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ANALYZING THE DOUBLE CROSSOVER MOVING AVERAGES STRATEGY BEFORE, DURING AND AFTER THE LOCKDOWN PERIOD

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ABSTRACT

Trading is a business, not an investment. Traders focus on minor to secondary trends, while investors focus on the primary trend. The trading timeframe is crucial in technical analysis. As such a trader who trades with a minor trend timeframe, must have a trading strategy. We aim to examine the impact of the moving averages double crossover strategy on traders' profit factor based on minor and secondary trend timeframes before, during and after the lockdown periods. Dow Theory was adopted for this study as a trend should be in effect until it gives a definite signal for a reversal. Data was collected from the Nasdaq Composite Index for a five-year period, from 2018 to 2022. During this time frame, the required data for the study was obtained at the point of the golden crossover and exiting at the dead crossover, in which 2018 to 2019 was the period before the lockdown, 2020 to 2021 was the period during lockdown, and 2022 was the year after

lockdown. By using trading profits and loss for both longs and shorts, we back tested three strategies of double crossover moving averages that were as follows: i) EMA5 crossover EMA10, ii) EMA5 crossover EMA20 and iii) EMA20 crossover EMA50. A non-parametric analysis of independent samples was used. The result shows that there was a significant difference among those three strategies before the lockdown period, but no significant difference during and after the lockdown period.

Keywords: Technical analysis, double crossover moving averages strategy, minor trend, lockdown.

JEL Classifications: G01, G12.

INTRODUCTION

In managing one's finances, excess money can always be invested or traded in the stock market. Investors choose to invest their excess money in a longer-term period of more than a year, while traders in a shorter to medium-term period of less than a year. This paper focuses on trading styles in the short to medium-term period in the Nasdaq Composite Index, back testing for a four-year period independently from 2018 to 2021. Technical analysis will be used instead of fundamental analysis. In technical analysis, market action discounts everything. Technical analysis focuses more on price actions of the market compared to the fundamentalist who focuses more on the economic forces to determine the stock price (Moosa & Li, 2009; Murphy, 1999).

Timing is also crucial in technical analysis. Traders focuses on minor to secondary trends compared to investors, who only focuses on the primary trend. There are many indicators that have been developed to forecast price action in the stock market. The basic indicators are moving averages, oscillators, point and figures charting, candlesticks and time cycles (Lim, 2016). Chart analysis can be difficult to quantify, test and most of the time are argued against by traders, but moving averages (MA) indicator is precise and non-debatable. In this study, we aim to examine the impact of selected moving averages double crossover method on traders' profits based on swing trading (minor

to secondary trend). We have selected three types of double crossover method using Exponential Moving Averages (EMA), which are as follows: i) EMA5 crossover EMA10, ii) EMA5 crossover EMA20 and iii) EMA20 crossover EMA50. We use the equity market of the Nasdaq Composite Index, and by back testing for a four-year period independently from 2018 to 2022 as our sample for the study.

Figure 1

Nasdaq Composite Index

Source. TradingView

The timeframe was selected as a result of the COVID-19 pandemic, which affected the whole world since early 2020. We can clearly see from Figure 1 that from mid-February 2022, the reversal from bullish to bearish started and continued until the end of March 2020. Lockdowns had been imposed in almost all countries around the world because of the spread of COVID-19. It was only after the end of March of 2020, that the reversal trend from bearish to bullish followed. However, not all industries were negatively affected during the lockdowns. The healthcare, education, online food delivery industries had actually boomed during lockdowns (Kusnic, 2021). Probably the heightened awareness to take care of one's health

had increased, as well as getting new knowledge without going to a physical class by doing it online, had become much easier. The online food delivery industry was obviously proliferating during the lockdown period as no one from any household is allowed to leave home to shop for groceries, and restaurants, as well as all other food outlets were shuttered.

The stock markets too were having its bullish trend during the lockdown (David, 2022). Looking into the moving averages of a long term trend of EMA50 crossover EMA200, the golden crossover happened in May 2020 in the Nasdaq Composite Index, as is shown in Figure 1. In the same chart if one looks at the short term moving averages, the golden crossover happened a month earlier for a short-term moving averages, which was in April 2020 and followed by the long-term moving averages of EMA50 crossover EMA200 in May 2020. As such a bullish trend can now be confirmed. Traders can now make more money until a reversal signal of dead crossover occurs.

