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Analysis of Investment Performance of Malaysia's Stock Market During Covid-19 Pandemic

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Abstract: The Covid-19 outbreak that was discovered in Wuhan, China, on 31st December 2019 caused damage to Malaysia's stock market. The problem statement of this study is the evaluation method to assess the funding production of a portfolio in a country, how the COVID-19 pandemic can influence the performance of a stock in Malaysia's stock market during the pandemic and how the returns or income on the portfolios examined differs from returns on other "natively selected" portfolios with same levels of risk. This study aims to examine the investment performance of the stocks market in Malaysia using Sharpe, Treynor and Jensen's alpha method, to obtain the evaluation value of each stock market's performance in Malaysia by using Sharpe, Treynor and Jensen's alpha method and to determine the effect of COVID-19 on the stock market's enactment in Malaysia with considering the effect of COVID-19 pandemic to the several sectors and industries. This research uses the quantitative method where the timeframe needed before the pandemic is between 1st March 2019 and 29th February 2020 while after the pandemic is between 1st March 2020 and 28th February 2021. The research data samples that obtained and then refined by using SPSS software and Microsoft Excel. It will be refined by using z-score transformation because the three methods have different properties. After that, the data that undergoes z-score transformation will be refined by using Kruskal Wallis Test for the decision making whether there is a notable difference in the portfolio performance and lastly, the T-test method is used to determine whether there is a notable difference in the ratios data for the pre-COVID-19 and during COVID-19. The results of this study are some of the stocks have low performance compared to the other stocks by using Sharpe, Treynor and Jensen's methods.

Keywords: Sharpe, Treynor, Jensen, Stocks Market, SPSS, Microsoft Excel

1. Introduction

Nowadays, the exchange has become very significant and is one of the important factors in a country's system of an economy [1]. But, the COVID-19 outbreak that was discovered in Wuhan, China, on March 2020 caused damage to Malaysia's financial growth that caused the performance of the

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Financial Times Stock Exchange (FTSE) Malaysia Composite Index has declined during the pandemic [13]. As we know, COVID-19 is the novel human coronavirus illness in 2019 that was first outlined in Wuhan, China in March 2020 and the WHO declared COVID-19 as a pandemic [10]. Not only the performance of the FTSE Malaysia Index affected by COVID-19 but it also led to an extraordinary upset in the economy of a country and also an unstable collapse in an exchange's country [7]. In order to evaluate the investment performance of a stock market, it can be evaluated by its performance using three methods; Sharpe, Treynor, and Jensen [8]. The portfolio performance evaluation establishes how a certain investment portfolio has been conducted relative to some comparison benchmark [5]. The investment analysis always faces problems in terms of evaluating the risks faced by the stakeholders [6]. The beta or systematic risk of a stock portfolio is usually estimated using a short-term income interval [3]. Based on this framework, the investors would anticipate that only assets that have a very high beta can obtain a high average income [9]. According to the Modern Portfolio says that a stock portfolio model is increased by cutting down the risk of the portfolio as measured by the variance of the value based on the given portfolio [11].

The objective of this study is to examine the investment performance of the stocks market in Malaysia, to obtain the evaluation value of each stock market's performance in Malaysia by using Sharpe, Treynor and Jensen's alpha method and to determine the effect on COVID-19 to the stock market's enactment in Malaysia with considering the effect of COVID-19 pandemic to the several sectors and industries. The problem statements of this study are what is the evaluation method to assess the investment performance of a portfolio in a country, how the COVID-19 pandemic can affect the performance of a stock in Malaysia's stock market during the pandemic and how the returns or income on the portfolios examined differs from returns on other "natively selected" portfolios with same levels of risk. The study consists of 10 public companies listed in the Financial Bursa Malaysia Kuala Lumpur Composite Index (FBM KLCI) over the time period ranging from March 2019 to February 2021, consisting of pre-COVID-19 and during COVID-19. This study's findings will further reveal the risk, return, and stock performance of Malaysia's stock market using Sharpe, Treynor and Jensen's alpha method that be necessary importance to guide investors in choosing the best stock for their investment using the three methods which are Sharpe, Treynor and Jensen's alpha.

