4th International Virtual Conference on Economics, Entrepreneurship and Management

(4th ICEEM)

Nilai July 30, 2021

BURSA MALAYSIA SECTORAL INDICES RETURN CORRELATION BEFORE AND DURING THE COVID-19 PANDEMIC

Nik Amalina Ismail[1], Norlida Mahussin[2]

[1,2]Universiti Sains Islam Malaysia

amalinaismail181998@gmail.com, norlida@usim.edu.my

Abstract. This study examines the Bursa Malaysia sectoral indices return and the co-movement among sectors before and during COVID-19. This study divides the period into two sub-periods which are PRE-PANDEMIC (27 December 2018 – 29 November 2019) and PANDEMIC (2 December 2019 – 30 October 2020). The study uses the Pearson correlation test to measure the correlation between sectors and paired t-test to test the difference in return during both periods. The findings show that on average, the best performers in the PANDEMIC period are Healthcare (KLHC) followed by Technology (KLTE) and Industrial Products (KLIP). Energy (KLEN) and Healthcare (KLHC) show significant return differences between PRE-PANDEMIC and PANDEMIC. All sectoral indices in Bursa Malaysia exhibit positive correlations in both periods, but the level of correlation increased during PANDEMIC.

Keywords*:* Correlation, Bursa Malaysia sectoral index, COVID-19

1. Introduction

The COVID-19 pandemic has changed the world dramatically. In the early stage of the pandemic, not much information is known about the virus that causes uncertainty on many aspects of the diseases. Since the declaration of Covid-19 as the global pandemic on March 11, 2020, by the World Health Organisation (WHO), the global uncertainty indicators showed a drastic increase from the previous record. Altig et al.(2020) examine major uncertainty indicators in the US and the UK, find all the indicators show huge uncertainty jumps between March to May 2020. This is mainly due to the strict measures taken by the international governments to curb the disease including partial or full lockdowns, closing borders, and travel restrictions that affect business activities. The global economy was estimated to have contracted by 4.3 percent according to the World Bank (World Bank Group, 2021). The pandemic hit the global stock markets and most markets closed to the lowest during March to May 2020 and volatility increased (Ashraf, 2020; Baek et al., 2020; Baker et al, 2020; Liu et al., 2020; Mazur et al., 2021). The impact of the pandemic is the worst since the Great Depression (Gopinath, 2020). Baker et al. (2020) note "no other pandemic has affected the U.S. stock market in such extraordinary ways" (p.756).

The pandemic has also affected the Malaysian stock market. The first Movement Order Control (MCO) which was announced on 16th March 2020 for two weeks beginning on

18 March has forced private and public agencies to close operation. Only certain economic sectors and services are allowed to operate such as food and beverages, and healthcare services. The pandemic and the MCO have dropped down the stock market to the lowest point at 1,219 on 19 March, a day after the implementation of the MCO (Chia et al., 2020; Lee et al., 2020). Though the benchmark index showed a downward trend during March-April 2020, some sectors benefit from the pandemic. Healthcare and Technology sectors are the two sectors on Bursa Malaysia that received attention during the pandemic (Poo and Khuen, 2020; Khuen, 2021). Mazur et al. (2021) examine S&P1500 stocks show healthcare, software and technology, food, and natural gas are among the best performing sectors during March 2020. In China, information technology and medicine manufacturing are two sectors that beat the market (Al-Awadhi et al., 2020). Baek et al. (2020) find some industries are less exposed to the Covid-19 pandemic. These industries include healthcare, food production, and beer and liquor.

