Effectiveness of Moving Average Rules During COVID-19 Pandemic: Evidence from Malaysian Stock Market

(Keberkesanan Peraturan Purata Bergerak Semasa Pandemik COVID-19: Bukti dari Pasaran Saham Malaysia)

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ABSTRACT

The COVID-19 outbreak significantly impacted the Malaysian stock market. To some extent, the Movement Control Order (MCO) implemented in the country affected the financial performance of listed companies. In consequence investors were quite uncertain of future movements of the stock market. Effective analysis techniques are thus required to study the market movements. Investors shall rely on signals emitted by technical indicators for their investment decisions making. The aim of this study is to examine the performance of the MA rules in Malaysian stock market during the different stages of the MCO. The sample used comprised 30 largest market capitalization stocks listed in the stock market. The period of study spanned 2 January 2020 to 30 August 2020. More than 50% of the buy signals emitted by (5,60,0.01) were found linked with positive returns in the next trading day during the MCO and CMCO sub-period respectively. Conversely, 41.28% and 34.78% of the sell signals emitted by (5,50,0.01) during the respective MCO and CMCO sub-period were linked with negative returns. Among all the MA rules, (5,60,0.01) generated the highest average return of 0.88% during the MCO and CMCO sub-period. Importantly, MA rules, (5,60,0.01) also generated positive returns during the out-of-sample period. The findings of this study shall contribute to the existing literature related to technical analysis. Besides that, the findings will benefit investors the most, inducing them to generate returns or avoid losses during the critical COVID-19 pandemic period. Investors are recommended to take the signals emitted by MA rules as alternative reference for their investments. Lastly, the relevant organizations should conduct more seminars to inform and enhance analytical skill of their clients, particularly retail investors.

Keywords: Stock market; technical analysis; COVID-19; movement control order
JEL Code: G17; G23; I20

ABSTRAK

Wabak COVID-19 memberi kesan yang signifikan terhadap pasaran saham Malaysia. Perintah Kawalan Pergerakan (PKP) yang dilaksanakan di negara ini mempengaruhi prestasi kewangan syarikat tersenarai. Akibatnya, pelabur tidak yakin akan pergerakan pasaran saham di masa hadapan. Oleh itu, teknik analisis yang berkesan diperlukan untuk mengkaji pergerakan pasaran saham. Pelabur sepatutnya bergantung pada isyarat yang dikeluarkan oleh petunjuk teknikal untuk membuat keputusan dalam pelaburan. Tujuan kajian ini adalah untuk mengkaji prestasi peraturan MA di pasaran saham Malaysia semasa peringkat MCO yang berlainan. Sampel yang digunakan terdiri daripada 30 saham permodalan pasaran terbesar yang tersenarai di pasaran saham. Tempoh kajian merangkumi 2 Januari 2020 hingga 30 Ogos 2020. Lebih daripada 50% isyarat beli yang dikeluarkan oleh (5,60,0.01) dikaitkan dengan pulangan positif pada hari dagangan yang berikutnya semasa sub-tempoh MCO dan CMCO. Sebaliknya, 41.28% dan 34.78% daripada isyarat jual yang dikeluarkan oleh (5,50,0.01) semasa sub-tempoh MCO dan CMCO dikaitkan dengan pulangan negatif. Di antara semua peraturan MA, (5,60,0.01) menghasilkan purata pulangan tertinggi sebanyak 0,88% semasa sub-tempoh MCO dan CMCO. Yang penting, peraturan MA, (5,60,0.01) juga menghasilkan pulangan positif dalam tempoh di luar sampel. Penemuan kajian ini akan menyumbang kepada literatur yang berkaitan dengan analisis teknikal. Selain itu, penemuan ini akan memanfaatkan para pelabur, mendorong mereka menjana pulangan atau mengelakkan kerugian dalam tempoh pandemik COVID-19 yang kritikal. Pelabur turut disyorkan untuk mengambil isyarat yang dikeluarkan oleh peraturan MA sebagai rujukan alternatif untuk pelaburan. Akhir sekali, organisasi yang berkenaan harus mengadakan lebih banyak seminar untuk memberi maklumat dan meningkatkan kemahiran analitik pelanggan mereka, terutamanya pelabur runcit.

Kata Kunci: Pasaran saham; analisis teknikal; COVID-19; perintah kawalan pergerakan

INTRODUCTION

Nearly a year have elapsed since the first case of COVID-19 was reported in China. The COVID-19 outbreak caused an unexpected negative shock to global economic activities, and thus indirectly influenced investors' sentiment (Liu et al. 2020). Looking back to the situation in the past, the first COVID-19 cases reported in Malaysia occurred on 24 January 2020 and the second wave at the beginning of March 2020. Following these occurrences, the Malaysian government declared the Movement Control Order (MCO) on 16 March 2020 to mitigate the COVID-19 outbreak in the country. In total, four phases of MCO were implemented beginning in the period between 18 March 2020 and 12 May 2020 and followed by the Conditional Movement Control Order (CMCO) between 13 May 2020 and 9 June 2020. During the MCO, many businesses were affected and only the essential services sector was allowed to operate (Godwin et al. 2020). On the other hand, a significant downtrend was witnessed in the Malaysian stock market when the Kuala Lumpur Composite Index (KLCI) dropped dramatically from 1,602.50 on 2 January 2020 to its lowest point at 1,219.72 on 19 March 2020 (Figure 1).
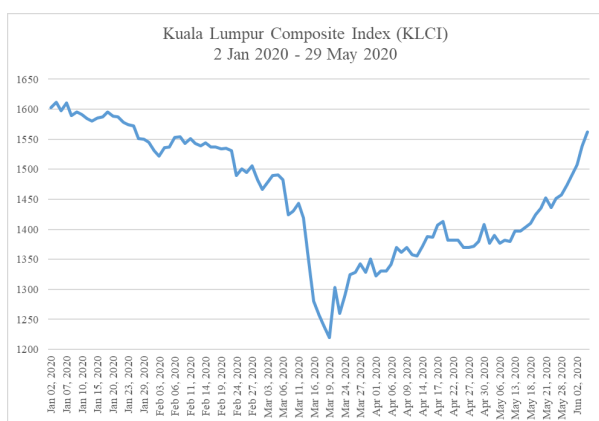