2. Methodology

For this research, it was conducted by using a quantitative method where the timeframe needed for pre-COVID-19 is between 1st March 2019 and 29th February 2020 while for during COVID-19 is between 1st March 2020 and 28th February 2021 and the statistical test used are z-score transformation, Kruskal Wallis Test and T-test [4]. For the z-score transformation,

$$z = \frac{x-\mu}{\sigma} \qquad \text{Eq. 1}$$

where μ= average of the stock portfolio, σ= standard deviation of the stock portfolio and x= data point of the stock portfolio. For the Kruskal Wallis Test, to find the H statistic,

$$H = \left(\frac{12}{n(n+1)}\sum_{j=1}^{k}\frac{{T_j}^2}{n_j}\right) - 3(n+1) \qquad \text{Eq. 2}$$

where n = sum of samples sizes for stock portfolio, k = number of samples of the stocks, T_J= sum of ranks in the jth sample of the stock portfolio and n_j = size of the j[th] sample of the sstock's portfolio. For the T-test,

$$t = \frac{\overline{X_1}-\overline{X_2}}{\sqrt{\frac{{s_1}^2}{n_1}+\frac{{s_2}^2}{n_2}}} \qquad \text{Eq. 3}$$

where n_1 and n_2 are the sample sizes of the stock portfolio, $\overline{X_1}$and $\overline{X_2}$ are the sample means of the stock portfolio and ${s_1}^2$ and ${s_2}^2$ are the sample variances of the stock portfolio. Sharpe's method, is a method developed by William Sharpe in 1966 that is based on the framework of Modern Portfolio Theory (MPT) developed by Markowitz [15]. This method is used to explain the rate of return of assets of a portfolio by computing the risk compensation that has been taken [8]. It measures the likelihood amount of a portfolio with a range of errors where the range of error itself is considered by the contrast between the mean funds and the mean of the entire funds [16]. To compute Sharpe's Index,

$$S_p = \frac{\overline{R_i} - \overline{R_f}}{\sigma_p} \qquad \text{Eq. 4}$$

where S_p is the Sharpe's Index, $\overline{R_i}$- denotes the average return portfolio i , $\overline{R_f}$ denotes the means income likelihood free assets and σ_p denotes the portfolio standard deviation. For Treynor's method, it is a method that developed by Jack L. Treynor in 1965 where the principle of this method is the beta coefficient (β) is used to measure the volatility of a stock, portfolio, or a market where the volatility of a stock, portfolio or market can be determined by calculating the standard deviation of the annualized returns over a given period of time [2]. To compute Treynor's Index,

$$T_P = \frac{\overline{R_i} - \overline{R_f}}{\beta_P} \qquad \text{Eq. 5}$$

where T_p is the Treynor Index, $\overline{R_i}$- is the means income collection i, $\overline{R_f}$ is the average level return risk free assets and β_p denotes the beta's portfolio. For Jensen's alpha method, it is a method developed by Michael C. Jensen in 1968 that measures the difference between the actual income and CAPM based on the same risk and it recognizes the capability of active management to improve the incomes as a reward from the market risk [2]. It can be easily interpreted as a measure of how much a portfolio "beats the market". An index that is positive means that the income of a portfolio is greater than its expected income because the portfolio has proportionally high income for the level risk or the other way round [12]. To compute the Jensen's alpha index,

$$\alpha_p = \overline{R_p} - [\overline{R_f} + \beta_p(\overline{R_m} - \overline{R_f})] \qquad \text{Eq. 6}$$

where α_p is Jensen's alpha index, $\overline{R_p}$ is the average return portfolio, β_p- is the beta portfolio, $\overline{R_m}$ is the average return market and $\overline{R_f}$ denotes the average level return risk free assets. The relationship between these three statistical tests and the three methods is the value of the three methods is used to show whether there is significant difference of the performance of the stock market by using three methods which is Sharpe, Treynor and Jensen's alpha.