The portfolio diversification theory Markowitz (1952) suggests that by combining assets whose returns are not perfectly positively correlated, investors can reduce the total variance of their portfolio, thus maximise portfolio return. However, during the crisis returns correlation tends to rise (Patev et al., 2006; Ilmanen, and Kizer, 2012; Page and Panariello, 2018). In an extensive study, Attig and Sy (2021) examine diversification benefits from 1995 – May 2020, covers several crises periods including the Covid-19 pandemic and posed the following questions "Is diversification beneficial when it is most needed, during difficult times?" (p.3). They find the diversification benefits persist during hard times, either international or industrial diversification. The findings suggest that diversification benefits are not dead during hard times. This background motivates our study. We are not focusing on diversification benefits, instead aim to examine the correlation between sectoral indices during the COVID-19 era, the global health crisis that changes the social and economic landscape. We compare the Bursa Malaysia sectors return correlation before and during the pandemic to understand how the unusual health crisis impacted various sectors and the possibility of domestic portfolio diversification.

The remainder of the paper is organized as follows. The following section explains data and method used in the analysis. Section three discusses the findings and the final chapter concludes.

2. Data and Methodology

2.1 Data

This study examines eleven Bursa Malaysia sectoral indices namely KL Construction (KLCT), KL Consumer Product (KLCM), KL Energy (KLEN), KL Finance (KLFI), KL Healthcare (KLHC), KL Industrial Product (KLIP), KL Plantation (KLPL), KL Property (KLPR), KL Technology (KLTE), KL Telecommunications & Media (KLTC) and KL Transportation & Logistics (KLTP). The daily indices data are collected from the investing.com website for the period from December 27, 2018, to October 30, 2020. We divide

the sample period into two sub-periods: PRE-PANDEMIC from December 27, 2018, to November 29, 2019, and PANDEMIC from December 2, 2019, to October 30, 2020. We compute the daily log index return expressed in percentage as follows:

$$R_t = ln(\frac{P_t}{P_{t-1}})$$

(1)

Where, R_t is the daily log return of the sectoral index, P_t is the closing price of the sectoral index in day t, and P_{t-1} is the closing price of the sectoral index in the previous day, t-1.

2.2 Methodology

2.2.1 Paired t-test

We perform paired t-test to determine whether the mean difference in return between the two sub-periods for every sector is significantly different from zero. The assumption of the paired t-test is the sample is random, dependent and follows normal distribution. The standardized test statistic is:

$$t = \frac{\bar{d} - \mu_d}{s_d/\sqrt{n}}$$

(2)

Where $\bar{d}$ is $\frac{s_d}{\sqrt{n}}$, s_d is the standard deviation of the differences between the paired, and μ_d is the mean of the differences of the paired. We reject null for no differences between the two sub-periods if H_1: $\mu_d \neq 0$.

2.2.2 Correlation Measure

To measure the correlation between sectoral indices return, we use the Pearson correlation coefficient. The correlation coefficient is used to examine the two random variables that are in the linear relationship in terms of their strength. It lies between the range of -1 to +1. -1 value of correlation coefficient means that all the unsystematic risk will be diversified away while the +1 value of correlation coefficient means that no unsystematic risk will be diversified away from two securities. If the value of the correlation coefficient is zero, it means that there is no correlation between the two security returns. Pearson's Product Moment Correlation is calculated as follows:

$$r = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{n\sigma_X.\sigma_Y}$$

(3)

where, X_i, Y_i are the sector X and Y return, $\bar{X}$, $\bar{Y}$ are sector X and Y mean return, σ_X, σ_Y are sector X and Y standard deviation, and n is the total observations.

3. Results and Discussion

3.1 Descriptive statistics

Table 1 presents the descriptive statistics for sectoral indices return for the overall period, PRE-PANDEMIC and PANDEMIC. Based on panel A, six sectoral indices posed positive returns which are Construction (KLCT), Healthcare (KLHC), Industrial Product (KLIP), Plantation (KLPL), Technology (KLTE) and Transportation & Logistics (KLTP) while other sectoral indices recorded negative return. The highest returns of the sectoral index for the overall period are Healthcare (KLHC), Technology (KLTE) and Transportation & Logistics (KLTP) which are recorded at 0.2433%, 0.2091% and 0.0139% respectively. Meanwhile, the lowest returns of the sectoral indices in the overall period are Finance (KLFI), Property (KLPR) and Energy (KLEN) which are recorded at -0.0797%, -0.0473% and -0.0197% respectively.