FIGURE 1. Kuala Lumpur Composite Index (KLCI) Movement from 2 January 2020 to 29 May 2020.
Sources: Investing.com

The MCO adversely affected not only business activities, but also household income. Specifically, business experienced reduction in terms of revenue, earnings and cash flow during its implementation (Deloitte 2020). Thus, the earning information of companies tended to lose relevancy during the economic downturn (Swanson et al. 2003). It however induced individuals to earn side incomes from the stock market, as evidenced by the increment of 100% in the opening of new trading account during the MCO period (NST 2020). Since these investors were unable to rely on the

earning information during the downturn, they began to look for alternative information for their investment decision. One example is the information produced by technical analysis (Hartono & Sulistiawan 2015), a form of stock market analysis that heavily depends on historical price movements and are well recognised by investors (Hilliard et al., 2013).

Generally, technical analysis employs past price movements and mathematical techniques to forecast future price movements (Psaradellis et al. 2018). In an earlier study McKenzie (2007) found that technical analysis was able to assist investors to generate returns during fluctuating market conditions. Technical analysis was also found to work better than the passive buy-and-hold strategies (Kwon & Kish, 2002). Investors also tended to respond to signals from the technical indicator and this would increase their stocks trading (Shi et al., 2020). The trading chamber tended to become noisy and boisterous when numerous investors simultaneously make their investment decisions based on the signals given by these analyses (Kornprobst 2017). Noteworthy, the moving average (MA) was the most widely used technical rules during this period (Souza et al. 2018). Different combinations of short MA and long MA can also be permuted. The COVID-pandemic period was especially challenging to investors who try to fathom suitable and effective MA rules for their trading activities since stock price movements tended to experience greater fluctuation at this time. Within this perspective, the effective MA rules shall be identified in this study and used as the reference for stock trading activities.

Additionally, the majority of fund managers also reportedly rely on technical analysis for their investment decision making (Menkhoff 2010). Although technical analysis has been widely applied in the investment field, academicians remain sceptical about the effectiveness of this technique. This doubt was mainly due to the violation of weak-form market efficiency hypothesis (Psaradellis et al 2018). According to this hypothesis the stock price fully reflects on past information and claims, and that investors are unable to make any abnormal gain by just referring to the historical stock price movement (Stankovic et al. 2015). Furthermore, Zhu and Zhou (2009) pointed out that there is no existing theory to support technical analysis and that the random walk theory, adopted in previous studies, completely rules out the profitability of this analysis. However, investors continuously make predictions on uncertain future events based on a short history of the data and project a broader picture that is apparently representative of this history (Sewell, 2008). This heuristic approach relates to representativeness, and is commonly employed to assess likelihood of events and also to predict values (Tversky & Kahneman 1973).

This study examines the performance of moving average indicator in the Malaysian stock market during

the COVID-19 outbreak period. The sample comprised 30 listed companies on the KLCI with the largest market capitalization. The sample period was from 2 January 2020 to 30 August 2020 which covered the three different phases of the MCO. The study makes fresh contributions to existing literature being the first to apply technical analysis on the performance of KLCI listed companies. In addition, the data used were sourced from both the MCO and RMCO phases. The rest of this study was organized as follows: Section 2 covered the relevant empirical literature while Section 3 discussed the data and methodology applied in this study. Section 4 discussed the results of the study which were further decomposed to cover the different stages of the MCO. Lastly, Section 5 recorded the conclusion.

LITERATURE REVIEW

IMPACT OF COVID-19

The COVID-19 pandemic severely impacted global economic activities and the financial markets. Kinateder, Campbell and Choudhury (2021) conducted a study to compare the impact of the Global Financial Crisis (GFC) and the COVID-19 pandemic on the financial markets. Although both the GFC and COVID-19 profoundly affected the foreign exchange market, the latter however impacted it at a faster rate. Researchers also revealed that the Japanese yen was a relatively safer haven for investment purposes. Their findings also showed that gold and the U.S sovereign bonds were safer options for similar investments during crisis period. This was mainly due to low correlation between US sovereign bonds and both the UK and GR sovereign bonds. About the same time, Demir et al. (2020) found that cryptocurrency can also play an effective hedging role against the uncertainly caused by the COVID-19 pandemic.

Alternatively, Hassan, Rabbani and Abdullah (2021) investigated the socio economic impacts of COVID-19 in the MENA region. They revealed that the region suffered from the decline in crude oil prices due to the negative supply and demand shock. Interestingly, Anh and Gan (2020) reported that the Vietnamese stock market slumped during the pre-lockdown period but rebounded during the lock-down period. This phenomenon also occurred in other markets including the USA, Spain, France, Italy, China, and India (Kotishwar 2020). In addition, Bahrini (2020) showed that the stock market performance of GCC countries was negatively affected by the number of COVID-19 death cases. A similar study, conducted by Kelvin, Jais and Chan (2020), also established that the frequency of COVID-19 cases negatively affected stock price movements for the majority of sectors in the Malaysian stock market.

TECHNICAL ANALYSIS RELATED LITERATURE

Fama (1970) developed three hypotheses that can be used to divide the market according to market efficiency. Namely, (i) weak form market efficiency hypothesis, (ii) semi-strong form market efficiency hypothesis and (iii) strong form market efficiency hypothesis. According to the *Strong form market efficiency hypothesis* stock price reflects both the public and private information; the *Semi-strong form market efficiency hypothesis* specified that stock price reflects public information; whereas the *Weak form market efficiency hypothesis* stated that the current stock price reflects past information. The hypotheses suggest that abnormal return cannot be generated by merely studying the historical price movements. As such technical analysis, which heavily depends on historical stock price, is a violation to the weak form market efficiency hypothesis (Tan et al., 2018).

