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Chia, Ricky Chee-Jiun and Liew, Venus Khim-Sen and Rowland, Racquel

2020

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Ricky Chee-Jiun Chia
Universiti Malaysia Sabah

Venus Khim-Sen Liew[♣]
Universiti Malaysia Sarawak

Racquel Rowland
Universiti Malaysia Sarawak

ABSTRACT

The Movement Control Order (MCO) not only restricts movement of human being, it also reduces firms' financial profits and brings significant impact to stock returns. The objective of this study is to examine the relation between Malaysian stock market returns and variables related to the novel Coronavirus (COVID-19) pandemic outbreak. The FTSE Bursa Malaysia KLCI Index and eight selected main indices from 2 January 2020 to April 30, 2020, which includes the first three MCOs, are considered in this study. The results show that daily new confirmed COVID-19 cases and deaths had negative but insignificant impact on the returns on indices. Interestingly, MCO had significant and positive impact on all the indices' returns while oversea financial risks had negative impact on these returns. Furthermore, it is found that the degree of impacts of MCO and oversea financial risks varied positively with the firm size of the indices' constituent companies. China's decision on unchanged loan prime rate on the 20 February 2020 was a favorable news to the Malaysia stock markets as indicated by the positive returns on all the indices. Similarly, the degree of impact of the China interest policy also varied positively with the firms' characteristics. These findings are useful for investors in the Bursa Malaysia to manage their investment portfolios based on their appetites for risk.

Keywords: COVID-19; Movement Control Order; Pandemic outbreak; Bursa Malaysia

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[♣] Corresponding author: Faculty of Economics and Business, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia. Tel: +6082-584291. Email: ksliew@unimas.my

Suggested citation: Ricky Chee-Jiun Chia, Venus Khim-Sen Liew, Racquel Rowland. (2020). Daily New Covid-19 Cases, the Movement Control Order, and Malaysian Stock Market Returns. *International Journal of Business and Society*, 21 (2), 553-568.

1. INTRODUCTION

The novel Coronavirus (COVID-19) pandemic outbreak has created a social risk that has impacted the financial growth of firms and the economic growth of Malaysia. Malaysian economic growth has hit as 10-year low as fears loom about COVID-19. Malaysia's economic growth has slowed from its rate of 4.3% in 2019, as The Central Bank of Malaysia has announced that the COVID-19 outbreak will affect Malaysia's rate of economic growth for Q1 2020. Moreover, due in large part to the COVID-19 pandemic, the World Bank has revised down Malaysia's GDP growth rate from 4.5% to -0.1% for 2020. The main sources for the economic damage in Malaysia come from both external and internal factors. First, Malaysia is expected to feel the knock-on effect of the impacts of the coronavirus abroad. Singapore and China, which are among Malaysia's biggest trading partners, are also dealing with damage to their economies and industrial productivity from the COVID-19 outbreak. Any disruption to the industrial productivity of China could have a grave impact on domestic manufacturers in Malaysia, which are dependent on Chinese raw materials. Apart from trade, China is also Malaysia's top source of tourists, exceeding that of the ASEAN group. Travel, tourism, and related sectors such as hotels and other accommodations are expected to be among the most affected sectors in Malaysia due to the travel band on China tourists.

Second, the economic slowdown is also due to domestic factors such as the movement control measures put in place because of COVID-19. On a macro level, the closure of businesses and services, as well as the impacts on travel and the controls put over movement, will have outsized impacts on the levels of domestic consumption and business investment. Individuals and businesses affected by the temporary closures, especially small-and-medium enterprises (SMEs) and other vulnerable groups, will face a liquidity squeeze in terms of their cash flow as their earnings dwindle. This could leave the entire economy with higher levels of businesses insolvency and individual bankruptcies, while the financial system as a whole will be saddled with non-performing loans.

Malaysia joined the list of countries with the coronavirus when the first case of infection was confirmed for a Wuhan tourist on January 25, 2020. The total number of confirmed COVID-19 cases surged to 428 cases on March 15, 2020, when there were 190 cases that were detected in that single day alone (a daily increment of 73.9%). The Malaysian government announced a nation-wide lock-down that started as of March 18, 2020, to control the spread of this infectious disease. Under the so-called Movement Control Order (MCO), all private and government offices, business premises, and places of worship, except those of these that were considered essential services, were closed. Soon after the implementation of the MCO, the number of daily confirmed new cases peaked on March 16, with 235 cases, and the number of cases per day started to decline gradually after that. The MCO was extended trice until May 3, 2020. The Conditional MCO (CMCO) was implemented the next day and was put in force until June 9, 2020. The CMCO allows for the majority of businesses to operate, though only if certain precautionary steps were strictly observed. As of May 13, 2020, there were altogether 6,779 confirmed COVID-19 cases, 5,281 cases of those who had recovered from the coronavirus (77.9%), and 111 deaths from the coronavirus (1.64%).

Many negative thoughts and panic come to the minds of investors whenever this global, dangerous infectious disease is mentioned. The Malaysian stock market has also taken a hit from the COVID-19 pandemic. As of March 27, 2020, the Bursa had sunk to its lowest numbers in a decade, having fallen 20.52% since the start of the year. Airlines stocks were among some of the most battered stocks this year, and other blue chip stocks in banking and consumer goods were not spared. There were a few who gained, however, from the COVID-19 outbreak, including healthcare stocks and, especially, manufacturers of gloves.

