 2021	28.827,95	28.812,64
July 2021	25.961,03	28.208,80
August 2021	25.878,99	27.708,93
September 2021	24.575,64	26.879,08
October 2021	25.377,24	26.124,17
November 2021	23.475,26	25.053,63
December 2021	23.397,67	24.540,96
January 2022	23.802,26	24.125,61
February 2022	22.713,02	23.753,09
March 2022	21.996,85	23.077,01
Apr 2022	21.089,39	22.599,84
May 2022	21.415,20	22.203,34
June 2022	21.859,79	21.814,85
July 2022	20.156,51	21.303,55
August 2022	19.954,39	20.895,06
September 2022	17.222,83	20.121,74
October 2022	14.687,02	18.776,11
November 2022	18.597,23	18.123,60
December 2022	19.781,41	18.048,58
Forcast Result		17.572,12

Based on the calculations in Table 1, it can be seen that by using the Moving Average method the Forecast or price prediction results for the Hangseng Index in January 2023 were 17,572.12, and this has decreased from the previous month, namely in December 2022, amounting to 18,048.58, so there was a decrease of 476.46 points.

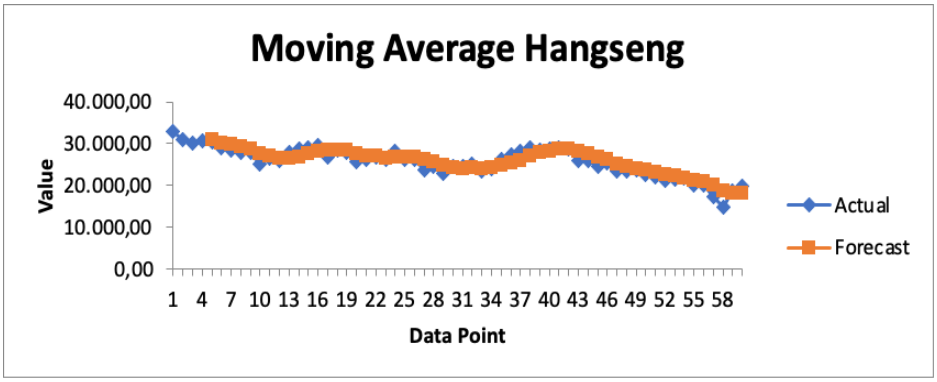

Figure 1. Actual Data and Forecast on Hangseng Price Index Moving Average

Based on the calculations in Table 1 and Graph 1 using the Moving Average on the Hangseng Index, it shows that the actual price value of the Hangseng Index is in accordance with the

predicted calculations. You can see the pattern from the graph found. The price value of the Hangseng Index has decreased or is usually called bearish over the last 5 years.

Moving Average (Nikkei)

