THE MOVING AVERAGE CROSSOVER STRATEGY: A STUDY

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ABSTRACT

A moving average is an indicator used in Technical Analysis to understand the strength and direction of the movement in prices. Moving averages are used to analyze Trend of the market/ stock. Moving averages are used to alert, to confirm and to forecast movement in prices in future. The study is restricted to the Nifty 50 Index for the period 1st January 2020 to 31st May 2020. The study covers only 5 day EMA, 13 day EMA and 26 day EMA and the crossover of 5 day EMA, 13 day EMA and 26 day EMA strategy to buy or short sell. The study concludes that traders can use the Moving Average crossover Strategy to understand the trend of the market / stocks. The Moving Average Crossover Strategy can be used by traders for short term trading in a trending market. When applied to the Nifty 50 Index chart in this study the strategy was successful.

___KEYWORDS___: *Technical Analysis, Indicators, Simple Moving Average, Exponential Moving Average.*

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Introduction

Technical Analysis is a study which analyzes past information of prices to forecast or to arrive at future movement in prices of stocks. A Technical Indicator uses a mathematical formula based on price and volume to generate buy and sell signals. A series of data points are arrived by applying a formula to the price of a stock is a technical indicator. Some indicators use closing price and some use closing price and volume.

In Technical Analysis there are two types of Indicators- Leading Indicators and Lagging Indicators. Leading Indicators lead/ move ahead of price movement and Lagging Indicators follow price movement. Relative Strength Index (RSI), Stochastic are considered Leading Indicators as they lead/ move ahead of price movements. Moving averages are considered as Lagging indicators as they lag behind prices. Moving averages follow price movements. Moving averages are also known as indicators which follow the Trend. Moving averages are best used in a trending market as they are trend following indicators. Moving averages may not work in a sideways / a range bound market.

A moving average is a tool used in Technical Analysis to understand the strength and direction of the movement in prices. A moving average is an indicator used in technical analysis. Moving averages are used to alert, to confirm and to forecast movement in prices in future. There are mainly two important types of Moving averages - Simple Moving Average (SMA) and Exponential Moving Average (EMA)

Simple Moving Average

A Simple Moving Average is arrived at by calculating the mean price (average) of a stock over a specified period of time. Usually the closing price of a stock is taken to calculate the average. A 5 day Simple Moving Average is calculated by adding the closing prices of a stock over a 5 day period and dividing the total by 5. The SMA gives equal value to each price for the time period selected.

A 5 day SMA is calculated as = **10 + 12 + 14 + 13 + 11 = 60**

= 60 / 5 = 12

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The calculation is continued for each price candle on the chart. The averages are joined to form a smooth curving line called the Moving Average line. If the next closing price is 13 then this added and the oldest price is deleted to calculate the moving average.

New 5 day SMA is calculated as = **12 + 14 + 13 + 11 + 13**

= 63 / 5 = 12.6

Exponential Moving Average

Exponential Moving Average is calculated by applying more weight to the recent prices as compared to the older prices. That means it will react faster to price changes than a SMA. EMA is also known as Exponentially Weighted Moving Average. Traders use Exponential Moving Average to reduce the lag in prices. Exponential Moving Averages can be percentage based or period based.

The formula for EMA is

EMA (current) = ((Price current) – EMA (previous)) X Multiplier + EMA (previous)

For a percentage based EMA the "Multiplier" is the specified percentage of EMA

For a period based EMA "Multiplier" is equal to 2 / (1+N) where N is the number of periods

A 5 period EMA Multiplier is calculated as follows:

$$\frac{2}{\text{Time period}+1} \quad = \quad \frac{2}{5+1} \quad = \quad 0.3333 \quad \text{or} \quad 33.33\%$$

The above means the 5 period EMA is 33.33%

In an EMA every previous closing price is used. For the older prices the weight will keep reducing but the price will never be removed from the calculation

Simple Moving Average (SMA) and Exponential Moving Average (EMA)

SMA moves with a lag to the price and EMA moves closer to the price. SMA reacts much slower to the price as compared to the EMA. EMA reacts faster to price but can break quickly. EMA can give more false signals. SMA can also give false signals. Traders use Moving averages depending on the frequency of trading. Mostly for short term trading EMA is preferred and to analyze the trend for the Long term SMA is used.

