

An Application of Moving Average Convergence and Divergence (MACD) Indicator on Selected Stocks Listed On National Stock Exchange (NSE)

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ABSTRACT

This study is aimed at undertaking technical analysis of selected companies included in the CNX Nifty. Technical Analysis is widely used by traders for trading decisions in the stock market especially intraday trading. Various technical indicators like the moving averages or momentum indicators assist the traders in decision making. One such trend indicator is the Moving Average Convergence and Divergence (MACD) indicator. This working paper analyses the application of MACD indicator on selected five stocks from the National Stock Exchange (NSE). Certain precautionary measures have also been suggested for successful implementation of the indicator. This project also demonstrates how MACD can be of valuable use for the investors in marking their investment decisions.

KEY WORDS

Technical analysis, Moving Average Convergence and Divergence, Technical Indicators, Stock Market

INTRODUCTION

Investment is the present sacrifice for the uncertain future reward, sacrifice of present earning with the hope of gaining some future benefits. Such decision making is a continuous and rational process which requires the features of knowledge, projection, risk bearing etc. Investment decision which is better known as trade-off between risk and return. Stock market is a lucrative but risky domain of investment. Without stock exchange the savings of the community the sinews of economic progress and productive efficiency would remain underutilized. A stock market is a public market for the trading of a company's stocks and derivatives at an agreed price; these are securities listed on a stock exchange as well as those only traded privately.

Many methods have been applied for stock market prediction ranging from time series forecasting, statistical analysis, fundamental and technical analysis. Investment analysts and investors examine historical price and volume data and other market related indicators to get an in depth view of securities trading on stock exchange for better results. Technical analysis helps in determining the future levels by examining the past price movements and trading volumes of stocks and indices.

Today what every investor needs is a technological architecture that will assist him in taking calculated risks with minimal losses.

The Dow Jones theory which marked the onset of technical analysis in stock markets, till today proves to be one of the best market indicators. Financial charts like the Japanese candle stick signals aid in taking stock market decisions. Technical analysis has proved to be a strong base for stock market decisions excluding the bubble burst situations. Technical analysis has slowly matured over the years and now has taken the shape of algorithms. Algorithmic trading and High Frequency trading have taken the stock markets by storm and decisions now need are directly taken by various trading algorithms. Investment banks protect these algorithms from outsiders with tremendous caution.

Application of one of the technical indicators:

Various technical indicators are used in the stock market. The technical indicator can be divided into the various categories based on the usage. The technical indicator categories are broadly mentioned below-

1. Moving averages
2. Price adjustment
3. Volatility Indicators
4. Momentum indicators
5. Trend Indicators
6. Market Strength Indicator

Each category will have a number of technical indicators to suit the purpose. In this working paper I have applied one of the trend indicator-Moving Average Convergence and Divergence (MACD).

OBJECTIVE OF THE STUDY

The following are the main objectives of this study:

1. It aims at analysing the MACD tool of technical analysis used for forecasting stock prices and interpreting whether to buy or sell them.
2. To interpret the movements of stock prices.
3. To give suitable investment suggestions to an investor.

METHODOLOGY

This study is descriptive research. The descriptive method is used to study the price trend of five stocks using MACD technique of technical analysis. The sampling method used in this research is simple random sampling. The five companies are taken from the CNX Nifty of National Stock Exchange, namely ACC Ltd. (ACC), Adani Ports and Special Economic Zone Ltd. (ADANI PORTS), Bharti Airtel Ltd. (BHARTIARTL), Larsen & Toubro Ltd. (LT), Zee Entertainment Enterprises Ltd. (ZEEL). This study has been done for the calendar year January 2015 to December 2015. The data used in this study are publicly available data collected from secondary source. The major source of the data is the website of NSE India.

ANALYSIS AND INTERPRETATION

Introduction to MACD: MACD is created by Gerald Appel in 1979. Moving Average Convergence Divergence (MACD) is one of the simplest and most effective momentum indicators available. Its construction requires three exponential moving averages (EMA), which are lagging indicators, to identify continuation or reversal of a trend. These lagging indicators are converted into a momentum oscillator by deducting the slow moving average from the fast moving average. Fast means shorter moving average and slow means longer moving average. In a standard setting the periods are 12 and 26 days for generating the first indicator.

MACD = EMA 1 (12-day closing prices) – EMA 2 (26-day closing prices)

The second indicator called signal line, is 9-day EMA of MACD.

Signal = EMA (9-day EMA MACD)

To calculate EMA for both indicators, the following formula has been applied.

$$EMA_{(t)} = \alpha * (\text{Closing Price})_t + (1-\alpha) * EMA_{(t-1)}$$

Where $\alpha = \frac{2}{(N+1)}$, N = Number of days.

Most technical analysis systems display an extra indicator that shows the difference between MACD and Signal by a solid block histogram. The MACD histogram is positive when MACD is above its 9-day EMA and negative when MACD is below its 9-day EMA. It was developed by Thomas Aspray in 1986.

A buy signal is generated when the more volatile indicator (MACD) cross the less volatile one (Signal) from beneath. On other hand, a sell signal is given when MACD indicator crosses Signal indicator from above.