Panel B presents the descriptive statistics for the PRE-PANDEMIC period. Six sectoral indices recorded positive returns which are Construction (KLCT), Energy (KLEN), Plantation (KLPL), Technology (KLTE), Telecommunications & Media (KLTC) and Transportation & Logistics (KLTP) while other sectoral indices recorded negative return before COVID-19. The highest returns for the period are Energy (KLEN), Technology (KLTE) and Construction (KLCT) which are recorded at 0.1635%, 0.1034% and 0.0647% respectively. Meanwhile, the lowest returns of the sectoral indices in pre-pandemic are Finance (KLFI), Property (KLPR) and Industrial Product (KLIP) which are recorded returns higher than -0.06%.

Panel C presents the returns statistic for the PANDEMIC period. Five sectoral indices recorded positive returns which are Healthcare (KLHC), Industrial Product (KLIP), Plantation (KLPL), Technology (KLTE) and Transportation & Logistics (KLTP) while other sectoral indices recorded negative returns. The highest returns are Healthcare (KLHC), Technology (KLTE) and Industrial Product (KLIP) which are recorded at 0.5106%, 0.3143% and 0.0574% respectively. Meanwhile, the lowest returns are Energy (KLEN), Finance (KLFI) and Telecommunications & Media (KLTC) which are recorded at -0.2022%, -0.0999% and -0.0590% respectively. If we look at the mean return, KL Healthcare and KL Technology are very attractive sectors for investors during the pandemic.

When we divide the period into PRE-PANDEMIC and PANDEMIC, we find that the standard deviation for sectors return is slightly higher in the PANDEMIC period showing an increase in return volatility. Healthcare (KLHC) and Industrial Production (KLIP) are the two sectors that the mean returns turn positive during PANDEMIC. The finding agreed with previous studies that the Healthcare (KLHC) sector benefited from the health crisis, (Al-Awadhi et al., 2020; Mazur et al., 2021).

Table 1 Descriptive statistic for the overall period, before COVID-19 and during COVID-19

Panel A: Overall period											
	KLCT	KLCM	KLEN	KLFI	KLHC	KLIP	KLPL	KLPR	KLTE	KLTC	KLTP
Mean	0.0104	-0.0154	-0.0197	-0.0797	0.2433	0.0080	0.0107	-0.0473	0.2091	-0.0140	0.0139
Max	0.0228	0.0116	0.0287	0.0115	0.0389	0.0182	0.0146	0.0159	0.0300	0.0181	0.0152
Min	-0.0238	-0.0118	-0.0328	-0.0145	-0.0241	-0.0195	-0.0151	-0.0170	-0.0274	-0.0177	-0.0170
Std. Dev.	0.0118	0.0058	0.0154	0.0064	0.0146	0.0090	0.0075	0.0080	0.0145	0.0091	0.0083
Panel B: PRE-PANDEMIC											
	KLCT	KLCM	KLEN	KLFI	KLHC	KLIP	KLPL	KLPR	KLTE	KLTC	KLTP
Mean	0.0647	-0.0065	0.1635	-0.0594	-0.0252	-0.0417	0.0148	-0.0506	0.1034	0.0312	0.0176
Max	0.0228	0.0116	0.0287	0.0115	0.0265	0.0173	0.0146	0.0159	0.0300	0.0181	0.0152
Min	-0.0238	-0.0118	-0.0328	-0.0145	-0.0241	-0.0195	-0.0151	-0.0170	-0.0274	-0.0177	-0.0170
Std. Dev.	0.0108	0.0044	0.0124	0.0043	0.0063	0.0063	0.0062	0.0068	0.0118	0.0079	0.0071
Panel C: PANDEMIC											
	KLCT	KLCM	KLEN	KLFI	KLHC	KLIP	KLPL	KLPR	KLTE	KLTC	KLTP
Mean	-0.0436	-0.0242	-0.2022	-0.0999	0.5106	0.0574	0.0066	-0.0441	0.3143	-0.0590	0.0104
Max	0.0228	0.0116	0.0287	0.0115	0.0389	0.0182	0.0146	0.0159	0.0300	0.0181	0.0152
Min	-0.0238	-0.0118	-0.0328	-0.0145	-0.0241	-0.0195	-0.0151	-0.0170	-0.0274	-0.0177	-0.0170
Std. Dev.	0.0127	0.0070	0.0177	0.0080	0.0192	0.0110	0.0086	0.0090	0.0166	0.0101	0.0095