Numerous empirical studies had provided evidences that Malaysian stock returns are effected by investor sentiments (Chia, 2019). To the best of our knowledge, the relation between Malaysian stock returns and investor sentiments that are driven by a fear of dangerous infectious diseases has not been investigated, except by Ali, Alam and Rizvi (2010). Ali et al. (2010) found in the Malaysian stock market evidence of a short-run stock market overreaction to dramatic internal and external events. Besides the economic crisis and the extraordinary political events that occurred in Malaysia, the Malaysian stock markets also overreacted to the dramatic international events caused by the SARS outbreak.

In a similar spirit of studying the impact of an infectious disease on stock market returns, this study focusses on the impact of the novel Coronavirus, that is, COVID-19, outbreak on Malaysian stock market returns. As of this writing, nearly 300,000 individuals have died from COVID-19 worldwide. This disease outbreak has been a large event that has been devastating to the economies and societies of more than 180 countries. It should also be recalled that the death tolls from SARS and MERS were each less than 1,000 worldwide for each and, therefore, for many countries, the SARS and MERS outbreaks did not become serious threats to their economies.

Specifically, our main contribution consists of employing a novel mood variable, namely, a proxy for the number of COVID-19 cases released by the Ministry of Health Malaysia, to examine the impact of dangerous infectious diseases on Malaysian stock indexes. Beutels et al. (2009) found a significant correlation in Beijing between the time series of daily and monthly SARS cases and deaths and the indicators of social and economic activity during the SARS outbreak. Our study researches investor fear of the COVID-19 pandemic as it is captured by an investment fear index, which is a proxy for the financial markets volatility index (VIX). A study by Albulescu (2020) confirmed that the new cases of COVID-19 and the rates of death reported outside China had a positive impact on the VIX, and that the spread of the coronavirus increased the levels of financial volatility.

Important in this research is the possibility that a fear of dangerous infectious diseases can bring about negative developments to the main indices of the Malaysian stock market, but, at the same time, this may generate positive investor sentiments or positive returns in specific market capitalization's main indices. This hypothesis is built on the argument that while dangerous infectious diseases spread fear and generate negative sentiments, investors may anticipate that there will be improvements in the performance of certain categories of firms that are listed in Bursa Malaysia, namely those for essential goods, services, and subsidies provided for fighting the disease. Related to this, the current study shows that the MCO had a significant and positive impact on the returns of all indices, and that this is probably due to positive market sentiments about the government efforts to control the outbreak of COVID-19, which came with a series of stimulus packages to help the needy and to stimulate the country's economic activities in the midst of the lockdown. Nevertheless, the number of daily new confirmed COVID-19 cases and deaths had a negative but insignificant impact on these returns. Moreover, overseas financial risks arising from COVID-19-related sentiments had a negative impact on these returns, while China's favorable interest rate policy positively impacted these returns.

There are three key contributions of this study. First, while the Movement Control Order is expected to weaken economic performance and to cause a negative stock market performance, this study postulates that it may result in positive investor sentiments, especially when there are government stimulus packages put in place, as is the case for Malaysia. The empirical evidence obtained in this study supports this argument. Second, this study is among the first to add to the literature on the Malaysia stock market concerning the impact of the novel coronavirus. It reveals the behaviour of Malaysia stock market during the time of the global pandemic crisis. Third, it demonstrates that the degree of impact of the MCO, global financial risks, and the Chinese interest rate policy varied with the listed companies' level of capitalization. Thus, investors in the Bursa Malaysia can take these findings as information that will help them manage their investment portfolios in terms of their appetites for risk.

The remainder of this study is structured as follows. Section 2 provides the literature review for studies related to infectious diseases and their effects on the performance of different stock markets. Section 3 describes the data obtained, and it contains a preliminary analysis of the results. Section 4 explains the study's methodology while the results of the estimation are given in Section 5. The last section concludes this study.

2. LITERATURE REVIEW

Past studies by Keogh-Brown and Smith (2020) and Beutels et al. (2009) had statistically estimated the economic impact of the infectious disease outbreaks of the Severe Acute Respiratory Syndrome (SARS). SARS was first reported in Asia in February 2003, and it quickly spread to 26 countries before being contained about four months later. Beutels et al. (2009) employed cross-correlation functions to document the impact of the SARS outbreak on Beijing using indicators of social and economic activity. Significant correlation coefficients were found for leisure activities, local and international transport, and tourism given that much of this consumption was postponed or cancelled. Keogh-Brown and Smith (2008) conducted a retrospective estimation that used macroeconomic indicators for ascertaining the effects on different countries. China and Hong Kong were reported to be the worst affected areas when compared to East Asia and Canada. The sectors that exhibited the greatest amount of losses due to SARS were those in investment, retail sales, restaurants, hotels, tourism, and air transport.

The Middle East Respiratory Syndrome (MERS) is respiratory disease, one that is also caused by a coronavirus. The 2015 MERS outbreak in the Republic of Korea resulted in 38 deaths and more than 16,000 people were quarantined by December 2015. Joo et al. (2019) estimated the economic impact in the Republic of Korea of the MERS outbreak on the tourism and travel-related service sectors. From their projection, Joo et al. (2019) found that the MERS outbreak caused a 37.4% decrease in the number of noncitizen visitors (2.1 million out of the 5.7 million non-citizen arrivals that were projected) from June through September, 2015, with an estimated loss of US$2.6 billion in the tourism sector. These results show that outbreaks of infectious diseases can cause significant losses to the economies of affected countries.