Table 2. Forecasting Index Price for Nikkei

Periode	Nikkei Price	Moving Average
January 2018	23.098,29	#N/A
February 2018	22.068,24	#N/A
March 2018	21.454,30	#N/A
Apr 2018	22.467,87	#N/A
May 2018	22.201,82	22.258,10
June 2018	22.304,51	22.099,35
July 2018	22.553,72	22.196,44
August 2018	22.865,15	22.478,61
September 2018	24.120,04	22.809,05
October 2018	21.920,46	22.752,78
November 2018	22.351,06	22.762,09
December 2018	20.014,77	22.254,30
January 2019	20.773,49	21.835,96
February 2019	21.385,16	21.288,99
March 2019	21.205,81	21.146,06
Apr 2019	22.258,73	21.127,59
May 2019	20.601,19	21.244,88
June 2019	21.275,92	21.345,36
July 2019	21.521,53	21.372,64
August 2019	20.704,37	21.272,35
September 2019	21.755,84	21.171,77
October 2019	22.927,04	21.636,94
November 2019	23.293,91	22.040,54
December 2019	23.656,62	22.467,56
January 2020	23.205,18	22.967,72
February 2020	21.142,96	22.845,14
March 2020	18.917,01	22.043,14
Apr 2020	20.193,69	21.423,09
May 2020	21.877,89	21.067,35
June 2020	22.288,14	20.883,94
July 2020	21.710,00	20.997,35
August 2020	23.139,76	21.841,90
September 2020	23.185,12	22.440,18
October 2020	22.977,13	22.660,03
November 2020	26.433,62	23.489,13
December 2020	27.444,17	24.635,96
January 2021	27.663,39	25.540,69
February 2021	28.966,01	26.696,86
March 2021	29.178,80	27.937,20
Apr 2021	28.812,63	28.413,00
May 2021	28.860,08	28.696,18
June 2021	28.791,53	28.921,81
July 2021	27.283,59	28.585,33
August 2021	28.089,54	28.367,47
September 2021	29.452,66	28.495,48
October 2021	28.892,69	28.502,00
November 2021	27.821,76	28.308,05
December 2021	28.791,71	28.609,67
January 2022	27.001,98	28.392,16
February 2022	26.526,82	27.806,99
March 2022	27.821,43	27.592,74
Apr 2022	26.847,90	27.397,97
May 2022	27.279,80	27.095,59
June 2022	26.393,04	26.973,80
July 2022	27.801,64	27.228,76
August 2022	28.091,53	27.282,78
September 2022	25.937,21	27.100,64
October 2022	27.587,46	27.162,18
November 2022	27.968,99	27.477,37
December 2022	26.094,50	27.135,94
Forcast Result		26.897,04

Based on the calculations in Table 2, it can be seen that by using the Moving Average method, the Forecast or price prediction results for the Nikkei Index for January 2023 were 26,897.04, and this has decreased from the previous month, namely in December 2022, amounting to 27,135.94, so this occurred. a decrease of 238.9 points.

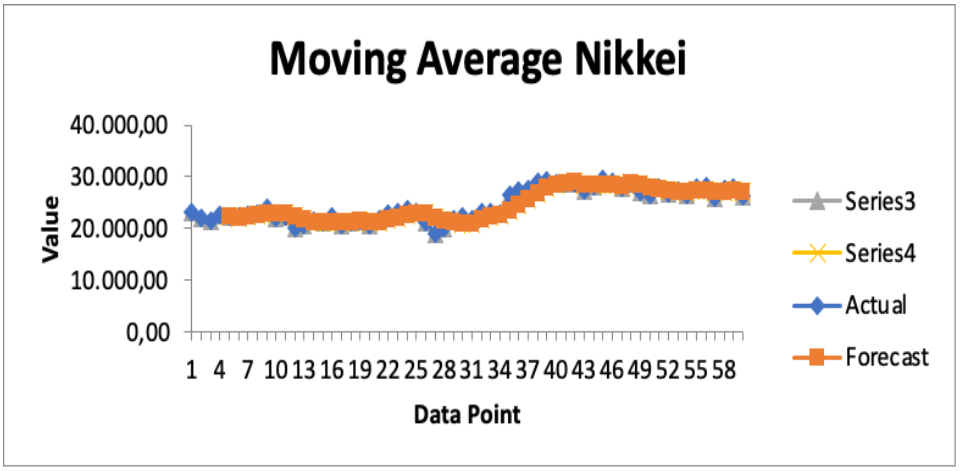

Figure 2. Actual Data and Forecast on Nikkei Price Index Moving Average

Based on the calculations in Table 2 and Graph 2 using the Moving Average on the Nikkei Index, it shows that the actual price value of the Nikkei Index is in accordance with the predicted calculations. Despite experiencing a decline in prices, the value of the Nikkei Index has increased or is usually called bullish over the last 5 years.