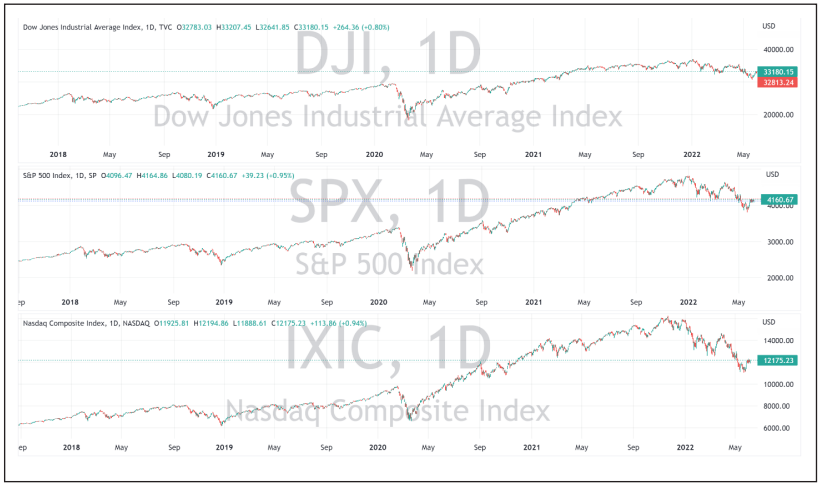
Referring to the three major indexes in the US, one can see that the trend was almost the same, that there was a bullish trend after the end of March 2020 (see Figure 2). This situation is in line with the postulation of Dow Theory that averages must confirm each other (Murphy, 1999). In Figure 1, one can obviously see that the three major indexes, namely the Dow Jones Industrial Averages Index, S&P 500 Index and Nasdaq Composite Index were all trending almost in the same direction.

Many academic researchers have studied moving averages relating to market performance (de Souza et al., 2018; Ishfaq Ahmad et al., 2017; Tapa et al., 2016). However, long-term data have been used. There is an empirical gap to work on short-term data as there are traders out there who trade based on minor (less than 3 weeks) to secondary trend (3 weeks to a few months). Empirically applying the double crossover moving averages strategy based on Dow Theory, which postulates that a trend should be in effect until it gives a definite signal for a reversal, the present study believes that in either a long or a short-term trend, the strategy should give no significant difference to the profits. Furthermore, looking into the double crossover moving averages strategy, and analysing it with different economic conditions of before, during and after the lockdown period, adds additional adrenaline to the expected result, as technical analysts believe market

action discounts everything, while the fundamentalist focuses more on the economic forces to determine the stock price. Therefore, this strategy needs to be empirically tested in the short to secondary-term trend, which involves a limited number of data points.

Figure 2

Dow Jones Industrial Average Index, S&P 500 Index and Nasdaq Composite Index



Source. TradingView

This paper is divided into five sections. The first section is the introduction, which introduces the background of the research. The second section presents the literature review, and the hypotheses are then developed. The third section is the research method section as it describes the trading data, strategy, rules and statistical analysis used. The fourth section presents the research findings and finally the fifth section concludes the study.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

Moving Averages

The moving averages (MA) method is a well well-known method to traders as the indicator is precise and non-debatable, unlike the other

type of indicators such as the chart pattern. The MA is considered a lagging indicator as it shows historical security prices in a set of periods. The MA can be considered as a time-series analysis. Many researchers have used moving averages to examine the trading strategy of traders and financial market performance (de Souza et al., 2018; Ishfaq Ahmad et al., 2017; Pramudya & Pramudya, 2020; Ren & Ren, 2018). There are quite a few types of moving averages, namely the simple moving average (SMA), exponential moving average (EMA), weighted moving average (WMA) and hull moving average (HMA). Each type has its own adherents, depending on each trader's risk appetite and trading style (Grinblatt et al., 2012; Ng & Wu, 2007; Ryu et al., 2017). According to Tapa et al., (2016), the results of their study show that the suggested modified crossover moving averages strategy must be accompanied with additional trading rules such as entry, exit, holding and stop-loss rules, in order to get the best return.