The most commonly used averages to analyze the long term trend of stocks are 50 day SMA, 100 day SMA and 200 day SMA and crossover of 50 day SMA, 100 day SMA and 200 day SMA. To analyze the short term trends traders mostly use 5 day EMA, 13 day EMA, 26 day EMA and crossover of 5 day EMA, 13 day EMA and 26 day EMA. Some traders also use 10 day SMA and 20 day SMA and crossover of 10 day SMA and 20 day SMA for analyzing the short term trend of stocks. In this study we are going to consider 5 day EMA, 13 day EMA and 26 day EMA and crossover of 5 day EMA, 13 day EMA and 26 day EMA.

Limitations of Moving Averages

- Moving Averages are called Lagging Indicators because they move behind the price movement. The indicator may be too late to react to price movement specially SMA's and prices may have already moved far before the signal is generated. Though EMA's move closer with the price movement as compared to SMA.

- Moving Average signals work only in a trending market, they may not work when the market is sideways or range bound.

- Moving Averages can generate false signals.

Literature Review

A number of studies have been done on technical analysis tools like Moving Averages. This paper brings forward a few studies on technical analysis tools.

[1] Mohd Naved and Prabhat Srivastava (2015) in their Paper titled "Profitability of Oscillators used in Technical Analysis in Financial Market" have made an attempt to study the profitability of various types of Oscillators used in Technical Analysis. The study is done on the S&P CNX Nifty 50 Index for the period 2004 to 2014. The Researchers have used three indicators, Relative Strength index (RSI), Stochastic and Commodity Channel Index (CCI). They have concluded that the three indicators generate same profit but CCI has given a slightly higher profit.

[2] Bhamini Garg (2014) in her Paper titled "Technical Analysis Indicators: Pathway towards Rewarding Journey" has tried to evaluate the profitability of Technical analysis indicators. She has tried to analyze indicators like Moving Average Convergence Divergence, Moving Averages, Average Directional Index, Relative Strength Index and Money Flow Index on charts. She has concluded that Indicators are one of the finest ways to make successful investment decisions.

[3] Darshan Shivanand Gadag and Manas Mayur (2015) in their paper titled "Technical Analysis and Stock Market Return" have made an attempt to study Moving Averages and Moving Average Crossovers on select Index/ stocks. They concluded that technical analysis tools like Moving Averages and Moving Average Crossovers help understand the trend in stocks or the trend in the market.

[4] Brock, W., J. Lakonnishok and B. LeBaron (1992) in their Paper titled "Simple Technical Trading Rules and Stochastic Properties of Stock Returns" the researchers have made an attempt to study two very simple trading rules, Moving Averages and Trading range breakout. They concluded that technical analysis has given positive results and buy signals have given better returns in comparison to Sell signals.

[5] Sakshi Varshney (2014) in her Paper titled "Technical analysis of Indian Pharmaceutical Companies" the researcher has made an attempt to study technical analysis on Indian pharma companies. She has used technical indicators like Bollinger Bands, Relative Strength index and Moving Averages to analyze the trend in stocks. She has concluded that indicators are important to analyze the trend in stocks.

Significance of the Study

Moving Averages are an important tool used by traders to analyze the trend in stocks/ market and to trade in stocks/ indices. In this study the researcher has made an attempt to study the moving average crossover strategy and has tried to see whether this tool is effective in analyzing the trend of the market/ stocks and whether it can be used for short term trading to make money.

Scope of the Study

Scope of the Study is restricted to the Nifty 50 Index of The National Stock Exchange of India Limited (NSE) for the period 1st January 2020 to 31st May 2020. The daily chart of Nifty 50 Index is used for analysis. The study covers only 5 day EMA, 13 day EMA and 26 day EMA and the crossover of 5 day EMA, 13 day EMA and 26 day EMA strategy to create buy signal or short sell signal.