Positive and Negative MACD:

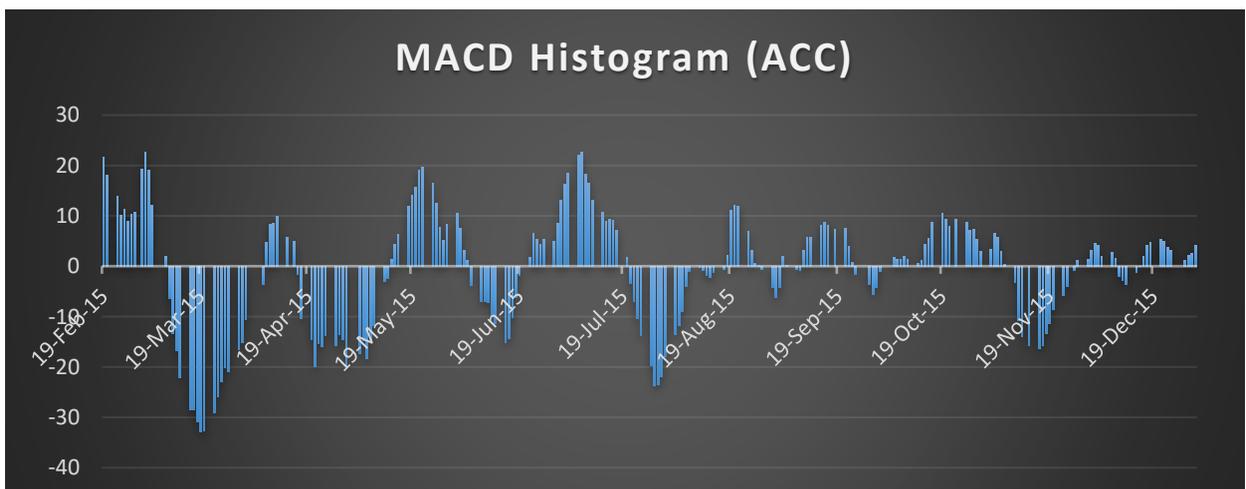
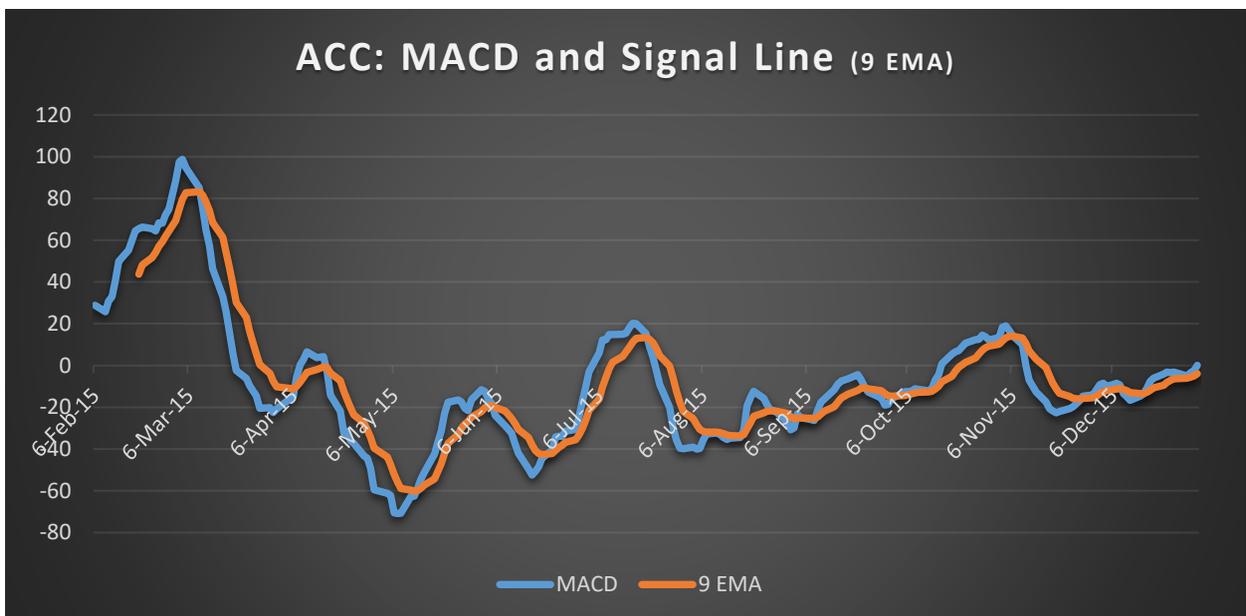
Positive MACD indicates that the 12-day EMA is above the 26-day EMA i.e. when the MACD histogram is positive. This means upside momentum is increasing. On the other hand, negative MACD indicates that the 12-day EMA is below the 26-day EMA i.e. when the MACD histogram is negative. This means down side momentum is increasing.

MACD Signals: MACD generates two kinds of signals. They are:

- **Signal Line Crossovers:** a bullish crossover occurs when MACD turns up and crosses above the signal line. A bearish crossover occurs when MACD turns down and crosses below the signal line.
- **Centre Line Crossovers:** a bullish centre line crossover occurs when MACD moves above the zero line to turn positive. At this time a BUY signal is generated. A bearish centre line crossover occurs when MACD moves below the zero line to turn negative. At this time a SELL signal is generated.

Now, here is discussion of application of MACD for selected five companies from different industries.

ACC Ltd. (ACC) – Industry: CEMENT AND CEMENT PRODUCTS



Interpretation and Discussion:

Above 3 graphs shows the Closing Price Trend, MACD and Signal Line, and MACD Histogram of ACC Ltd., for the time period of 1 year (from 1st January, 2015 to 31st December, 2015).

