

Identification of Companies Making Significant Impact on Sensex Values and Fitting of ARIMA Models

***K. Venu Gopal¹, K. Sridevi², Dr. K. Pavan³**

¹Associate Professor, Department of Basic Science, Vishnu Institute of Technology, Bhimavaram-534202

² Assistant Professor, Department of Mathematics, K.G.R.L College of P.G Courses, Bhimavaram-534201

³ Professor, Department of Management Studies, Vishnu Institute of Technology, Bhimavaram-534202

Email¹: venugopal.kudupudi@gmail.com, Email²: sridevi.kommasani@gmail.com

Email³: kocherlakotakotapavan@gmail.com

Abstract:

Indian telecom sector is growing rapidly and drastic changes took place in the operations and services provided by these companies to the customers with the emergence of 4G technology. Most of the Indian telecom companies in the market are competing with each other to get hold over the customers so as to improve their market share. In this context, it is necessary for an investor to know how the shares of these companies will perform in long run to take proper investment decisions. In this regard, it is necessary for an investor to understand which company is making significant impact on the market and will yield better returns in the future. In this paper, the daily market capitalization values of selected companies are considered and their impact on Index of BSE namely SENSEX is calculated by using multiple regression analysis and suitable ARIMA models were fitted to find the performance in future.

Keywords: ARIMA, MULTIPLE REGRESSION, STANDARDISED COEFFICIENTS, SENSEX, BSE, MEAN REVERSION

1. Introduction

It is well known that the present day economy in different parts of the world is volatile in nature, which leads to many economic and social problems in the society. One of the important factors that make volatility in economic process is due to the fluctuations in share market which is dynamic in nature. Hence studying about share market is one of the important things in analyzing and understanding the economy.

With the emergence of 4G technology most of the telecom operators have changed their methods of providing various services like data services, tariff rates, Internet services, SMS, prepaid and post paid services etc., to attract the customers and improve their market share and thereby they can sustain in the market. In this context researcher felt necessary to know how the shares of these companies will perform in future. As telecom sector includes many service providers and all these service providers will definitely have impact on BSE SENSEX but for the study purpose researcher considered top four telecom companies basing on their market shares and performance. The daily market capitalization values of Bharati Airtel, Idea, Reliance and Tata Telecom were taken along with BSE SENSEX during the period 1-Jan-2013 to 31-Sep-2018 and their monthly averages were taken for the study purpose.

2. Objectives of the Study:

1. To identify the company which makes significant impact on SENSEX.
2. To identify the company which performs better in future.

3. Methodology:

The Data was collected from the website of BSE for the purpose of study and it is purely secondary data. A sample of four telecom companies were considered for the purpose of study basing on their performance during the period 01-01-2013 to 31-12-2017.

4. Analysis and Interpretation:

For the purpose of identifying the company that makes significant impact on SENSEX, Multiple Regression analysis is used and the same is presented below:

Table 4.1: Multiple regression output

Predictor	Coef	SE Coef	t- value	p- value
Constant	41904.06	4978.78	8.42	0.00
AIRTEL	38.54	13.50	2.85	0.01
IDEA	-80.44	22.66	-3.55	0.00
RCOM	-30.11	25.23	-1.19	0.24
TATA	-37.27	5.40	-6.90	0.00

Using the p-values in Table 4.1, the companies making significant impact are identified. All the companies are making significant impact on SENSEX values and are ultimately considered.

The regression equation is

$$\text{SENSEX} = 41904.06 + 38.54 \text{ AIRTEL} - 80.44 \text{ IDEA} - 30.11 \text{ RCOM} - 37.27 \text{ TATA TELECOM}$$

In order to identify the company making more impact on SENSEX among the selected companies' standardized coefficients are calculated and are presented below. The standardized coefficient values are obtained by multiplying the values of coefficient of the company with the standard deviation of the company and the result will be divided with the standard deviation of the SENSEX.