Objectives of the Study

- To study the Moving Averages used by traders in the stock market.
- To study if Moving Averages can help analyze trend of the market/ stocks
- To study the Moving Average Crossover Strategy used by Traders for short term trading.

Research Methodology

The data for the study is collected from the charting software of Sharekhan – "Trade Tiger", www.sharekhan.com and www.nseindia.com. The study is descriptive and analytical and is based on secondary data. The sample consists of the Nifty 50 Index and the period of the study is from 1st January 2020 to 31st May 2020. The Moving Average cross over strategy is analyzed and interpreted by way of graphical representation of past prices on Charts. In the charting software of Sharekhan – "Trade Tiger" historical prices of stocks/ Indices are represented in a graphical form by way of candlesticks. The study analyzes 5 day EMA, 13 day EMA and 26 day EMA and the crossover of 5 day EMA, 13 day EMA and 26 day EMA strategy to buy or short sell. Short selling can only be done in futures and Options in the Equity Derivatives Market. In this study the period for trading Short term is defined as 2 days to 2 months. In this study the analysis is done on Cash market/ spot market charts and buy or short sell position is taken in Nifty futures of the Derivatives market. So the prices mentioned below are of Cash market/ spot market prices. The charting software used for the study is Sharekhan –"Trade Tiger". Sharekhan is a subsidiary of BNP Paribas.

Trading Signals generated by Exponential Moving Average Crossovers - The Strategy
Buy Signal generated by EMA crossover

- When the 5 day EMA crosses above the 13 day EMA on the daily chart a Buy signal is generated. It is important that the Buy signal is supported by increase in volume in case of stocks. Volume need not be considered in case of Indices like Nifty and Bank Nifty because Indices already trade with high volume. A person can Buy when this Buy signal is generated.

- When the 5 day EMA crosses above the 26 day EMA on the daily chart a Buy more signal is generated. One can buy more or add more when the signal is generated. This indicates that the uptrend is getting stronger. It is important that the signal is supported by increase in volume in case of stocks.
- When the 13 day EMA crosses above the 26 day EMA on the daily chart the signal generated is the uptrend is getting even stronger. One can hold on to the bought shares when the signal is generated. This indicates that the uptrend is getting stronger and stronger. It is important that the signal is supported by increase in volume in case of stocks.
- When the 5 day EMA crosses above the 13 day EMA and the 26 day EMA on the daily chart at the same time a strong Buy signal is generated. This signal means there can be a sudden spurt in share price and mostly an immediate spurt in the share price. Mostly the stock moves 5 % up in the immediate short term after this signal is generated. A person can buy more when the signal is generated. This indicates that the uptrend is getting stronger. It is important that the signal is supported by increase in volume in case of stocks.

Sell Signal / Short Sell Signal Generated by EMA Crossover

- When the 5 day EMA crosses below the 13 day EMA on the daily chart a Sell signal is generated. It is important that the Sell signal is supported by increase in volume in case of stocks. Volume need not be considered in case of Indices like Nifty and Bank Nifty because Indices already trade with high volume.
- When the 5 day EMA crosses below the 26 day EMA on the daily chart a Sell more signal is generated. One can sell or short sell more when the signal is generated. This indicates that the down trend is getting stronger. It is important that the Sell signal is supported by increase in volume in case of stocks.
- When the 13 day EMA crosses below the 26 day EMA on the daily chart the signal generated is the downtrend is getting even stronger. One can hold on to the short sell position when the signal is generated. This indicates that the downtrend is getting stronger and stronger. It is important that the signal is supported by increase in volume in case of stocks.
- When the 5 day EMA crosses below the 13 day EMA and the 26 day EMA on the daily chart at the same time a strong Sell signal is generated. This signal means there can be a sudden fall in share price and mostly an immediate fall in the share price. Mostly the stock moves 5 % down in the immediate short term after this signal is generated. A person can sell more when the signal is generated. This indicates that the downtrend is getting stronger. It is important that the signal is supported by increase in volume in case of stocks.

