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Assets Correlation in Malaysian Stock Market Before and During Pandemic Covid19

Zulkifli Mohamed[1*], Ahmad Bukhari Mohd Yasin[2], Md Khairu Amin Ismail[3]

[1,2,3]Faculty of Business and Administration, Universiti Teknologi MARA Cawangan Kelantan, Kampus Kota Bharu, 15050 Kota Bharu, Kelantan.

[*] Corresponding author: zulkifli030@uitm.edu.my

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ABSTRACT

Stock market volatility is an unsolved issue discussed by many scholars. Uncertain political scenarios, complex economic issues surrounding and ambiguity of various information are among the factors contributed to the stock market volatility. This situation is also known as VUCA environment. Investors and fund managers faced difficulties in making investment decisions in these macros challenging situation since the element of systematic risks were rising. It's also influencing the degree of asset correlation in the stock market and leads to the diversification strategy problem. In the Modern Portfolio Theory, the elements of investment risk can be minimized through portfolio diversification. The diversification benefit can be maximized by combining negative correlation assets in a portfolio. Therefore, objective of the study is to measure the various values or assets' correlation in Malaysian stock market for duration of 'before and during the pandemic covid19'. 13 different types of assets were being analyzed. This study had provided the lights that asset combination are changes upon market condition. Comparison of assets correlation between all the sub-period showed that 'during pandemic', the number of negative correlation assets is 36%. This is higher compared to 'before pandemic' and 'whole period' duration. Utilities (7) and REITs (7) asset sectorial are having highest negative assets correlation. This condition gave higher opportunities for the fund managers and investors to minimize their investment risk.

Keywords: Asset correlation, Stock market, Investment, Portfolio, Diversification

1 INTRODUCTION

Investment is very important in expanding economic activities. Investors and fund managers working hard in managing the public and private money. They have to make an investment decision in a very highly volatile stock market. Changes in political, economic, social and technologies will influence the stock market trends. Political stability is the most critical factor since it will influence other factors in creating a healthy economic and social culture in a country. While political instability will lead to poor investors' confidence in a country [16]. They will switch their investment from one country to another due to political stability. Economic activities are a catalyst for business expansion.

The element of interest rate, corruption, money supply and inflation level also will influence the business performance and directly will affect the company's stock prices. Therefore, investors and fund managers need to make a thorough analysis [15].

As an example, Bernhart et.al. [9] had studied the assets correlations in calm and turbulent periods. They used major stock indices from three regions for the calm and turbulent market periods sub periods for the time period between 1987 and 2009. The correlation structures in the respective periods are compared. They revealed that the correlations between as well as within the asset classes under investigation are far from being stable and vary significantly between calm and turbulent market periods as well as in time. They also released that the US and European markets are much more integrated than the Asian and US/European ones.

The Pandemic Covid19 who had affected Malaysia and the world have given a vast impact to the business activities. Movement Control Order (MCO) imposed by the authorities had restricted all the business operation during the pandemic duration. Generally, as a result, the stock market transaction was also affected due to lower demand for shares and had caused a downward trend in stock price movement. However, the stock market was governed by more than 1500 listed companies which were operated in all various economic sectors.

All sectors have different degrees of sensitivity to the economic and stock market conditions [10]. However, it is still uncertain to what extend the companies in Malaysia were affected by the changes in the stock market due to pandemic covid19. In these scenarios, it is hard for the fund managers and investors to make an investment strategy in managing their portfolios. Therefore, further analysis is needed in order to explore changes in the asset's correlation. Consequently, using applied mathematical approach, this study had investigated the effect on assets correlation in Malaysian stock market before and during pandemic covid19.

1.1 Literature review

In Modern Portfolio Theory, Harry Markowitz [8] proved the fundamental theorem of mean variance portfolio theory, namely holding constant variance, maximize expected return, and holding constant expected return minimize variance. These two principles led to the formulation of an efficient frontier from which the investor could choose his or her preferred portfolio, depending on individual risk return preferences. The important message of the theory was that assets could not be selected only on characteristics that were unique to the security. Rather, an investor had to consider how each security co-moved with all other securities. Furthermore, taking these co-movements into account resulted in an ability to construct a portfolio that had the same expected return and less risk than a portfolio constructed by ignoring the interactions between securities [4]. As a result, the application of security interactions nowadays can be measured by the assets correlation.

Since then, asset allocation and diversification benefit has gained scholars' interest. Stock market fluctuation will influence the degree of assets correlation. According to [5] assets correlation tends to increase in volatile periods which reduces the power of diversification. Asset correlation is also being used in making risk management strategies. They also found that asset correlation and risk management model assumed at least short-term stability of the covariance structure of asset returns, but actual covariance and correlation relationship fluctuate dramatically.

Inconsistency in assets correlation had led stock markets to a dynamic in asset correlation between assets. A study by Case et. al [3], had used Generalized Autoregressive Conditional Heterroskedasticity (DCC-Garch) to examine dynamics in the correlation of asset returns between publicly traded REITS and non-REIT stocks. The result revealed that the REIT-stock correlation was changing over time. They had divided the study into three different periods. This shows that assets correlation will change over time and need to be monitored continuously since it will influence the portfolio's return volatility.