The term "technical analysis" refers to the group of technical indicators that emit the buy and sell signals based on the historical stock price movement (Khand, Anand & Qureshi 2020). Technical analysis also follows three basic principles, which include (i) market action reflects everything, including the supply and demand of stocks; (ii) stock price moves in trend and (iii) stock prices movement tend to be repeated in the future (Murphy, 1999). Based on the principle of "stock price moves in trend", Murphy (1999) also claimed that investors tend to invest according the signals emitted by technical indicators. Conversely, past studies have also reported that the majority of brokerage firms publish their commentary based on the signals of technical analysis (Sulistiawan et al. 2020). Furthermore, the technical analyst tends to identify the trend in stock price at an earlier stage and then maintain their position until the next signal is emitted (Lubnau & Todorova, 2014).

Among technical indicators, the moving average (MA) is the most common trading rules applied by investors in forecasting the future movement of stock prices (McKenzie 2007). Further, MA is the technical indicator which is able to smoothen the trend of stock prices (Sulistiawan, et al. 2020). In a pioneering paper, Brock et al. (1992) examined the capability of moving average (MA) and trading-range breaks (TRB) on Dow Jones Industrial Average (DJIA) over the period 1897 to 1986. The researchers found that the variable moving average (VMA) rules was profitable, where annual returns of 12% and 7% could be generated if the investors follow the buy and sell signals respectively. Additionally, return generated by the buy signals were reported to be higher and less volatile as compared to the returns generated by sell signals. The researchers further reported that the returns generated by technical analysis strategies were greater than those generated by the buy-and-hold strategies.

Bessembinder and Chan (1995) re-examined the technical trading rules of Brock et al. (1992) by using data from six Asian countries covering the period from 1975 to 1989. They revealed that MA and TRB still had the predictive power and were able to generate returns in the Asian markets before taking transaction costs into consideration. Once this was considered, technical trading rules will only perform well in the emerging markets which included Malaysia, Thailand and Taiwan. Despite the predictive ability there was slight variation across Asian countries. Even with transaction cost considered, the study still concluded that the Asian stock market is inefficient in terms of information. The MA trading rules of Brock et al. (1992) were further investigated by Lam et al. (2007) by using the 35-year daily data of Hang Seng Index. He contended that the (1, 50) MA rule was the best. Specifically, the buy signals and sell signals generated 2.5% and 7.5% return respectively in the absence of transaction costs. They also concluded that MA rules still generate returns regardless of the inclusion of transaction costs.

In the context of the Indian stock market, Achuthan and Anubhai (2005) tested 22 variable moving average (VMA) rules by using the daily data of Bombay Stock Exchange Index (BSE Sensex) over the period 1991 to 2005, with 1% trading band and transaction costs. They concluded that returns generated by VMA rules could be enhanced by using longer MA. Conversely, Muhannad and Ian (2006) provided evidence on the ability of MA in generating return in the Jordanian stock market. Importantly, they also revealed that the (1,5) MA rule (*1 days short MA and 5 days long MA*) could still generate returns after taking into consideration the transaction costs. Lai et al. (2007) however discovered that MA rules tend to lose their predictive power during the bearish period in Malaysia. Lai et al. (2007) and Heng, Azizan and Yeap (2012) also provided evidence that in the presence of transaction costs, technical analysis maintained the ability in generating abnormal returns.

In addition to that, a number of past studies tested the predictive power of technical analysis in other countries. For instance, Vasiliou et al (2008) tested the MA rules based on large capitalization firms on the Athens Stock Exchange (ASE). They reported that MA rules generated an annual return of 29%, which was higher than the 14% return of buy-hold strategy. Using MA rules, Metghalchi et al. (2012) also proved that technical indicators perform well in the smaller European countries even under the presence of transaction costs. Masry (2017) also tested six different MA rules in the Egyptian stock market over the period from 1995 to 2015. Four MA rules, (1, 50, 0), (1, 50, 1), (1, 150, 0) and (1, 150, 1), generated excess returns over the buy-and-hold (BH) strategy., Metghalchi et al. (2018) reported that MA rules with long MA of 200

days were able to outdo the buy-and-hold strategy in the Bulgarian stock market.

Raissi and Mohammad (2011) employed technical analysis to determine market efficiency in the Iranian stock market. They revealed that the approach performed well and concluded that Iranian stock market was not a weak form market. Similarly, Nguyen and Yang (2013) further established that technical analysis was able to assist investors to generate returns in the Vietnamese stock market following the inclusion of transaction costs. Lubnau and Todorova (2014) provided a comprehensive view on the predictive power of technical analysis in the Asian stock market. Nguyen and Yang (2013) used ten indices from the Asian markets as samples for their study. They concluded that the MA rules have the ability to generate returns even after considering transaction costs, both in the developing or developed Asian stock market. Specifically, they identified that MA rules with 50 days long MA were the best trading rules as compared to the MA rules with other long MA.

Recently, Sulistiawan et al. (2020) tested several exponential moving average (EMA) in the Indonesian stock market by using data collated over the period from 2008 to 2017. They found that EMA rules tended to generate returns even after having considered the transaction costs. They also recommended that investors follow the longer EMA since it generated higher returns relative to the shorter EMA. Khand et al. (2020) tested the MA and TRB rules by using the KSE-100 Index over the period 1997-2013 which included both the Asian currency and Global financial crises. They established that the MA and TRB rules generated lower return during the crisis period. Furthermore, they discovered that (1, 50, 1) and (1, 50, 0) rules of MA and TRB generated higher profits in the Pakistan stock market even after taking transaction costs into consideration. Contrary to the Pakistan market, Kung (2020) found that the MA and TRB rules maintained their predictive power in three Asian markets, namely Singapore, Korea and Hong Kong, during the global financial crisis.