An infectious disease poses a number of economic and social risks, and this is reflected in stock market performance. However, there is a dearth of research on the stock market performance during the periods when there is an infectious diseases outbreak (Ali et al., 2010; Donadelli, Kizys, & Riedel, 2017; Jiang et al., 2017). The study by Jiang et al. (2017) found a significant correlation between the number of daily reported human avian influenza A (H7N9) cases and the stock price of the Shanghai Composite Index. The number of cases was also found to be associated with the prices of the Avian Influenza sector index as well as the prices of a few Chinese pharmaceutical stocks. In the United States, Donadelli et al. (2017) had shown that the investor mood is driven by disease-related news concerning the outbreak of infectious diseases (e.g., SARS, Influenza A (H1N1), polio, and Ebola). Specifically, this disease-related news had the effect of leading to a positive and significant sentiment among investors in pharmaceutical companies' stocks.

Learning from the previous SARS and MERS epidemic experiences, soon after the outbreak of the COVID-19, researchers have started proactive crisis response on the most affected countries. The paper of Zimmermann et al. (2020) provided an initial understanding of the driving factors for the spread of the COVID-19 infection. Globalization, a major force behind global wellbeing and equality, is found to be highly associated with the spread of the virus. Moreover, globalization has been indicated as a factor that facilities the spread of this infectious disease, it can have an impact on many different channels including international trade, international tourism, and transportation. Consequently, it is anticipated that the COVID-19 pandemic can pose a longer-term economic threat to those infected countries and lead to a severe global economic crisis.

In view of this, preliminary studies have been conducted on the financial market to reveal the impact of the COVID-19. As such, the studies of Nia (2020), Ali, Alam and Rizvi (2020), Liu, A. Manzoor, Wang, Zhang and Z. Manzoor (2020) and Sharif, Aloui and Yarovaya (2020) found evidence that the COVID-19 pandemic negatively affected the equity market. In particular, focusing on the Indonesian capital market during the COVID-19 outbreak, Nia (2020) found that the market return, market capitalization and book to market value ratio mutually affected the portfolio expected return. Nia (2020) also recommended that banking and consumer sectors can be an alternative portfolio for long-term investment in Indonesian stock market. Interestingly, Ali et al. (2020) reported that panic in the global financial markets increased as the COVID-19 evolved from epidemic to pandemic. Liu et al. (2020) also mentioned that Asian stock market tended to react faster and able to recover from pandemic impact at the later stage. In the time of writing this paper, while China and the Asian market has stabilised, market volatility increased tremendously at the bigger economies such as the US, UK and Germany in the later phase of the spread. Importantly, Sharif et al. (2020) pointed out that the COVID-19 risk is perceived differently over the short and the long-run and it may turn into an economic crisis and this prompted urgent attention of policymakers and asset managers.

Besides the equity markets, cryptocurrencies also become the focus of researches in relation to the COVID-19 pandemic. By using Wavelet coherence analysis, Demir, Bilgin, Karabulut and Doker (2020) found a negative relationship between Bitcoin price and the number of reported cases and deaths. The findings for Ethereum and Ripple were also similar but with weaker interactions. Demir et al. (2020) argued that the hedging role of cryptocurrencies against the uncertainty has been raised by the COVID-19 during the period of this pandemic outbreak.

3. DATA AND PRELIMINARY ANALYSIS

3.1. Variables and the Sources of Data

This study examines the daily closing values of the FTSE Bursa Malaysia KLCI Index (denoted as KLCI) and eight selected main indices. The latter are the FTSE Bursa Malaysia Top 100 Index (T100), FTSE Bursa Malaysia Mid 70 Index (M70), Small Cap Index (SC), EMAS Index (EMAS), EMAS Shariah Index (ESH), Hijrah Shariah Index (HSH), ACE Index (ACE), and Fledgling Index (FLED).

Briefly, the KLCI and M70 constitute the largest 30 and the next 70 largest companies listed on the Bursa Malaysia Main Board in terms of their full market capitalisation that meets the eligibility requirements relating to free float and liquidity. T100 is comprised of the constituents of KLCI and M70, while the SC is comprised of those eligible companies within the top 98% of the Bursa Malaysia Main Market that are non-T100. The EMAS is constituted of companies included in the T100 and SC. The ESH and HSH are comprised of companies included in the EMAS and KLCI, respectively, that are Shariah-compliant (which requires another screening process) and are investable in terms of Shariah principles. By contrast, the FLED is comprised of those eligible companies in the Bursa Malaysia Main Market that are not constituents of the EMAS, whereas the ACE is comprised of all eligible companies, and normally it is start-ups and new companies that are listed on the ACE market, which has less stringent requirements. Note that the companies listed in FLED and ACE do not have to go through a liquidity screening process (Bursa Malaysia, 2020).

The full sample period covers the period from January 2, 2020, to April 30, 2020. Note also that the Movement Control Order (MCO) was implemented in Malaysia as of March 18, 2020, and it was in force for the last day of this sample period (Bunyan, March 16, 2020; Bernama, April

23, 2020). The data for the stock indices data was obtained from *Investing.com*. The data for the daily new confirmed COVID-19 cases and deaths was collected from *Worldometers.com*.

The daily percentage return on an index can be calculated as:

$$R_t = \frac{(I_t - I_{t-1})}{I_{t-1}} \times 100\%, \quad (1)$$

where R_t is the return on the market index at day t, whereas I_t and I_{t-1} stand for the closing prices of index at day t and $t-1$, respectively.