Solnik et.al [2] had conducted a study on international correlations for stocks and bonds. They found that the correlation for stocks and bonds fluctuates widely over time, and it is contagious across market. In addition, international correlation increases in periods of high market volatility. The study showed that asset correlation is very important for portfolio diversification and risk management.

The application of asset correlation also can be used in identifying the hedging strategy. Olson et.al [6] studied a relationship between the energy and equity markets by estimating volatility impulse response functions from a multivariate BEKK model of the Goldman Sach's Energy Index and the S&P 500. They also calculate the time varying conditional correlations and time varying dynamic hedge ratios. They found that from the volatility impulse response functions, the low S&P 500 returns caused substantial increases in the volatility of the energy index. However, they also found that only a weak response from S&P 500 volatility to energy price shocks. From this study, they concluded that the energy index is generally a poor hedging instrument.

Recently, intersectoral study in KLSE was conducted by Nazir et. al [7] using rolling window correlation method relating to covid19 declaration in Malaysia. They released that the pandemic declaration does not affect the positive correlation between all the indices in either timeline. Unexpectedly, all the correlation values were increased after the pandemic declaration except a few. As a lesson, the intersectors positive correlation persist at certain level in whatever market condition. This will become an indication for fund managers in making an investment decision.

2 MATERIAL AND METHODS

This applied research had used a mathematical approach of Pearson correlation co-efficient as a tool measure the degree of asset correlation in the Malaysian stock market. SPSS ver26 software was used in analyzing the data.

2.1 Methodology and Data

This study covers all 13 sectorial indexes in Bursa Malaysia, namely: -Construction, Finance services, Plantation, Property, Technology, Consumer Products and Services, Industrial Products and Services, Energy, Health Care, Telecommunications and Media, Transportation and Logistics, Utilities and Real Estate Investment Trust (REIT). All the data was extracted from Refinitiv Eikon Database. Alam et. al [12] also used sectorial indexes to study on efficiency of stock markets and financial performance aspects by conducting a comparative analysis of 10 sectorial global indices for both conventional and Islamic counterpart.

This study covers weekly data from March 6, 2018, until April 1, 2022. The study distinguishes the period of the study into three categories; - the whole period, before the pandemic and during the pandemic. The before pandemic sub-period is defined between March 06 2018, and March 17 2020. March 17 2020, has been chosen as the cut-off date as the government has declared that the first Movement Control Order (MCO) has begun starting on March 18, 2020. The duration of the pandemic starts from March 18, 2020, up to April 01 2022. April 01 is the beginning of the endemic era as declared by the government as MCO have gave a serious impact to Malaysian economic [13].

To simplify the discussion, this study only covers two asset combination scenarios. Therefore, Pearson Correlation is the best and most straightforward method to identify the best combination between the sectors. All the standard rules of Pearson Correlation assumptions have been tested and validated [1].

2.1.1 Correlation Coefficient

Correlation analysis was used to measure the degree of assets association in a stock market as used by Solnik et.al [2]. Coefficient of correlation between every pair of assets were determined by the covariance between the pair of assets, divided by the product of standard deviation of every asset. Correlation coefficient will take the value be -1 and +1 [11].

Correlation coefficient

$$\rho_{x,y} = \frac{Cov(x,y)}{\sigma_x.\sigma_y} \tag{1}$$

2.1.2 Portfolio Variance

Portfolio variances measure the variability data for portfolio return combined in a portfolio. The elements of asset weightage, assets' standard deviation, co-variance was taken into consideration in determining the portfolio risk value [8,14].

Porfolio Variance

$$\sigma_P^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j COV_{i,j} \tag{2}$$

$$\sigma_P^2 = \sum_{i=1}^{n}\sum_{j=1}^{n} w_i w_j \rho_{i,j}\sigma_i\sigma_j \tag{3}$$

where

σ_P^2 - *Portfolio variance*

w_i, w_j, - *Weightage in asset i and asset j*

$COV_{i,j}$ - *Covariance between asset i and asset j*

$\rho_{i,j}$ - *Coefficient of correlation between asset i and asset j*

$\sigma_i\sigma_j$ - *standard deviation between asset i and asset j*

3 RESULT AND DISCUSSION

The results of the Pearson correlation for all periods are presented in Table 1 (before the pandemic) and Table 2 (during the pandemic). In the 'whole period' duration of study, covers the longer duration of 37 months and the economic conditions were covered in both 'before' and 'during' the pandemic situation. The value of assets correlation is very important for minimizing the portfolio risk.

Table 1 shows the correlation value for various combinations. The best investment diversification strategy is to look at the negative correlation. The negative correlation will result in a low portfolio standard deviation. The result revealed that the best sectorial combination for the whole period is between Utilities and REITs (r= -0.781) and Technology with REITs (r=-0.781).

