



## A Study on the Effectiveness of Moving Average Convergence and Divergence Using Select Stocks from Automobile Sector in NSE India

### KEYWORDS

MACD, Technical Analysis, Automobile sector, NSE India.

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### ABSTRACT

*Technical analysis is the art of analyzing the movement of prices and forecasting the short term movement of prices using charts with technical indicators as a primary tool to make better investments. This paper attempts to measure the effectiveness of a technical indicator Moving Average Convergence and Divergence (MACD) on five selective stocks of the Automobile sector. This paper studies which of the selected stocks will give more profits and more average return per trade, if traded according to MACD signals. The study is purely based on the secondary data. The prices of the stocks were taken for four years from 30<sup>th</sup> September 2012 to 30<sup>th</sup> September 2016 and the signals given by the technical indicator were plotted accordingly. Interpretations and suggestions to investors are given based on the analysis.*

### Introduction:

Technical Analysis is the art of finding the trend in which price moves with charts as the primary tool to make better investments. Technical analysts believe that the prices of securities move according to predictable trends and patterns. Buying and selling securities with the objective of maximizing profits and minimizing risk of loss is the main aim of an investor which can be done through proper technical analysis. The base of modern technical analysis is from the Dow Theory, developed around 1900 by Charles Dow. This research paper is focused on one of the widely used technical indicator Moving Average Convergence Divergence (MACD) by technical analysts to predict the future price movement of any stocks based on past price movements. This tool is easy to use and interpret and also most popular among the technical analysts. Basic aim of this paper is to find the profitability of MACD using select stocks of automobile sector in NSE India.

### Literature Review:

Studies conducted by Vasiliou et al. (2006) focused on the performance of most popular technical trading rules Moving Averages and MACD Indicator in the Athens Stock Market. The methodologies they employed include standard tests and bootstrap. The researchers investigated by comparing the returns given by the buy (long position) signals of the moving average and MACD with the returns of the buy and hold method.

Geetha and Swaminathan (2015) indicated that the prevailing trend can be understood by smoothing the data and it can be done in many ways like simple average and oscillators like Average true range, moving average convergence and divergence, Exponential moving average and stochastic models. Their study was focused on MACD technique complementing with the support and resistance model.

Studies conducted by Dejan et al. (2009) focused on determining the possibility of MACD and RVI indicators application in investment decision making processes on the financial market of the Republic of Serbia. The researchers identified the most profitable parameters of the MACD and RVI indicators as functions of investment strategy optimization on the financial market. They also concluded that the application of the MACD and RVI indicators of technical analysis significantly contributes to investment strategy optimization on the financial market.

Nithya et al. (2014) analyzed three stocks from banking sector using MACD and RSI. The researchers used descriptive method

to study the price trend of three stocks using MACD and RSI charting technique of technical analysis. They also suggested that the investment is based on the risk appetite of the investor.

### Need for the study:

A statistical data in the recent past indicated that 95 per cent of the investors in the stock markets are losers, since they invest without any information and without discipline. There are many technical indicators available to study the stock price movements technically. The Investors have to make use of the technical indicators available in an appropriate way to avoid losses. So as to know the effectiveness of applying MACD indicator on the price movement, the study was conducted.

### Objectives of the study:

- To study the MACD technical indicator.
- To measure the profitability of using MACD.
- To analyze the effectiveness of using MACD
- To help investors in decision making.
- To find the right stock among the selected stocks in the automobile sector by applying MACD as a technical analysis tool for investment / trading.

### Sample Size:

Five companies from the Automobile sector are used for the purpose of the study. The selection of stocks is made among the most liquid and large capitalized Indian Automobile stocks in CNX Auto Index.

### Period of the study:

The prices of five Automobile stocks were taken and MACD signals were plotted accordingly for the period of four years from 30<sup>th</sup> September 2012 to 30<sup>th</sup> September 2016.

### Data Collection:

The data is purely secondary which had been collected from NSE India website, I charts website, journals and magazines. Weekly chart of the data is taken for the purpose of the study.

### MACD:

The Moving Average Convergence Divergence (MACD) is an oscillator developed by Gerald Appel which comprises two lines. The MACD line and signal line. The MACD line is the difference between a 12 and a 26 period Exponential Moving Average (EMA) of price. The signal line is a 9 period EMA of the MACD line.

The interpretation of the MACD oscillator is to buy when the MACD line crosses above the signal line and to sell when the

MACD line crosses below the signal line. Histogram is a series of bars extending above and below the center line of the MACD oscillator is the difference between the MACD line and the signal line. When the MACD line (followed by the slower signal line, of course) rises to relatively high levels, it indicates an overbought market. Also, if the MACD line diverges from price, it indicates that the current price trend is losing momentum and could turn.