3.2. *The Behaviour of Returns on Indices*

The plots of the daily percentage returns on these indices are presented in Figure 1. It is apparent from Figure 1 that, overall, the returns were fluctuating around the zero level. However, a number of substantial large market corrections were observed from around the last trading week of February until mid-March 2020. This occurred in collaboration with a series of global deep market corrections during this period due to growing fears about the economic impact of the pandemic. This set of stock market plunges was referred to as the 2020 global stock market crash by financial news (see, e.g., Smith, February 28, 2020 and Williams, March 10, 2020). On the other hand, there was an obvious massive amount of positive daily returns for all indices March 20, 2020, as a result of the positive market sentiment in Asia arising from China keeping its loan prime rate unchanged (Huang, 2020). Remarkably, the returns on all of the indices were more on the negative side, especially during the one month period before the MCO implementation. By contrast, the returns were more positive during the implementation of the MCO.

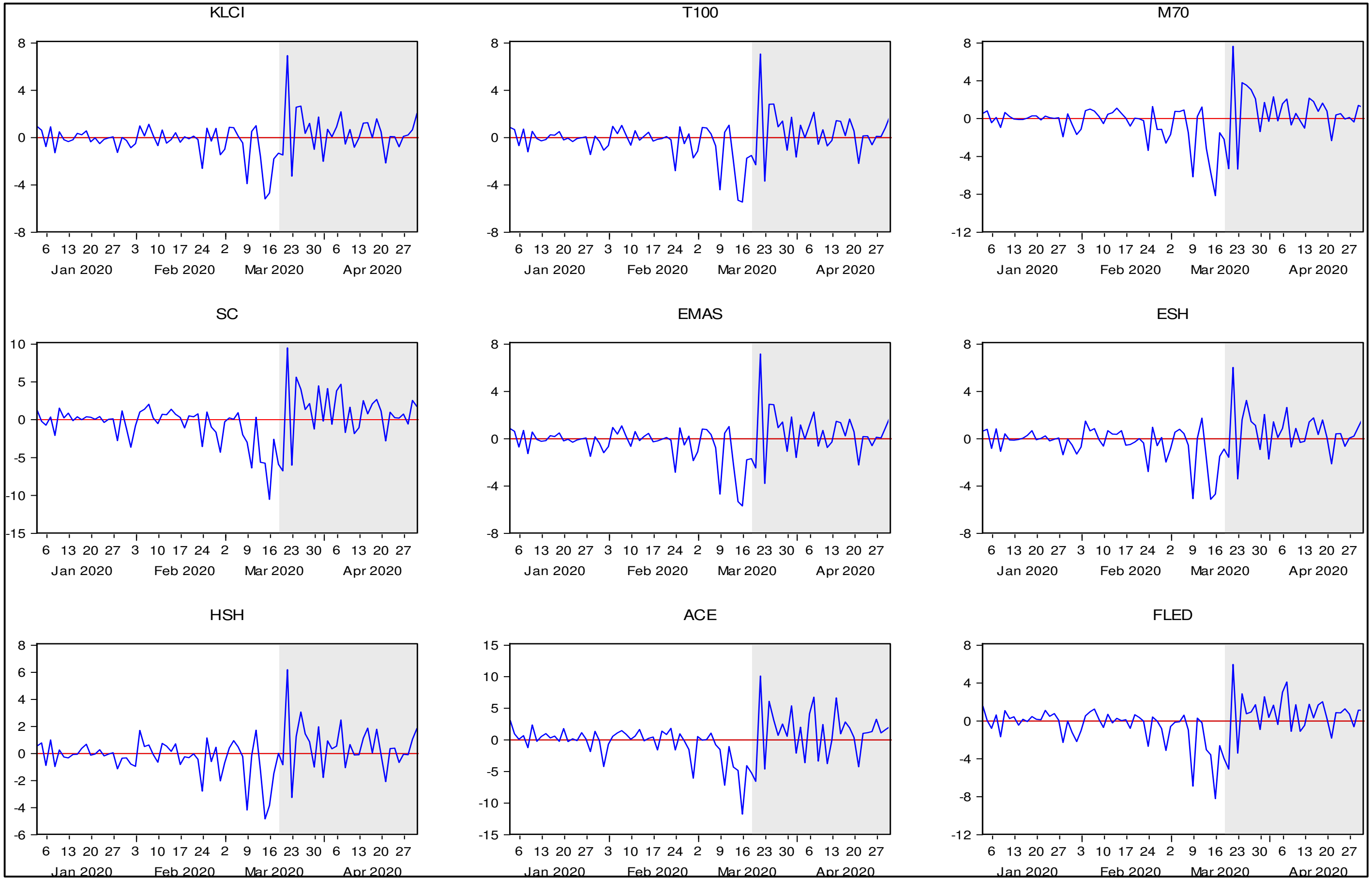
3.3. The Returns on Indices and A Firm's Characteristics

The incidences of the minimum and maximum daily percentage returns on the indices for the full sample period are summarised in Table 1. Table 1 shows that the Malaysia indices registered for the largest daily loss in the range of 4.897% and 10.641% on March 13 and 16. Meanwhile, they recorded the largest amount of daily profits in the range of 5.876% and 9.370% on March 20, 2020.