3. Results and Discussion

For this section, the beta portfolio, the risk-free rate, the standard deviations, the computations of the Sharpe, Treynor and Jensen's ratio of each stock portfolio and the statistical test (Kruskal Wallis Test and T-test) are shown to show which stock has the highest performance among the others and to determine whether there is a significant difference of the performance of the stock by using three methods.

3.1 Beta

Beta of the stock portfolio is described as the relative volatility of an individual securities portfolio, taken as a whole, as measured by the individual stock betas of the securities making it up. The Beta for the stock portfolio used in this research can be obtained by computing the variance and covariance of each stock portfolio as profits to obtain the following results as follows:

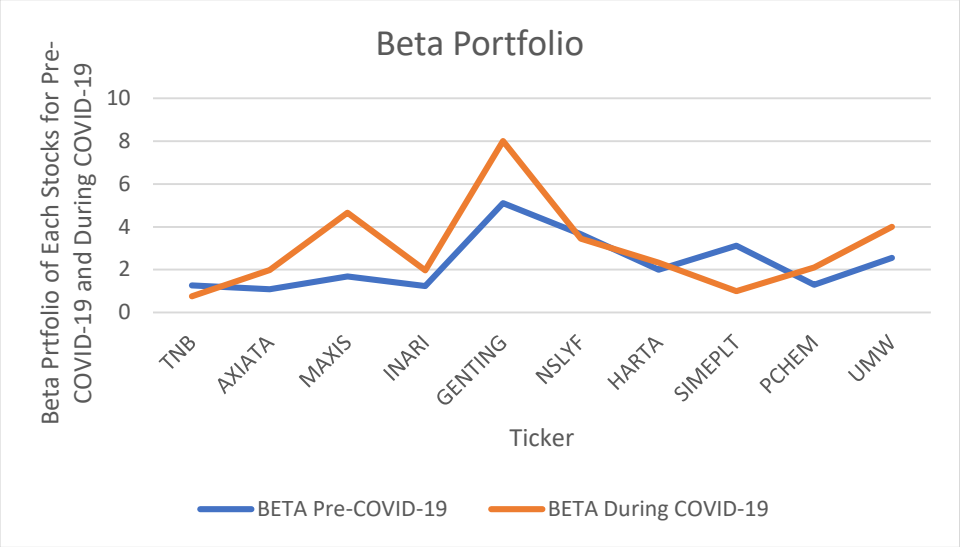

Figure 1: **The Beta Portfolio of Each Stock for Pre-COVID-19 and During COVID-19**

Based on the figure above, the Beta portfolio of each stock for Pre-COVID-19 is lower than the Beta portfolio of each stock during COVID-19. This is because the risk of each stock for Pre-COVID-19 is lower than the risk of each portfolio during COVID-19. Thus, the Beta of each stock portfolio for Pre-COVID-19 is less than the Beta of each stock portfolio during COVID-19. Next, the Beta portfolio of TNB for pre-COVID-19 is slightly greater than the Beta portfolio of TNB during COVID-19 due to the high risk that contained by the TNB for pre-COVID-19 rather than during COVID-19. Then, the Beta portfolio of NSLYF for pre-COVID-19 is higher than the Beta portfolio of SIMEPLT during COVID-19. This is because the risk that carried by the NSLYF is greater than SIMEPLT. Thus, the Beta portfolio of NSLYF is greater than the SIMEPLT for Pre-COVID-19.