Table 4.2: Standardized coefficients

	Coefficients	Standard Error
AIRTEL	0.5090	0.1783
IDEA	-0.3566	0.1005
RCOM	-0.0767	0.0643
TATA	-0.6208	0.0900

It is clear from the above table that the greater absolute value of standardized coefficients is 0.6208 which represents TATA TELECOM, hence it is impacting more on SENSEX when compared to other companies.

Further ARIMA models are fitted for the companies and mean reversion were calculated to identify their future performance.

In order to find the future performance it is necessary to know whether the series is mean reverting or not. A series is mean reverting if its values tend to fall when they are above the individual series mean and rise when they are below the individual series mean i.e.,

$$X_t = b_0 + b_1 X_{t-1}$$

$$X_t > b_0 / (1 - b_1) \text{-- series will fall}$$

$$X_t < b_0 / (1 - b_1) \text{-- series will raise}$$

Autocorrelation and partial auto correlation coefficients of AIRTEL

For the date on week beginning day market capitalization values of the AIRTEL, Auto correlation Coefficient (AC) and Partial auto correlation coefficient (PAC) values against different time lags are calculated and presented in Table 4.3 and the corresponding graphs of AC and PAC values against the time lags were known as ACF(Auto correlation function) and PACF (Partial auto correlation function) are they are shown in the Fig 4.1(a) and Fig 4.1(b) respectively.

Table 4.3

Time Lag	Auto Correlation Coefficient	Partial Auto Correlation Coefficient
1	0.791729	0.791729
2	0.544493	-0.220658
3	0.388955	0.105468
4	0.274661	-0.051689
5	0.140209	-0.130023
6	0.029309	-0.014002
7	0.004328	0.075087
8	0.008351	0.038333
9	0.033939	0.052443
10	0.002805	-0.157032

Fig 4.1 (a)

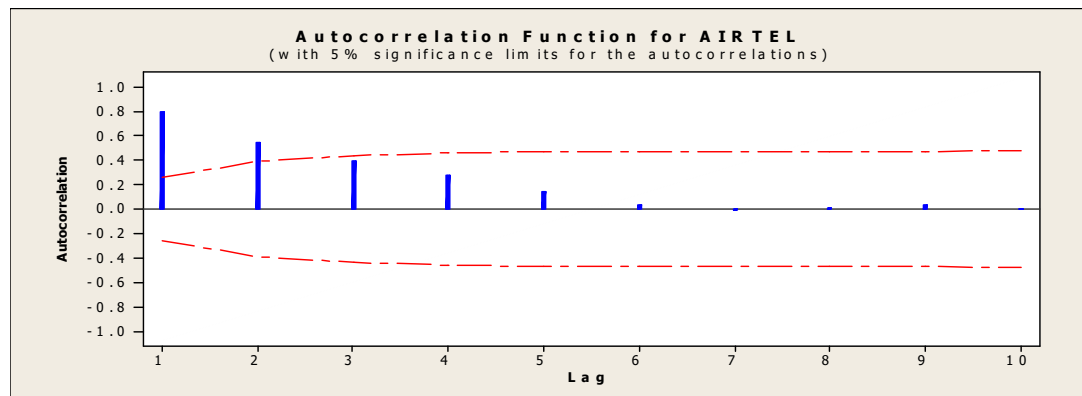
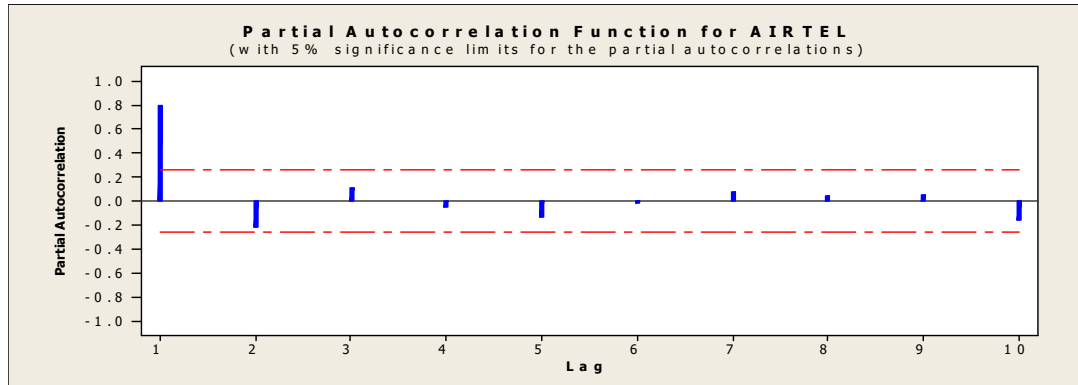