Remarkably, Table 1 reveals three important facts that can be observed from the sample data set for the period from the outbreak of the COVID-19 pandemic. First, the returns on the indices depend on the capitalisation of their constituent companies. In particular, the larger (smaller) the capital size of the constituent companies, the less (more) was the index's maximum daily loss in a time of an unfavourable market sentiment, while the less (more) was the index's maximum daily profit in a time of favourable market sentiment. The KLCI, comprised of the top 30 companies in terms of capitalisation, had less of a maximum amount of loss (-5.261%) when compared to the M70 (-8.233%), which consists of the next 70 largest companies. The M70, in turn, recorded a smaller level of loss when compared to the SC (-10.641%), which is comprised of companies that have a smaller capital size, when compared to the KLCI and M70. Actually, the SC suffered the second-largest single-day loss after the ACE (-11.888%), when compared to all of the other indices. On the other hand, the SC managed to register the second-largest single-day profit (9.370%) after the ACE (9.982%), when compared to all of the other indices. Moreover, the M70 (7.548%) performed better than the KLCI (6.851%). These findings suggest that the companies listed in Bursa Malaysia with a smaller capital size are more susceptible to a higher amount of single-day losses during a bad period, but also that they have a higher potential to yield a greater amount of profits when the market rebounds.

Second, the Shariah indices sustained less single-day losses than their counterparts in the bad markets. However, their counterparts performed better in the good markets. In this case, the ESH had a smaller single-day loss (-5.195%), when compared to the EMAS (-5.758%), whereas the EMAS had a higher single-day level of profit (7.084%) than the ESH (5.961%). Similarly, the HSH sustained a smaller amount of loss (-4.897%) than the KLCI (-5.261%), but the KLCI attained a larger amount of profit (6.851%) than the HSH (6.123%). Third, the ACE made more in terms of a single-day loss (-11.888%) than the EMAS (-5.758%), but nevertheless it secured a higher single-day amount of profit (9.982%) than the EMAS (7.084%).

Figure 1: Plots of daily percentage returns on indices



Notes: KLCI: FTSE Bursa Malaysia KLCI Index, T100: FTSE Bursa Malaysia Top 100 Index, M70: FTSE Bursa Malaysia Mid 70 Index, SC: Small Cap Index, EMAS: EMAS Index, ESH: EMAS Shariah Index, HSH: Hijrah Shariah Index, ACE: ACE Index, and FLED: Fledgling Index. The shaded region shows the MCO period from 18 March onwards to the end of this sample period. The horizontal line marks the zero return level.

Table 1: Minimum and maximum daily percentage returns on indices (full sample)

Daily Return	KLCI	T100	M70	SC	EMAS	ESH	HSH	ACE	FLED
Minimum	-5.261	-5.537	-8.233	-10.641	-5.758	-5.195	-4.897	-11.888	-8.291
Date	13 March	16 March	16 March	16 March	16 March	13 March	13 March	16 March	16 March
Rank	7	6	4	2	5	8	9	1	3
Maximum	6.851	6.996	7.548	9.370	7.084	5.961	6.123	9.982	5.876
Date	20 March	20 March	20 March	20 March	20 March	20 March	20 March	20 March	20 March
Rank	6	5	3	2	4	8	7	1	9

Notes: KLCI: FTSE Bursa Malaysia KLCI Index, T100: FTSE Bursa Malaysia Top 100 Index, M70: FTSE Bursa Malaysia Mid 70 Index, SC: Small Cap Index, EMAS: EMAS Index, ESH: EMAS Shariah Index, HSH: Hijrah Shariah Index, ACE: ACE Index, and FLED: Fledgling Index. For negative returns, minimum implies maximum losses. Rank stands for the position of the index counting in the descending order of the magnitude of the returns.

3.4. Returns on indices and Movement Control Order

The mean and standard deviations of the daily percentage returns on the indices over the full sample and sub-samples are given in Table 2.

Table 2: The mean and standard deviation of the daily percentage returns on the indices

Daily Return	KLCI	T100	M70	SC	EMAS	ESH	HSH	ACE	FLED
Mean									
Full Sample	-0.130	-0.149	-0.209	-0.248	-0.154	-0.096	-0.065	-0.051	-0.223
Rank	4	5	7	9	6	3	2	1	8
Before MCO	-0.433	-0.484	-0.653	-0.869	-0.501	-0.449	-0.387	-0.655	-0.661
Rank	8	6	4	1	5	7	9	3	2
During MCO	0.371	0.405	0.528	0.781	0.420	0.488	0.469	0.951	0.502
Rank	9	8	3	2	7	5	6	1	4
Standard deviation									
Full Sample	1.563	1.666	2.168	2.896	1.713	1.602	1.504	3.182	2.050
Rank	2	4	7	8	5	3	1	9	6
Before MCO	1.313	1.412	1.856	2.362	1.455	1.415	1.290	2.580	1.827
Rank	2	3	7	8	5	4	1	9	6
During MCO	1.819	1.915	2.462	3.410	1.962	1.740	1.693	3.822	2.217
Rank	3	4	7	8	5	2	1	9	6

Notes: KLCI: FTSE Bursa Malaysia KLCI Index, T100: FTSE Bursa Malaysia Top 100 Index, M70: FTSE Bursa Malaysia Mid 70 Index, SC: Small Cap Index, EMAS: EMAS Index, ESH: EMAS Shariah Index, HSH: Hijrah Shariah Index, ACE: ACE Index, and FLED: Fledgling Index. Rank stands for the position of the index counting in the descending order of the magnitude of the returns.

Table 2 shows that the average returns on the indices were all negative regardless of a firm's characteristics for the full sample period as well as for the sub-sample for the period before the MCO. However, the average negative returns for the sub-sample period before the MCO is larger in magnitude than the full sample. By contrast, all of the returns were positive for the during the MCO sub-sample. Note that the average daily profits during the MCO sub-period had smaller magnitude when compared to the average daily losses for before the MCO sub-period, with the exceptions of the ESH, HSH, and ACE. On the other hand, the standard deviations of the daily returns were consistently larger during the MCO sub-period, when compared to before, for all of the indices. Since the standard deviations are taken as a measurement for market risk, the finding suggests that the market risk was larger during the MCO period when compared to before.