Figure 3

50-day Simple Moving Average (SMA) in S&P500 Index

Source. TradingView

There are two basic methods when using moving averages to make decisions. The first method is by looking at the candles in the chart. By using this method, if the moving averages is above the candles, it means that the trend is still an uptrend. If the candles are below the moving averages, then there is a downtrend. A trader who wants to commit a long position will enter the position when the moving average crosses above the candles. Those who would like a short

position will exit the position when the moving average crosses below the candles. Figure 3 shows the methods discussed.

Ren and Ren (2018) have used the max-min simple moving average instead of the above methods, and the difference is that a trader must exit a position at the maximum (long) SMA or exit at the minimum (short) SMA. As such a trader does not need to wait for the SMA to cross below or above the candles to exit a position. According to Ren and Ren (2018) if this trading rule is applied, a trader may be able to reach a profit factor of 10 to 20 in the DJIA, NASDAQ and S&P Index. But the question arises as to how maximum the candles can rise for a trader to exit a long position, and how minimum the candles can fall for a trader to exit a short position. If this happens, traders ordinarily will apply more than one indicator, such as candle and chart patterns to make decisions. According to Ishfaq Ahmad et al. (2017), there are many indicators in technical analysis that helps predict historical data on prices (or other information) to drive signals about future prices

Crossover Moving Averages

The second method is by using moving average crossovers. This strategy combines two or three moving averages to give a buy or sell signal to the traders. The shorter period moving average should cross up the longer period moving average to enter a long position (golden crossover) or cross down to exit a long position (dead crossover) (refer to Figure 4). Gurrib (2016) found that the optimized double cross over strategy resulted in a relatively lower risk and returns during a post financial crisis which occurred between 1993 to 2014, as compared to the traditional buy-and-hold strategy. The crossover moving average strategy requires much work compared to the buy-and-hold strategy and often satisfies traders that exercise swing trading (minor to secondary trend).

Studies have mixed results regarding the period of averages which gives a higher impact to trader's return. Some have agreed that shorter crossover averages give a higher return or profit factor (Ishfaq Ahmad et al., 2017; Ren & Ren, 2018), but some found the buy-and-hold strategy; in a longer period normally a year or more than a year, should give a higher return (Chang et al., 2018). Some have used stock market indexes, while some have used other markets such as bond (Zakamulin, 2016), cryptocurrencies (Brown & Pelosi, 2019) or

futures and commodity markets (Levine & Pedersen, 2016; Monteiro et al., 2022). Intrinsically, when it is in a different timeframe in a different financial market, the results are mixed.

Figure 4

EMA50 Crossover EMA200 in S&P500 Index

Note. Blue-colored trendline is EMA50 and red-colored trendline is EMA200.
Source. TradingView

The motivation for the present study was triggered by the Malaysian traders' organizations or institutions that traded international market equities with varieties of double crossover moving averages strategies. Each organization had a different timeframe when selecting their strategies. Therefore, this study is more of an applied research, but the element of basic research has been added by streamlining it with an academic theory, namely Dow Theory, in which a trend should be in effect until it gives a definite signal for a reversal. A famous quote by Edward Seykota (n.d.), who pioneered a computerized trading system, has pointed out that "the trend is your friend except at the end where it bends" is related to the latter. In other words, by using the double EMA crossovers strategy, it is believed that given any timeframe a trader adopts, the profits distribution would have no significance difference, since one uses a minor to secondary timeframe. Therefore, in this study three null hypotheses were proposed and assumed to be true:

H_{O1}: There is no significant difference of profits distribution across all three strategies before the lockdown period

H_{O2}: There is no significant difference of profits distribution across all three strategies during the lockdown period

H_{O3}: There is no significant difference of profits distribution across all three strategies after the lockdown period

RESEARCH METHOD

Trading Data

This study has taken data from TradingView, a trading social media network and analysis platform, which has provided charting to indicators selection that has helped traders around the world to make decisions on trade and investment. It keeps historical data, as well as real time data while the market opens. Since the present study follows the Dow Theory that investigates trendline and the signs of reversal, it has used the double crossover moving averages to empirically test for traders return. Since the focus was on trading rather than investing, its concern was with the minor to secondary trend trading style, that is, a swing trading style. Yearly data from 2018 to 2022 from the Nasdaq Composite Index were selected, and these were analyzed independently. The three periods of concerned in the study were the period during the lockdown from 2020 to 2021, before the lockdown from 2018 to 2019, and after the lockdown in 2022.