Fig 4.1(b)



By taking the structures of the significant values of Auto correlation coefficient and Partial auto correlation coefficients of AIRTEL shown in Fig 4.1(a) and 4.1(b), it is observed that AR(1) model (Auto regressive model with order one) is the best suited.

The ARIMA model with estimated values for AIRTEL is

$$X_t = 5.1 + 0.994X_{t-1}$$

To find whether the future values of this company will rise or fall following calculations are to be done for the next period by considering the end value of the company as X_{t-1}

$$b_0 / (1 - b_1) = 5.1 / (1 - 0.994) = 850$$

$$X_1 = 5.1 + 0.994 * (338.668) = 341.74$$

clearly $X_1 < b_0 / (1 - b_1)$ which indicates that the series will rise in future.

Autocorrelation and partial auto correlation coefficients of IDEA

For the date on week beginning day market capitalization values of the IDEA, Auto correlation Coefficient (AC) and Partial auto correlation coefficient (PAC) values against different time lags are calculated and presented in Table 4.4 and the corresponding graphs of AC and PAC values against the time lags were known as ACF (Auto correlation function) and PACF (Partial auto correlation function) are they are shown in the Fig 4.2(a) and Fig 4.2(b) respectively.

Table 4.4:

Time Lag	Auto Correlation Coefficient	Partial Auto Correlation coefficient
1	0.934068	0.934068
2	0.861509	-0.086067
3	0.783323	-0.080992
4	0.694568	-0.124117
5	0.630760	0.156618
6	0.561736	-0.096538
7	0.505557	0.059179
8	0.462735	0.027757
9	0.413316	-0.058121
10	0.375065	0.018021

Fig 4.2(a)

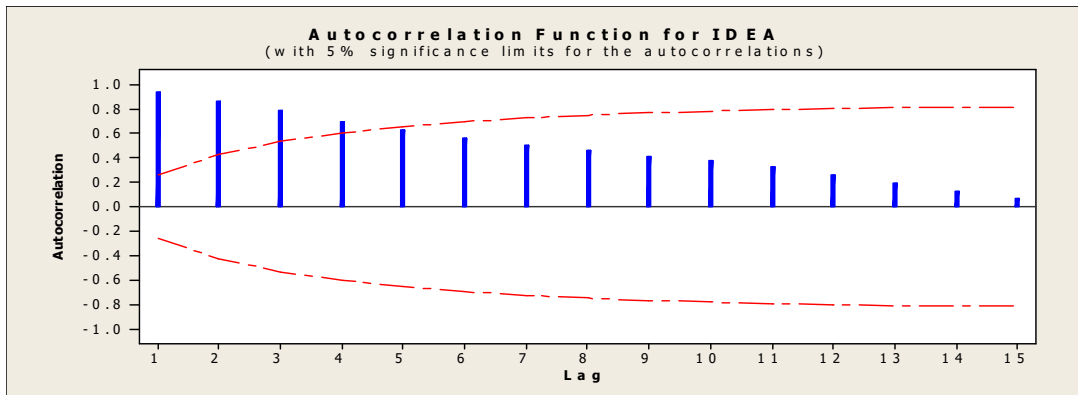
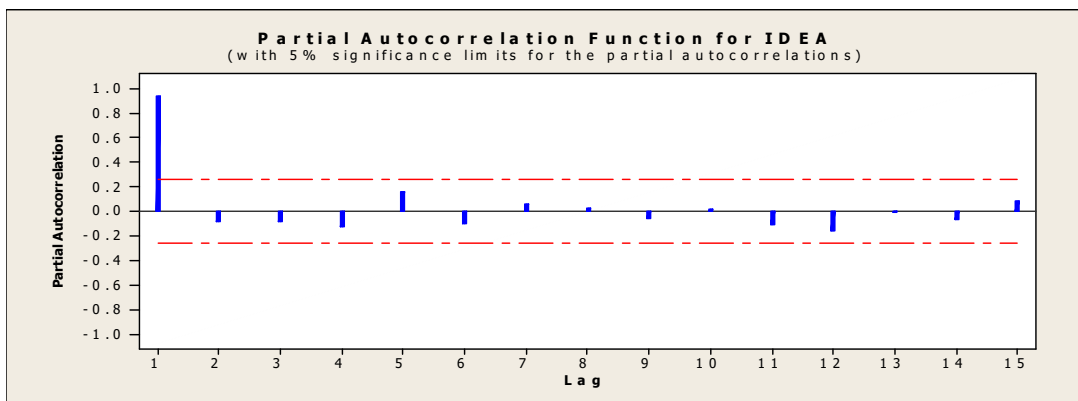


