

# MOMENTUM OSCILLATORS - A TOOL TO PREDICT STOCK PRICE BEHAVIOUR

Management Insight  
12(1) 65 - 69  
<http://dx.doi.org/10.21844/mijia.v12i1.11394>

Shishir Kumar Gujrati\*

shishirgujrati@gmail.com

## ABSTRACT

*Stock markets are always taken as the barometer of the economy. The price movement of their indices reflects every ups & downs of the economy. Although seem to be random, these price movements do follow a certain track which can be identified using appropriate tool over long range data. One such method is of Technical Analysis wherein future price trends are forecasted using past data. Momentum Oscillators are the important tools of technical analysis.*

*The current paper aims to identify the previous price movements of sensex by using Relative Strength Index (RSI) and Moving Average Convergence Divergence (MACD) tools and also aims to check whether these tools are appropriate in forecasting the price trends or not.*

**Key Words :** EMA, SEMA, LEMA, RSI, MACD

## INTRODUCTION

Movements in stock prices appear to be random without any correlation with each other. There seems no relationship between their current movements and future returns. However, when observed for longer time period and analyzed with the help of some suitable tools, one can reveal certain patterns in their movements. They tend to move between a range for long time and whenever they break their borders, there tend to be some corrections in their prices.

Momentum oscillators are the tools of technical analysis that are used to analyze the price movements of stock and the pattern & trend shown by them over the period. It is also used to signal the probable ups & downs and movements of stock prices. The main tools that are used are Relative Strength Index (RSI) and Moving Average Convergence Divergence (MACD).

RSI measures the velocity and magnitude of

directional price movements and represents the information within the value of 0 to 100. MACD shows the relationship between two moving averages of price. It is plotted as a signal line which shows signal for buy & sells.

## REVIEW OF LITERATURE

Chong & Wing-Kam (2008), in their article "Technical Analysis and London Stock Exchange: testing the MACD & RSI rules using the FT 30" found that both RSI & MACD can generate higher returns than the buy - hold strategy in most cases. Steven B. Achelis (2001) in his book "Technical Analysis from A to Z" discussed about the usefulness and variants of RSI & MACD.

Cheung, Lam & Yeung (2009) in their article on the study of Hong Kong stock exchange found that SMA provided for better prediction. Their results contradicted the previous finding that returns are predictable in Hong Kong and the Hong Kong stock market may be in weak form of efficiency after 1986.

\* Assistant Professor, School of Management Sciences, Varanasi (UP)

Rosillo, Fuente & Brugos (2013) in their article regarding Spanish market used RSI & MACD to provide buy & sell signals to small investors. In their study they found that combination of 8 day and 17 days EMA & signal line produced more reliable buy signals. Boboc & Dinica (2013) in their article dealt with the efficiency of EUR/USD market based on EMA, MACD & RSI and found that RSI is the best indicator when used for the companies with high capitalization.

## RESEARCH DESIGN & METHODOLOGY

The present paper attempts to analyze the price movements of Sensex and to locate the various signal points of buy and sell with the help of momentum oscillators RSI & MACD. It also attempts to check whether these momentum oscillators have been able to generate sufficient signals to buy or sell or not and whether there has been similar movements observed in the market price of the index or not.

Data related to Sensex have been taken from the official website of BSE for the period ranging from March 2015 to May 2015 (10th May). Such period is taken to generate sufficient accurate results. For the study purpose, only closing prices of the index during this period have been taken into consideration. For the analysis of price movement of Sensex, following tools have been used:

**1. Relative Strength Index (RSI):** RSI reflects the velocity of a change in a trend. The upward or downward movement in the value of RSI reflects the quantum of price movements in the underlying security or index. The most basic use of RSI is to find out the over bought and over sold signals of any index or scrip. The movement under 30 is considered as oversold and movement above 70 is taken as over bought signal. The movement around 30 level is viewed as a signal for bullish movement while movement of RSI around 70 level is taken as a set up of bearish trend. The main calculation is based upon the 14 days average price although lesser days can be taken to get faster and steeper changes in RSI movements.