As a summary, previous studies shown that MA rules performed well in the Asian and other stock markets. The number of MA rules with different long MA and short MA was also tested in previous studies. It is also worth noting that 1-day short MA and long MA with 50 days or 200 days consistently perform well in previous studies. However, these studies only focused on the performance of technical analysis based on the major indices in a particular stock market. In addition, there was lack of evidence on the performance of MA rules during the economic downturn or crisis period. Thus, this study aims to fill in the knowledge gap by exploring the ability of MA rules in generating abnormal return for the constituent stocks of Kuala Lumpur Composite Index (KLCI) during the COVID-19 pandemic.

DATA AND METHODOLOGY

This section discusses the data and methods used in the study. The study sample comprised the 30 largest market capitalization stocks traded in Bursa Malaysia as of 2 January 2020. Data used in the study were downloaded from Investing.com and covered the period between 2 January 2020 and 30 August 2020, except for 31August 2020, the Merdeka (Independence) Day holiday, when no trading was conducted. As shown in Table 1, the sample period was further divided into four sub-periods, namely: The (i) Pre-MCO; (ii) MCO (iii) CMCO and (iv) RMCO sub-period.

TABLE 1. Date for MCO and RMCO

Period	Date
Pre-Movement Control Order (Pre MCO)	2nd January 2020 to 17th March 2020
Movement Control Order (MCO)	18th March 2020 to 3rd May 2020
Conditional Movement Control Order (CMCO)	4th May 2020 to 9th June 2020
Recovery Movement Control Order (RMCO)	10th June 2020 to 30th August 2020

There are many technical indicators available in the market. However, this study applied the moving average (MA) rules to identify the buy and sell signals for sample stocks. The rationale behind this selection was the extensive use of moving averages by market participants and investors alike. The buy (sell) signals of MA would be emitted when the short MA cross above (below) the long MA (as illustrated in Figure 2).

The study employed the short MA of 1 day, 2 days and 5 days, whereas, the long MA used 10 days, 20 days, 30 days, 40 days, 50 days and 60 days. The MA is calculated by using equation (1):

$$N \text{ days MA} = \frac{1}{N}\sum_{i=1}^{N}P = \frac{P_N + P_{N-1} + P_{N-2} + ... + P_1}{N},$$
where n = *1, 2, 5, 10, 20, 30, 40, 50, 60* (1)

$$\text{Short MA} = \frac{1}{N}\sum_{i=1}^{N}P = \frac{P_N + P_{N-1} + P_{N-2} + ... + P_1}{N},$$
where n = *1, 2, 5* (2)

$$\text{Long MA} = \frac{1}{N}\sum_{i=1}^{N}P = \frac{P_N + P_{N-1} + P_{N-2} + ... + P_1}{N},$$
where n = *10, 20, 30, 40, 50, 60* (3)

There are two steps taken to obtain the *n*-days for short MA or long MA. First, sum up the stock prices for the previous n-days. Second, divide the total of stock prices in n-days with *n* to get the short MA or long MA.

Tan et al (2018) also contended that "whiplash" signals would be emitted when the short MA and long MA is close to one another. Accordingly, this study includes the 1% trading band in the Long MA to eliminate "whiplash" signals and reduce the number of buy and sell signals (Khand, Anand & Qureshi 2020). Furthermore, the inclusion of trading band also helps to avoid the data mining problem (Kwon & Kish 2002). The upper and lower band of Long MA is calculated by using equation (2) and (3):
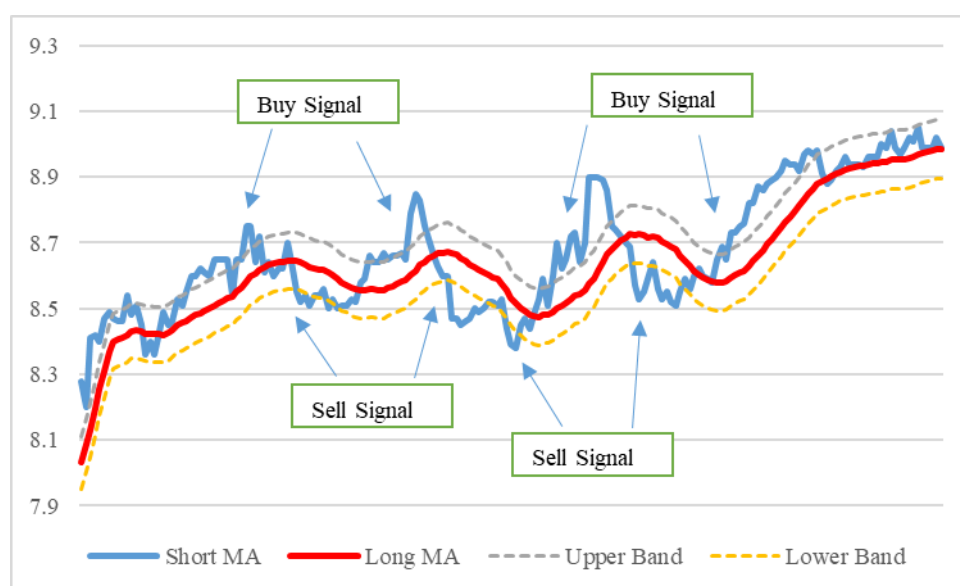

FIGURE 2: Identification of Buy and Sell Signals
Sources: Author's computation

$$UB_{t,n} = (1 + 0.01) \times LMA_{t,n} \qquad (4)$$
$$LB_{t,n} = (1 - 0.01) \times LMA_{t,n} \qquad (5)$$

Based on the short MA, long MA and trading band of 1% selected, a total of 36 MA trading rules were tested in this study. The MA trading rules was expressed in the following format, (Short MA, Long MA, Trading Band). For instance, trading rule of (1, 20, 0.01) refers to MA trading rule with the combination of 1-day short MA, 20-days long MA and 1% trading band. On other hand, Qi and Wu (2006) argued that there was a greater chance in figuring out the profitable trading rules when large number of trading rules are tested based on a data set.