3.2 Standard deviation

The standard error of the 10 stocks listed in FBM KLCI is computed using the stock portfolio income data to get the following results:

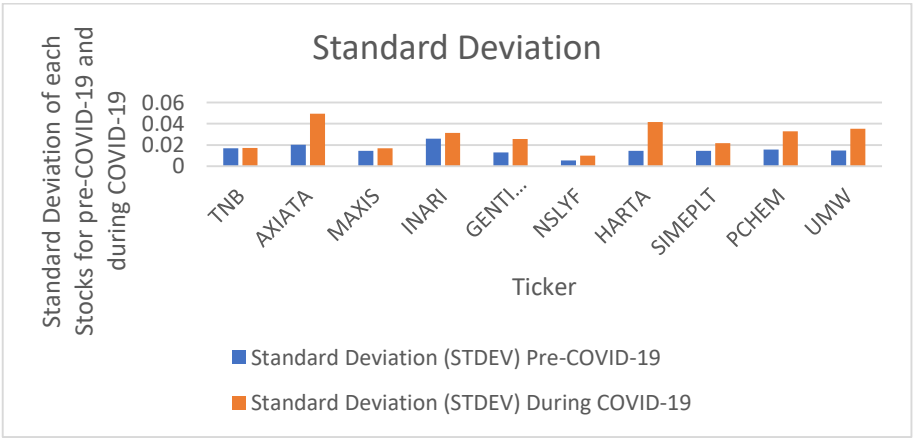

Figure 2: Standard Deviation of each Stock for Pre-COVID-19 and During COVID-19

From Figure 2, the entire standard error for pre-COVID-19 is 0.202345 while the entire standard error during COVID-19 is 0.281538. This is because the instability of the stock portfolio income during COVID-19 is more than the volatility of the stock portfolio incomes for Pre-COVID-19, thus it is not possible to have a greater risk during COVID-19 than pre-COVID-19. Besides that, Axiata Group Bhd. (AXIATA) had recorded the highest standard error for pre-COVID-19 and during COVID-19 which are 0.020178 and 0.049415, respectively. This is due to the stock price volatility that causes it to carry the higher risk thus the highest incomes obtained for pre-COVID-19 and during COVID-19. Lastly, Nestle Malaysia Bhd. recorded the lowest standard deviation during COVID-19 which is 0.009825.

3.3 Market Return (Rm)

Market Return is the price changes in an index or other security that may be captured by investors or traders as profits. In this study, the market return of 10 stocks listed in FBM KLCI are as follows:

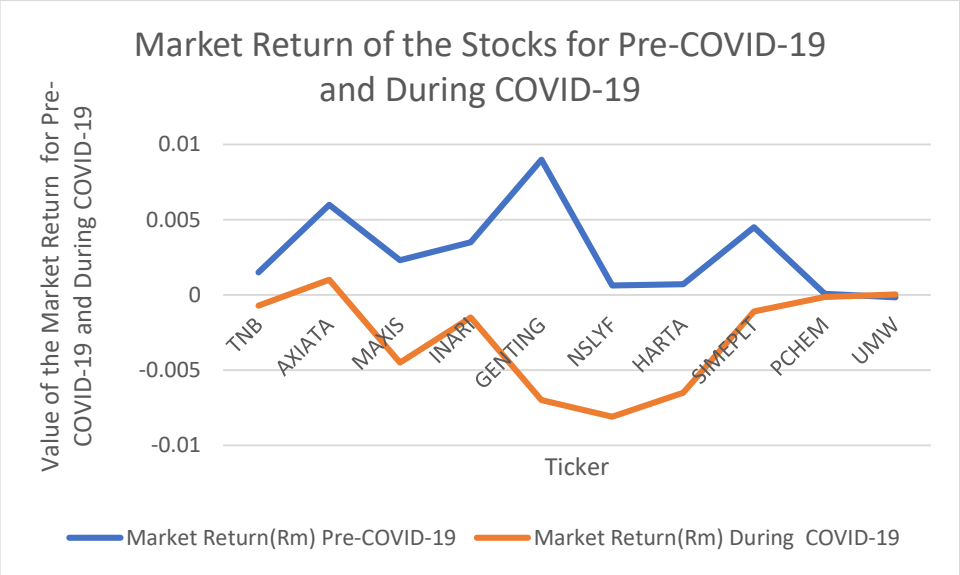

Figure 3: Market Return of the Stocks for Pre-COVID-19 and During COVID-19

Based on the figure above, Genting Bhd recorded the highest market return which is 0.009. Nestle Malaysia Bhd recorded the lowest market return which is -0.0081 during COVID-19. This is because Genting Bhd has the highest market value than the other stocks due to the higher risk that made the investors invest in the stock thus, it obtained the highest return among the other stocks. Next, the return market of the TNB for pre-COVID-19 is 0.0015 while the return market of the TNB during COVID-19 is -0.00071. This is because the supply and demand for electricity pre-COVID-19 is much higher than during COVID-19. Then, the return market of the MAXIS for pre-COVID-19 is 0.0023 while the return market of the MAXIS during COVID-19 is -0.0045. This is because the supply and demand for telecommunication services pre-COVID-19 are greater than during COVID-19. Lastly, the return market of the SIMEPLT for pre-COVID19 is 0.0045 while the return market of the SIMEPLT during COVID-19 is -0.0011.