3.2 Paired t-test

Table 2 presents the paired t-test of the Bursa Malaysia sectoral indices for PRE-PANDEMIC and PANDEMIC. We find that only Energy (KLEN) and Healthcare (KLHC) returns are significantly different between the two periods. In PRE-PANDEMIC, the average return for Healthcare (KLHC) is negative, but positive in the PANDEMIC period. Meanwhile, Energy (KLEN) average return is positive in PRE-PANDEMIC but negative in PANDEMIC. Based on the mean return, the sector's return difference between PRE-PANDEMIC and PANDEMIC is -0.5358% for Healthcare (KLHC) and 0.3657% for Energy (KLEN).

Table 2 Differences between sector returns in PRE-PANDEMIC and PANDEMIC

	Paired Difference					df	T-test
				95 Confidence Interval			
	Mean differences	Standard Deviation	Standard Error Mean	Lower	Upper		
KLCT	0.0010	0.0159	0.0011	-0.0010	0.0031	225	1.02
KLCM	0.0001	0.0076	0.0005	-0.0008	0.0011	225	0.35
KLEN	0.0037	0.0213	0.0014	0.0009	0.0064	225	2.56**
KLFI	0.0004	0.0087	0.0006	-0.0007	0.0015	225	0.71
KLHC	-0.0054	0.0197	0.0013	-0.0079	-0.0028	225	-4.08***
KLIP	-0.0009	0.0124	0.0008	-0.0026	0.0006	225	-1.2
KLPL	0.00008	0.0105	0.0007	-0.0013	0.0015	225	0.12
KLPR	-0.00006	0.011	0.0007	-0.0015	0.0015	225	0.03
KLTE	-0.0021	0.0203	0.0014	-0.0048	0.0005	225	-1.57
KLTC	0.0009	0.0116	0.0008	-0.0006	0.0024	225	1.17
KLTP	0.00007	0.0116	0.0008	-0.0014	0.0016	225	0.09

Note: *, **, *** represent significant at 1%, 5% and 10% respectively

3.3 Sectoral Correlation

Table 3 presents the correlation coefficient between sectors for the overall period. The result of the correlation coefficient between sectors for the overall period shows that the highest correlation is between Property (KLPR) and Construction (KLCT) while the lowest correlation is between Healthcare (KLHC) and Finance (KLFI). The finding shows a positive correlation for all pairs sector indicates that all sectoral indices move in the same direction. Table 4 presents the correlation coefficient between sectors in PRE-PANDEMIC. The result of the correlation coefficient shows that the highest correlation is Property (KLPR) and Construction (KLCT) while

the lowest correlation is Healthcare (KLHC) and Plantation (KLPL). Table 5 presents the correlation coefficient between sectors during PANDEMIC. The result of the correlation coefficient between sectors during COVID-19 shows that the highest correlation is Consumer Product (KLCM) and Industrial Product (KLIP) while the lowest correlation is Healthcare (KLHC) and Finance (KLFI). All sectoral indices have a positive correlation between them during both periods. Overall, the findings suggest correlations between sectors increase during PANDEMIC compared to the PRE-PANDEMIC period in line with the argument that correlation increases during the crisis period. Though the correlation increases during PANDEMIC, combining stocks from low correlated sectors will provide investors with diversification benefits.