RESULTS AND DISCUSSION

This section presents the empirical results for the test of 36 moving average (MA) rules on the 30 largest market capitalization stocks in Malaysia. It begins with discussion on the effectiveness of MA rules for three different periods. The next subsection discusses the statistical results on the returns generated by the buy and sell signals. Lastly, results for out-of-sample test are discussed.

EFFECTIVENESS OF BUY AND SELL SIGNAL

Table 2 shows the number of buy and sell signals emitted by the 36 MA rules and the portion of effective signals for three different periods. The buy signal is considered effective when a positive return comes after it. The effectiveness of buy signal is then calculated dividing it with the total number of signals emitted during specific period. The results obtained indicated that the effectiveness of buy signal is relatively low during the pre-MCO period, which ranged between 32.23% to 43.06%. In line with Anh and Gan (2020) and Kotishwar (2020), this result also indicated an emergence of bearish situation in Malaysian stock market before the lockdown period. Thereafter, the buy signal tends to show greater effectiveness during the MCO and CMCO period. Specifically, the effectiveness of buy signals during the MCO period was ranged between 43.98% and 55.97%, whereas the effectiveness of buy signals during the CMCO period was ranged between 51.86% and 55.92%. Noteworthy, the MA rule (5,60,0.01) consistently showed higher percentage of effective buy signals, around 55.97% and 55.43% during the MCO and CMCO period respectively. This implied that more than 50% of the buy signals emitted by the MA rule (5,60,0.01) were effective and linked to the positive returns in the next trading day during the period.

On the other hand, the sell signal is considered effective when a negative return comes after it. The results in Table 2 showed more than 50% of the MA rules emitted effective sell signal during the pre-MCO period, in which the MA rule (5,60,0.01) had the highest percentage (55.58%) of effective sell signals, followed by the MA rule (5,40,0.01) with 55.76% and MA rule (5,50,0.01) with 55.75%. However, the effectiveness of the sell signals began to subsequently drop. During the MCO period, effectiveness of sell signals fell to within the 31.69% to 41.4% range. The effectiveness of sell signals subsequently dropped further to a lower range of 21.15% to 36.48%. Noteworthy, MA rule (5,50,0.01) consistently showed higher percentage of effective sell signals, around 41.28% and 34.78% during the MCO and CMCO period respectively.

STATISTICAL ANALYSIS

Table 3 shows the average returns generated by the 36 Moving Average (MA) rules in three different periods. Consistently, none of the buy signals show positive returns before the Movement Control Order (MCO) period. This implied that the 30 largest stock market experienced the bearish situation before MCO implementation. The majority of the buy signal also showed positive returns during the Movement Control Order (MCO) period, except for the MA rules of (1,50,0.01), (2,50,0.01), (1,60,0.00), (1,60,0.01) and (2,60,0.00). However, none of the MA rules showed any significant results during that period. This implied that the investors who followed the buy signal cannot generate any significant returns during MCO period. It was worth noting that the buy signal only generated significant results at 1% level of significance during the Conditional Movement Control Order (CMCO) period. The MA rules of (5,60,0.01) had the highest average return of 0.88%, followed by (2,10,0.01) with 0.86% and (1,60,0.01) with 8.48%.

The figures reported under the sell signal have different meaning as compared to the buy signal. The positive returns reported under the sell signal shall be treated as a loss. The rationale behind this is that the sell signal should help the investors to avoid facing a drop in stock price. Any price drop after the sell signal simply refers to a saving (or return) for investors who followed the sell signals. Similar to the buy signal, none of the sell signal showed significant returns. During the MCO and CMCO period, the sell signal of all the MA rules showed significant returns at 1% significance level. Only the sell signal of MA rules (1,50,0.01) and (5,50,0.01) showed significant returns at 5% significance level during the CMCO period. This implied that sell signal performed well and was able to help the investors avoid loss during the MCO and CMCO period. During the MCO, sell signals of MA rules (1,10,0.01) were able to help generate the average return of 1.20%, followed

