

EVALUATION OF TECHNICAL ANALYSIS INDICATORS' PERFORMANCE IN THE KOREA STOCK EXCHANGE BEFORE AND DURING THE COVID-19 PANDEMIC

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Abstract

This study aims to evaluate the efficiency and performance of a set of technical analysis indicators on the Korean Stock Exchange, during two critical time periods: before and during the Corona pandemic, for the period from 2017 to the end of 2022. Based on the general index of the Korean market as a representative of the overall market performance.

The study relied on analyzing the performance of five of the most popular and widely used technical analysis indicators: Bollinger Bands, Relative Strength Index (RSI), Simple Moving Average (SMA), MACD, and Money Flow Index (MFI).

Trading signals were generated using the Python programming language, as it provides accuracy and speed in processing financial data, and daily returns and cumulative returns were calculated using Excel, which allowed for accurate quantitative comparison between the performance of different indicators.

The study included a double comparison between the performance of indicators in the market during the two periods before and during the pandemic. The results showed a clear discrepancy in the performance of the indicators between the two periods, as the accuracy of some indicators declined during the pandemic as a result of high levels of volatility and uncertainty, while other indicators proved their flexibility and ability to adapt to exceptional market conditions. The study concluded by identifying the most efficient indicators in each market, and provided practical recommendations to investors and financial analysts on how to use these indicators in periods of stability and crises, stressing the importance of adapting to changing market conditions and not relying exclusively on a single indicator.

Introduction

Technical analysis indicators are one of the most prominent tools used in evaluating price trends and making investment decisions in the financial markets, as they rely on studying historical patterns of price movement and trading volume to generate entry and exit signals.

However, the effectiveness of these indicators remains in question when sudden economic shocks occur, as in the case of the Corona pandemic, which caused widespread disruption in global markets and reshaped the behavior of investors and financial institutions in an unconventional manner.

In this context, this study proceeds to evaluate the performance of a selected set of technical indicators (RSI, MACD, SMA, MFI, BB) in the Korean market. The study period extends from January 2017 to December 2022, covering the pre-pandemic and pandemic phases, allowing for a quantitative and significant comparison between the periods of stability and disorder.

The study seeks to test the extent to which the efficiency of technical indicators in generating accurate trading signals changes during the crisis, using statistical analysis tools, foremost of which is the Welch's t-test, to detect significant differences in the performance of indicators across the studied market. It also aims to provide a knowledge framework that helps investors understand the limits of using technical analysis in unstable market conditions, and to propose systematic improvements to enhance the reliability of these tools during future crises.

The importance of this study lies in the fact that it fills a clear gap in the financial literature on the effectiveness of technical analysis in crisis contexts, and contributes to enriching the applied side by providing practical recommendations to investors and policymakers, thus enhancing the ability of markets to absorb shocks and achieve greater efficiency and stability.

Study Problem

Despite the wide spread of technical analysis indicators and their use by investors in the financial markets to predict price movements and make investment decisions, their actual effectiveness during periods of global economic turmoil, such as the Corona pandemic crisis, remains in question. The pandemic has led to sharp and unprecedented volatility in the markets, raising doubts about the ability of those indicators, which are mainly based on historical market behavior, to provide accurate signals in exceptional and non-recurring contexts. Hence, the problem of the study is to ask: (Is the performance of technical analysis indicators different in the Korea Stock Exchange before and during the Corona pandemic?, and did its results vary from the period of stability to the period of crisis?) .

Hypothesis

Based on the problem of the study and how to know the performance of technical analysis indicators in the Korea Stock Exchange, the study is based on the following hypotheses:

Basic Hypothesis (H): There are no statistically significant differences in the performance of technical analysis indicators in the South Korean market between the pre-pandemic period and the period during the pandemic.

Alternative Hypothesis (H): There are statistically significant differences in the performance of technical analysis indicators in the South Korean market between the pre-pandemic period and the period during the pandemic.

Objectives of the study:

The study seeks to achieve a set of objectives that can be summarized as follows:

- 1- The main objective of the study is to analyze and evaluate the performance of technical analysis indicators in the Korean market before and during the Corona pandemic.
- 2- Analysis of the performance of selected technical indicators (RSI, MACD, SMA, MFI , BB) during the period before and during the Corona pandemic.
- 3- Provide recommendations to investors and financial institutions based on the results of the study , by providing a knowledge map that helps researchers and practitioners to understand the limits and opportunities related to the use of technical analysis in non-traditional conditions.
- 4- Determine the reliability of these indicators during crises as a tool for investment decision-making and propose methodological improvements for the use of technical analysis during future crises.
- 5- Applying statistical analysis to detect significant differences in the performance of indices in the Korea Stock Exchange

Importance of the study

- 1- Addressing the scientific gap: The study bridges a clear lack of literature on the effectiveness of technical analysis under economic shocks.
- 2- Practical contribution: Provides investors with thoughtful assessment tools to improve their decisions during crises.
- 3- Benefit policymakers: The results guide economic policies to promote market stability in times of crisis.
- 4- Provides a reference for researchers and those interested in technical analysis on the effectiveness of indicators in light of sudden global variables.