3.5 The Returns of the Indices and Market Risks

To examine whether or not the market risks and returns are associated, the scatter plots of the average daily returns against the standard deviations are given in Figure 3. For a formal test, Kendall's tau-*b* correlation analysis was conducted, and the results are presented in Table 3.

Figure 3: The average daily returns against standard deviations

Full Sample	Before MCO	During MCO

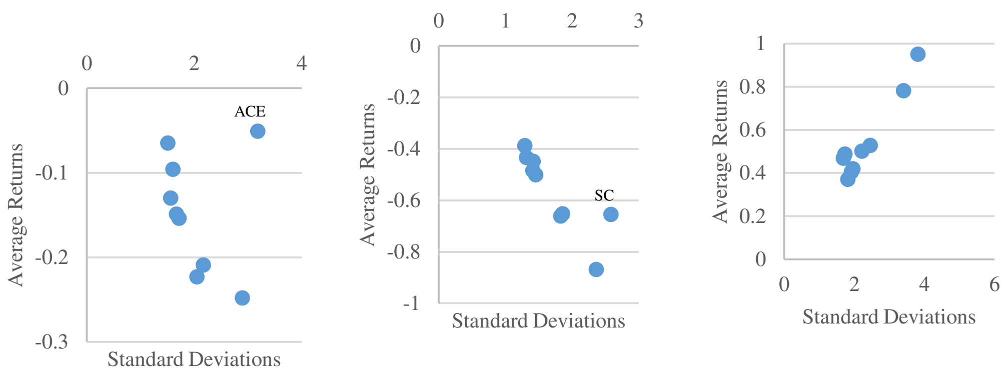


Table 3: The correlation analysis between the mean and standard deviations

	Include Outliers		*Exclude Outliers*	
Period	**Correlation Coefficient**	**Probability**	**Correlation Coefficient**	**Probability**
Full Sample	-0.444[c]	0.095	-0.857[a]	0.003
Before MCO	-0.778[a]	0.004	-0.857[a]	0.003
During MCO	0.667[b]	0.012	N.A.	N.A.

Note: The null hypothesis of correlation analysis is that means and standard deviations are not correlated. Rejection of null hypothesis implies the pair are significantly correlated. See note to Figure 2 for outliers to be excluded. N.A. denotes not applicable. Superscripts [a], [b] and [c] stand for rejection of null hypothesis at 1,5 and 10% respectively.

It is apparent from Figure 3 that in the case of the Bursa Malaysia indices, the market risk and returns were correlated during the full and sub-sample periods of this study. For the full sample period and the period before the MCO, negative correlations were observed in the fourth quadrant of the *x*-*y* plot. This implies that the indices with higher (lower) risks were associated with larger (smaller) losses. On the other hand, during the MCO period, the indices with higher (lower) risks were associated with larger (smaller) returns. Table 3 confirms these observations by establishing significant correlations between the returns and the standard deviations. Nonetheless, the strength of the correlation is reduced from strong before the MCO period to fair during the MCO period.[1]

4. METHODOLOGY

[1] According to Mason, Lind and Marchal (1983), a correlation coefficient greater than 0.68 in magnitude is to be considered as strong in terms of the strength of the correlation.

The following model is estimated using ordinary least squares (OLS) technique:

$$R_t = \theta_0 + \theta_1 DCC_t + \theta_2 MCO_t + \theta_3 LVIX_t + \theta_4 R_{t-1} + \theta_5 DM20_t + \epsilon_t, \quad (2)$$

where DCC_t is the confirmed new cases of COVID-19 at day t, MCO_t is a dummy variable that takes on value of one during Movement Control Order (MCO) period and zero otherwise, $LVIX_t$ is used to proxy the investment fear sentiment outside Malaysia, R_{t-1} is the lagged dependent variable, $DM20_t$ is the dummy variable which is equal to one on March 20, 2020, and zero on other days. $\theta's$ are the parameters to be estimated, and ϵ_t is the white noise residuals.[2]

It is expected that the greater the amount of the daily confirmed new COVID-19, the more negative would be the market sentiment as a result of fear. This would in turn cause negative returns on the indices. Hence, $\theta_1 < 0$ is expected. The MCO not only restricted the movement of human beings to reduce the scope of COVID-19 outbreak, it also reduced the level of economic activities. Hence, the MCO was anticipated to bring about a negative impact on the returns on the indices by reducing firms' financial profits. Next, $\theta_3 < 0$ is anticipated, since the higher amount of financial volatility outside of Malaysia should negatively affect the Malaysia stock market and vice versa, due to its interconnectedness with global stock markets. As for lagged dependent variable, $\theta_4 < 0$ implies an adjustment towards equilibrium, while $\theta_4 > 0$ implies a persistence in deviations. Finally, $\theta_5 > 0$ is expected from preliminary data analysis.

In Equation (2), θ_0 denotes the expected returns in the absence of independent variables. Notably, the estimated value of R_t for the trading days without the *MCO* and *D20* can be derived as follows:

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[2] The residuals of the estimated models without $DM20_t$ are not normally distributed. So, another purpose of the inclusion of this dummy is to normalize the residuals.

$$\hat{R}_t = \hat{\theta}_0 + \hat{\theta}_1 DCC_t + \hat{\theta}_3 LVIX_t + \hat{\theta}_4 R_{t-1}, \tag{3}$$

where $\hat{R}_t$ denotes the estimated value of R_t and $\hat{\theta}'s$ are estimated $\theta's$.