TABLE 2. Number of Buy and Sell Signals and Percentage of Effective Signals

MA Rules	Buy			Sell		
	Pre	MCO	CMCO	Pre	MCO	CMCO
1, 10, 0.00	517	594	430	1073	366	230
	0.3501	0.4579	0.5186	0.5154	0.3443	0.3130
1, 10, 0.01	232	407	314	726	243	107
	0.3233	0.4398	0.5287	0.5179	0.3169	0.2991
2, 10, 0.00	511	595	451	1079	365	209
	0.3542	0.4689	0.5322	0.5209	0.3589	0.3349
2, 10, 0.01	203	388	304	655	241	85
	0.3300	0.4407	0.5592	0.5191	0.3485	0.3059
5, 10, 0.00	524	572	472	1066	388	188
	0.3626	0.4860	0.5233	0.5206	0.3892	0.3298
5, 10, 0.01	125	309	230	468	220	52
	0.3760	0.4628	0.5348	0.5299	0.4000	0.2115
1, 20, 0.00	471	567	443	1119	393	217
	0.3503	0.4762	0.5350	0.5147	0.3740	0.3088
1, 20, 0.01	264	467	359	842	315	123
	0.3712	0.4732	0.5348	0.5190	0.3683	0.2927
2, 20, 0.00	489	557	445	1101	403	215
	0.3620	0.4847	0.5281	0.5159	0.3896	0.3023
2, 20, 0.01	258	449	353	826	319	115
	0.3798	0.4855	0.5496	0.5266	0.3981	0.3217
5, 20, 0.00	505	555	443	1085	405	217
	0.4000	0.4865	0.5260	0.5346	0.4025	0.3180
5, 20, 0.01	247	424	329	755	321	93
	0.4008	0.5000	0.5380	0.5351	0.4019	0.3441
1, 30, 0.00	483	459	473	1107	501	187
	0.3810	0.4706	0.5370	0.5266	0.3832	0.3262
1, 30, 0.01	342	379	400	901	426	109
	0.3889	0.4828	0.5325	0.5228	0.3756	0.2752
2, 30, 0.00	500	453	473	1090	507	187
	0.4020	0.4834	0.5285	0.5367	0.3905	0.3102
2, 30, 0.01	347	370	401	891	433	105
	0.4035	0.4838	0.5436	0.5331	0.3903	0.3048
5, 30, 0.00	514	446	472	1076	514	188
	0.4066	0.4865	0.5360	0.5446	0.4008	0.3351
5, 30, 0.01	357	365	378	845	438	92
	0.4090	0.5014	0.5450	0.5467	0.3973	0.3043
1, 40, 0.00	496	335	529	1094	625	131
	0.3831	0.4896	0.5236	0.5356	0.3920	0.2901
1, 40, 0.01	381	270	457	905	576	75
	0.4147	0.4963	0.5295	0.5260	0.3924	0.3200
2, 40, 0.00	503	324	528	1087	636	132
	0.3996	0.5031	0.5322	0.5437	0.3994	0.3182
2, 40, 0.01	384	265	452	890	581	77
	0.4115	0.5057	0.5354	0.5393	0.3976	0.3247

5, 40, 0.00	522	309	529	1068	651	131
	0.4061	0.5210	0.5350	0.5459	0.4117	0.3359
5, 40, 0.01	417	249	448	859	598	72
	0.4245	0.5301	0.5335	0.5576	0.4097	0.3472
1, 50, 0.00	504	233	500	1086	727	160
	0.3810	0.5193	0.5360	0.5331	0.4044	0.3250
1, 50, 0.01	404	200	448	908	675	114
	0.4109	0.5050	0.5402	0.5308	0.4044	0.3421
2, 50, 0.00	510	226	507	1080	734	153
	0.3922	0.5133	0.5365	0.5417	0.4019	0.3333
2, 50, 0.01	403	193	447	890	581	77
	0.4218	0.5181	0.5414	0.5393	0.3976	0.3247
5, 50, 0.00	533	216	515	1057	744	145
	0.4146	0.5463	0.5417	0.5506	0.4140	0.3448
5, 50, 0.01	432	179	442	861	705	115
	0.4306	0.5475	0.5385	0.5575	0.4128	0.3478
1, 60, 0.00	541	186	429	1049	774	231
	0.3845	0.5108	0.5338	0.5329	0.4031	0.3420
1, 60, 0.01	422	152	380	886	731	189
	0.4123	0.5197	0.5421	0.5372	0.4022	0.3598
2, 60, 0.00	555	182	427	1035	778	233
	0.4054	0.5220	0.5433	0.5488	0.4036	0.3648
2, 60, 0.01	421	145	378	870	739	191
	0.4157	0.5310	0.5397	0.5483	0.4087	0.3613
5, 60, 0.00	580	169	420	1010	791	240
	0.4086	0.5503	0.5333	0.5515	0.4109	0.3458
5, 60, 0.01	450	134	359	842	748	196
	0.4178	0.5597	0.5543	0.5558	0.4091	0.3622

Notes: The figures reported refers to the research findings. *First number* in the moving average (MA) rules represent the short MA; *Second number* in the moving average (MA) rules represent the long MA; *Third number* in the moving average (MA) rules represent the trading band, in which 0.00 represent the 0% trading band and 0.01 represent the 1% trading band; "Pre" refers to the pre-MCO period (2nd Jan 2020 to 17th March 2020); "MCO" refers to the Movement Control Order period (18th March 2020 to 3nd May 2020); "CMCO" refers to the Conditional Movement Control Order period (4th May 2020 to 9th June 2020); "Buy" refers to the returns generated by the buy signals of MA rules; "Sell" refers to the returns generated by the sell signals of MA rules; The *Italic figures* reported in the table refers to the effectiveness of the buy or sell signals. The figure of 0.5467 simply indicated that 54.67% of the signals were effective.

TABLE 3. Return Generated by Buy and Sell Signals

MA Rules	Buy			Sell		
	Pre	MCO	CMCO	Pre	MCO	CMCO
1, 10, 0.00	-0.0034	0.0001	0.0078	0.0045	-0.0096	-0.0050
	-4.7878[1]	0.1566[1]	5.0535[1]	6.4064[2]	-5.3239[2]	-3.9984[2]
1, 10, 0.01	-0.0038	-0.0011	0.0083	0.0058	-0.0119	-0.0062
	-2.9260	-0.9314	4.2834	6.0145	-4.6611	-3.7735
2, 10, 0.00	-0.0032	0.0004	0.0070	0.0046	-0.0091	-0.0063
	-4.2866	0.5118	5.0180	6.6322	-4.9304	-3.7736