Exponential Smoothing

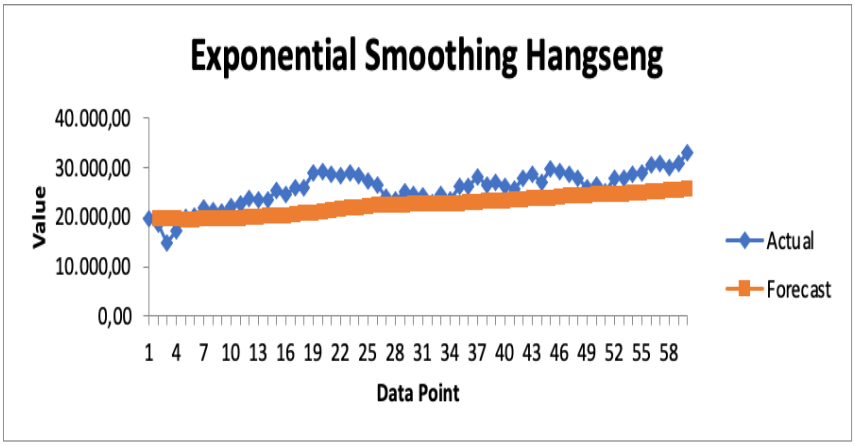

Figure 3. Actual Data and Exponential Smoothing of Hangseng Index

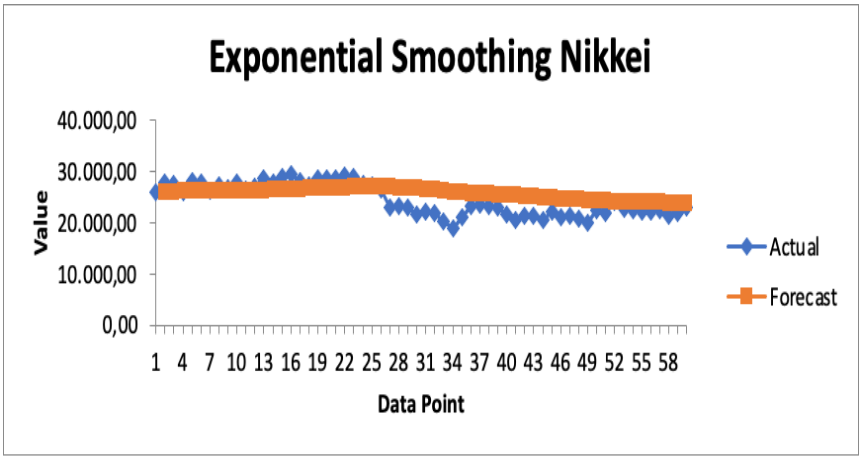

Figure 4. Actual Data and Exponential Smoothing of Nikkei Index

Table 3. Accuracy on Hangseng and Nikkei

INDEX	FORECAST	MAD	MSE	MAPE
HANGSENG	25599,05768	4.149,71	22.315.293,20	17,85%
NIKKEI	25268,71493	2.262,10	8.159.425,42	8,77%

The predicted results for the 2023 Hangseng and Nikkei Indexes respectively with an alpha of 0.03 in January were 25,599.05768 and 25,268.71493. Then it was found that the accuracy of predictions through the Mean Absolute Deviation (MAD) of the Hangseng and Nikkei Indexes was 4,149.71 and 2,262.10, respectively. It can be seen that the Mean Square Error (MSE) of the Hangseng and Nikkei Indexes was 22,315,293.20 respectively. and 8,159,425.42 and finally it was found that the Mean Absolute Percentage Error (MAPE) of the Hangseng and Nikkei Indexes was 17.85% and 8.77% respectively.