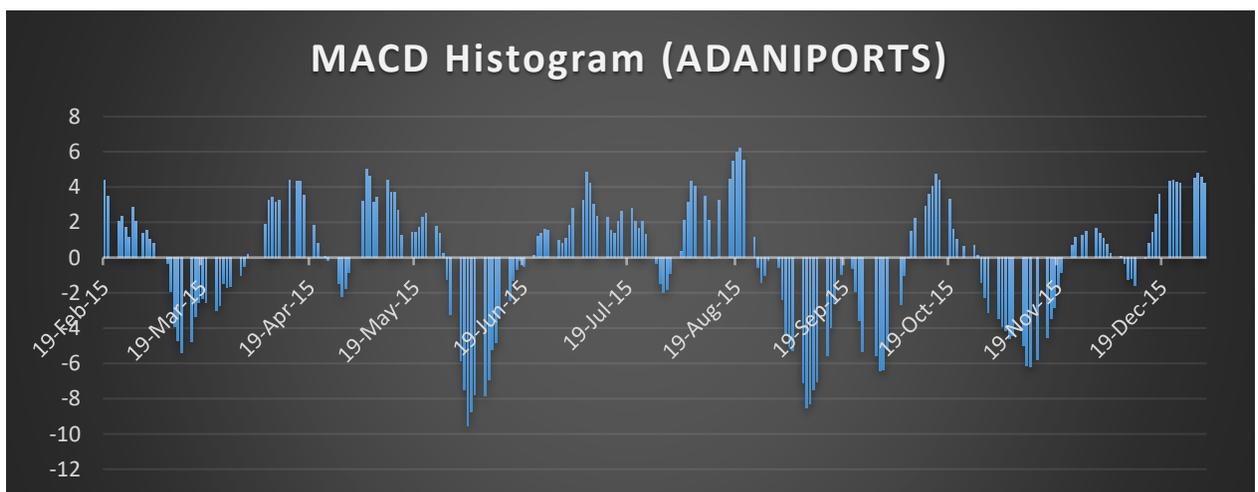
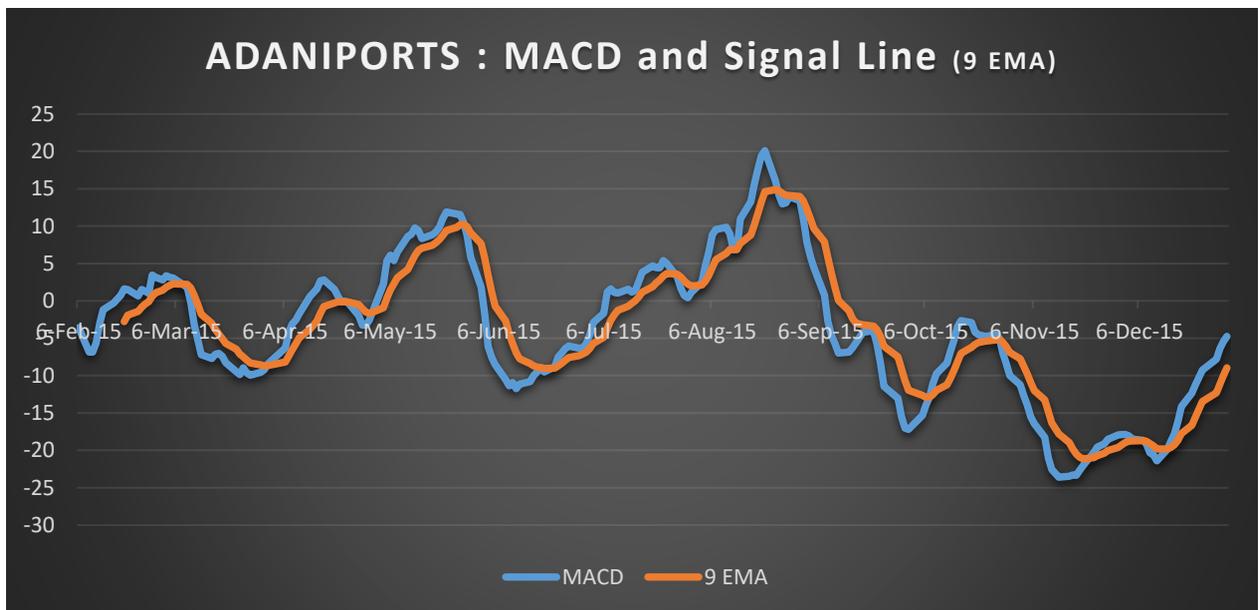
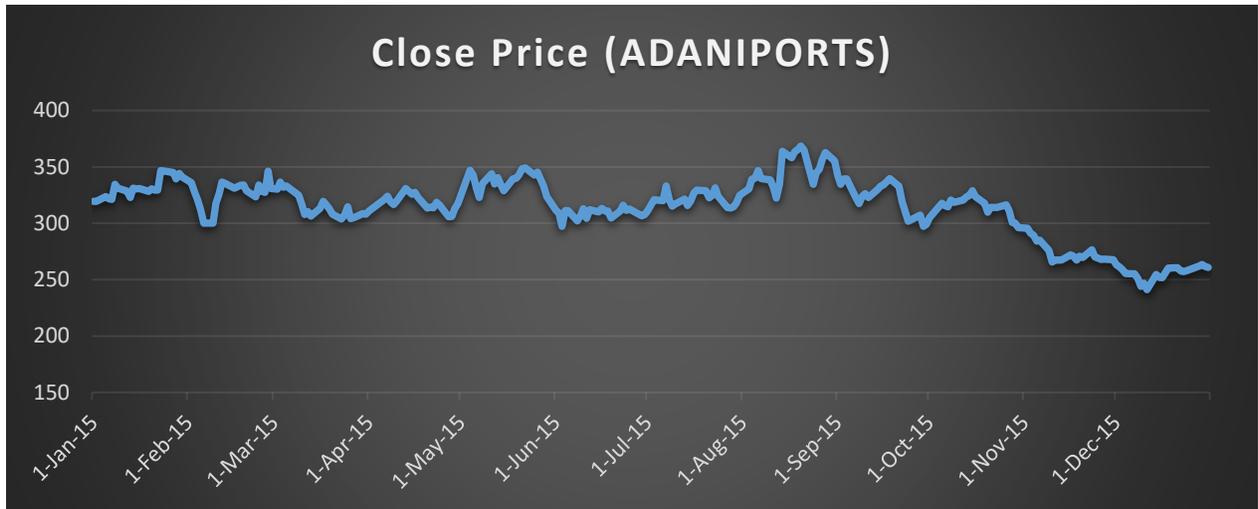
It is observed that stock of ACC was range bound for the past 1 year between the prices of INR 1763 and INR 1314.