2, 10, 0.01	-0.0039	-0.0015	0.0086	0.0061	-0.0112	-0.0066
	-2.7867	-1.2397	4.5027	5.9476	-4.2481	-3.5150
5, 10, 0.00	-0.0027	0.0011	0.0065	0.0049	-0.0076	-0.0075
	-3.9388	1.2340	4.7531	6.8330	-4.3106	-4.4131
5, 10, 0.01	-0.0012	0.0002	0.0077	0.0070	-0.0108	-0.0165
	-0.6278	0.1782	3.3807	4.9918	-3.7086	-3.8308
1, 20, 0.00	-0.0027	0.0011	0.0081	0.0047	-0.0076	-0.0042
	-3.6903	1.1952	5.3012	6.9490	-4.3539	-3.6410
1, 20, 0.01	-0.0021	0.0004	0.0078	0.0053	-0.0088	-0.0045
	-1.8177	0.4054	4.6546	6.1714	-4.1970	-3.1689
2, 20, 0.00	-0.0027	0.0010	0.0071	0.0048	-0.0076	-0.0061
	-3.6473	1.1027	4.9967	6.9659	-4.3577	-3.8325
2, 20, 0.01	-0.0016	0.0010	0.0082	0.0059	-0.0079	-0.0051
	-1.3890	0.9534	4.7925	6.6467	-3.7216	-2.8784
5, 20, 0.00	-0.0015	0.0015	0.0071	0.0054	-0.0067	-0.0062
	-2.1487	1.7719	4.9763	7.6892	-3.8670	-3.8501
5, 20, 0.01	-0.0010	0.0017	0.0082	0.0062	-0.0083	-0.0087
	-0.9337	1.6577	4.5683	6.5753	-3.9159	-2.9624
1, 30, 0.00	-0.0017	0.0004	0.0078	0.0052	-0.0068	-0.0044
	-2.3252	0.4250	5.4360	7.5925	-4.7085	-3.2441
1, 30, 0.01	-0.0015	0.0002	0.0075	0.0056	-0.0076	-0.0054
	-1.6780	0.2122	4.7414	6.7763	-4.6048	-3.4761
2, 30, 0.00	-0.0011	0.0009	0.0072	0.0055	-0.0062	-0.0058
	-1.6587	0.9428	5.1391	7.9073	-4.3596	-3.8070
2, 30, 0.01	-0.0008	0.0006	0.0082	0.0059	-0.0069	-0.0062
	-0.8724	0.5198	5.1006	7.1701	-4.1782	-2.8038
5, 30, 0.00	-0.0008	0.0013	0.0073	0.0058	-0.0059	-0.0055
	-1.1678	1.2699	5.2780	8.1122	-4.1275	-3.3958
5, 30, 0.01	-0.0009	0.0016	0.0077	0.0065	-0.0066	-0.0059
	-1.0690	1.4634	4.8003	7.5065	-4.0448	-2.8521
1, 40, 0.00	-0.0013	0.0003	0.0068	0.0054	-0.0056	-0.0066
	-1.8833	0.2218	5.3311	7.7973	-4.6097	-3.5649
1, 40, 0.01	-0.0009	0.0002	0.0073	0.0059	-0.0062	-0.0056
	-1.0187	0.1724	5.0470	7.1734	-4.7735	-2.7587
2, 40, 0.00	-0.0008	0.0008	0.0068	0.0057	-0.0052	-0.0069
	-1.1982	0.6689	5.3190	8.1087	-4.3415	-3.4619
2, 40, 0.01	-0.0006	0.0007	0.0076	0.0062	-0.0059	-0.0088
	-0.7556	0.5426	5.1737	7.4295	-4.5702	-2.8955
5, 40, 0.00	-0.0008	0.0017	0.0068	0.0058	-0.0047	-0.0069
	-1.2388	1.4041	5.3166	8.0971	-3.9667	-3.5016
5, 40, 0.01	-0.0003	0.0018	0.0073	0.0069	-0.0051	-0.0071
	-0.4137	1.3572	5.0546	8.0138	-3.9790	-2.7392
1, 50, 0.00	-0.0011	0.0006	0.0075	0.0056	-0.0047	-0.0045
	-1.5964	0.4320	5.5184	7.9363	-4.3565	-3.1116
1, 50, 0.01	-0.0009	-0.0006	0.0077	0.0061	-0.0052	-0.0037
	-1.0585	-0.3648	5.2444	7.3582	-4.4988	-2.3850

cont.

2, 50, 0.00	-0.0009	0.0004	0.0073	0.0057	-0.0048	-0.0052
	-1.3050	0.2550	5.4911	8.0916	-4.4250	-3.0333
2, 50, 0.01	-0.0004	-0.0003	0.0078	0.0062	-0.0059	-0.0088
	-0.5039	-0.2062	5.2665	7.4295	-4.5702	-2.8955
5, 50, 0.00	-0.0007	0.0016	0.0071	0.0059	-0.0044	-0.0055
	-1.0494	1.1152	5.4729	8.2003	-4.0471	-3.0946
5, 50, 0.01	-0.0001	0.0013	0.0076	0.0068	-0.0047	-0.0036
	-0.1898	0.8225	5.0884	7.9437	-4.1923	-2.2373
1, 60, 0.00	-0.0012	-0.0004	0.0079	0.0056	-0.0047	-0.0047
	-1.9028	-0.2801	5.2086	7.8128	-4.5421	-3.5594
1, 60, 0.01	-0.0008	-0.0003	0.0085	0.0063	-0.0051	-0.0041
	-0.9710	-0.1522	5.0998	7.5006	-4.6918	-2.8883
2, 60, 0.00	-0.0007	-0.0001	0.0082	0.0060	-0.0046	-0.0043
	-1.0958	-0.0936	5.3784	8.1972	-4.4458	-3.2005
2, 60, 0.01	-0.0005	0.0004	0.0082	0.0066	-0.0047	-0.0048
	-0.6861	0.2239	4.9483	7.7232	-4.2809	-3.2205
5, 60, 0.00	-0.0007	0.0013	0.0076	0.0061	-0.0042	-0.0054
	-1.2008	0.8833	4.9556	8.1632	-4.1035	-3.9947
5, 60, 0.01	-0.0006	0.0030	0.0088	0.0068	-0.0045	-0.0050
	-0.8427	1.8197	5.0273	7.7572	-4.2023	-3.3408