Limits of the Study

- 1- Time limits: Stretching from January 2017 to December 2022 to cover the pre-pandemic period and during it and analyze the change in the performance of the indicators .
- 2- Spatial Limits: Korea Stock Exchange .
- 3- Statistical methods used in the applied side of the study

In line with the scientific requirements of the study, many programming and statistical methods were adopted. The most important programming language was (Python) , as this language was used to obtain the buy and sell signals that are adopted by traders when using technical analysis indicators, and to show these signals in the form of illustrations and curves that make it easier for the reader to identify these signals. Statistical programs (Excel , Spss) were used to calculate the cumulative returns of indicators, the average daily returns of each indicator, the standard deviation of returns, the Sharpe ratio and the maximum decline of returns. The Welch's t-test was chosen because it does not assume equal differences between the two groups, and it is appropriate to analyze financial data that may contain different variations in the two study periods.

Evaluating the performance of technical analysis indicators in the South Korean stock market The KOSPI General Index was adopted as a data source in this study for its broader representation of the Korean market, as it contains the largest 850 companies in the whole of Korea. The historical performance of the KOSPI during the study period (2017-2022) provided a rich ground for monitoring the differences between the two time periods before and during the pandemic, and assessing the responsiveness of the RSI, SMA, MFI, BB, and MACD indicators to market changes in this context. The performance of these indicators will be evaluated through the following measures:

Cumulative Strategy Returns, Average Daily Returns (Strategy Returns Mean) and Standard Deviation of Returns (Strategy Returns Std Dev.) Sharpe Ratio and Maximum Drawdown, for each indicator, for the duration of the study .

1- Simple Moving Indicator Performance Assessment (SMA)

The Simple Moving Average (SMA) trading strategy saw uneven performance over the duration of the study . According to the State of South Korea, Table No. (1) below shows the results of the performance of this indicator :

duration	Cumulative Returns	Average daily returns	Standard Deviation	Sharpe Ratio	Fall back!
COVID-19	-0.99%	-0.00%	0.26%	-0.00	7.64%
COVID-19	4.72	-0.01%	0.43	-0.02	88%
Recovery from the COVID-19	.4 89	0.02%	0.25%	0.08	1/70

Table No. (1): Results of the evaluation of the performance of the SMA index on the general index of the Korean market KOSPI

Source : Prepared by the researcher based on the outputs of (Python)

a) Coronavirus (COVID-19) Pandemic

Through the above table, we note that the index recorded negative cumulative returns of -0.99%, reflecting minor but continuous losses during this period . Average daily returns were relatively moderate and tended to lose slightly (-0.00%), with a low to medium standard deviation (0.26%), indicating limited volatility in the market. Despite this relative stability, Sharpe's ratio was negative (-0.00), which meant that the returns were not enough to cover the risk. The maximum decline was -7.64%, which is a relatively moderate decline.

b) Coronavirus (COVID-19) Pandemic

Through the same table, during this period, we notice a further deterioration in the performance of the index, as it recorded a larger cumulative loss of (-4.72%).) Although the average daily returns remained negative but by a small percentage (-0.01%), the standard deviation rose to (0.43%) as a result of increased market volatility. As a result, the Sharpe ratio decreased to (-0.02) , reflecting poor performance against the size of the risk, while the maximum decline reached (-11.88%) , which is the highest among all periods, indicating the poor performance of this indicator on predicting the direction of the market during the turmoil and financial crises.

At the beginning of December (2021), we notice a noticeable period of recovery in the Korean market as the performance of the index improved, and it achieved positive cumulative returns of (4.89%) , and the average daily returns of the index reached (0.02%) , which is an

indication of stable growth in performance. The standard deviation decreased to (0.25%) , reflecting a decrease in volatility compared to the previous period.

Sharpe's ratio rose to (0.08), becoming positive for the first time during the study period, indicating an improvement in returns relative to risk. Also, the maximum decline decreased to (-1.70%), which is the lowest decline recorded during the period , reflecting an improvement in the level of risk.

In general, the performance of this indicator was not effective before and during the pandemic, as it achieved negative results with weak Sharpe ratios, indicating that it did not adequately compensate for the risks. With the exception of the recovery period from the pandemic, the index has started to achieve positive results, with an improvement in stability and a reduction in losses. Figure No. (1) shows the signals of selling (arrow in red) and buying (arrow in green) to trade on the Korea Stock Exchange based on the index (SMA) segmented according to time periods (before and during the pandemic and recovery from the pandemic) .