The basis equation of RSI to be used is

$$100 - (100 / (1 + RS))$$

Where in, RS = Average of X days up close / Average of X days down close  
The RS values are smoothed using the following step:

$$((\text{Previous Average Gain or Loss} * 13) + \text{Current Gain or Loss}) / 14$$

## 2. Moving Average Convergence Divergence (MACD):

It is the technical indicator which uses the difference between short term and long term price trends to anticipate future movements of stocks. It uses difference between 26 day EMA & 12 day EMA and 9 day EMA is plotted as signal to trigger for buy & sell indications. When MACD is above 0, it signals upward momentum and vice versa. EMAs are calculated by giving more weightage to latest price data in comparison to older one. The calculation of MACD is based on the following equation:

$$\text{EMA} = \text{Exponent} * (\text{Closing Price} - \text{Previous EMA}) + \text{Previous EMA}$$

Where in, Exponent =  $(2 / (\text{Time Period} + 1))$

## DATA ANALYSIS AND INTERPRETATION

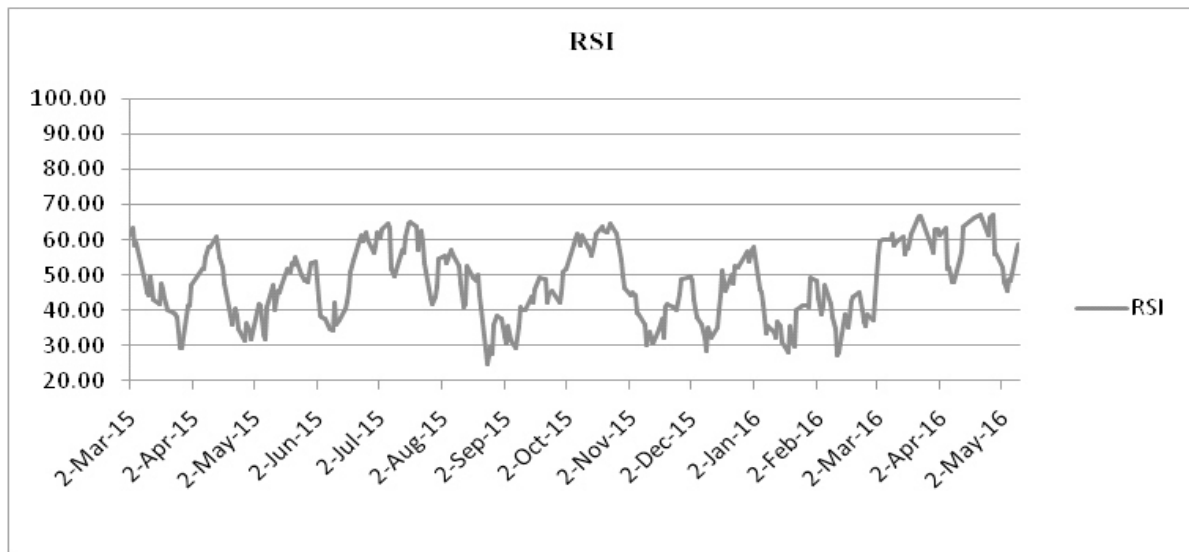
### 1. Relative Strength Index (RSI):

From graph 2, it can be observed that sensex has never been above the over bought mark of 70 during the study period. It has, however, crossed over sold mark of 30 few times during study period. Graph 2 clearly pictures the volatile price movements in sensex. There were huge market corrections during this period and the price of the index was very volatile. The signals generated through RSI tool were very rapid and violent in generating buy or sell signals. They were fully in tune with the prices of sensex and provided a fair forecast of the price movement of the index. In the graph 2, it is observed that during the end of March 2015, the RSI showed the value of Sensex below 30 or over sold. Immediately after these days (26 & 27 Mar, 15), Sensex reported a continuous rise for next 15 days as depicted by the reversal trend of RSI in graph 2. Another incidence of signaling price movement occurred in October 2015 when RSI values for sensex were continuously near 70 or

Graph 1: Closing Price of Sensex



Graph 2: Relative Strength Index Values of Sensex



over bought region (19 to 23 Oct, 15), the correction set in and its value slide down for more than 1500 points in next 15 days. The RSI value then slides to near 30 or over sold region which again induced reversal trend. Similar over bought trends were observed during end of April 2016 (26 & 27 Apr) which gave a fair signal of downtrend in the index price which was also actually observed in the initial working days of May 2016.

It was particularly observed throughout the study period that RSI tool generated very fast

buy or sell signal which were also observed in the actual price movements of sensex within 2-3 days. Hence, it can be concluded that the use of RSI tool is of great help in forecasting the price movement of any index in short term period.