MACD of ACC has generated 15 Signal Line Crossovers and 7 Centre Line Crossovers during the taken time frame. Strong Bullish Crossovers signals are generated during 6th April, 15th May, 25th June and 4th December, 2015. It signifies that MACD turns up and crosses above the signal line. It generates Buy signal. Strong Bearish Crossovers signals are generated during 17th April, 5th June, 28th August and 24th September, 2015. It signifies that MACD turns down and crosses below the signal line. It generates Sell signal.

It is observed that strong bullish centre line crossovers occurred during 8th April, 6th July and 16th October, 2015. It happened as MACD moves above the zero line to turn positive. It means a BUY signal is generated. Strong Bearish centre line crossover occurred during 23rd July and 10th November, 2015. It happened as MACD moves below the zero line to turn negative. It means a SELL signal is generated.

Through MACD Histogram of ACC, the positive and negative MACD have been identified and shown. Positive MACD Histogram constructed above the Zero Line and Negative MACD Histogram constructed below the Zero Line. Positive MACD indicates that the 12-day EMA is above the 26-day EMA and it means upside momentum is increasing. Negative MACD indicates that the 12-day EMA is below the 26-day EMA and it means down side momentum is increasing.

Adani Ports and Special Economic Zone Ltd. (ADANIPTS) – Industry: SHIPPING



Interpretation and Discussion:

Above 3 graphs shows the Closing Price Trend, MACD and Signal Line, and MACD Histogram of Adani Ports and Special Economic Zone Ltd., for the time period of 1 year (from 1st January, 2015 to 31st December, 2015).