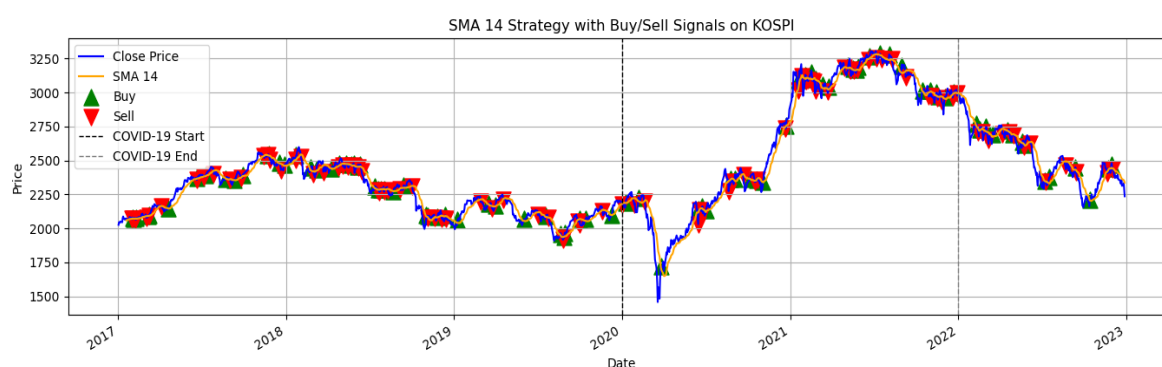


Figure (1) Buy and sell signals for trading in the South Korean market based on the SMA index during the study period

Source : Prepared by the researcher based on the outputs of (Python)

Figure (2) shows the cumulative returns of the trading strategy of the KOSPI market using the SMA indicator segmented by time periods before and during the pandemic and the recovery period.

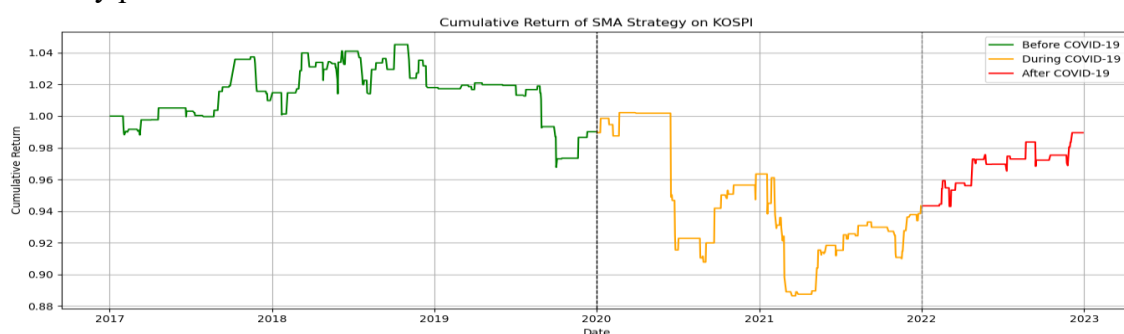


Fig 2 Cumulative Returns of the Trading Strategy for the South Korean Market Using the SMA Indicator

Source : Prepared by the researcher based on the outputs of (Python)

2- Evaluating the performance of the Relative Strength Index (RSI)

The Relative Strength Index (RSI) trading strategy saw uneven performance over the duration of the study. According to the State of South Korea, Table No. (2) below shows the results of the performance of this indicator :

duration	Cumulative Returns	Average daily returns	Standard Deviation	Sharpe Ratio	Fall back!
COVID-19	1.58%	0.00%	0.16%	0.01	3-13
COVID-19	6-29	-0.01%	0.29%	-0.04	9:50.
Recovery from the COVID-19	3:07	0.01%	0.15%	0.08	0-41

Table No. (2): Shows the results of the evaluation of the performance of the RSI index on the general index of the Korean market KOSPI

Source : Prepared by the researcher based on the outputs of (Python)

a) Coronavirus (COVID-19) Pandemic

We note that for the period before the COVID-19 pandemic, the RSI trading strategy achieved simple cumulative returns of (1.58%), indicating relative stability in the market with limited opportunities for large gains. Average daily returns were close to zero, showing a balance between daily profits and losses, while the standard deviation was (0.16%), reflecting moderate market volatility. Sharpe ratio was very low at (0.01) , which means that the returns against risks were low , and the maximum decline recorded was (-3.13%) , i.e. a moderate consecutive loss. The bottom line is that the market has been relatively stable with low to moderate strategy outcomes and moderate risk under control.

b) Coronavirus (COVID-19) Pandemic

During the COVID-19 pandemic, the strategy witnessed a decline in performance, recording cumulative losses of (-6.29%), with average negative daily returns of (-0.01%) .While the standard deviation rose to (0.29%), which indicates a sharp increase in market volatility and instability. Sharpe's ratio was negative (-0.04), reflecting that the losses exceeded the potential risks, and the maximum decline reached (-9.50%) , reflecting large consecutive losses during the period of the market panic.

In conclusion, this period was the most difficult due to the impact of the crisis on the markets and the increase in volatility, which led to the poor performance of the strategy.

In the period of recovery from the COVID-19 pandemic, we note clearly the improvement in market conditions and the performance of the trading strategy in this indicator, as it achieved positive cumulative returns of (3.07%) , with a positive average daily returns (0.01%). The standard deviation decreased slightly to (0.15%), reflecting reduced volatility and increased stability. Sharpe's ratio improved to (0.08) , which indicates a higher effectiveness of the strategy by achieving good returns against risk, and the maximum decline reached (-0.41%), which reflects a greater ability to protect capital and reduce risk.