Conclusion

This study examines eleven sectoral indices on Bursa Malaysia before and during the Covid-19 pandemic. We find that Healthcare, Technology, Industrial Products, Plantation and, Transportation & Logistics are sectors that posed average positive returns during the pandemic. Among the sectors, Healthcare and Technology are the best performers during the health crisis. This is mainly due to higher demand for healthcare and technology products as cases increase and prolonged MCO. Meanwhile, the Energy sector lost the most during the pandemic. All sectors show a positive correlation before and during the pandemic. However, the correlations between sectors are higher during pandemic suggesting an increase in systematic risk. Though our study does not provide any evidence on portfolio diversification benefit, the findings suggest including Healthcare and Technology stocks into a portfolio alongside other stocks from sectors that have low correlation with these two sectors may reduce the total risk of the portfolio during the pandemic. This study is based on a simple correlation test, therefore co-integration techniques for evaluating sector co-integration should be applied.

Table 3 The correlation coefficient between sectors for the overall period

Sector	KLCT	KLCM	KLEN	KLFI	KLHC	KLIP	KLPL	KLPR	KLTE	KLTC	KLTP
KLCT	1										
KLCM	0.5964	1									
KLEN	0.5762	0.5815	1								
KLFI	0.5063	0.6519	0.4753	1							
KLHC	0.2654	0.2518	0.3019	0.1562	1						
KLIP	0.594	0.6692	0.553	0.624	0.3288	1					
KLPL	0.5393	0.5829	0.4244	0.5304	0.2448	0.5611	1				
KLPR	0.6423	0.621	0.5617	0.5489	0.3635	0.6219	0.5352	1			
KLTE	0.5608	0.5406	0.5942	0.4163	0.417	0.5745	0.3778	0.5303	1		
KLTC	0.543	0.5936	0.5319	0.4972	0.2071	0.5406	0.4800	0.5309	0.501	1	
KLTP	0.5636	0.5457	0.5381	0.4812	0.3101	0.5686	0.4601	0.5777	0.4992	0.4663	1

Note: All correlations are significant at 1% respectively.

Table 4 The correlation coefficient between sectors in PRE-PANDEMIC

Sector	KLCT	KLCM	KLEN	KLFI	KLHC	KLIP	KLPL	KLPR	KLTE	KLTC	KLTP
KLCT	1										
KLCM	0.4844	1									
KLEN	0.4398	0.4754	1								
KLFI	0.3944	0.554	0.3483	1							
KLHC	0.3440	0.3582	0.3473	0.2612	1						
KLIP	0.4160	0.4586	0.4487	0.3742	0.3987	1					
KLPL	0.4553	0.4651	0.2480	0.4072	0.2041*	0.3494	1				
KLPR	0.586	0.5427	0.3506	0.4525	0.3400	0.4477	0.4364	1			
KLTE	0.5711	0.5106	0.5112	0.2925	0.3310	0.4657	0.2237	0.4358	1		
KLTC	0.5029	0.5189	0.3822	0.3168	0.2819	0.4146	0.3630	0.3587	0.4725	1	
KLTP	0.4885	0.3487	0.4111	0.3584	0.3519	0.4347	0.2980	0.4806	0.3776	0.3274	1

Note: All correlations are significant at 1% respectively except *.

Table 5 The correlation coefficient between sectors in PANDEMIC

	KLCT	KLCM	KLEN	KLFI	KLHC	KLIP	KLPL	KLPR	KLTE	KLTC	KLTP
KLCT	1										
KLCM	0.6654	1									
KLEN	0.6598	0.6329	1								
KLFI	0.5729	0.6876	0.5274	1							
KLHC	0.2899	0.2489	0.3469	0.1514*	1						
KLIP	0.7016	0.7494	0.6140	0.7054	0.3193	1					
KLPL	0.5940	0.6388	0.5175	0.5852	0.2767	0.6552	1				
KLPR	0.6814	0.6613	0.6796	0.5970	0.4022	0.7044	0.5890	1			
KLTE	0.5668	0.5589	0.6572	0.4730	0.4543	0.6201	0.4590	0.5825	1		
KLTC	0.5686	0.6347	0.6122	0.5820	0.2224	0.6109	0.5470	0.6329	0.5263	1	
KLTP	0.6135	0.6410	0.6097	0.5379	0.3296	0.6331	0.5475	0.6319	0.566	0.5475	1

Note: All correlations are significant at 1% respectively except *.