3.4 Sharpe, Jensen and Treynor Ratio Calculations

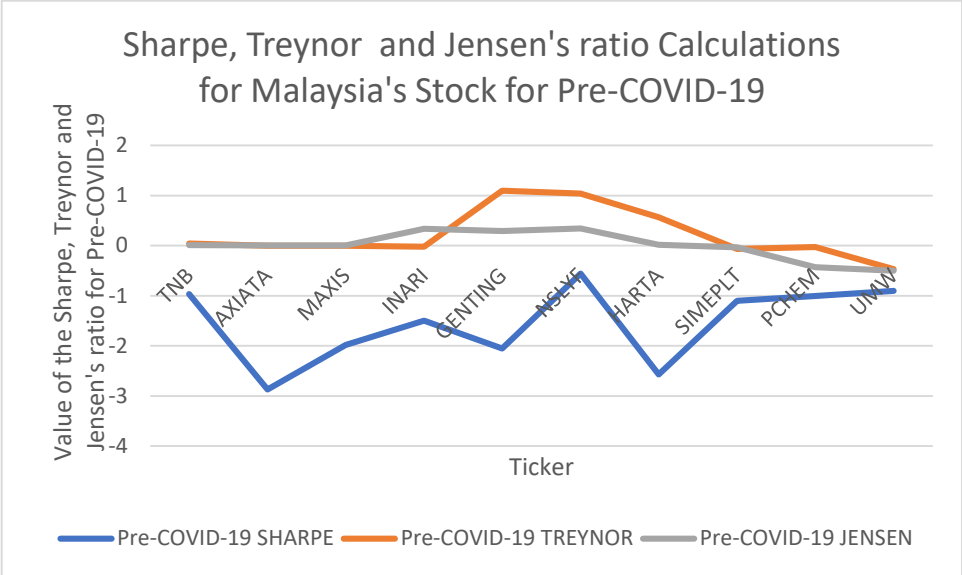

Figure 4: Sharpe, Treynor and Jensen's ratio Calculations for pre-COVID-19

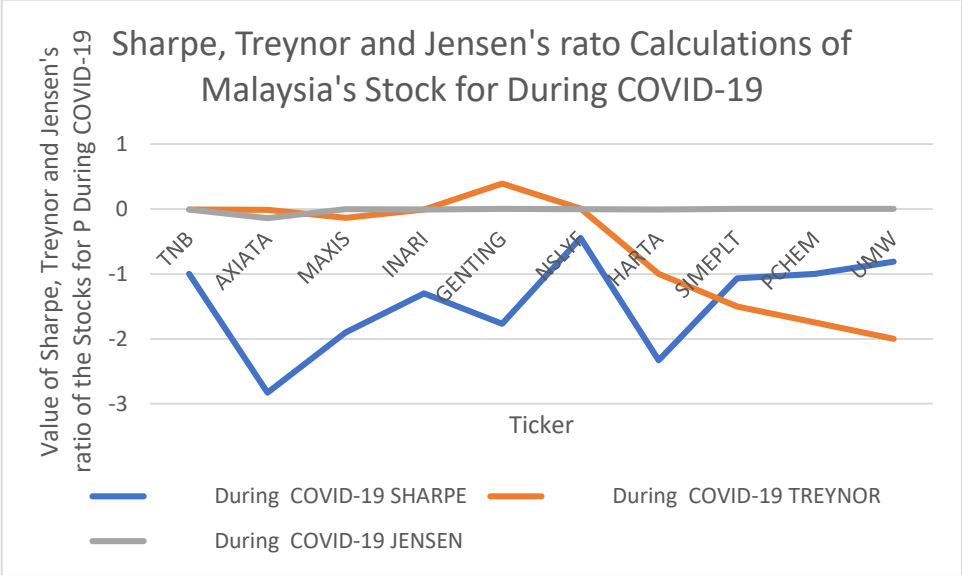

Figure 5: Sharpe, Treynor and Jensen's Calculations for during COVID-19

From this, the lowest performance of the stocks for the Sharpe's ratio for pre-COVID-19 and during COVID-19 is Axiata Bhd. which is -2.87 and -2.83, respectively. This is because Axiata Bhd. had the highest standard deviation which is 0.020178; thus, it carried more risk and caused the portfolio performance of the stock to become the lowest among the other stocks. For Treynor's ratio, the highest performance of the stocks for pre-COVID-19 and during COVID-19 is Genting Bhd. with 1.095 and 0.391, respectively. This is because Genting Bhd. had the highest beta portfolio over the other stocks for pre-COVID-19 and during COVID-19 which is 5.11 and 8, respectively as shown in the figure and Genting Bhd. was the highest investment return than the other stocks. Thus, it was the highest performance of the other stocks. For Jensen's ratio, the highest performance of the stocks for pre-COVID-19 is Nestle Malaysia Bhd. that is 0.3397 while the highest performance of the stocks during COVID-19 is Petronas Chemicals Group Bhd. which is 0.0008. This indicates that the risk-adjusted returns of NSLYF (Nestle Malaysia Bhd.) and PCHEM (Petronas Chemicals Group Bhd.) were higher

than the other stocks thus the investment return of the NSLYF and PCHEM were greater than the other stocks.

3.5 Kruskal Wallis Test

Kruskal Wallis Test is a rank-based nonparametric test that can be used to determine whether there are statistically significant differences between two or more groups of an independent variable on a continuous or ordinal dependent variable. For this research, it is used to determine whether there is a significant difference between the performance of each stock by using Sharpe, Treynor and Jensen's method by combining the results of the three methods since the three methods have different attributes to obtain the results as follows:

Table 6: Kruskal Wallis Test on Sharpe, Treynor and Jensen Method

	Z-score
Chi-Square	4.84
df	2
Asymp.Sig.	0.656

From the results of the SPSS output in Table 6, the results of the Kruskal Wallis test show a critical value of 4.84 with a degree of freedom (df) was 2 and the *p*-value of 0.656 with a significance level which was 0.05. By comparing the critical value of 14.84 with the value at the chi-square table (X^2 distribution), with a significance level of which it was found that 4.84 < 5.991, thus we can infer that there was a significant difference between the performance of each stock by using Sharpe, Treynor and Jensen's method during the period.

3.6 T-test

T-test is an inferential statistic used to determine if there is a statistically significant difference between the means of two variables. For this research, it is used to determine whether there is a significant difference in the performance of each stock by using Sharpe, Treynor and Jensen's method.

Table 7: T-test Results for the Stocks in Pre-COVID-19 and During COVID-19 for Treynor ratio.