Trading Strategy and Rules

Referring to Figure 1 (see page 59), one can see that during lockdowns traders can make more money compared to before lockdowns. The EMA was used since it had less lag compared to the SMA. Since the present focus was on the crossover, the EMA measured in Equation (2) adapted faster to market reversal as it adopted more recent prices, compared to the SMA measured in Equation (1) (Jasemi & Kimiagari, 2012).

$$SMA_{N,T} = \sum_{i=0}^{N-1} P_{T-i}/N \quad (1)$$

$$EMA_{N,T} = \frac{2}{(N+1)} \times \left(P_T - EMA_{N,T-1}\right) + EMA_{N,T-1} \quad (2)$$

where, is the simple moving average of length N on day T; the exponential moving average of length N on day T; is the stock price of day T and N is the length of the moving average.

Three types of double crossover moving averages were selected and they were as follows: i) EMA5 crossover EMA10, ii) EMA5 crossover EMA20 and iii) EMA20 crossover EMA50 in the Nasdaq Composite Index. The EMAs were selected based on the minor to secondary trend. By using the profit factor, that is the gross profit divided by the gross loss, the above-mentioned double crossover moving averages was back tested. The sample used in this study was from the Nasdaq Composite Index, data was collected by entering at the golden crossover and exiting at the dead crossover, for a four year period respectively from 2018 to 2022. The period from 2018 to 2019 were the years before the Covid-19 lockdown. While the period from 2020 to 2021 were the years during the lockdown. The year 2022 was the year after the lockdown.

Figure 5

EMA5 Crossover EMA10 in the Nasdaq Composite Index in 2018

Source. TradingView

Both long and short positions had been back tested with profit and loss to answer the hypotheses. The double crossover moving averages was analyzed using the Strategy Tester from TradingView. A $10,000 capital was used with $0 commission being charged. It was assumed that the trader had chosen a brokerage firm charging $0 for trading stocks, and charging only for other instruments such as options and cryptos. Figure 5 shows the EMA5 crossover EMA10, in which one can see that there were 10 long trades and 11 short trades which had taken place in 2018, with one short trade still opened until the end of 2018. The list of trades with the above-mentioned timeframe had

been generated via TradingView. From there one will be able to get the performance summary of each strategy for each year. The results of the performance will be discussed in the next sub-topic.

Statistical Analysis

To answer the hypotheses of the study, the list of trades for each performance strategy will be used as the sample of the study. Since the samples were not normally distributed, sample sizes were not equal, some sample sizes were less than 30, and some contained outliers. The non-parametric of Independent Samples Kruskal-Wallis Test was used to run the analysis using Statistical Package for Social Science (SPSS,version 28). This test has been mainly used in a medical science research since their subject or samples have the same criteria as mentioned above (Khokhlova et al., 2022; Sherwani et al., 2021). Since the present study analysed data over a 4-year period from 2018 to 2022 independently, the samples were deemed best analysed using the non-parametric of Independent Samples of Kruskal-Wallis Test.

Other related studies that have used Covid-19 as the issue of concern in the financial economics area have had different objectives and hypothesis. Bessler and Vendrasco (2022) have used logit regression to look at the short selling restrictions to stabilise the financial market in Europe. While Thai et al. (2022) have studied the exchange rate stability during Covid-19 using DECO-GARCH and Transfer Entropy. On the other hand, Haddad et al. (2021) have studied the bond market during Covid-19 covering the period from January to June 2020. However, they were interested in the spread of the bond and had used the bond daily log spread changes. As such they had sufficient data points to run a time-series analysis, unlike the present study which had used the double crossover moving averages strategy with a minor to secondary timeframe. This meant more limited data points. As a result, the study chose to use the non-parametric analysis of Independent Samples of Kruskal-Wallis Test.