Data Analysis and Findings

Nifty 50 Index Chart

Source: Sharekhan – Trade Tiger

The 5 day Exponential Moving Average (EMA) line is in blue colour, the 13 day EMA line is in dark pink colour and the 26 day EMA line is in dark green colour.

Findings

- On 20th February 2020, the 5 day EMA blue line crosses below the 26 day EMA dark green line. A Sell / Short Sell Signal was generated. The closing price for Nifty 50 Index on 20th February 2020 was 12080.85. On 24th February the 5 day EMA blue line crosses below the 26 day EMA dark green line and 13 day EMA dark pink line, the Short Sell signal gets stronger and a person could short sell more or add more to the short sell position. The closing price of Nifty 50 Index on 24th February 2020 was 11829.40. Prices of Nifty 50 Index kept falling till 24th March 2020. Prices made a low of 7511.20 and closed at 7801.05 on 24th March 2020.

  The Short Sell position on Nifty can be closed and profit can be booked on 25th March 2020 as the price of Nifty 50 Index had closed above the 5 day EMA blue line. The closing price of Nifty 50 Index on 24th March 2020 was 8317.85 and the low was 7714.75. Short selling can only be done in futures and options in the Equity Derivative market. Short selling cannot be done in the Cash market.

  The lot size for Nifty 50 Index is 75 shares in Futures. If a person had short sold 1 lot of 75 shares of Nifty 50 on 20th February 2020 at 12080.85 on closing or on the next day and he would have booked profit on 25th March 2020 he would have made a profit of Rs 2,82,225 [(12080.85 - 8317.85) X 75= Rs 2,82,225] in a period of 1 month and few days. The Moving Average cross over strategy has proved to be profitable in the short term in the above case.

- On 9th April 2020 the 5 day EMA blue line crosses above the 13 day EMA dark pink line. A Buy Signal was generated. The closing price of Nifty 50 Index on 9th April 2020 was 9111.90. A person could buy on 9th April or on the next day. On 28th April 2020 the 5 day EMA blue line crosses above the 26 day EMA dark green line. A stronger Buy signal was generated. A person could add more to the Buy position. The closing price of Nifty 50 Index on 28th April 2020 was 9380.90. The high made on 30th April for Nifty 50 was 9889.05 and the closing price was 9859.90. A person would have earned around 748 points on Nifty 50 Index Buy trade had he bought on 9th April. On a lot size of 75 shares on nifty a person would have made a profit of Rs 56,100. [(9859.90-9111.90) X 75 shares = Rs 56,100]. The Moving Average cross over strategy has proved to be profitable in the short term in the above case.

- On 27th May 2020 the 5 day EMA blue line crosses above the 13 day EMA dark pink line. A Buy Signal was generated. The closing price of Nifty 50 Index on 27th May 2020 was 9314.95. A person could buy on 27th May towards the day end or on the next day. On 28th May 2020 the 5 day EMA blue line crosses above the 26 day EMA dark green line. A stronger Buy signal is generated. A person could add more to the Buy position. The closing price of Nifty 50 Index on 28th May 2020 was 9490.10. The closing price of Nifty 50 Index on 29th May 2020 is 9580.30

Conclusions

- The 5 day EMA, 13 day EMA and 26 day EMA crossover strategy to buy or short sell can be used by traders for short term trading in a trending market. Strategy should be used with a strict stop loss.

- When applied to the Nifty 50 Index chart in this study the strategy was successful.

- Traders can use the Moving Average crossover Strategy to analyze and understand the trend of the stocks / market.

Limitations of the Study

- The study was done for a very short period from 1st January 2020 to 31st May 2020 on the Nifty 50 Index of NSE. This was done just to explain the Moving Average Crossover Strategy used by traders for analyzing trend and for short term trading. To understand if the strategy has a good success ratio or no, the study needs to be done on a larger sample size and for a longer period of time.

- The Moving Average Crossover Strategy works only in a trending market. It may not work in a sideways or a range bound market.

- The Volume is not considered for the Nifty 50 Index as Indices trade with large volume but if this strategy is applied to stocks volume must be considered along with the moving average crossovers.

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