

# Prediction of stock price movements through regression analysis for Sun Pharma and Cipla

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## Abstract

Stock price prediction of the company aims to determine the future price movements of the stock. With the advent of data analytics, prediction of stock price movement has become highly popular. The researchers use numerous ways to predict the stock price movements like data mining, artificial neuron networks, technical analysis etc. This study aims to predict the stock prices with the integration of statistical tool known as regression analysis. Regression analysis has become an immense part of financial modelling as it sets to establish the relationship between dependent and independent variables. Thus the study takes into consideration the regression analysis for the data analysis. Due to the onset of Covid 19, pharma stocks have evidenced volatility in their prices. Hence two pharma companies are considered for the study. The changes in stock prices of Sun pharma and Cipla were studied for the span of three years. The probability of price variation was analysed and a robust model was developed to understand the probability of change in prices for the future. The study would be very helpful for the equity investors as it would help them in maximisation of their wealth.

**Keywords:** Prediction, forecasting, stock price movements, regression analysis, Sun Pharma, Cipla

## Introduction:

Indian stock market is always considered volatile. The volatility in the stock price movements are basically dependent on various internal and external environmental factors. The stock market experts have proposed various methods of market analysis to forecast the future price movements of the stock. The regression analysis is used as one of the statistical tool to understand and explore the future price of stock. It is a technique largely used in financial modelling to understand the interrelationship between the variables. It helps to analyse the influence of the most significant variable on other variables commonly known as dependent and independent variables. Many studies on prediction of stock price movements have already been done in the past. The research basically aims at the development of probability models through the regression analysis.

The two major companies from the pharmaceutical industry are used for the study. Sun Pharmaceutical Industries Ltd (Sun Pharma) is the fourth largest speciality generic pharmaceutical company in the world. It provides high quality and affordable medicines. The global revenue of the company is US \$ 4.5

Billion As per the data taken from money control, the market capitalisation of Sun

Pharma as on 23<sup>rd</sup> Jan 2022 is 100448 crores. It is the top company with the highest market share in the country.

The second company chosen for the study was Cipla. The company constantly works towards ensuring access to high quality and affordable medicines to support patients in need. It has its presence in 80 plus countries by providing over 1500 products across categories in 50 plus dosage forms. The current market capitalisation of the company is 40278 crores. It enjoys fourth position in terms of market share in the country.

## Objectives of the study:

The following are the objectives of the study.

1. To predict the future prices of the stock based on its historical prices.
2. To evaluate the relationship between two major pharmaceutical companies based on their stock price movements.

## Research Methodology:

The study used secondary methods of data collection. The three year data of both the companies were collected from yahoo finance

website. The regression analysis was done in Excel.

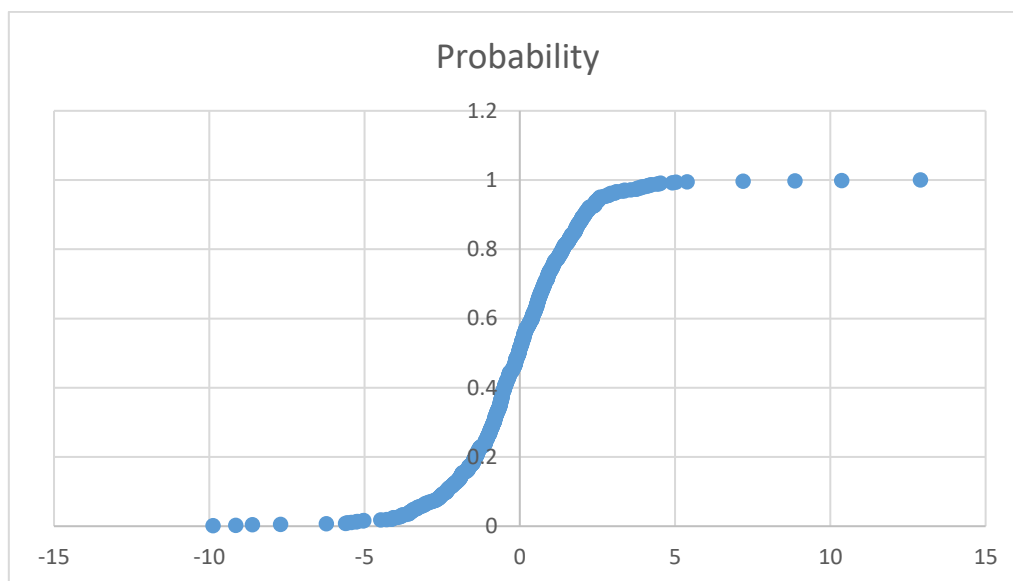
### Methodology:

The closing share prices of both the companies were extracted from yahoo finance for the 3 year period from Jan 2019 to Jan 2022. It was arranged in ascending order as a next step. The percentage change in the share prices were calculated by using the below formula:

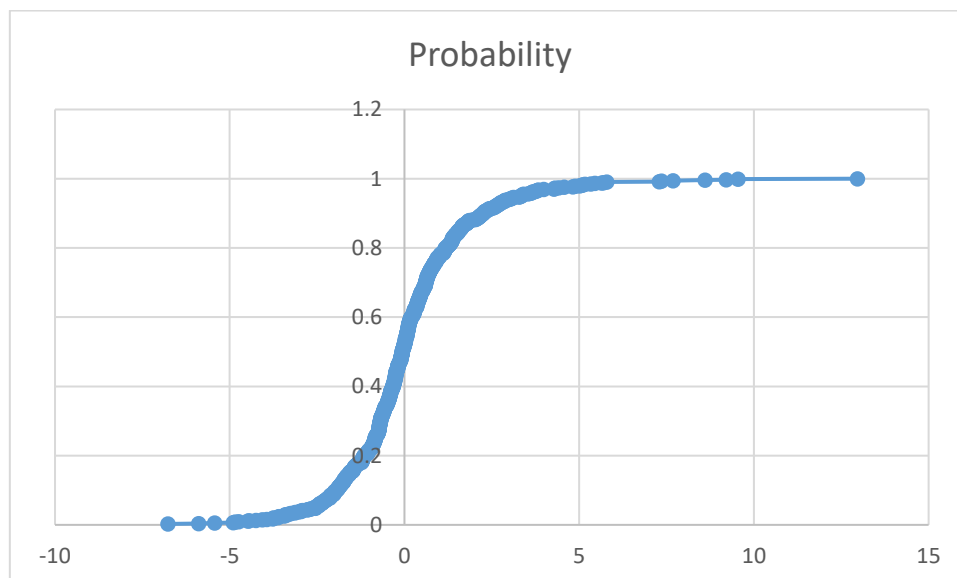
$$\frac{(\text{Today's price} - \text{Yesterday's price}) / \text{Yesterday's price} \times 100}{\text{Yesterday's price}}$$

Further the change in percentage figures were sorted in descending order. The probability was calculated for each row considering the total number of observations. i.e., 740.

### The Relationship between the % change in Sun Pharmaceutical Industries Ltd. closing prices and Probability:



### The Relationship between the % change in Cipla closing share prices and Probability:



Based on the above results, the financial modelling was used wherein the percentage change of prices and probability figures were used for ascertainment of the probability percentage of change in next day's share prices.

V lookup function was used here to gauge the change in prices. The same was also used to predict the future prices.

The second objective was to study the trend of movement of stock prices of two competitors. The objective was to understand if two companies operating in the same industry are

related to each other or differ from each other. The regression statistics and ANOVA was applied to understand the relationship between the stock prices.

### Data Analysis:

**Table 1:**

% Change in Sun Pharma stock price	Probability	Expected % change in price
0.996084561	0.736486486	1
1.999826144	0.866216216	2
<b>Probability of stock price between 1 and 2 %</b>		
	0.12972973	

**Table 2:**

% Change in Cipla stock price	Probability	Expected % change in price
0.999182465	0.775978408	1
-1.789961231	0.12145749	-1.78
<b>Probability of stock price between 1 and -1.78%</b>		
	0.654520918	

**Table 3:**

<i>Regression Statistics</i>	
Multiple R	0.909188
R Square	0.826623
Adjusted R Square	0.826388
Standard Error	58.22750
Observations	740

### ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	119296.81	119296.80	3518.621	4.9751E-283
Residual	738	250214.6	3390.441		
Total	739	144318.27			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	72.52745	8.2500	8.791120	1.03E-17	56.33103	88.723	56.331	88.723
509.60000	0.684507	0.0115	59.31796		0.661852	0.7071	0.6618	0.7071
6	258	4	717	5E-283	85	62	53	62

### Observations and Findings:

Table 1 depicts the percentage change in stock price of Sun Pharma over the last 3 years as index 1 and Probability as index 2. Both the figures are compared to the hypothetical figures of 1% and 2%. The objective here was to find the difference in the probability figures ( $0.866 - 0.736 = 0.130$ ). The probability of having the changes in closing share prices between 1 and 2% is 13%. In other words, there is 13% probability that the stock price might increase or decrease in the range between 1 and 2%.

Table 2 depicts the percentage change in stock price of Cipla over the last 3 years as index 1 and Probability as index 2. Both the figures are compared to the hypothetical figures of 1% and -1.78%. The objective here was to find the difference in the probability figures ( $0.776 - 0.121 = 0.654$ ). The probability of having the changes in closing share prices between 1 and 2% is 65%. In other words, there is 65% probability that the stock price might increase or decrease in the range between 1 and -1.78%. The same was proved by the share price of the next day. Hence it is proved that the probability calculation is the best method of predicting the future share prices for the company.

Table 3 depicts the relationship between the movement of share prices of both the companies. The data of 3 years was taken for comparison of these two companies. The regression coefficient of 0.909 indicates the strong relationship in share price movements of the companies.

### Conclusion:

It can be concluded that regression is an effective tool in forecasting the future share prices of the company. The equity investors can use this tool to understand the stock price movements and invest in a company which would give higher returns in the future. The goal of wealth creation and appreciation can be achieved through this statistical technique.

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