Use of Moving Average Convergence Divergence for Predicting Price Movements

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Abstract

The main purpose of this study is to carrying out how Moving Average Convergence Divergence (MACD) works for predicting price of securities and to assist investment decisions. It is one of the powerful technical indicators, which is frequently used by technical analysist in stock market. However, most tests fail to verify performance with traditional parameter settings of 12, 26, and 9 days. This technique consists of a combination of close neighbor classification and some well-known tools of technical analysis, namely, stop loss or stop profit. In order to evaluate the potential use of the proposed method in practice, we compare the results obtained with the results obtained by adopting the buy and hold strategy. This paper shows how trade signal generated by this indicator can be used to minimize trading risk in markets. This study also tests which model is able to improve profitability by applying additional criteria to avoid false trade signals. The key performance measure in this technique is profitability. Technical analysis is used to assist in properly timing entry and exit points, when to buy and sell of stocks?

Keywords: Exponential moving averages (EMA), Moving Average Convergence Divergence (MACD), Technical Analysis, Stock Market

1. Introduction

Using the MACD technical indicator, forecasting the price movement in the stock market is one of the most difficult tasks. It is one of the most popular momentum indicators used in technical analysis of stock and other tradable asset prices. Moving average convergence refers to the moving average line and the signal line moving towards each other, whereas moving average divergence means moving average line and signal line diverging from a common point in different direction. It consists of three parameters that define three time periods: Two parameters are used to calculate the MACD series, the 'short-term' and 'long-term' exponential moving averages (EMA) of the price series. There is a difference between the second series is for the 'signal' which is the EMA of the MACD. All series are calculated from historical price data, often using daily closing prices, and displayed on indicator graphic charts.

The technical indicator MACD indicates convergence and divergence with the help of two moving averages i.e., 12 day EMA which is fast line and 26 day EMA which is a slow line, and further indicates buying and selling between the two lines. Above or below each other at a point when the histogram is either 0 or min above 0 or below 0 (Singh & Chakraborty, 2022).

MACD is a trend following momentum indicator it shows the relationship between two moving average of a stock price. It is calculated by subtracting the 26-term Exponential Moving Average (EMA) from the 12-term EMA. The result of this calculation is the MACD line. The MACD's nine-day EMA, called the "signal line", is then plotted above the MACD line, which can act as a trigger for buying and selling signals (Vishwakarma, Aod, Gaur, & Prof. Thakkar, 2021). "MACD Line" and "Signal Line" in terms of signal generation, it is common to interpret the following: 'Buy' when the MACD line goes above the signal line and 'Batch' when it goes below the signal line. This trading principle is called "signal line crossover" and the buy / sell signal is considered to be a basic signal provided by the signal, although the actual ways in which investors use this model for trading are diverse (Kang, 2021).

MACD was introduced by Gerald Appel in 1979 and is one of the most popular technical indicators. It is also an indicator that measures the speed of the price i.e., the strength and direction of the trend in the stock price. MACD as a technical analysis can do something about the way to invest in the stock market. Extraordinary cost and risk adjusted profits for some companies at times (Anghela, 2015). It is one of the simplest and most effective momentum indicators. It fluctuates above and below the zero line as the moving averages convergence, Cross and divergence. The standard MACD is 12-day exponential moving average (EMA) lower then, the standard MACD 26-day EMA. A 9-day EMA of MACD is plotted along the MACD and its 9-day EMA, the signal line (Sudheer V. , 2015).
Calculation:
MACD line = (12-day EMA – 26-day EMA)
Signal line = 9-day EMA of MACD line
MACD histogram = MACD line – Signal line
The MACD can be formulated as:

$$MACD = \sum_{i=1}^{n} EMA_k - \sum_{i=1}^{n} EMA_d$$

Where,
k = 12 days
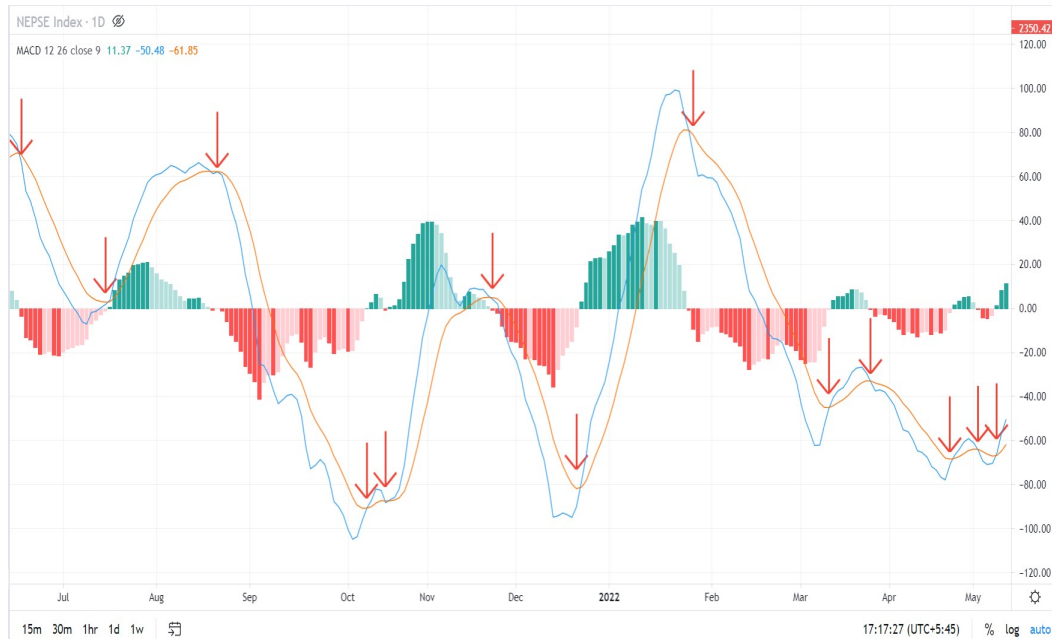d = 26 days

$$\text{Exponential Moving Average (EMA)} = \left[\frac{2}{n} \times (P_t - EMA_{t-1})\right] + EMA_{t-1}$$

Where,
n = no. of period
t = time
P_t = index value at time

Figure 1: *MACD of Nepal Stock Exchange Ltd. (NEPSE)*
Source: *www.sharesansar.com*

The above figure represents MACD histogram, MACD line is in blue color, whereas signal line is in orange color. Histogram is in positive is in green and deem green color same like negative histogram is in red and pink color. In the figure MACD line has intersected the signal line 13 times in a year, whereas MACD has made the highest top by +100.36, and same like highest bottom of -105.22. On the other hand histogram has made highest positive by +41.62 and highest negative by -41.30.

1.1 Research Objectives

The main objective of this study is to find out how the MACD helps to forecast price movement and fluctuation in stock market. A prominent objective of this study is to assess whether the use of this indicator by traders can make profit in a short period or not. This study will also help to examine the use of MACD to identify the relatively up and down trend price of securities.

2. Materials and Method Used

This study is based on the review of literature. In this study, collected information is secondary data, and hence, the data have been collected from various books, journals and websites, whereas research design is based on descriptive and analytical research design. The analysis of data is based on the technical indicator Moving Average Convergence Divergence (MACD) and inferred based on the chart patterns formed.

3. Result and Discussion

Technical analysis is used to identify stock market price patterns and trends. Various technical indicators help investors to predict future price movements. MACD as a technical indicator is used by different traders to predict price movements in the stock market. This will help investors to make some strategies investment decisions to enter or exit the market at any time (Manjula & Rao, 2018).

Use technical tools such as candlestick charts, RSI and MACD indicators to sell and buy signals. This technical analysis is needed to study the stock market. Researchers had done research for over a year to analyze price movements (Ramesh & Devendar, 2017).

3.1 MACD Benefits

It combines aspects of both momentum and trend into one indicator. As a momentum indicator, the MACD has the potential to predict movement in basic security. It divergences can be important factors in predicting a trend change. It represents the convergence and divergence of two moving averages. The standard setting for MACD is the difference between 12 and 26-period EMA. For volatile stocks, a slow moving average may be needed to help smooth the data. The MACD should be in line with its own trading style, objectives and risk tolerance (Drakopoulou, 2015).

3.2 MACD Drawbacks

The MACD shows the difference between the two moving averages. There may still be some gaps in the indicator itself. MACD-Histogram shows the difference between the MACD and its trigger line, the 9 day EMA of MACD. If the value of MACD exceeds the value of its 9-day EMA, then the value on MACD histogram will be positive. Conversely, if the MACD value is lower than its 9-day EMA, the value on the MACD-histogram will be negative. This is not particularly good for indicating overbought and oversold levels. The MACD has no upper or lower limits for its movement (Drakopoulou, 2015).

There is only one side of the stock market and it is not the bull side or the beer side but the technical analysis can be used on the right side, when to buy and when to sell of stock. With the help of technical analysis, the investor can make the right buying and selling decisions (Sudheer V. , 2015).

It is also important that investors have some knowledge of the stock market and technical indicators before making any investment (Murugesan & Priya, 2016).

4. Conclusion and Recommendation

The use of technical analysis in context of Nepal is no longer history. At the time of Covid 2019 investors and traders were free at home so, due to the lock down most of them used their leaser time to learn technical analysis. Thus, due to attraction in stock marker the traders in NEPSE increased rapidly to approximately 1.1 million, same like Demat Account increase to approximately 5.3 million. But, still in the stock exchange and regulatory body doesn't have fully technical analysis chart in official website. The attraction in the stock market among the Nepalese investors is increasing day-by-day. The main focus of participation in the stock market is for higher return in short period. Therefore, the investor can rely on technical analysis techniques, before investing s/he should not make any investment decision blindly.

The investor's risk tolerance level should also be taken into consideration before making any investments. When the stock market is highly volatile at that time MACD doesn't give right decision for short term trading. The scrip should also be fundamentally good. So it's advisable to use both technical & fundamental analyses before investing money.

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