	Pre-COVID-19	*During COVID-19*
Mean	-0.01645	0.004043
Variance	0.001894	0.083096096
Observations	10	10
Pearson Correlation	-0.02822	
Hypothesized Mean Difference	0	
Df	9	
t Stat	-0.22137	
P(T<=t) one-tail	0.414873	
t Critical one-tail	1.833113	
P(T<=t) two-tail	0.829746	
t Critical two-tail	2.262157	

Based on the Table 7 above, the *p*-value of the Treynor ratio obtained with a confidence level of 0.95 is 0.829746. By comparing the *p*-value obtained with the significance level of 0.05, it was found that there were no significant differences in the Sharpe ratio for pre-COVID-19 and during COVID-19.

Table 8: T-test results for the Stocks in Pre-COVID-19 and During COVID-19 for Jensen's ratio

	Pre-COVID-19	*During COVID-19*
Mean	-0.017731	0.08799
Variance	0.001776748	0.290605512
Observations	10	10
Pearson Correlation	0.068345501	
Hypothesized Mean Difference	0	
df	9	
t Stat	-0.621591237	
P(T<=t) one-tail	0.274814761	
t Critical one-tail	1.833112933	
P(T<=t) two-tail	0.549629522	
t Critical two-tail	2.262157163	

Based on the Table 8, the *p*-value of the Jensen ratio obtained with a confidence level of 0.95 is 0.549629522. By comparing the *p*-value obtained with the significance level of 0.05, it was found that there were no statistically significant differences in the Sharpe ratio for pre-COVID-19 and during COVID-19.

Table 9: T-test results for the Stocks in Pre-COVID-19 and During COVID-19 for Sharpe ratio

	Pre-COVID-19	*During COVID-19*
Mean	-1.4615	-1.5504
Variance	0.609254	0.631090489
Observations	10	10
Pearson Correlation	0.989343	
Hypothesized Mean Difference	0	
Df	9	
t Stat	2.427829	
P(T<=t) one-tail	0.019059	
t Critical one-tail	1.833113	
P(T<=t) two-tail	0.038118	
t Critical two-tail	2.262157	

Based on Table 9, the *p*-value of the Sharpe ratio obtained with a confidence level of 0.95 is 0.038118. By comparing the *p*-value obtained with the significance level of 0.05, it was found that there were statistically significant differences in the Sharpe ratio for pre-COVID-19 and during COVID-19.

5. Conclusion

In conclusion, the study aims to examine the investment performance of the stocks market in Malaysia by using Sharpe, Treynor and Jensen, to obtain the evaluation value of each stock market by using Sharpe, Treynor and Jensen's alpha method and to and to determine the impact on COVID-19 to the stock market's enactment in Malaysia with considering the impact of COVID-19 widespread to the several sectors and industries.

The first aim is successfully achieved by referring to the results of the Kruskal Wallis Test, where it shows the critical value of 4.84 with degree of freedom (df) was 2 and the p-value of 0.656 with a significance level which was 0.05. By comparing the critical value with the value at the chi-square table,

we can conclude that there was a significant difference between the performance of each stock by using Sharpe, Treynor and Jensen's method during the period.

For the second aim, it is successfully achieved by referring to the results of Sharpe, Treynor and Jensen's calculations, where the lowest performance of the stocks for Sharpe's ratio for pre-COVID-19 and during COVID-19 is Axiata Bhd. For Treynor's ratio, the highest performance of the stocks for pre-COVID-19 and during COVID-19 is Genting Bhd. For Jensen's ratio, the highest performance of the stock for pre-COVID-19 is Nestle Malaysia Bhd. while the highest performance of the stock during COVID-19 is Petronas Chemicals Group Bhd.

The third objective is achieved by referring to the results of the beta portfolio where from the beta portfolio results of each stock, the return market of the TNB for pre-COVID-19 is 0.0015 while the return market of the TNB during COVID-19 is -0.00071. Then, the return market of the MAXIS for pre-COVID-19 is 0.0023 while the return market of the MAXIS during COVID-19 is -0.0045. Lastly, the return market of the SIMEPLT for Pre-COVID19 is 0.0045 while the return market of the SIMEPLT during COVID-19 is -0.0011 thus all the objectives is achieved.

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