On the other hand, the estimated value of R_t during the *MCO* without *D20* can be calculated as:

$$\hat{R}_t = (\hat{\theta}_0 + \hat{\theta}_2) + \hat{\theta}_1 DCC_t + \hat{\theta}_3 LVIX_t + \hat{\theta}_4 R_{t-1}. \tag{4}$$

5. OLS REGRESSION RESULTS

The estimated results are summarized in Table 4. The key findings are given below.

5.1. The Impact of Daily New Confirmed COVID-19 Cases

First and foremost, the coefficient of the *DCC* has the correct negative sign for all cases. In terms of magnitude, these were minute. Specifically, for each additional newly confirmed case, the returns on the indices will fall by 0.003% to 0.005%. Nevertheless, the impact is statistically significant for all indices, with the exception of the SC, ACE, and FLED.

5.2. The Impact of the Movement Control Order (MCO)

The MCO had a positive impact on all returns for the indices, and the impact was statistically significant at a 1% level in all cases. Note that these indices had been falling in reaction to the global occurrence of the pandemic outbreak before the implementation of the Movement Control Order. The positive impact probably was due to the positive market sentiment that came from the government's effort to control for the outbreak of COVID-19; this came with a series of stimulus packages to help the needy and to stimulate the country's economic activities in the midst of the lockdown. In particular, the heavyweight Second Economic Stimulus Package 2020 (Crowe, March 28, 2020), worth 250-billion-ringgit, was announced on March 28, 2020, in addition to the First Economic Stimulus Package 2020, worth 10-billion-ringgit, that was announced on February 28, 2020 (Crowe, February 28, 2020). Furthermore, on April 7, 2020, the Additional *Prihatin* SME Economic Stimulus Package 2020, worth 20-billion-ringgit, was announced (Crowe, April 7, 2020).

Second, it can be observed that the MCO had a greater impact on the SC (4.379%) than the M70 (3.132%), which in turn had received higher amount of impact from the MCO than the KLCI (2.000%, the least impact of all. Meanwhile, the MCO also had a greater impact on the ACE (4.666%) than the EMAS (2.358%) and other indices. These findings suggest that the degree of impact of the MCO on indices' returns varies with the characteristics of the indices' constituent companies. Specifically, the smaller the companies' capital size, the more benefit they would receive from the MCO and vice versa. Besides, from the estimated coefficient of the MCO for T100 (2.260%) and the EMAS (2.254%), when compared to the same coefficient for the respective counter indices that are for non-Shariah compliant companies (2.254% for the ESH and 2.007% for the HSH), it can be concluded that the MCO had a slightly higher level of impact on the non-Shariah companies.

5.3. The Impact of the Overseas Financial Market Risk

As expected, LVIX had a significant and negative impact on the returns on the indices consistently with no exceptions. Similar to the degree of the MCO impact, the impact of LVIX varied with the characteristics of the indices' constituent companies. In particular, companies with a smaller capital size were more adversely affected by investors' sentiments about the overseas financial risks. Nevertheless, non-Shariah companies were less hurt by the overseas financial risk sentiments.

5.4. *The Impact of the Lagged Dependent Variable*

Table 4: Estimated Results

Variable	KLCI	T100	M70	SC	EMAS	ESH	HSH	ACE	FLED
Constant	2.949[b]	3.378[c]	4.759[c]	8.401[c]	3.619[c]	3.086[c]	2.476[b]	9.861[c]	5.578[c]
	[0.014]	*[0.009]*	*[0.008]*	*[0.001]*	*[0.006]*	*[0.010]*	*[0.021]*	*[0.000]*	*[0.000]*
DCC	-0.003[a]	-0.004[a]	-0.005[a]	-0.004	-0.004[a]	-0.004[a]	-0.003[b]	-0.004	-0.003
	[0.084]	*[0.081]*	*[0.081]*	*[0.285]*	*[0.090]*	*[0.063]*	*[0.043]*	*[0.368]*	*[0.250]*
MCO	2.000[c]	2.260[c]	3.132[c]	4.379[c]	2.358[c]	2.254[c]	2.007[c]	4.666[c]	3.134[c]
	[0.001]	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*
LVIX	-1.092[c]	-1.246[c]	-1.741[c]	-2.994[c]	-1.330[c]	-1.150[c]	-0.935[c]	-3.431[c]	-2.034[c]
	[0.008]	*[0.004]*	*[0.004]*	*[0.000]*	*[0.003]*	*[0.004]*	*[0.009]*	*[0.000]*	*[0.000]*
R(-1)	-0.058	-0.043	-0.003	-0.044	-0.045	-0.048	-0.085	-0.078	-0.004
	[0.634]	*[0.735]*	*[0.982]*	*[0.711]*	*[0.726]*	*[0.678]*	*[0.437]*	*[0.483]*	*[0.975]*
DM20	6.832[c]	6.974[c]	7.635[c]	9.406[c]	7.066[c]	5.819[c]	5.924[c]	9.782[c]	6.109[c]
	[0.000]	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*
Key Statistics									
n	69	69	69	69	69	69	69	69	69
Adjusted R^2	0.405	0.410	0.376	0.388	0.410	0.359	0.363	0.364	0.386
AIC	3.477	3.605	4.199	4.751	3.661	3.608	3.472	4.966	4.044
F	10.261[c]	10.436[c]	9.203[c]	9.638[c]	10.451[c]	8.627[c]	8.758[c]	8.772[c]	9.554[c]
	[0.000]	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*	*[0.000]*
JB	1.376	0.833	1.292	0.555	0.684	1.604	1.643	0.760	4.093
	[0.502]	*[0.659]*	*[0.524]*	*[0.758]*	*[0.710]*	*[0.448]*	*[0.440]*	*[0.687]*	*[0.129]*
Q(5)	3.023	3.991	4.620	5.820	3.905	4.391	5.300	3.084	4.816
	[0.696]	*[0.551]*	*[0.464]*	*[0.324]*	*[0.563]*	*[0.495]*	*[0.380]*	*[0.684]*	*[0.439]*
ARCH	0.358	1.360	2.471	4.893[b]	1.603	0.134	0.279	0.315	2.448
	[0.552]	*[0.248]*	*[0.121]*	*[0.030]*	*[0.210]*	*[0.718]*	*[0.599]*	*[0.578]*	*[0.122]*