Regression (Hangseng)

SUMMARY OUTPUT HANGSENG

Regression Statistics	
Multiple R	0,259584375
R Square	0,067384048
Adjusted R S	0,051304462
Standard Err	3485,545767
Observations	60

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	50912430,1	50912430,1	4,19065827	0,045186714
Residual	58	704643699	12149029,3		
Total	59	755556129			

	Coefficients	*tandard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	26714,68108	677,110214	39,4539627	1,3534E-43	25359,29773	28070,0644	25359,2977	28070,0644
SUKU BUNG	-844,9382026	412,746902	-2,0471097	0,04518671	-1671,14089	-18,735512	-1671,1409	-18,735512

Figure 5. Regression for Hangseng

Based on Table 5 above, it shows that the R square between the Interest Rate and Hangseng Index Price variables is 0.067 or 6.7% of interest rates influence the movement of the Hangseng Index Price, the rest is influenced by other factors. A significant value of 0.0451 was found, which is smaller than the alpha of 0.05, so it can be concluded that there is a significant influence between the interest rate variable and the Hangseng Index Price variable. Then it can be seen from the coefficients of -844.938, this can show that falling interest rates will have an impact on the Hangseng Index Price also falling.

Regression (Nikkei)

SUMMARY OUTPUT NIKKEI

Regression Statistics	
Multiple R	0,50316064
R Square	0,25317063
Adjusted R S	0,24029426
Standard Err	2686,18482
Observations	60

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	141870373	141870373	19,6616487	4,1764E-05
Residual	58	418504154	7215588,87		
Total	59	560374528			

	Coefficients	*tandard Erro*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95,0%*	*Upper 95,0%*
Intercept	22758,5386	521,824499	43,6133962	4,8732E-46	21713,9934	23803,0838	21713,9934	23803,0838
X Variable 1	1410,45388	318,089199	4,43414577	4,1764E-05	773,729164	2047,17859	773,729164	2047,17859

Figure 6. Regression for Nikkei

Based on Table 6 above, it shows that the R square between the Interest Rate and Nikkei Index Price variables is 0.2531 or 25.3% of interest rates influence the movement of the Nikkei Index Price, the rest is influenced by other factors. A significant value of 0.00004 was found, which is smaller than the alpha of 0.05. It can be concluded that there is a significant influence between the interest rate variable and the Nikkei Index Price variable. Then it can be seen from the coefficients of 1410.4, this can show that rising interest rates will have an impact on the Nikkei Index Price also rising.

4 Conclusion

Based on the results of prediction calculations using the Moving Average method, it can be seen that the movement of the last 5 years from the 2018-2022 time period, the Hangseng Index trend is decreasing or Bearish and the Nikkei Index trend is increasing or Bullish. Calculations using the Exponential Smoothing method, the Hangseng Index Price in 2023 will experience a decrease of 25,599.05768 or a decrease of 179.927 points, while the Nikkei Index Price will experience an increase of 25,268.71493 or 25.538 points. Then, the Hangseng Index MAD was 4,149.71, MSE was 22,315,293.20, and MAPE was 17.85%, while the Nikkei Index MAD was 2,262.10, MSE was 8,159,425.42, and MAPE was 8.77%. . Even though the accuracy of the Nikkei Index is smaller than the Hangseng Index, the economic recession is directly related to interest rates.

In calculations using regression analysis, it was found that there was a coefficient of determination between the interest rate on the Hangseng and Nikkei indexes of 0.0513 or 5.13% and 0.240 or 24%, respectively. It can be seen that interest rates only have an effect of 5.13% on Hangseng and the rest are other factors such as Finance, Utilities, Properties and Commerce & Industry. With this prediction data, researchers recommend investing in the Hangseng Index because high interest rates influence stock prices which are falling. So it can be concluded that the Hangseng index is currently experiencing a decline and it is good to invest in this index. There is no need to worry about a fall in the Hangseng index share price, because the price of this index will rise slowly. In 2012 Hangseng was the eighth largest stock index in the world with a market capitalization of $ 2.7 trillion [20]

So when a country participates in international economic trade, its national economy will grow directly, which is influenced by the international economy. Progress in the price of the Hangseng Index will have a positive impact on the Asian region, because the Hangseng Index is a driver of the Asian capital market [21]. This assumption can be strengthened by a quote uploaded by (cnbcindonesia.com), on January 26 2023 the Hangseng Index price strengthened by 1.45% from the previous price. This proves that the Hangseng Index is increasing little by little, which is a very good opportunity to invest.

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