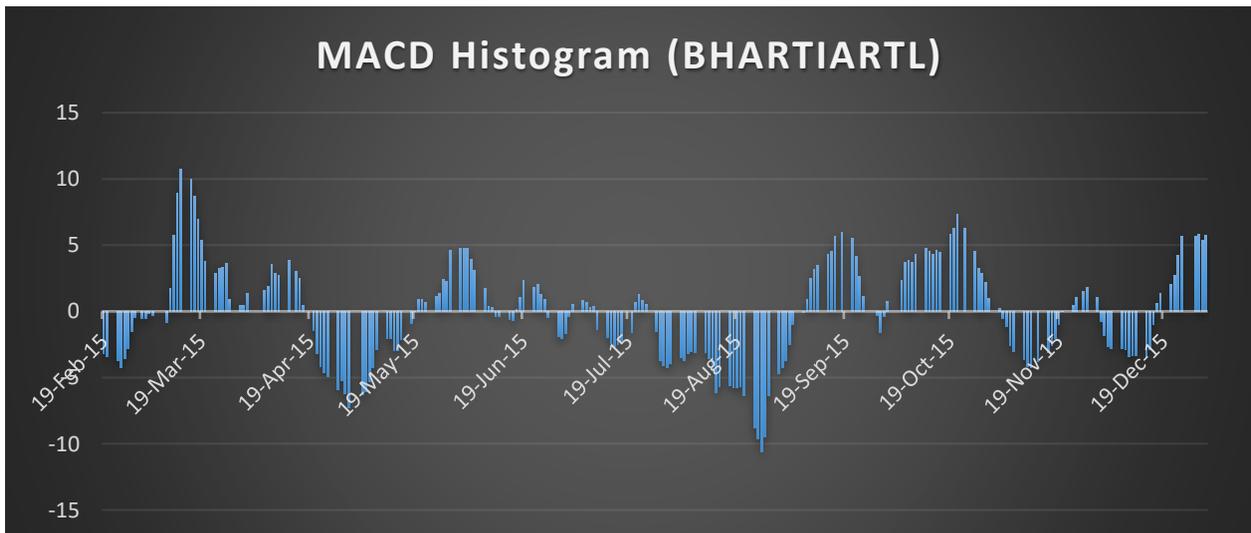
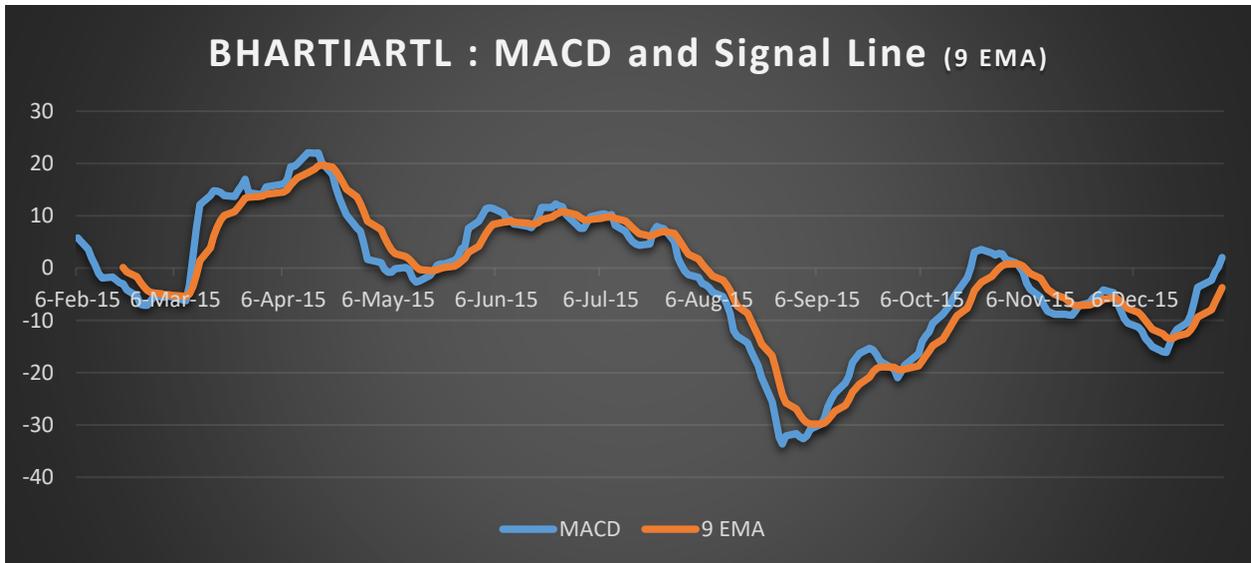
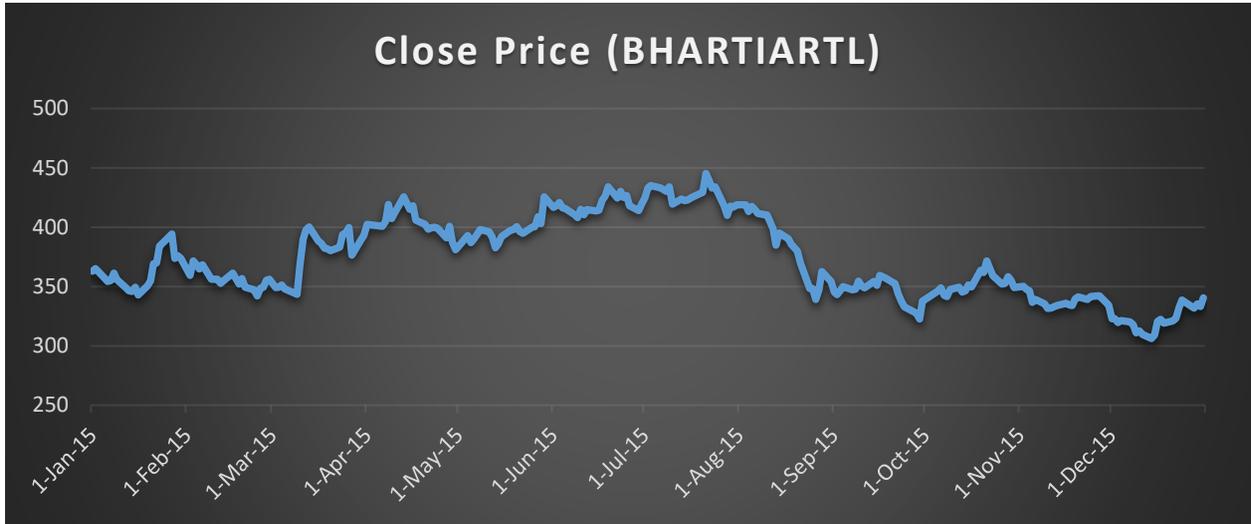
It is observed that stock of ADANI PORTS was range bound for the past 1 year between the prices of INR 369 and INR 242.

MACD of ADANI PORTS has generated 14 Signal Line Crossovers and 8 Centre Line Crossovers during the taken time frame. Strong Bullish Crossovers signals are generated during 1st April, 4th May, 22nd June, 3rd August, 8th October and 23rd November, 2015. It signifies that MACD turns up and crosses above the signal line. It generates Buy signal. Strong Bearish Crossovers signals are generated during 9th March, 28th May, 27th July and 25th August, 2015. It signifies that MACD turns down and crosses below the signal line. It generates Sell signal.

It is observed that strong bullish centre line crossovers occurred during 13th April, 4th May and 7th July, 2015. It happened as MACD moves above the zero line to turn positive. It means a BUY signal is generated. Strong Bearish centre line crossover occurred during 2nd June and 8th September 2015. It happened as MACD moves below the zero line to turn negative. It means a SELL signal is generated.