Notes: See Equation (2) for symbols of variables used. AIC refers to the Akaike Information Criterion, while *F* stands for *F*- test of overall significant of the independent variables. JB, Q(5) and ARCH denote Jarque-Bera normality test statistic, correlogram statistic to test for autocorrelation up to lag 5 and Autoregressive Conditional Heteroscedasticity test statistic, respectively. The *p*-values of various tests are in square brackets. HAC standard errors & covariance are used in the estimation of the model. Superscripts [a, b] and [c] stand for rejection of null hypothesis at 1,5 and 10% respectively.

The estimated coefficient of the lagged dependent variable has a negative sign for all of the returns on the indices. This implies that the deviations of returns would not persist and that they tend to revert to the equilibrium positions. However, this mean-reverting behaviour was not statistically significant. This means that current returns were not affected by previous returns in all cases.

5.5. The Impact of the News on the Interest Rate Policy in China

On March 20, 2020, China made an announcement on its decision to keep its loan prime rate unchanged. This was treated as favourable news as stocks in Asia (including those in Malaysia) surged substantially that the same day. The impact on the returns of each individual index can be measured by the estimated coefficient of the DM20 dummy variable. It can be seen from Table 1 that the impact was significant and positive at the 1% significance level for all returns on the indices. In line with the impacts of the MCO and LVIX, the impact of China's interest rate policy also depended on the firms' characteristics. In this case, the smaller the firms' capital sizes, the larger was the impact and vice versa. This is evident from the SC, where the returns surged by 9.406% due to the news of March 20, 2020, when compared to the M70 (7.635%) and the KLCI (6.832%). Moreover, the returns of the ACE surged the most of all (9.782%), while the return of the EMAS rose by 7.066%. These findings reveal that the companies with smaller capital sizes benefited more from the favourable news and vice versa. On the other hand, the favourable news from China had more of an impact on non-Shariah-compliant companies when compared to their Shariah-compliant counterparts. This is demonstrated by the amount of returns on their indices: the T100 (6.974%) and the EMAS (7.066%) in comparison to their Shariah complaint counter indices, the HSH (5.924%) and the ESH (5.819%), respectively. Note that the estimated impact on the returns of all of the indices differs slightly with the actual observations, as shown in Table 1.

5.6. The Impact of the Number of Daily Deaths Due to COVID-19

Apart from the number of daily newly confirmed cases, another important piece of information released by Ministry of Health every day is the amount of daily deaths due to COVID-19. To measure the impact of the number of daily deaths reported, Equation (2) is estimated with the daily new confirmed cases variable replaced by the number of daily deaths. The results obtained (not reported here) show that the amount of daily deaths had a negative but insignificant impact on the returns on all of the indices. Other than that, the previous mentioned findings from the daily newly confirmed cases remains consistent in terms of quality.

6. CONCLUDING REMARKS

The novel coronavirus (COVID-19) outbreak has drastically reduced economy activities and has changed the norms related to social lifestyles. The Movement Control Order (MCO) not only restricted the movement of human beings, it also reduced firms' financial profits and brought about a negative impact on stock returns. This study examines the impact of the Movement Control Order, issued in light of the COVID-19 pandemic outbreak, on the Bursa Malaysia benchmark indices. A few key findings are obtained. First, while the amount of daily deaths had no significant impact, the number of daily new COVID-19 cases had a significant, although minimal, impact on the returns on the indices. Second, the returns on the indices depend on the characteristics of the constituent companies. In particular, the larger (smaller) the capital size of the constituent companies, the less (more) was the amount of the index's maximum daily loss in a time of unfavourable market sentiment and the less (more) was the index's maximum daily profit in a time of favourable market sentiment.

Third, the Shariah indices sustained less in terms of single-day losses than their conventional indices in bad markets. However, the latter performed better in good markets. Fourth, the average returns on the indices were all negative regardless of a firm's characteristics before the MCO. However, they turned positive for the sub-sample from the period during the MCO, although the indices did not manage to recover their losses before the MCO. On the other hand, the market risk was larger during the MCO period when compared to before. Last but not least, the MCO had a significant and positive impact on all returns on the indices. This is probably due to the positive market reaction to the government's commitment to contain COVID-19, as well as the social aid and economic stimulus packages put in place during the lockdown. These findings are useful for investors in the Bursa Malaysia to manage their investment portfolios based on their appetites for risk.

Last but not least, two future directions are recommended here. First, this study does not consider the possibility of stock market anomalies. Further study could look into this to examine if any anomaly exists for the Bursa Malaysia. Second, the findings are based on composite indices. More research should be conducted to understand how COVID-19 affects individual firms or specific economic sectors.

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