**2. Moving Average Convergence Divergence (MACD):** MACD is calculated by using the difference between 12 day EMA (also known as SEMA) and 26 day EMA (also known as LEMA). A 9 day signal line is also plotted from MACD value to depict the price trend more precisely. Conceptually there can be four

conditions;

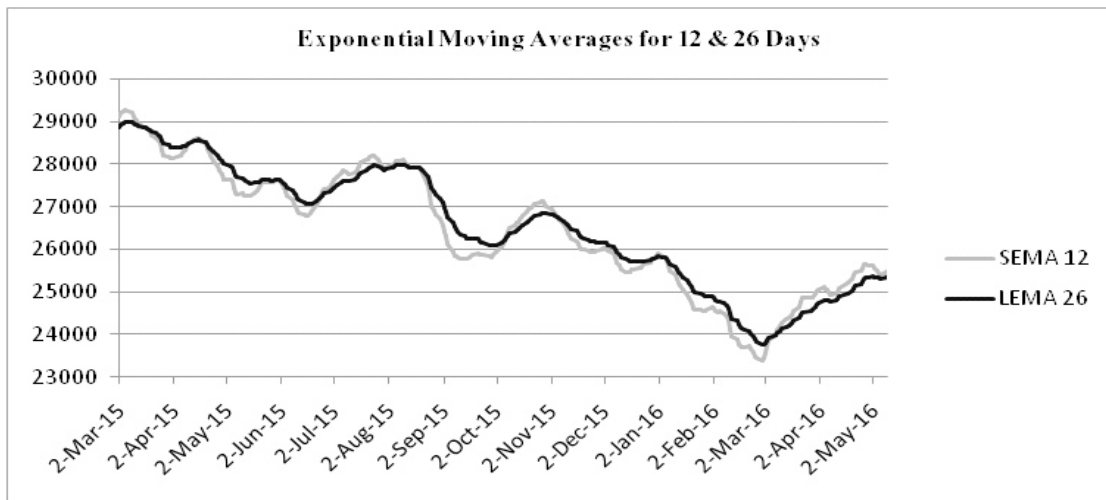
- a. When MACD crosses over zero line, it shows that SEMA has crossed LEMA.
- b. Prices will move in the direction of crossover of zero line.
- c. MACD in positive side indicates rising price trend.
- d. Negative value of MACD shows SEMA below LEMA and a declining price trend.

With these concepts in thought, we can now analyze the MACD graph.

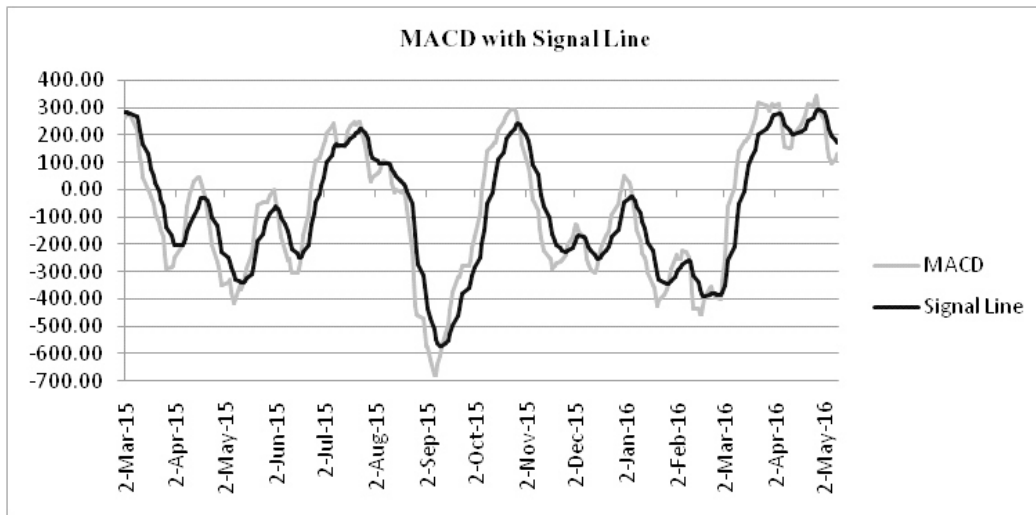
Graph 3 shows SEMA & LEMA and graph 4

shows MACD with its signal line. From the graph 3, it is observed that MACD generated a downfall signal in the stock price on March 17, 2015 as it entered in negative zone and similarly SEMA slide below LEMA (graph 4). This downfall continued for another one week after which this trend got reversed as shown by MACD and signal line at the end of March 15 (also confirmed by RSI movements). A mixed bag movement was observed in MACD values towards the end of June 15 which showed rise in index prices on