Through MACD Histogram of ADANI PORTS, the positive and negative MACD have been identified and shown. Positive MACD Histogram constructed above the Zero Line and Negative MACD Histogram constructed below the Zero Line. Positive MACD indicates that the 12-day EMA is above the 26-day EMA and it means upside momentum is increasing. Negative MACD indicates that the 12-day EMA is below the 26-day EMA and it means down side momentum is increasing.

Bharti Airtel Ltd. (BHARTIARTL) – Industry: TELECOMMUNICATION – SERVICES



Interpretation and Discussion:

Above 3 graphs shows the Closing Price Trend, MACD and Signal Line, and MACD Histogram of Bharti Airtel Ltd., for the time period of 1 year (from 1st January, 2015 to 31st December, 2015).

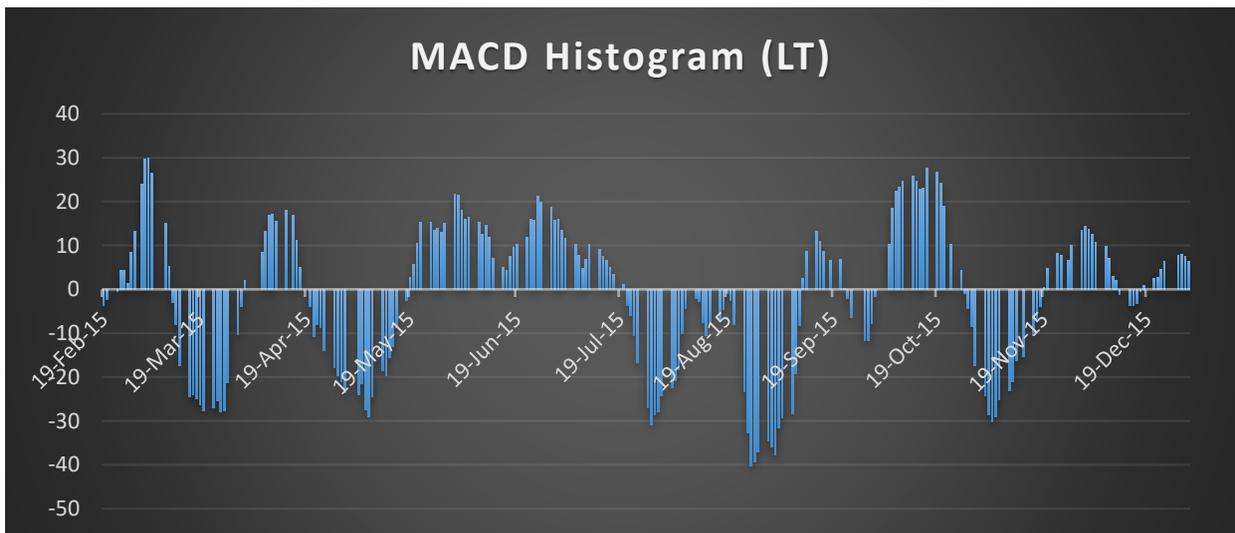
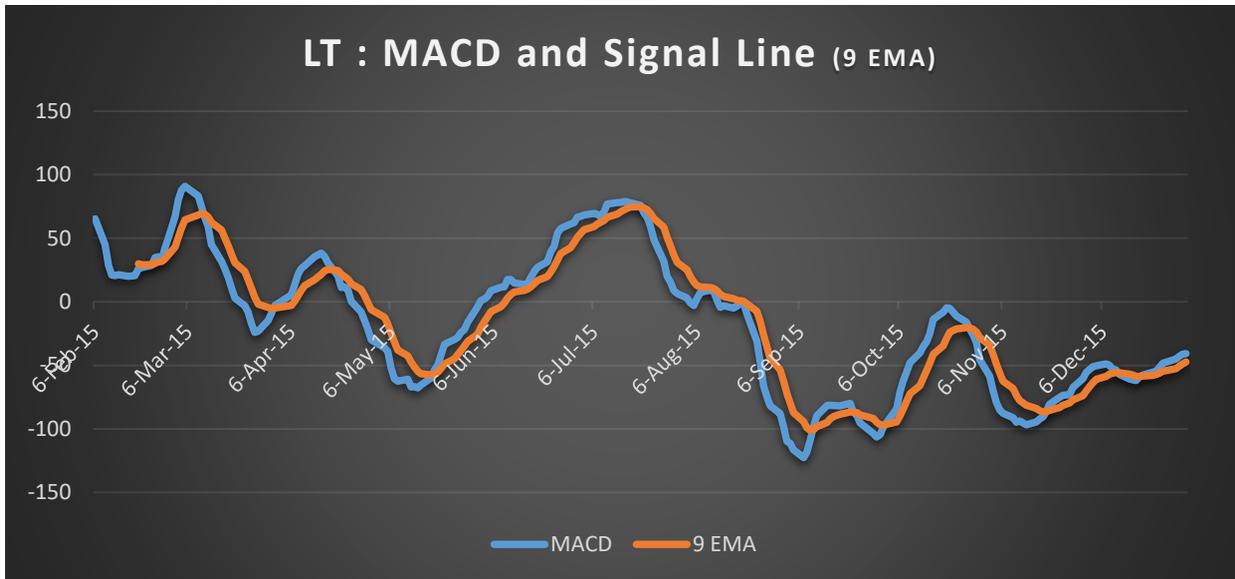
It is observed that stock of BHARTIARTL was range bound for the past 1 year between the prices of INR 446 and INR 307.