In conclusion, the recovery period after Corona witnessed stability and a significant improvement in performance, which made the strategy safer and more efficient , and it can be said that the performance of the RSI index applied to the KOSPI market was weak during the period of the COVID-19 crisis, as losses and volatility worsened. But as the market recovered, the strategy of applying the RSI indicator returned for better profits with higher

stability and lower volatility. It can also be said that before the crisis, the strategy was fairly neutral with low profits but moderate risk. Figure No. (3): The buy and sell signals for the KOSPI market according to the performance of the RSI indicator are divided according to the periods of time before and during the pandemic and the recovery period.

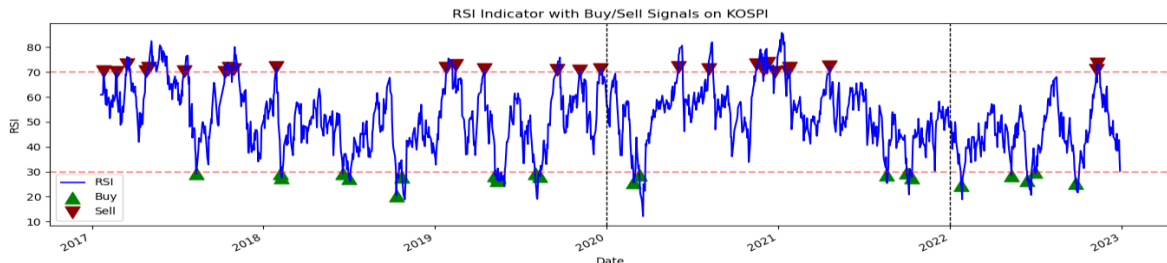


Figure 3: Buy and sell signals for trading in the general index of the Korean market KOSPI according to the performance of the RSI indicator

Source : Prepared by the researcher based on the outputs of (Python)

Figure (4): The cumulative returns of the trading strategy of the KOSPI market using the RSI indicator are segmented according to the periods of time before and during the pandemic and the recovery period.

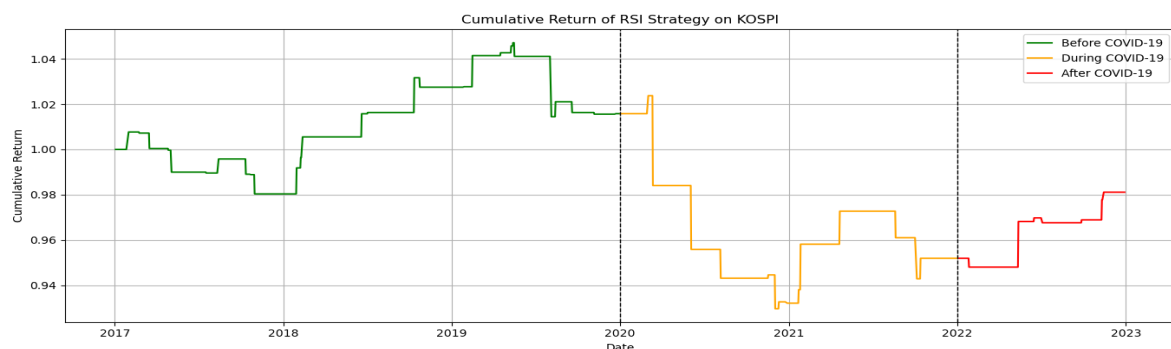


Figure number (4) The cumulative returns of the trading strategy in the general index of the Korean market KOSPI using the RSI indicator

Source : Prepared by the researcher based on the outputs of (Python)

3- Evaluating the Performance of the Convergence – Average Divergence (MACD) Index

The MACD trading strategy saw uneven performance over the duration of the study . According to the State of South Korea. Table (3) below shows the results of the performance of this indicator :

duration	Cumulative Returns	Average daily returns	Calibrated Deviation	Sharpe Ratio	Fall back!
COVID-19	7-26	0094)	2370	-0.63	-11.48%
COVID-19	3.24%	0256	3363	1.21	2.82***
Recovery from the COVID-19	2.83 %	0011	2773	-0.06	5.39%

Table No. (3): Results of the evaluation of the performance of the MACD index on the general index of the Korean market KOSPI

Source : Prepared by the researcher based on the outputs of (Python)

a. Before COVID-19

Through countries No. (3), we note that the cumulative returns in this period were negative by -7.26% , which indicates that the trading strategy using this indicator did not achieve profits during the period. The average daily return was negative (-0.0094%) with an average volatility of (0.237%) and the Sharpe ratio was also negative (-0.63). This indicates that the size of the returns relative to risk was very bad and did not cover volatility tolerance, and that the maximum decline reached (-11.48%) , which is a relatively large decline. Therefore, we note clearly that the performance of this indicator in this period is not good. Trading using this indicator(MACD) is not appropriate to take advantage of market movements before the pandemic.

b. Coronavirus (COVID-19) Pandemic

We note from Table (3) that the performance of the indicator during this period began to improve , as the cumulative returns were positive (+3.24%), with a positive average daily return (+0.0256%), and relatively larger fluctuations (standard deviation 0.3363%). Sharpe ratio was strong and positive (1.21), which means that the strategy provided good returns compared to the risk. In addition, the maximum drawdown was very low (-2.82%), demonstrating greater capital protection. Thus, this was the best period for the performance of the indicator, which indicates that the performance of this indicator is good during crises as compared to the rest of the indicators in the study sample, and the researcher believes that the reason for this is due to the use of more than one trend indicator at the same time.