Fig 4.2(b)



By taking the structures of the significant values of Auto correlation coefficient and Partial auto correlation coefficients of IDEA shown in Fig 4.2(a) and 4.2 (b), it is observed that AR(1) model (Auto regressive model with order one) is the best suited.

The ARIMA model with estimated values for IDEA is

$$X_t = 6.31 + 0.949X_{t-1}$$

$$b_0 / (1 - b_1) = 6.31 / (1 - 0.949) = 123.72$$

$$X_1 = 6.31 + 0.949 * (112.868) = 113.42$$

clearly $X_1 < b_0 / (1 - b_1)$ which indicates that the series will rise in future.

Autocorrelation and partial auto correlation coefficients of RCOM

For the date on week beginning day market capitalization values of the RCOM, Auto correlation Coefficient (AC) and Partial auto correlation coefficient (PAC) values against different time lags are calculated and presented in Table 4.5 and the corresponding graphs of AC and PAC values against the time lags were known as ACF(Auto correlation function) and PACF (Partial auto correlation function) are they are shown in the Fig 4.3(a) and Fig 4.3(b) respectively.

Table 4.5:

Time Lag	Auto Correlation Coefficient	Partial Auto Correlation coefficient
1	0.947887	0.947887
2	0.891447	- 0.069383
3	0.827609	- 0.101401
4	0.766669	- 0.000780
5	0.712105	0.031895
6	0.649276	- 0.123728
7	0.584809	- 0.056868
8	0.533896	0.115658
9	0.487208	- 0.000145
10	0.435970	- 0.120342

Fig 4.3(a)