FINDINGS

Table 1 to 5 shows the result from the analysis of data from 2018 to 2022. Comparing across the three types of moving averages, the results of the minor trend strategy in 2020, namely i) EMA5 crossover

EMA10 and ii) EMA 5 crossover EMA20 had given the highest profit factor, that is 2.397 and 2.966 for both the long and short, respectively (see Table 3). As for the other years, the profit margin was below 1 profit factor, which shows that the gross loss was higher than the gross profit. This shows that trading activity, when using the minor trend strategy was profitable during the lockdown period in 2020. However, this was not the case in 2021, in which many countries were still in a lockdown period with all three strategies having shown a profit factor of below 1. The result of the EMA5 crossover EMA20 showed a result of near to1, that is a 0.96 profit factor. Furthermore, if the result in 2021 had dived into profit factor of longs and shorts, the profit factor for longs were still seen to have a result of more than 1 for all three strategies. When one looks further into the max run-up and max drawdown, only then can one see that the EMA5 crossover EMA10 had a maximum drawdown of $2203.02, compared to the maximum run-up of $1101.48. In fact, there were more losing trades than winning trades for both longs and shorts, which had a total of up to 12 losing trades and only 7 winning trades. Therefore, this has resulted in a more gross loss compared to gross profits, which had led to a profit factor of less than 1. This situation might be due to the volatility of trading in a shorter timeframe period in 2021, when the economy had started to re-open.

Table 1

Results of the Analysis in 2018

2018	EMA 5 CROSSOVER EMA10					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-1002.87	-10.03	-604.60	-6.05	-398.27	-3.98
Gross Profit	1114.99	11.15	518.44	5.18	596.55	5.97
Gross Loss	2117.86	21.18	1123.04	11.23	994.82	9.95
Max Run-up	428.67	4.47				
Max Drawdown	1211.19	11.86				
Profit Factor	0.53		0.46		0.60	
Number of Winning Trades	5		3		2	
Number of Losing Trades	15		7		8	

2018	EMA 5 CROSSOVER EMA20					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-1923.47	-19.23	-900.70	-9.01	-1022.77	-10.23
Gross Profit	667.76	6.68	261.51	2.62	406.25	4.06
Gross Loss	2591.23	25.91	1162.21	11.62	1429.02	14.29
Max Run-up	471.47	5.18				
Max Drawdown	1923.47	19.23				
Profit Factor	0.26		0.23		0.28	
Number of Winning Trades	3		2		1	
Number of Losing Trades	11		5		6	
2018	EMA 20 CROSSOVER EMA50					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-383.68	-3.84	-5.89	-0.06	-377.79	-3.78
Gross Profit	0.00	0.00	0.00	0.00	0.00	0.00
Gross Loss	383.68	3.84	5.89	0.06	377.79	3.78
Max Run-up	0.00	0.00				
Max Drawdown	383.68	3.84				
Profit Factor	0		0		0	
Number of Winning Trades	0		0		0	
Number of Losing Trades	2		1		1	

Table 2

Results of the Analysis in 2019

2019	EMA 5 CROSSOVER EMA10					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-18.12	-0.18	345.94	3.46	-364.06	-3.64
Gross Profit	790.78	7.91	625.78	6.26	165	1.65
Gross Loss	808.9	8.09	279.84	2.8	529.06	5.29
Max Run-up	747.41	7.15				
Max Drawdown	478.5	4.57				
Profit Factor	0.978		2.236		0.312	
Number of Winning Trades	5		3		2	
Number of Losing Trades	6		2		4	

2019	EMA 5 CROSSOVER EMA20					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-310.08	-3.1	-58.27	-0.58	-251.81	-2.52
Gross Profit	98.38	0.98	20.2	0.2	78.18	0.78
Gross Loss	408.46	4.08	78.47	0.78	329.99	3.3
Max Run-up	98.38	0.97				
Max Drawdown	408.46	4.04				
Profit Factor	0.241		0.257		0.237	
Number of Winning Trades	2		1		1	
Number of Losing Trades	3		1		2	
2019	EMA 20 CROSSOVER EMA50					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-1356.26	-13.56	-325.15	-3.25	-1031.11	-10.31
Gross Profit	0	0	0	0	0	0
Gross Loss	1356.26	13.56	325.15	3.25	1031.11	10.31
Max Run-up	0	0				
Max Drawdown	1356.26	13.56				
Profit Factor	0		0		0	
Number of Winning Trades	0		0		0	
Number of Losing Trades	5		2		3	