From Table (3), we note at the end of 2021 the beginning of the recovery period from the pandemic , as the cumulative returns continued to be positive but slightly lower (+2.83%), with a slightly negative average daily return (-0.0011%), and moderate fluctuations (standard deviation 0.2773%). Sharpe's ratio was negative (-0.06), indicating that the returns were not sufficient for the risk. The maximum decline reached (-5.39%), which is slightly worse than the pandemic period but better than the period before it. This indicates a relative improvement compared to the pre-pandemic, but the strategy has lost some of its efficiency, and may reflect the absence of a clear trend in the market or the poor accuracy of MACD signals in this period . In summary, the best performance was during the Corona pandemic, as this indicator provided stable returns with low risks (Sharpe ratio 1.21). The worst performance was before the pandemic with negative returns and high risks (Sharpe ratio (-0.63) and maximum decline (-11.48%). The MACD strategy seems to be sensitive to the market situation, as it performs well in periods of clear trends (during crises) and this performance is reduced in normal sideways or volatile markets. Figure No. (5): Sell and buy signals for trading for the KOSPI market according to the performance of the MACD indicator are divided according to the periods of time before and during the pandemic and the recovery period:



Figure No. (5) Buy and sell signals for trading General index of the Korean market KOSPI According to the performance of the index MACD

Source : Prepared by the researcher based on the outputs of (Python)

Figure No. (6): It shows the cumulative returns of the trading strategy of the KOSPI market using the MACD indicator segmented by time periods before and during the pandemic and the recovery period.



(Fig. 6). Cumulative Returns of the KOSPI Trading Strategy Using the MACD Indicator

Source : Prepared by the researcher based on the outputs of (Python)

4- Bollinger Bands Performance Evaluation

The trading strategy using the Bollinger Bands indicator witnessed uneven performance during the study period, and we note that the performance was negative throughout the study period. According to the State of South Korea, Table No. (4) below shows the results of the performance of this indicator:

duration	Cumulative Returns	Average daily returns	Standard Deviation	Sharpe Ratio	Fall back!
COVID-19	42.17%	-0.0697%	3886	2.85	42.
COVID-19	65.77%	1203	0.6454%	2/96	40-80%
Recovery from the COVID-19	76.74%	1443	5351	4.28	32.05

Table No. (4):Results of evaluating the performance of the Bollinger Bands index on the general index of the Korean market KOSPI

Source : Prepared by the researcher based on the outputs of (Python

a. Coronavirus (COVID-19) Pandemic

From Table No. (4), we note that the cumulative returns in this period were negative by (-42.17%) , which indicates that the trading strategy using this indicator did not achieve profits during the period. The average daily return was negative (-0.0697%) with an average volatility of (0.3886%) and the Sharpe ratio was also negative (-2.85). This indicates that the size of the returns relative to risk was very bad and did not cover volatility tolerance, and that the maximum decline reached (-42.17%), which is a relatively large decline, which indicates that the market before the pandemic was witnessing a sharp and sudden decline, so we note clearly that the performance of this indicator in this period is not good , and that trading using this indicator is not suitable to take advantage of market movements before the pandemic.

b. Coronavirus (COVID-19) Pandemic

We note from Table (4) that the performance of the index during this period we note that the markets witnessed the highest volatility during the pandemic, and this is expected in light of the panic and confusion in the financial markets. Paradoxically, the performance in this period was not the worst compared to what happened during the recovery period, which indicates that the weakness of the strategy was not only due to volatility. This was due to other factors, as the cumulative returns were negative (-65.77%), with a negative average daily return (-0.1203%), and relatively larger fluctuations (a standard deviation of 0.6454%). The Sharpe ratio was negatively low (-2.96), which means that the strategy did not provide good returns compared to the risks. In addition, the maximum drawdown was very high (-40.80%). This indicates that the market in this period was witnessing a significant decline.

From Figure (4), we note at the end of 2021 the beginning of the recovery period from this pandemic , as the cumulative returns continued to be negative but larger (-76.74%), with an average negative daily return (-0.1443%), and medium fluctuations compared to previous periods (standard deviation 0.5351%). Sharpe's ratio was negative (-4.28), representing the performance of risk-adjusted returns, and its sharp decline during the recovery period indicates a deterioration in relative performance compared to the level of risk. This confirms that the strategy did not achieve an acceptable profit against the risks that the market was exposed to. The maximum decline reached (-32.05%) , which is slightly less than the pandemic period before it. This indicates a relative improvement compared to the pre-pandemic . However, the recovery period from the Corona pandemic witnessed the worst cumulative returns, reflecting a significant deterioration in the strategy's performance as a result of new post-pandemic market conditions such as high market volatility, changing market structure and investor behavior. The increasing negative daily average indicates that the strategy has become less profitable and more negative continuously, as losses have been more regular and frequent in the recovery period.