MACD of BHARTIARTL has generated 16 Signal Line Crossovers and 6 Centre Line Crossovers. Strong Bullish Crossovers signals are generated during 19th May, 2nd July, 21st July, 8th September, 23rd November and 17th December, 2015. It signifies that MACD turns up and crosses above the signal line. It generates Buy signal. Strong Bearish Crossovers signals are generated during 17th April, 10th June, 28th September and 30th November, 2015. It signifies that MACD turns down and crosses below the signal line. It generates Sell signal.

It is observed that strong bullish centre line crossovers occurred during 11th March, 20th October and 30th December, 2015. It happened as MACD moves above the zero line to turn positive. It means a BUY signal is generated. Strong Bearish centre line crossover occurred during 5th May and 30th July, 2015. It happened as MACD moves below the zero line to turn negative. It means a SELL signal is generated.

Through MACD Histogram of BHARTIARTL, the positive and negative MACD have been identified and shown. Positive MACD Histogram constructed above the Zero Line and Negative MACD Histogram constructed below the Zero Line. Positive MACD indicates that the 12-day EMA is above the 26-day EMA and it means upside momentum is increasing. Negative MACD indicates that the 12-day EMA is below the 26-day EMA and it means down side momentum is increasing.

Larsen & Toubro Ltd. (LT) – Industry: ENGINEERING



Interpretation and Discussion:

Above 3 graphs shows the Closing Price Trend, MACD and Signal Line, and MACD Histogram of Larsen & Toubro Ltd., for the time period of 1 year (from 1st January, 2015 to 31st December, 2015).

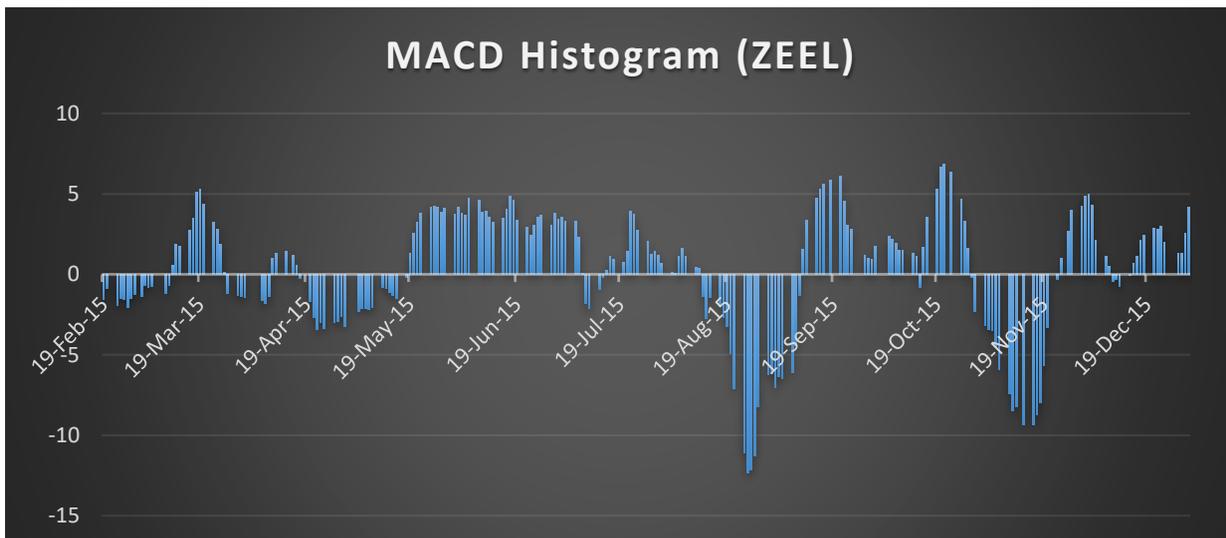
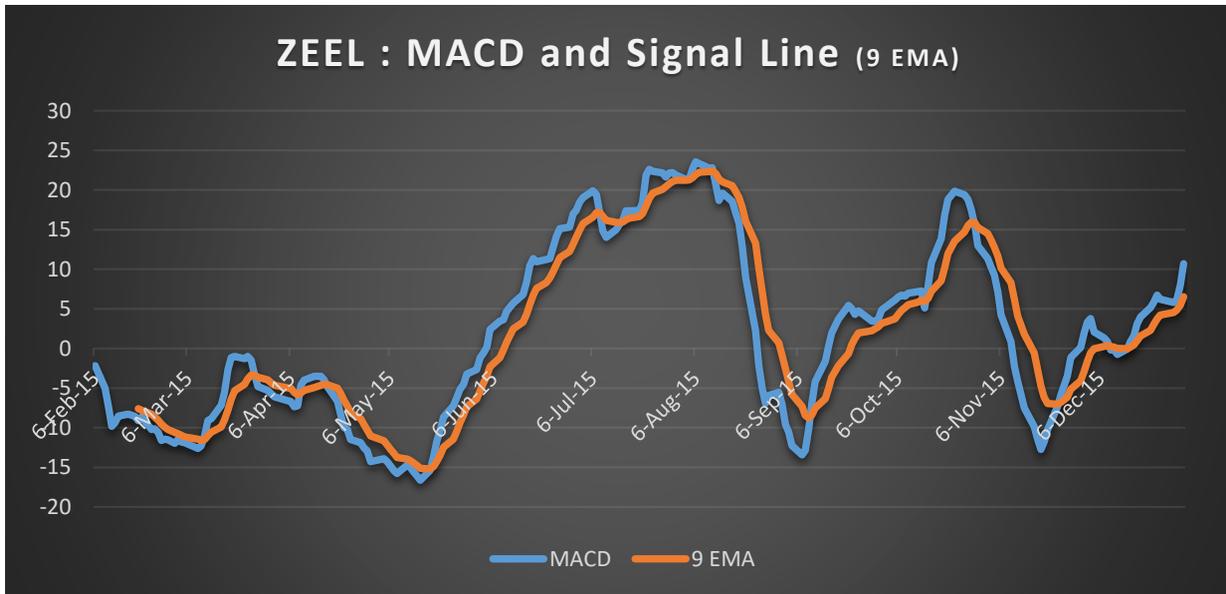
It is observed that stock of LT was range bound for the past 1 year between the prices of INR 1877 and INR 1275.