Alternatively, a trader would be on the winning side if they did longs than shorts for the minor trend strategy of i) EMA5 crossover EMA10 and ii) EMA 5 crossover EMA20 from 2019 to 2021 (See Table 2, Table 3 and Table 4). This situation coincided with the maximum run-up in 2019 and 2020, compared to the maximum drawdown. For those two years, even though one can see that the overall number of losing trades were more, the magnitude of the winning trades was larger than the losing trades. This is clearly seen in 2020, as the maximum run-up for the EMA5 crossover EMA10 was 28.37 percent and the maximum drawdown was 6.56 percent. This was followed by the EMA5 crossover EMA10, having a maximum run-up which was 3 times higher than the maximum drawdown (See Table 3).

The worst year for trading using the moving averages crossover with minor trend strategy was in 2018. Profit factor was null for the

secondary trend strategy of the EMA20 crossover EMA50, and for the minor trend strategy of i) EMA5 crossover EMA10 and ii) EMA 5 crossover EMA20, which was 0.53 and 0.26, respectively (See Table 1). The trend was quite similar to 2021, in which the profit factor was less than 1, but the magnitude was not as bad as in 2018. In fact, the EMA5 crossover EMA20 profit factor was 0.96 (approximately 1) in which the gross profit and gross loss nearly matched each other with a gross profit of $1705.09 and a gross loss of $1774.26 (See Table 4). After the lockdown period in 2022, all three strategies had a profit factor of less than one, which shows that the gross loss is more than gross profits (See Table 5).

Table 3

Results of the Analysis in 2020

2020	EMA 5 CROSSOVER EMA10					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	2584.12	25.84	2631.65	26.32	-47.53	-0.48
Gross Profit	4545.58	45.46	2984.44	29.84	1561.14	15.61
Gross Loss	1961.46	19.61	352.79	3.53	1608.67	16.09
Max Run-up	3700.96	28.37				
Max Drawdown	656.28	6.56				
Profit Factor	2.317		8.46		0.97	
Number of Winning Trades	4		3		1	
Number of Losing Trades	7		2		5	
2020	EMA 5 CROSSOVER EMA20					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	2478.11	24.78	2668.23	26.68	-190.12	-1.9
Gross Profit	3738.29	37.38	2895.75	28.96	842.54	8.43
Gross Loss	1260.18	12.6	227.52	2.28	1032.66	10.33
Max Run-up	3738.29	27.21				
Max Drawdown	1260.18	9.17				
Profit Factor	2.966		12.727		0.816	
Number of Winning Trades	2		1		1	
Number of Losing Trades	3		1		2	

2020	EMA 20 CROSSOVER EMA50					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	0	0	0	0	0	0
Gross Profit	0	0	0	0	0	0
Gross Loss	0	0	0	0	0	0
Max Run-up	0	0				
Max Drawdown	0	0				
Profit Factor	N/A		N/A		N/A	
Number of Winning Trades	0		0		0	
Number of Losing Trades	0		0		0	

Table 4

Results of the Analysis in 2021

2021	EMA 5 CROSSOVER EMA10					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-2071.47	-20.71	199.59	2	-2271.06	-22.71
Gross Profit	1770.06	17.7	1572.05	15.72	198.01	1.98
Gross Loss	3841.53	38.42	1372.46	13.72	2469.07	24.69
Max Run-up	1101.48	12.38				
Max Drawdown	2203.02	22.03				
Profit Factor	0.461		1.145		0.08	
Number of Winning Trades	7		4		3	
Number of Losing Trades	12		5		7	
2021	EMA 5 CROSSOVER EMA20					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-69.17	-0.69	1212.89	12.13	-1282.06	-12.82
Gross Profit	1705.09	17.05	1641.75	16.42	63.34	0.63
Gross Loss	1774.26	17.74	428.86	4.29	1345.4	13.45
Max Run-up	912.53	9.06				
Max Drawdown	902.11	8.96				
Profit Factor	0.961		3.828		0.047	
Number Winning Trades	3		2		1	
Number Losing Trades	8		3		5	