In general, the recovery period, as compared to other indicators, is the worst performer in terms of total returns and risk effectiveness. The performance of this strategy is clearly deteriorating as the market environment changes, demonstrating its need to reset or replace it with a strategy that is more flexible and adapted to market conditions all the time .

Figure (7): The buy and sell signals for the KOSPI market according to the performance of the Bollinger Bands index are segmented according to the periods of time before and during the pandemic and the recovery period.

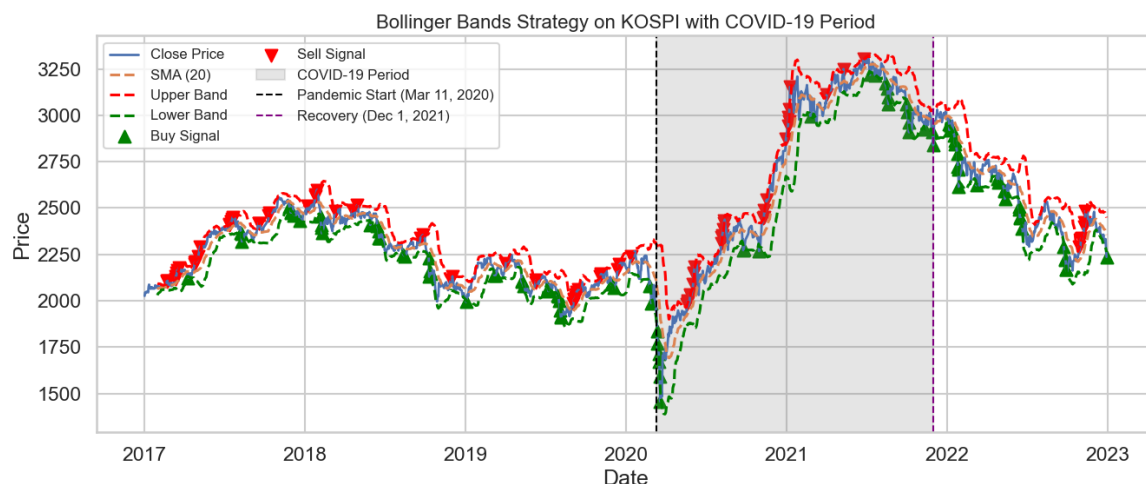


Figure 7. Buy and sell signals for trading General index of the Korean market KOSPI

According to the performance of the indicator Bollinger Band

Source : Prepared by the researcher based on the outputs of (Python)

Figure (8): The cumulative returns of the trading strategy of the KOSPI market are divided according to the performance of the Bollinger Bands indicator, the time periods before and during the pandemic, and the recovery period.

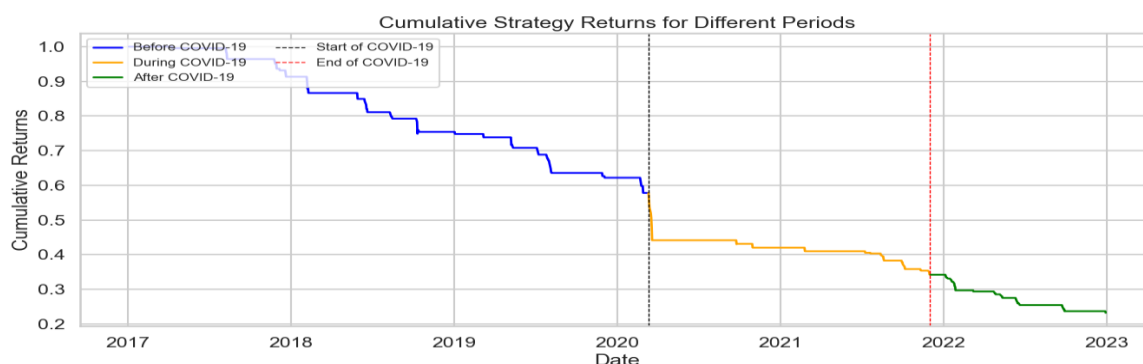


Figure No. (8) The cumulative returns of the trading strategy The General Index of the Korean market KOSPI is segmented according to the performance of the Bollinger Bands Index

Source : Prepared by the researcher based on the outputs of (Python)

5- Evaluating the performance of the Money Flow Index (MFI)

The MFI trading strategy witnessed uneven performance during the study period, and we note that the performance was negative throughout the study period. According to the State of South Korea, Table No. (5) below shows the results of the performance of this indicator:

duration	Cumulative Returns	Average daily returns	Standard Deviation	Sharpe Ratio	Fall back!
COVID-19	24:14).	-0.0351%	3126	1-78.	25-30
COVID-19	30-53	0169	8,533	-0.31	71 17,
Recovery from the COVID-19	37-45	0382	5173	1- 17.	12:45

Table No. (5): Shows the results of the evaluation of the performance of the MFI index on the general index of the Korean market KOSPI

Source : Prepared by the researcher based on the outputs of (Python)