References

Al-Awadhi, A. M., Alsaifi, K., Al-Awadhi, A., Alhammadi, S. (2020). Death and contagious infectious diseases: Impact of the COVID-19 virus on stock market returns. *Journal of Behavioral and Experimental Finance*, *vol.27*(100326).

Altig D., Baker, S., Barrero, J.M., Bloom, N.,. Bunn, P., Chen, S.... and Thwaites, G. (2020). Economic uncertainty before and during the COVID-19 pandemic. *Journal of Public Economics, vol.191*(104274).

Ashraf, B. N. (2020). Stock markets' reaction to COVID-19: Cases or fatalities? *Research in International Business and Finance*, *vol.54*(101249).

Attig, Najah and Sy, O. (2021). *Diversification during Hard Times*. http://dx.doi.org/10.2139/ssrn.3848814

Baek, S., Mohanty, S.K., and Glambosky, M. (2020). COVID-19 and stock market volatility: An industry level analysis. *Finance Research Letters*, *vol.37*(101748).

Baker, S. R. , Bloom, N., Davis , S.J., Kost, K., Sammon, M., and Viratyosin, T. (2020). The unprecedented stock market reaction to COVID-19. *The Review of Asset Pricing Studies*, *10*(4), 742–758.

Chia, R.C.J., Liew, V.K.S., Rowland, R. (2020). Daily new Covid-19 cases, the Movement Control Order, and Malaysian stock market returns. *International Journal of Business and Society*, *21*(2), pp.553-568.

Gopinath, G. (2020). *The Great Lockdown: Worst Economic Downturn Since the Great Depression*. https://blogs.imf.org/2020/04/14/the-great-lockdown-worst-economic-downturn-since-the-great-depression/

Ilmanen, Antti., and Kizer, J. (2012). The Death of Diversification Has Been Greatly Exaggerated. *The Journal of Portfolio Management 38*, *no. 3*, 15–27.

Khuen, L. W. (2021). *Surviving the impact of Covid-19: Healthcare the sector with most deals*. The Edge. https://www.theedgemarkets.com/article/surviving-impact-covid19-healthcare-sector-most-deals

Lee, K. Y. M., Jais, M.,Chan, C. W. (2020). Impact of COVID-19: Evidence from Malaysian stock market. *International Journal of Business and Society*, *vol.21*(2), pp.607-628.

Liu, H., Manzoor, A., Wang, C., Zhang, L., and Manzoor, Z. (2020). The COVID-19 outbreak and affected countries stock markets response. *International Journal of Environmental Research and Public Health*, *vol.17*(8), pp.2800.

Longin, F., & Solnik, B. (2001). Extreme correlation of international equity markets. *The Journal of Finance*, *56*(2), 649-676.

Markowitz, H. (1952). Portfolio selection. *The Journal of Finance*, *7*(1), pp.77-91.

Mazur, M., Dang, M., and Vega, M. (2021). COVID-19 and the march 2020 stock market crash: Evidence from S&P500. *Finance Research Letters*, *vol.38*(101690).

Page, S., & Panariello, R. A. (2018). When diversification fails. *Financial Analysts Journal*, *74*(3), 19-32.

Patev, P., Kanaryan, N., & Lyroudi, K. (2006). Stock market crises and portfolio diversification in Central and Eastern Europe. *Managerial Finance*.

Poo, C. and Khuen, L. W. (2020). *Tech and healthcare stocks to lead equities in 2021 recovery, says Principle Asset*. The Edge. https://www.theedgemarkets.com/article/tech-and-healthcare-stocks-lead-equities-2021-recovery-says-principal-asset.

World Bank Group. (2021). *Global Economic Prospect*. https://www.worldbank.org/en/publication/global-economic-prospects