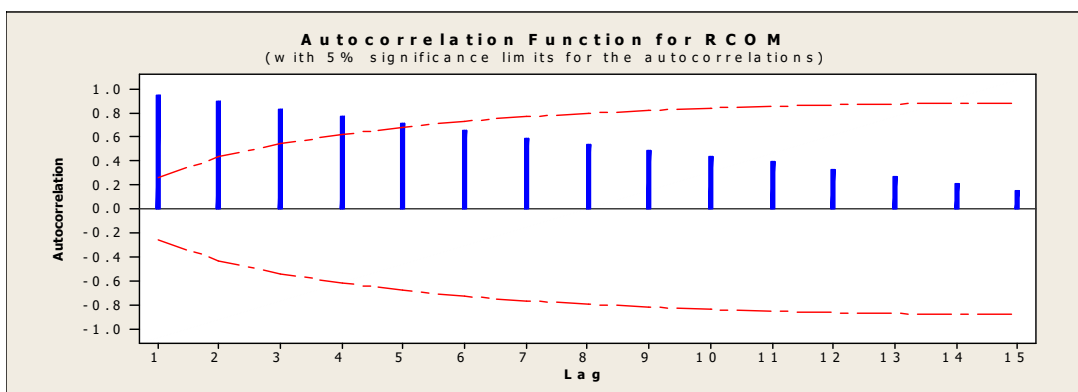
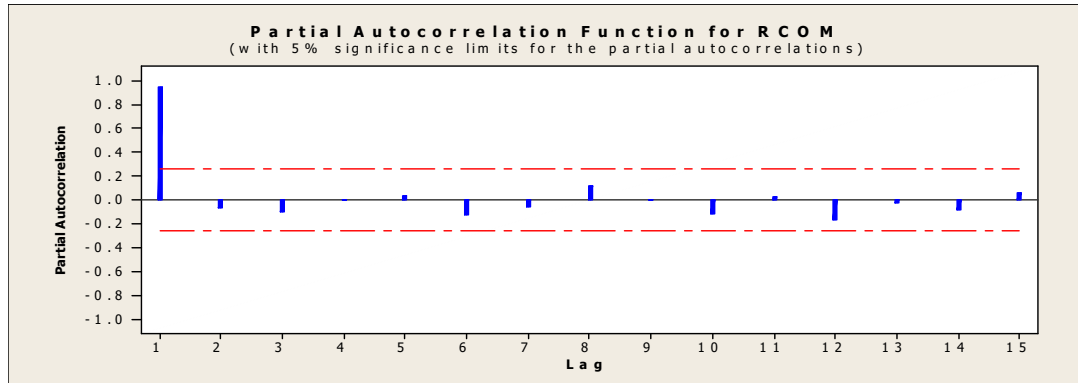


Fig 4.3(b)



By taking the structures of the significant values of Auto correlation coefficient and Partial auto correlation coefficients of RCOM shown in Fig 4.3(a) and 4.3(b), it is observed that AR(1) model (Auto regressive model with order one) is the best suited.

The ARIMA model with estimated values for RCOM is

$$X_t = -0.18 + 0.987X_{t-1}$$

$$b_0 / (1 - b_1) = 0.18 / (1 - 0.987) = -13.85$$

$$X_1 = 0.18 + 0.987 * (82.43) = 81.18$$

clearly $X_1 > b_0 / (1 - b_1)$ which indicates that the series will fall in future.

Autocorrelation and partial auto correlation coefficients of TATA TELECOM

For the date on week beginning day market capitalization values of the TATA TELECOM, Auto correlation Coefficient (AC) and Partial auto correlation coefficient (PAC) values against different time lags are calculated and presented in Table 4.6 and the corresponding graphs of AC and PAC values against the time lags were known as ACF(Auto correlation function) and PACF (Partial auto correlation function) are they are shown in the Fig 4.4(a) and Fig 4.4(b) respectively.

Table 4.6:

Time Lag	Auto Correlation Coefficient	Partial Auto Correlation coefficient
1	0.950687	0.950687
2	0.894092	-0.100985
3	0.838265	-0.016476
4	0.782845	-0.027653
5	0.726337	-0.042906
6	0.657196	-0.164097
7	0.573853	-0.178112
8	0.497993	0.039527
9	0.415447	-0.143395
10	0.336108	-0.015918

Fig 4.4(a)