Table 1: Pearson Correlation (Before Pandemic 6/3/2018 -17/3/2020)

	CONSTR	FIN	PLANT	PROP	TECH	CONSUM	INDUSTR	ENERGY	HEALTH	TELEC	TRANSPT	UTILITIES	REITs
CONSTR	1												
FIN	.321**	1											
PLANT	.618**	.662**	1										
PROP	.557**	.886**	.800**	1									
TECH	.151	-.167	.318**	.041	1								
CONSUM	.344**	.792**	.689**	.859**	.249**	1							
INDUSTR	.300**	.920**	.668**	.851**	.087	.856**	1						
ENERGY	.704**	.462**	.716**	.734**	.166	.576**	.423**	1					
HEALTH	.604**	.376**	.637**	.668**	.181	.444**	.289**	.865**	1				
TELEC	.895**	.364**	.510**	.558**	.169	.425**	.311**	.620**	.556**	1			
TRANSPT	.388**	**-.319****	-.036	**-.270****	.232*	-.164	**-.253****	-.010	-.146	.397**	1		
UTILITIES	.505**	.745**	.685**	.823**	.226*	.721**	.755**	.697**	.595**	.545**	-.048	1	
REITs	**-.305****	**-.654****	**-.639****	**-.711****	.065	**-.434****	**-.579****	**-.624****	**-.627****	**-.203***	.413**	**-.708****	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

For the period of 'before the pandemic', Table 1 indicates that the best combination is between Property and REIT (r=-0.711). This finding is quite interesting as the underlying assets of the REIT sector are Real estate, which generally has a positive relationship with the property market. This interesting finding might need further investigation in future research.

Table 2: Pearson Correlation (During Pandemic 18/3/2020 -1/4/2022)

	CONSTR	FIN	PLANT	PROP	TECH	CONSUM	INDUSTR	ENERGY	HEALTH	TELEC	TRANSPT	UTILITIES	REITs
CONSTR	1												
FIN	.129	1											
PLANT	.194*	.338**	1										
PROP	.490**	.864**	.231*	1									
TECH	.135	.804**	.030	.839**	1								
CONSUM	.745**	.631**	.248*	.877**	.676**	1							
INDUSTR	.142	.943**	.237*	.904**	.922**	.685**	1						
ENERGY	.383**	**-.610****	.305**	**-.443****	**-.628****	-.116	**-.643****	1					
HEALTH	.339**	**-.528****	.231*	**-.326****	**-.359****	.019	**-.466****	.828**	1				
TELEC	.322**	.714**	-.185	.831**	.873**	.704**	.802**	**-.614****	**-.472****	1			
TRANSPT	.386**	.217*	.179	.283**	-.029	.347**	.116	.110	-.170	.179	1		
UTILITIES	.292**	**-.699****	**-.236***	**-.537****	**-.778****	**-.265****	**-.784****	.609**	.314**	**-.462****	.367**	1	
REITs	.289**	**-.823****	-.130	**-.607****	**-.761****	**-.274****	**-.851****	.833**	.664**	**-.605****	.159	.865**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

For the period during the pandemic, Table 2 indicates that the best sector to be combined in the investment portfolio is REIT with Industrial Products and Services sector (r=-0.851).

Table 3: Number of Negative Assets' Correlation in All Sectors

Duration	Constr	Fin	Plant	Prop	Tech	Consum	Industr	Energy	Health	Telec	Transpt	Utilities	REITs
Whole	2	2	1	2	**9**	2	6	3	**9**	2	3	3	4
Before C19	1	3	3	4	0	2	2	2	2	1	7	2	**10**
During C19	0	4	3	4	5	3	4	6	6	5	2	**7**	**7**

Table 3 above showed that every sectorial asset has a different degree of assets correlation. In the 'whole' period of study assets in Technology sector (9 assets) and Health sector (9 assets) having the higher number of negative assets correlation. This implied an indicator for investors in choosing the right pair of assets for their asset selection. In the 'before pandemic' period, it shows that the REIT sector is having the highest number of negative correlation assets of 10. While in 'during pandemic' period the Utilities and REIT assets are having higher number of negative correlation assets.

Table 4: Number of Pearson Correlations in the Whole, Before and During Pandemic Covid19

	Whole	Before C19	During C19
Number of Positive Assets' Correlation	108(69%)	117(75%)	100(54%)
Number of Negative Assets' Correlation	48(31%)	39(25%)	56 (36%)
Number of Total Asset Correlation	156(100%)	156(100%)	156(100%)

Comparison of assets correlation between all the sub-period in Table 4 above showed that 'during pandemic' the number of negative correlation asset (36%) is higher compared to 'before pandemic' and 'whole period' duration. Utilities (7 assets) and REITs (7 assets) sectorial are having the highest negative assets correlation. This condition gave higher opportunities for the fund managers and investors to minimize their investment risk.

4 CONCLUSION

Managing investment in highly volatile, uncertain, complex and ambiguity environment are very challenging for investors and fund managers to ensure profitability investment and minimizing risk. However, using Modern Portfolio Theory, the negative correlation assets were recommended as an alternative in minimizing investment risk. Therefore, this study had explored the trend of assets correlation in difference period of time for all sectorial of assets in Malaysian stock market. Investors and fund managers can identify the appropriate negative assets selection by looking at the correlation value in difference sub-period in order to minimize the investment risk and maximize investment return.

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