Notes: The figures reported refers to the research findings. *First number* in the moving average (MA) rules represent the short MA; *Second number* in the moving average (MA) rules represent the long MA; *Third number* in the moving average (MA) rules represent the trading band, in which 0.00 represent the 0% trading band and 0.01 represent the 1% trading band; "Pre" refers to the pre-MCO period (2nd Jan 2020 to 17th March 2020); "MCO" refers to the Movement Control Order period (18th March 2020 to 3nd May 2020); "CMCO" refers to the Conditional Movement Control Order period (4th May 2020 to 9th June 2020); "Buy" refers to the returns generated by the buy signals of MA rules; "Sell" refers to the returns generated by the sell signals of MA rules; [1]The t-statistics for the tests of buy return is greater than buy-and-hold return. [2]The t-statistics for the tests of sell return is lesser than buy-and-hold return; **Significant at 5% level of significance, *Significant at 1% level of significance

TABLE 4. Result of Out-of-Sample Test

MA Rules	Buy	Buy	Sell	Sell	Sell	Sell
	5, 20, 0.01	5, 60, 0.01	2, 10, 0.01	5, 10, 0.00	5, 10, 0.01	5, 20, 0.01
Return	0.0024	0.0070	-0.0001	-0.0040	-0.0030	-0.0100
T-statistics	1.4047[1]	2.2664[1,**]	-0.2539[2]	-1.8380[2]	-1.5822[2]	-2.2517[2,**]

Notes: The figures reported refers to the research findings. *First number* in the moving average (MA) rules represent the short MA; *Second number* in the moving average (MA) rules represent the long MA; *Third number* in the moving average (MA) rules represent the trading band, in which 0.00 represent the 0% trading band and 0.01 represent the 1% trading band. "Buy" refers to the returns generated by the buy signals of MA rules; "Sell" refers to the returns generated by the sell signals of MA rules; [1]The t-statistics for the tests of buy return is greater than buy-and-hold return. [2]The t-statistics for the tests of sell return is lesser than buy-and-hold return; **Significant at 5% level of significance, *Significant at 1% level of significance

by (2,10,0.01) with 1.11% and (5,10,0.01) with 1.08%. As for the CMCO period, sell signals of MA rules (5,10,0.01) were able to help generate the average return of 1.65%, followed by (2,40,0.01) with 0.88% and (2,50,0.01) with 0.88%.

OUT-OF-SAMPLE TEST

The six best performing MA rules have been selected and the study proceeded with the out-of-sample test to validate the performance of the particular MA rules.

The test period used in this study covered the first phases of RMCO, from 10 June to 30 August 2020. For the buy signal, two of the best performing MA rules were (5,20,0.01) and (5,60,0.01). These two MA rules consistently posed the positive returns during the MCO and CMCO period. Table 4 shows that the returns generated by the buy signals of these two MA rules remain positive during the RMCO period. The MA rule of (5, 20, 0.01) and (5, 60, 0.01) tend to generate the average returns of 0.24% and 0.70%, respectively. However, only the buy signals of MA rule (5, 60, 0.01)

showed result at 5% significance level. This implied that the buy signal emitted by MA rule of (5, 60, 0.01) was able to assist the investors in making their investment decision.

For the sell signal, four of the best performing MA rules were (2,10,0.01), (5,10,0.00), (5,10,0.01) and (5,20,0.01). These rules consistently posed negative returns during the MCO, CMCO period and RMCO period (*Out-of-Sample period*). The negative returns generated by the sell signals simply refer to the saving for the investors. Investors who follow the sell signal tend to dispose or not acquire the particular stocks. Logically, the negative returns should come after the sell signals. Thus, it is not a surprise to report the negative returns under the sell signals. Among the four best performing rule, only the MA rule (5,20,0.01) showed significant result at 5% significance level. As a summary, this study established that 5 days shall be used as the short MA, while 20 and 60 days shall be used as the long MA during these critical periods. The findings of this study also contradicted those of past studies by Khand, Anand and Qureshi (2020) and Masry (2017). This can be explained in that 1 or 2 days moving average was not appropriate to reflect the information in Malaysian stock market, regardless of the MCO stage. The results however concurred with the earlier findings by Lai et al. (2007) and Heng, Azizan and Yeap (2012). Results from this study confirmed that the weak-form market efficiency hypothesis does not occur in Malaysian stock market for the reason that stock prices in Malaysian stock market tend to follow a trend and can be predicted through technical analysis.

CONCLUSION

This study examines the performance of 36 MA rules in the Malaysian stock market during the COVID-19 pandemic. Specifically, this study decomposes the sample period, namely the MCO (Movement Control Order), into four sub-periods to reflect its different stages. The last sub-period, spanning the Recovery Movement Control Order (RMCO), was used to validate the best performance of MA rules which spanned the MCO and CMCO sub-period. This study discovered two best performing MA rules, (5,20,0.01) and (5,60,0.01), which emitted the buy signals during this time. Four other best performing MA rules, (2,10,0.01), (5,10,0.00), (5,10,0.01) and (5,20,0.01) which emitted effective sell signals were also found during the same sub-period. The performance of these six MA rules were further validated by using the data of out-of-sample period, which spanned the Recovery Movement Control Order (RMCO) sub-period. In conclusion, the study discovered that the buy signal of MA rule (5,60,0.01) tended to assist investors in generating significant positive returns for all the three different stages of the

MCO. Retail investors may follow the buy signals emitted by the MA rule (5,60,0.01) before their entry into the market. This study also established that more than 50% of the buy signals were effective. Further, the sell signal of MA rule (5,20,0.01), one of the best performers, was inclined to assist investors in avoiding loss during all three different stages of the MCO. Findings from this study shall contribute to the existing technical analysis literature through information provided on the best MA rule for use during this critical pandemic period. The research findings can also be used as alternative reference for investors seeking for value-investing, during this critical time. Investors shall rely on these signals for their trading guide. Lastly, the relevant organizations need to organize more seminars or conduct campaigns to inform and enhance the financial analytical skill among investors.

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