2021	EMA 20 CROSSOVER EMA50					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-1186.62	-11.87	65.58	0.66	-1252.2	-12.52
Gross Profit	483.8	4.84	483.8	4.84	0	0
Gross Loss	1670.42	16.7	418.22	4.18	1252.2	12.52
Max Run-up	483.8	5.04				
Max Drawdown	1186.62	11.87				
Profit Factor	0.29		1.157		0	
Number of Winning Trades	1		1		0	
Number of Losing Trades	3		1		2	

Table 5

Results of the Analysis in 2022

2022	EMA 5 CROSSOVER EMA10					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-2118.94	-21.19	-2698.57	-26.99	579.63	5.8
Gross Profit	4266.74	42.67	1084.57	10.85	3182.17	31.82
Gross Loss	6385.68	63.86	3783.14	37.83	2602.54	26.03
Max Run-up	3264.96	26.83				
Max Drawdown	3276.3	29.6				
Profit Factor	0.668		0.287		1.223	
Number of Winning Trades	6		2		4	
Number of Losing Trades	15		9		6	
2022	EMA 5 CROSSOVER EMA20					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-1246.32	-12.46	-2169.54	-21.7	923.22	9.23
Gross Profit	2837.43	28.37	294.96	2.95	2542.47	25.42
Gross Loss	4083.75	40.84	2464.5	24.64	1619.25	16.19
Max Run-up	2511.6	20.59				
Max Drawdown	2449	21.99				
Profit Factor	0.695		0.12		1.57	
Number of Winning Trades	4		1		3	
Number of Losing Trades	9		6		3	

2022	EMA 20 CROSSOVER EMA50					
	All $	All %	Long $	Long %	Short $	Short %
Net Profit	-1488.34	-14.88	-1577.29	-15.77	88.95	0.89
Gross Profit	298.87	2.99	0	0	298.87	2.99
Gross Loss	1787.21	17.87	1577.29	15.77	209.92	2.1
Max Run-up	1591.03	14.68				
Max Drawdown	1553.95	15.54				
Profit Factor	0.167		0		1.424	
Number of Winning Trades	1		0		1	
Number of Losing Trades	4		3		1	

Notes: Net Profit = Gross Profit – Gross Loss
Profit Factor = Gross Profit / Gross Loss
Max Run-Up = Within the trading period, max run-up measures the greatest distance, or profit, from a previous equity trough.
Max Drawdown = Within the trading period, max drawdown measures the greatest distance, or loss, from a previous equity peak.
Golden crossover = The shorter period moving average crosses up the longer period moving average
Death crossover = The shorter period moving average crosses down the longer period moving aver

To answer the hypotheses of the study, a list of trades for each performance strategy with non-parametric of Independent Samples Kruskal-Wallis test was used to run the analysis. The findings show that only Hypotheses 2 and 3 are supported, that is there was no significant difference among the three strategies before the lockdown period, which was at the 0.05 significance level. As for Hypothesis 1, there was a Type I error. Though it was assumed that the null hypothesis should be true, it turned out to be otherwise. The null hypothesis at 0.05 significance level had to be rejected (See Table 6).

Since Hypothesis 1 had a Type I error, further analysis to look into which pair of the strategy has a significant difference, a pairwise comparison strategy was carried out. The sample strategy was recoded as follows: i) EMA5 crossover EMA10 as Strategy A, ii) EMA5 crossover EMA20 as Strategy B, and iii) EMA20 crossover EMA50 as Strategy C. The findings show that at the 0.01 significance level,

Strategy C and A had a significant difference before the lockdown period, while Strategy B and A showed a significance level at 0.10, that is at the 90 percent confidence level (See Table 7).

Table 6

Summary of Hypothesis Tests

	Null Hypothesis	Test	Sig.[a,b]	Decision
1	The distribution of profits Before the lockdown period is the same across categories of Strategy.	Independent-Samples Kruskal-Wallis Test	.000	Do not support
2	The distribution of profits During the lockdown period is the same across categories of Strategy.	Independent-Samples Kruskal-Wallis Test	.193	Accept
3	The distribution of profits After the lockdown period is the same across categories of Strategy.	Independent-Samples Kruskal-Wallis Test	.771	Accept

Note. a. The significance level is .050.
b. Asymptotic significance is displayed.