Graph 3: Exponential Moving Averages for 12 & 26 Days



Graph 3: Exponential Moving Averages for 12 & 26 Days





account of MACD values being above zero. MACD generated another signal on 13th August 2015 when it crossed below zero line to enter negative zone. At the same time, SEMA also came below LEMA. The index also dipped and remained negative for next two months. As observed from graph 3, SEMA crossed over LEMA and also MACD entered in positive zone above zero line (graph 4) during the first week of October 2015. These two simultaneous movements generated positive signals and set in the price reversal trend for next one month. Reversal trends towards price increase were also observed in the first week of March 2016 when SEMA crossed LEMA from below and similarly signal line started showing positive movements by crossing over MACD from below.

Thus, it was observed that MACD, SEMA and LEMA generated sufficient signals indicating price trends. For most of the time, these signals were clear indicators of forthcoming price trends. However these indicators were relatively faster as compared to actual price movements.

## FINDINGS

During the entire period of study it was observed that both RSI and MACD tools generated enough signals to depict the price trends in the index. These tools can be effectively used to anticipate the price movements for any scrip/index in short term. These tools become more effective with the increase in the period under study i.e. they provide more accurate prediction when data set is large (above 200). Also, these tools are to be used in combination with each other as no tool alone is sufficient to predict price movements alone.

During the study it was also observed that RSI was more accurate in predicting buy or sell signals. However, results produced by MACD and EMA were more faster and steeper i.e. they gave less time to react.

## CONCLUSION

Momentum Oscillator tools can be effectively used for the movement prediction of any scrip during short term. They generate fast signals to

indicate buy and sell moments and can be used in combination to formulate effective trading strategies. These tools are used with standard data period (14 days for RSI, 12 days for SEMA, and 26 days for LEMA) but this can be changed in accordance with the purpose of study. When used with short period data, these tools will give faster results and will become less sensitive towards price changes if used for an extended period. Moreover, chances of accurate prediction increase when data set is more than 200.

*The author is grateful to the anonymous referees of the journal for their suggestions to improve the overall quality of the paper. Usual disclaimers are applicable.*

## REFERENCES

- Hendrik Bessembinder & Kalok Chan (1998). Market Efficiency and the Returns to Technical Analysis. *Financial Management*, 27(2), pp 05-17. Retrieved from <http://www.jstor.org/stable/3666289>.
- Terence Tai - Leung Chong and Wang - Kam Ng (2008). Technical Analysis and the London Stock Exchange: Testing the MACD and RSI Rules using FT30. *Applied Economics Letters*, 15(14), pp 1111-1114. DOI: 10.1080/13504850600993598.
- William Cheung, Keith S.K. Lem & Hang Fai Yeung (2011). Intertemporal Profitability and the Stability of Technical Analysis: Evidences from the Hong Kong Stock Exchange. *Applied Economics*, 43(15), pp 1945-1963. DOI: 10.1080/000368409028178051
- R. Rosillo, D. de la Fuente & J.A.L. Brugos (2013). Technical Analysis and the Spanish Stock Exchange: Testing the RSI, MACD, Momentum and Stochastic Rules using Spanish Market Companies. *Applied Economics*, 45(12), pp 1541-1550. DOI: 10.1080/00036846.2011.631894.
- Loana-Andreea Boboc & Mihai-Cristian Dinica (2013). An Algorithm for Testing the Efficient Market Hypothesis. *PLoS ONE*, 8(10), pp 01-11. DOI: 10.1371/journal.pone.0078177.
- Cheol-Ho Park, Scott H. Irwin (2007). What Do We Know About The Profitability of Technical Analysis. *Journal of Economic Surveys*, 21(4), pp 786-826. DOI: 10.1111/j.1467-6419.2007.00519.x
- Steven B. Achelis (2001). Technical Analysis from A to Z. Retrieved from <http://www.freetradingdownloads.com/>