To assess the performance of the market through this indicator, Table No. (5) shows the results of the measures applied to the data of the study period. The results when applying this indicator in the Korean market were not profitable throughout the study , as all periods recorded negative cumulative returns.

a. Coronavirus (COVID-19) Pandemic

Table (5) above indicates that the daily returns and cumulative returns using this indicator are negative for the duration of the study , but the lowest loss achieved before the Corona pandemic, where the cumulative returns reached (24.14%), while the average daily returns were negative in all periods of time , as the average return in this period reached (-0.0351%), while when calculating the standard deviation, it reached (0.3126%), which means that it is less volatile than the period during the pandemic , the Sharpe ratio, which measures the adjusted return on risk, was negative in all periods, which indicates that the returns achieved by the strategy were not sufficient to compensate for the risks borne by the investor. The lowest pre-pandemic Sharpe ratio was (-1.78) , however, the pre-pandemic period was relatively more stable with less cumulative losses. As for the maximum decline, the largest decline occurred before the pandemic (-25.30%), which is higher than the declines during the pandemic and recovery period, indicating that the maximum losses were before the pandemic period, although the market was less volatile compared to the pandemic period.

b. Coronavirus (COVID-19) Pandemic

During this period, we note from the above table that the losses were greater as the cumulative returns reached (-30.53%), while the average daily returns were negative in all periods of time , with the lowest daily loss during the pandemic (-0.0169%), which indicates repeated daily losses but at a slower pace in the duration of the pandemic compared to other periods. When calculating the standard deviation, it reached its highest level during the pandemic (0.8533%), reflecting high volatility in the market, stressing that the pandemic period was the most dangerous and unstable. Sharpe's ratio was the highest during the pandemic, reaching (-0.31), which means that the risk-adjusted return for this period is less negative than other periods, while the maximum decline was (-17.71%) during the pandemic, which is less than the period before it.

During the period of recovery from the pandemic, the cumulative returns were (-37.45%), which indicates the impact of high market fluctuations during the pandemic and the recovery period on the performance of the index. The average daily returns were negative in all time periods , as the average return in this period was (-0.0382%), which means it is the most loss

compared to other periods. When calculating the standard deviation, it reached (0.5173%), which means that the standard deviation began to decrease gradually, while we see that the Sharpe ratio in this period is (-1.17), and the maximum decline was (-12.45%) during the recovery from the pandemic, which is less than the period before it.

In general, these results show that the MFI index did not perform well in the KOSPI market in the study sample period, if compared to other indicators with relatively better performance before the Corona pandemic, and a clear negative impact of periods of high market volatility during and after the pandemic. Figure No. (9): The buy and sell signals for the KOSPI market according to the performance of the MFI index are divided according to the periods of time before and during the pandemic and the recovery period.

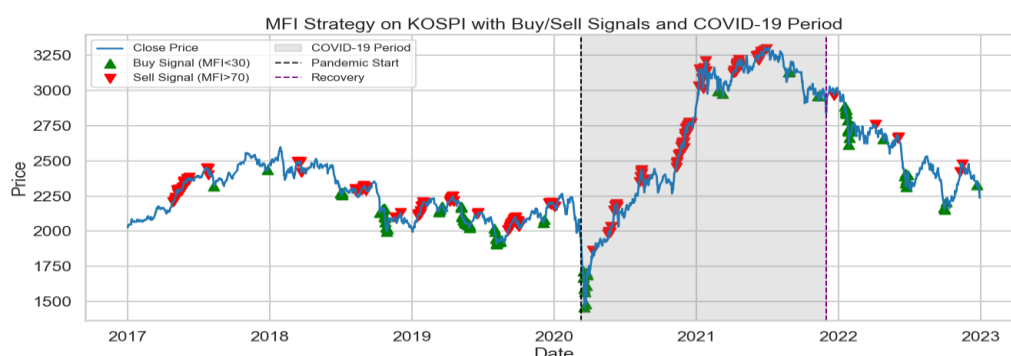


Fig 9 Buy and sell signals for trading General index of the Korean market KOSPI
According to the performance of the index MFI

Source : Prepared by the researcher based on the outputs of (Python)

Figure No. (10): It shows the cumulative returns of the trading strategy of the KOSPI market segmented according to the performance of the MFI indicator for the duration of the study.