When the MACD line is above the signal line, the trend is upwards, bullish and positive similarly, when the MACD line is below the signal line, the trend is downwards, bearish and negative.

Exponential moving averages highlight recent changes in a stock's price. By comparing EMAs of different lengths, the MACD series gauges changes in the trend of a stock. The difference between the MACD series and its average is claimed to reveal subtle shifts in the strength and direction of a stock's trend. Since the MACD is based on moving averages, it is inherently a lagging indicator.

#### Analysis and Interpretations:

The following tables shows various trading signals generated by MACD indicator which were plotted using charts and also profit / loss obtained in each trade and the return percentage on the investment made for each trade for the five selected companies in Automobile sector.

#### i) Tata motors Ltd:

Table 1: Data obtained from weekly chart of Tata motors Ltd.

Date	Buy Signal	Sell Signal	Profit/Loss per share	% Return
14.12.2012	292.1			
08.02.2013		285.4	-6.70	-2.29
11.05.2013	307.6			
20.12.2013		373.7	66.10	21.49
21.02.2014	396.2			
25.07.2014		461.1	64.90	16.38
14.08.2014	484.6			
10.10.2014		492.7	8.10	1.67
23.10.2014	515.6			
05.12.2014		525.4	9.80	1.90
16.01.2015	525.8			
27.03.2015		535.4	9.60	1.82
09.10.2015	356.4			
29.01.2016		336.9	-19.50	-5.47
04.03.2016	343.5			
30.09.2016		534.9	191.40	55.72
		<b>TOTAL</b>	<b>323.70</b>	<b>91.22</b>
		<b>Average return per trade</b>		<b>11.40</b>

MACD gives 8 buy and 8 sell signals for the period of four years from 30<sup>th</sup> September 2012 to 30<sup>th</sup> September 2016. Total profit for the four years is Rs.323.70 per share and the Average rate of return is 11.40 per trade.

#### ii) Maruti Suzuki India Ltd:

Table 2: Data obtained from the weekly chart of Maruti Suzuki India Ltd.

Date	Buy Signal	Sell Signal	Profit/Loss per share	% Return
02.11.2012	1466			
15.02.2013		1475	9	0.62
18.04.2013	1525			
28.06.2013		1538	13	0.85
04.10.2013	1429			
31.01.2014		1636	207	14.49
14.03.2014	1738			

26.12.2014		3333	1595	91.77
19.06.2015	3937			
09.10.2015		4276	339	8.61
29.04.2016	3795			
30.09.2016		5477	1682	44.32
		<b>TOTAL</b>	<b>3845.00</b>	<b>160.66</b>
		<b>Average return per trade</b>		<b>26.67</b>

There were 12 MACD line and the signal line crossovers which gives 6 buy and 6 sell signals for the period of four years from 30<sup>th</sup> September 2012 to 30<sup>th</sup> September 2016. Total profit for the four years is Rs.3845 per share and the Average rate of return is 26.67 per trade.

#### iii) Mahindra & Mahindra Ltd:

Table 3: Data obtained from the weekly chart of Mahindra & Mahindra Ltd.

Date	Buy Signal	Sell Signal	Profit / Loss per share	% Return
26.10.2012	880.9			
18.01.2013		886	5.1	0.58
03.05.2013	961			
05.07.2013		971.6	10.6	1.10
18.10.2013	882.7			
24.01.2014		884.8	2.1	0.24
21.02.2014	930			
10.10.2014		1317	387	41.61
29.05.2015	1258			
28.08.2015		1234	-24	-1.90
13.11.2015	1251			
24.12.2015		1258	7	0.56
08.04.2016	1232			
09.09.2016		1472	240	19.48
		<b>TOTAL</b>	<b>627.80</b>	<b>61.67</b>
		<b>Average return per trade</b>		<b>8.81</b>

MACD gives 14 trading signals for the period of four years from 30<sup>th</sup> September 2012 to 30<sup>th</sup> September 2016. Total profit for the four years is Rs.627.8 per share and the Average rate of return is 8.81% per trade.

#### iv) Bajaj Auto Ltd:

Table 4: Data obtained from the weekly chart of Bajaj Auto Ltd.