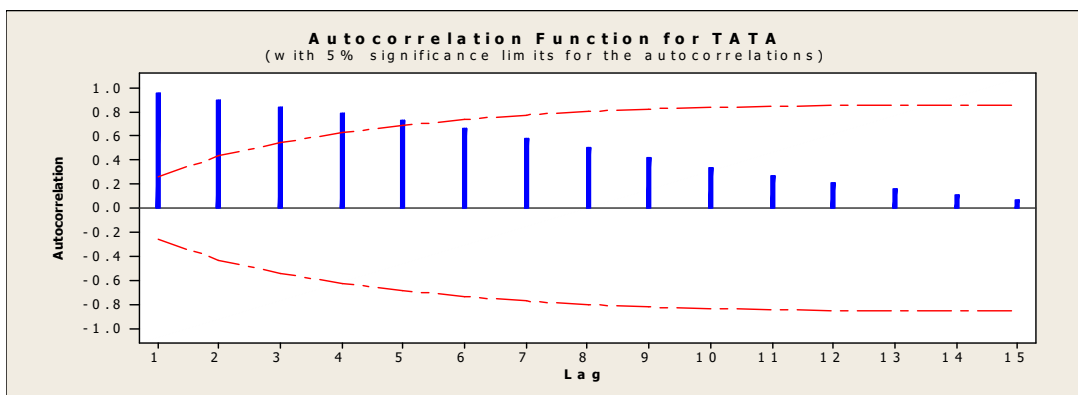
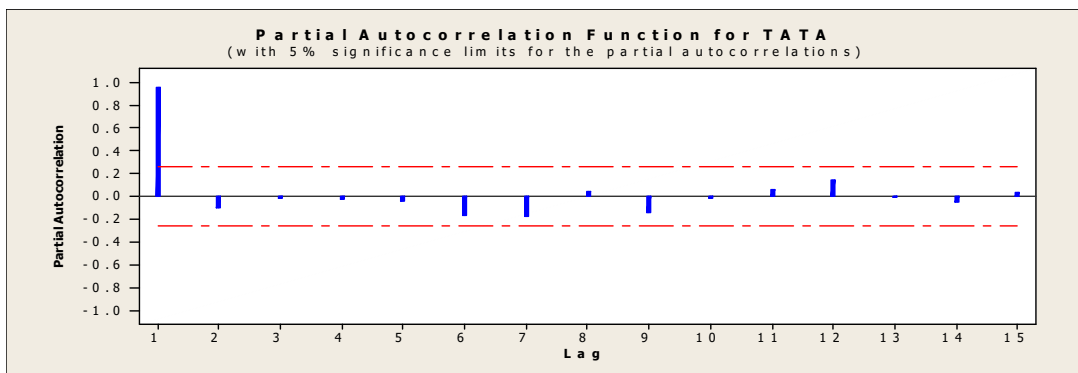


Fig 4.4(b)



By taking the structures of the significant values of Auto correlation coefficient and Partial auto correlation coefficients of TATA TELECOM shown in Fig 4.4(a) and 4.4(b), it is observed that AR(1) model (Auto regressive model with order one) is the best suited. The ARIMA model with estimated values for TATA TELECOM is $X_t = 11.6 + 0.991X_{t-1}$

$$b_0 / (1 - b_1) = 11.6 / (1 - 0.991) = 1289$$

$$X_1 = 11.5 + 0.991 * (243.348) = 252.75$$

$X_1 < b_0 / (1 - b_1)$ this indicates that the series will rise in future.

Consolidated Mean reverting series, individual means and priority

Company	X_t	$b_0/(1-b_1)$	Mean reverting series	Company mean	Priority
AIRTEL	341.74	850	Rise.	355.414	2
IDEA	113.42	123.73	Rise	127.971	3
RCOM	81.18	-13.85	Fall	75.737	4
TATA	252.75	1289	rise	434.091	1

From the above table all the ARIMA models fitted to the corresponding companies are rising in future except RCOM. Out of the four companies TATA TELECOM is having higher individual series mean for the study period followed by AIRTEL and IDEA. Since series are rising in future which indicates that the values will be above the individual company means and so priority were given accordingly.

5. Conclusion:

From the regression analysis and standardized coefficients it is clear that TATA Telecom is making high impact on SENSEX out of the selected stocks. Further for the purpose of identifying the trend ARIMA models were fitted and using mean reverting series the future trend is predicted. Investors are suggested to give first priority to TATA Telecom out of the three rising series because it is having higher individual mean when compared to other companies.

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