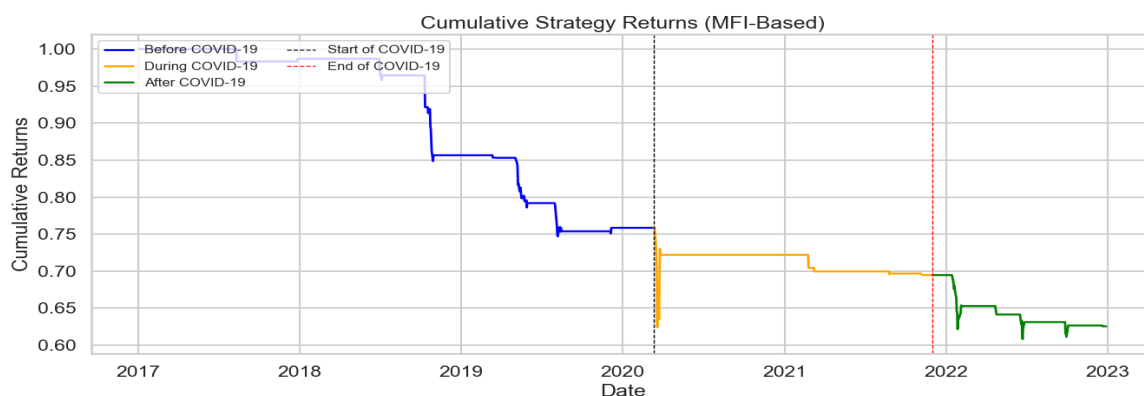


Figure 10 The cumulative returns of the trading strategy The General Index of the Korean market KOSPI According to the performance of the index MFI

Source : Prepared by the researcher based on the outputs of (Python)

First: Statistical Analysis of the Performance of Technical Analysis Indicators in the Korean Market

Table(6) shows the details of the means and standard deviations of each indicator in the Korean market, with t-values and p-test to indicate the existence of significant differences to test the following sub-hypotheses:

Indicator	Average returns Before Pandemic	Pre-pandemic standard deviation	Average returns during the pandemic	Standard deviation during the pandemic	t-Statistic	P-value
SMA	2220.58423	163.92734	2649.95333	490.59318	47560	00000
RSI	48.89509	12.18537	54.30622	12.57426	-6.86220	00000
MACD	0.27865	7.35493	-0.13156	11.61221	0.66350	0.50720
BB	Box 43659	67.48712	217.94973	134.94967	-12.60670	00000
MFI	52.03777	16.84496	55.70132	14.97729	-3.60740	00030

Table(6) Averages, standard deviations and (t-test) for each indicator before and during the pandemic for the Korean market (KOSPI)

Source : Prepared by the researcher based on (spss)

1- • Simple Moving Average (SMA)

Through Table (6), we note that the average returns before the pandemic increased from (2220.58423) to (2649.95333) during the pandemic , with a rise in the standard deviation from (163.92734) to (490.59318). This indicates a significant increase in volatility in the average returns , the value of t: Calculated (-18.47560) is much larger than the tabular value, and since the value of p (0.00000) is moral , so we reject the basic hypothesis (H): and we accept the alternative hypothesis (H): , we note that the difference is highly moral, which indicates a clear change in the general trend of prices during the pandemic, and this reflects an increase in price volatility.

2- RSI.

Through Table (6), we note that the average returns before the pandemic increased from (48.89509) to (54.30622) during the pandemic , with a rise in the standard deviation from (12.18537) to (12.57426). This indicates a high fluctuation in the average returns , the value of t: calculated (-6.86220) is greater than the tabular value, and since the value of p: (0.00000) is moral , so we reject the basic hypothesis (H): and accept the alternative hypothesis (H): , we note that the difference is moral to a high degree, which indicates an increase in market momentum, perhaps as a result of rapid changes in investor behavior during the crisis.

3- for moving average convergence/divergence

Through Table (6), we note that the average returns decreased from (0.27865) before the pandemic to (-0.13156) during the pandemic with an increase in the standard deviation from (7.35493) to (11.61221). This indicates an increase in the fluctuation in the average returns , the value of t: calculated (0.66350) is less than the tabular value, and since the value of p: (0.50720) is immaterial, so we accept the basic hypothesis (H): We reject the alternative hypothesis (H): There are no significant differences, which indicates that short-term trends were not significantly affected in the Korean market during the pandemic.

4- Bollinger Bands (BB)

Through Table (6), we note that the average returns before the pandemic increased from (132.43659) to (217.94973) during the pandemic , with a decrease in the standard deviation from (16.84496) before the pandemic to (134.94967) during the pandemic , and this indicates a high volatility in the average returns , the value of t: Calculated (-12.60670) is much larger than the tabular value, and since the value of P: (0.00000) is moral , so we reject the basic hypothesis (H): and accept the alternative hypothesis (H): , we note that the difference is highly moral, reflecting a significant increase in price fluctuations, which is in line with the nature of the indicator that measures volatility.

5- (MFI)

Through Table (6), we note that the average returns before the pandemic increased from (52.03777) to (55.70132) during the pandemic , with an increase in the standard deviation from (67.48712) before the pandemic to (14.97729) during the pandemic , and this indicates a decrease in volatility in the average returns , the value of t: Calculated (-3.60740) is much greater than the tabular value, and since the value of P: (0.00030) is moral , so we reject the basic hypothesis (H): and accept the alternative hypothesis (H): , we note that the moral difference indicates a change in the flow of liquidity towards securities , perhaps as a result of changes in trading volume or investor trends.

Conclusion

From this, we conclude that four out of five technical indicators showed significant differences in performance between the two periods, which indicates that the South Korean market was clearly affected by the Corona pandemic in terms of general trends, momentum, and volatility.

As for the MACD, it has maintained relative stability, which may reflect the Korean market's resistance to short-term changes or the weak response of this indicator in crisis conditions.

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