Date	Buy Signal	Sell Signal	Profit/Loss per share	% Return
12.10.2012	1744			
15.02.2013		1970	226	12.96
28.06.2013	1924			
22.11.2013		1889	-35	1.82
07.03.2014	1955			
02.05.2014		1907	-45	2.30
06.06.2014	2048			
26.12.2014		2481	433	21.14
08.05.2015	2123			
28.08.2015		2280	157	7.40
23.10.2015	2516			
01.01.2016		2518	2	0.07
08.04.2016	2389			
30.09.2016		2828	439	18.38
		<b>TOTAL</b>	<b>1177.00</b>	<b>55.83</b>
		<b>Average return per trade</b>		<b>7.98</b>

MACD generates 14 trading signals out of which 7 are buy signals and 7 are sell signals for the period of four years from 30<sup>th</sup> September 2012 to 30<sup>th</sup> September 2016. Total profit for the four years is Rs.1177 per share and the Average rate of return is 7.98 per trade.

## v) Hero Motocorp Ltd:

Table 5: Data obtained from the weekly chart of Hero Motorcorp Ltd.

Date	Buy Signal	Sell Signal	Profit/Loss Per trade	% Return
19.10.2012	1850			
11.01.2013		1839	-11	0.59
11.05.2013	1709			
22.11.2013		1976	267	15.62
28.03.2014	2253			
14.08.2014		2511	258	11.45
05.09.2014	2762			
26.12.2014		3096	334	12.09
22.05.2015	2603			
28.08.2015		2399	-204	7.84
09.10.2015	2565			
15.01.2016		2428	-137	5.34
19.02.2016	2706			
30.09.2016		3414	708	26.16
		<b>TOTAL</b>	<b>1215.00</b>	<b>51.55</b>
<b>Average return per trade</b>				<b>7.36</b>

There were 14 MACD line and signal line crossovers which gives 7 buy signals and 7 sell signals for the period of four years from 30<sup>th</sup> September 2012 to 30<sup>th</sup> September 2016. Total profit for the four years is Rs.1215 per share and the Average rate of return is 7.36% per trade.

## Findings:

Table: 6 Comparison between Returns of Companies

Company	No. of Buy signals	No. of Sell signals	Total Profits	Total return %	Average Return %
Tata Motors Ltd	8	8	323.7	91.22	11.4
Maruti Suzuki India Ltd	6	6	3845	160.66	26.67
Mahindra & Mahindra Ltd	7	7	627.8	61.67	8.81
Bajaj Auto Ltd	7	7	1177	55.83	7.98
Hero Motocorp Ltd	7	7	1215	51.55	7.36

If MACD technical indicator is applied as technical analysis tool, among five companies in the automobile sector of NSE India, Maruti Suzuki India Ltd. gives more profits of Rs.3845 and 26.67% return for the amount invested or traded. The second best scrip is Tata Motors Ltd. which gives average return on investment per trade of 11.4% and total profits of Rs.323.7. Even though total profits are higher in Mahindra & Mahindra Ltd amounting to Rs. 627.8, this scrip is at third place as the average return is only 8.81%. Fourthly, Bajaj Auto Ltd gives profits of Rs.1177 and average return is 7.98%. Finally Hero Motocorp Ltd. gives profits of Rs. 1215 and the return is 7.36%.

From the analysis made, it was clear that when the trade is made according to the signals given by the Moving Average Convergence Divergence (MACD) indicator, the investor can enjoy profits without his/her investment being lost. The study analyzed, interpreted and measured the effectiveness of the indicator in five major Automobile companies.

## Suggestions:

Many studies were conducted revealing the profitability of indicators by comparing each technical indicator with the buy and hold strategy. This study focuses on measuring the profits earned by using this particular technical indicator. Anyway the transaction costs, brokerage costs etc. are not taken into consideration while calculating the profits. The investor has to patiently wait for the proper signal. The MACD line should

diverge from the signal line for making trade. Trade entries and exits are to be made accordingly. Risk management and time management are to be made effectively by the investor. Major traders suffer loss as they do not follow any standard technique or discipline.

## Conclusion:

Technical analysis is a tool for guiding investment decisions. In general, we can conclude from the result that technical indicators can play useful role in the trade entry and exit. By applying technical indicators brokers or investors enjoys substantial profit. However to have maximum effect fundamental analysis of stocks should also be made. Technical Analysis, if used improperly, they can also produce false signals. Investors should know to interpret the signals. Investors must also take into account various factors like Government of India budget, company performance, political and social events, climatic conditions etc. before any decision is made. The scrip should also be fundamentally good. Therefore, the small investors and traders should not blindly make an investment rather they should analyze using the various tools to check if the scrip is technically strong.

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