MACD of LT has generated 11 Signal Line Crossovers and 4 Centre Line Crossovers. Strong Bullish Crossovers signals are generated during 31st March, 19th May, 10th September and 19th November, 2015. It signifies that MACD turns up and crosses above the signal line. It generates Buy signal. Strong Bearish Crossovers signals are generated during 11th March, 20th April, 22nd July, 22nd September 28th October and 10th December, 2015. It signifies that MACD turns down and crosses below the signal line. It generates Sell signal.

It is observed that strong bullish centre line crossovers occurred during 6th April and 2nd June, 2015. It happened as MACD moves above the zero line to turn positive. It means a BUY signal is generated. Strong Bearish centre line crossover occurred during 23rd March and 27th April, 2015. It happened as MACD moves below the zero line to turn negative. It means a SELL signal is generated.

Through MACD Histogram of LT, the positive and negative MACD have been identified and shown. Positive MACD Histogram constructed above the Zero Line and Negative MACD Histogram constructed below the Zero Line. Positive MACD indicates that the 12-day EMA is above the 26-day EMA and it means upside momentum is increasing. Negative MACD indicates that the 12-day EMA is below the 26-day EMA and it means down side momentum is increasing.

Zee Entertainment Enterprises Ltd. (ZEEL) – Industry: MEDIA & ENTERTAINMENT



Interpretation and Discussion:

Above 3 graphs shows the Closing Price Trend, MACD and Signal Line, and MACD Histogram of Zee Entertainment Enterprises Ltd., for the time period of 1 year (from 1st January, 2015 to 31st December, 2015).

It is observed that stock of ZEEL was range bound for the past 1 year between the prices of INR 438 and INR 302.

MACD of ZEEL has generated 14 Signal Line Crossovers and 5 Centre Line Crossovers. Strong Bullish Crossovers signals are generated during 10th March, 18th May, 14th July, 9th September and 23rd November, 2015. It signifies that MACD turns up and crosses above the signal line. It generates Buy signal. Strong Bearish Crossovers signals are generated during 25th March, 17th April and 30th October, 2015. It signifies that MACD turns down and crosses below the signal line. It generates Sell signal.

It is observed that strong bullish centre line crossovers occurred during 4th June, 15th September and 30th November, 2015. It happened as MACD moves above the zero line to turn positive. It means a BUY signal is generated. Strong Bearish centre line crossover occurred during 25th August and 10th November, 2015. It happened as MACD moves below the zero line to turn negative. It means a SELL signal is generated.

Through MACD Histogram of ZEEL, the positive and negative MACD have been identified and shown. Positive MACD Histogram constructed above the Zero Line and Negative MACD Histogram constructed below the Zero Line. Positive MACD indicates that the 12-day EMA is above the 26-day EMA and it means upside momentum is increasing. Negative MACD indicates that the 12-day EMA is below the 26-day EMA and it means down side momentum is increasing.

SUGGESTIONS AND CONCLUSION

The MACD indicator is special because it brings together momentum and trend in one indicator. This unique blend of trend and momentum can be applied to daily, weekly or monthly charts. Chartists looking for more sensitivity may try a shorter short-term moving average and a longer long-term moving average. Thus MACD (5, 35, 5) is more sensitive than MACD (12, 26, 9). MACD is not particularly good for overbought and oversold levels. MACD Line is calculated using the actual difference between two moving averages. This means MACD values are dependent on the price of underlying security.

In this report, application of MACD Indicator has been shown for the selected five stocks and a stipulated time period. It reversals that MACD is employed for buying and selling decision. In this regard, very important supplementary buy and sell rules:

Buy signals are much more reliable when MACD has crossed from above to below “0” at some time since the most recent sell signal. MACD does not have to be below “0” at the time of the buy signal but should have been below “0” at some time since the start of the recent decline.

Sell signals are more reliable when MACD has crossed from below to above “0” at some time since the most recent buy signal. MACD does not have to be above “0” at the time of the sell signal but should have been above “0” at some time since the start of the most recent advance.

During very strong market periods, usually during the early and best stages of bull markets, MACD will retreat during market reactions, to a level just above “0”, in which case investors can shade the above rules a bit as investors might if MACD tops out just below “0” during a bear market or severe intermediate decline. Most often, however, the “0” crossing condition should be respected.

Sometimes MACD can also generate false indicators. Especially when a stock is overvalued the mechanism might not work as expected. A solution for this problem being the fundamental analysis should be done of the stock chosen for application of the MACD indicator. All the above five stocks have strong financial fundamentals and so the MACD worked with perfection. The MACD indicator does offer investors the ability to generate profits by stock market investment.

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