Table 7

Pairwise Comparisons Strategy

Strategy 1-Strategy 2	Std. Error	Std. Test Statistic	Test Statistic	Sig.	Adj. Sig.[a]
C-B	10.035	1.790	17.964	.073	.220
C-A	9.266	3.645	33.779	.000	.001
B-A	6.816	2.320	15.815	.020	.061

Note. Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same. Asymptotic significances (2-sided tests) are displayed. The significance level is .050. a. Significance values have been adjusted by the Bonferroni correction for multiple tests.

CONCLUSION

From the discussion of the above findings, one can conclude that the study premise has been supported, which is that the distribution of profits during and after the lockdown period is the same across all strategies. However, the same premise is not supported before the lockdown period. Further analysis of the study results has been able

to show which strategy gives a significant difference. The minor trend strategy of EMA5 crossover EMA10 has given a significant difference to EMA5 crossover EMA20 and EMA20 crossover EMA50, as is shown in Table7. This situation may be due to a volatility trend between the minor and secondary trends. Looking into the number of trades (winning and losing) carried out among these strategies, more trades were carried out before the lockdown period compared to during and after the lockdown period, as is simplified in Appendix 1.

The findings of Hypotheses 2 and 3 supported the study's null hypotheses, in which there was no significant difference across all strategies during and after the lockdown period. This is in line with Dow theory which holds that a trend should be in effect until it gives a definite signal for a reversal. The next question, following the double crossover moving averages strategy, is how much the max run-up and max drawdown, as well as the number of winning and losing trades play an important role in traders' profits. A trader may want to give a certain percentage to cut loss, and to avoid a max drawdown in their trading journal. This corroborates the findings in other researches carried out that study the crossover moving averages (Ren & Ren, 2018; Tapa et al., 2016).

This study seems to suggest that the long-term trend of 200 moving averages must not be left out by short-term trend traders. In fact, the long-term trend must be analyzed first, before looking into a short-term trend in the chart to make decisions. If the candles were above the 200 moving averages, that showed that the overall market was bullish; and if otherwise where candles were below the 200 moving averages, the market was bearish. As such the short-term double crossover moving averages strategy should be long for the former and short for the latter. This coincides with the result of longs during the lockdown period (see Table 3 and Table 4) with a profit factor above 1, in which the candles were above 200 moving averages thus, showing a bullish trend. While shorts after the lockdown period (see Table 5) with a profit factor above 1, in which the candles were below the 200 moving averages, thus showing a bearish trend.

The motivation of this study is due to the practice of the Malaysian traders' organization or institution or society that traded international market equities with a variety of double crossover moving averages strategies. Each organization had used different timeframes when selecting its strategies. Practically some have argued that their strategy is better than others. Theoretically, any strategy should end

up with quite a similar result, as statistically it shows that there was no significant difference among the strategies during and after the lockdown period. As such a trader should understand his own trading style and trading timeframe to satisfy his trading appetite. This study has only used a technical analysis with double crossover moving averages with minor and secondary trend timeframes. The data was then analysed based on Dow theory, which states that a trend should be in effect until it gives a definite signal for a reversal. Into the future, a researcher may be able to test other strategies in a technical analysis, and by using a variety of timeframes to search for a significant difference among the strategies.

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Appendix 1

Number of Winning and Losing Trades

	EMA 5 CROSSOVER EMA10		
	Before Lockdown	During Lockdown	After Lockdown
Number Winning Trades	10	9	6
Number Losing Trades	21	13	15
Total Trades	31	22	21
	EMA 5 CROSSOVER EMA20		
	Before Lockdown	During Lockdown	After Lockdown
Number Winning Trades	5	5	4
Number Losing Trades	14	11	9
Total Trades	19	16	13
	EMA20 CROSSOVER EMA50		
	Before Lockdown	During Lockdown	After Lockdown
Number Winning Trades	0	1	1
Number Losing Trades	7	3	4
Total Trades	7	4	5

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