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## COVID-19 Vaccine R & D Company: A Predictive analytical study of stock price performance of M/S Aurobindo Pharmaceuticals Ltd, India during the period 2018-20 for retail investors

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### Abstract

Covid-19 has been a stumbling block in every walk of every one's life. Healthcare and Pharmaceutical companies in the organic race of inventing effective vaccine for mitigating Covid-19. In this regard M/s Aurobindo Pharmaceuticals Ltd, India (Auro Vaccines) is one of the front runners in the race of developing Covid-19 Vaccine. This research paper is to examine the past stock price performance (April 2018 – March 2020) of M/s Aurobindo Pharmaceuticals and to do a predictive analysis based on the past stock price performance, with the other fundamental inputs about the company's research and development initiatives in inventing a new vaccine for Covid-19. The variables used for analysis are closing stock price data and percentage of stock trading delivery data. Using spreadsheet analytical tools like: Descriptive Statistical Analysis, Log Natural Return Analysis, Regression Analysis, Scatter Plot Graphical Analysis

**Keywords:** Covid-19, Pharmaceutical Companies, Stock Price, Predictive Analysis

**JEL Classifications:** I-15 | I-11 | G-10 | C-53

## Introduction

Corona Viral Disease 2019 (Covid-19) is resetting the entire world towards a new normal. As an offshoot of the epidemic the panic is creeping to the newer heights day by day and deepening the crisis, which is making shift in the gear of all the avenues of businesses and investments. As there is a huge halt in businesses, investors are screaming at the stock markets as their investments are seeing new lows, ever since the inception of many companies. Covid-19 has been a stumbling block in every walk of every one's life. Healthcare and Pharmaceutical companies in the organic race of inventing effective vaccine for mitigating Covid-19.

In this regard M/s Aurobindo Pharmaceuticals Ltd, India (Auro Vaccines) is one of the front runners in the race of developing Covid-19 Vaccine. This research paper is to examine the past stock price performance (April 2018 – March 2020) of M/s Aurobindo Pharmaceuticals and to do a predictive analysis based on the past stock price performance, with the other fundamental inputs about the company's research and development initiatives in inventing a new vaccine for Covid-19.

## Review of Literature

Rich Karlgaard (May 2020) "Covid-19 is a global crisis, ... While global stocks have seen dramatic declines so far in 2020, China's stock markets are down by comparatively modest percentages this year—Shanghai down 7%, Shenzhen up 2% and Hong Kong 15% lower—reflecting China's first-to-suffer, first-to-recover status."

Abhinav Angirish (May 2020) "Investing is not about market levels. A blue-chip company available at a discount is a strong indicator to buy. Heavily discounted stock prices indicate irrationality, and markets are always rational, they will find the fair levels again. Successful wealth creators always take advantage of rupee cost averaging. This is the only strategy one needs to create wealth, and it is the one that works".

Surbhi Jain (July 2020) "On the back of coronavirus-induced lockdown, decline in elective surgeries, ... The brokerage firm has recommended to 'buy' four pharma stocks with an upside of up to 16 per cent. These include Aurobindo Pharma with 16 per cent gain ..."

## Objectives of the Study

Based on the gaps found / studied through the review of literature, the researcher set the following objectives for the study:

- i. To study the past stock price performance of M/s Aurobindo Pharma during the years 2018-20, and
  - ✓ **Hypothesis Study to testify the Objective #(i)**
    - (i) **H0**: *There are no significant relationship between the past stock price performance and % of actual stock delivery in the market. (Null Hypothesis)*
    - (i) **H1**: *There exists significant relationship between the past stock price performance and % of actual stock delivery in the market. (Alt. Hypothesis)*
- ii. To do the predictive analysis based on the past price performance and select qualitative data from the industry/market.
  - ✓ **Hypothesis Study to testify the Objective #(ii)**
    - (ii) **H0**: *There are no significant variables to do the predictive analysis with the past stock price data (Null Hypothesis)*
    - (ii) **H1**: *The past stock price data is sufficient and significant to perform the predictive analysis. (Alt. Hypothesis)*

## Research Methodology

The variables used for analysis are closing stock price data and percentage of stock trading delivery data. Using spreadsheet analytical tools like:

- Descriptive Statistical Analysis
  - *For past stock price performance analysis*
- Log Natural Return Analysis
  - *For past stock price performance analysis*
- Regression Analysis
  - *For predictive analysis*
- Scatter Plot Graphical Analysis
  - *For past stock price performance analysis*

## Scope and Importance of the Study

As an offshoot of Covid-19, many stocks are tumbling in the stock market; but few Pharma companies are performing ahead of market performance with high positive price returns. One such pharmaceutical company is M/s Aurobindo Pharma Ltd, which is one of the front-runners in inventing the Covid-19 Vaccine. Through this research paper, the author has decided to make a predictive analysis based on the past stock price data of M/s Aurobindo Pharma Ltd.

## Data Analysis & Interpretations

Period: April 2018 – March 2020 (*Illustrative Data Analysis*)

Date	Close Price	% Dly Qty	Stk Price Log Returns	Change in Delivery %
02-Apr-18	592.55	30.04		
03-Apr-18	593.35	24.53	0.13%	-20.26%
04-Apr-18	590.45	38.67	-0.49%	45.52%
05-Apr-18	599.15	33.19	1.46%	-15.28%
06-Apr-18	619.4	28.71	3.32%	-14.50%
09-Apr-18	611.9	16.4	-1.22%	-56.00%
10-Apr-18	607.85	33.27	-0.66%	70.74%
00-Jan-00	617.65	23.55	1.60%	-34.55%
12-Apr-18	611.8	39.65	-0.95%	52.10%
13-Apr-18	621.75	20.54	1.61%	-65.77%
16-Apr-18	624.6	15.56	0.46%	-27.77%
17-Apr-18	620.45	37.18	-0.67%	87.11%
18-Apr-18	609.5	20.5	-1.78%	-59.53%
19-Apr-18	617.8	29.24	1.35%	35.51%
20-Apr-18	618.6	26.24	0.13%	-10.83%
23-Apr-18	642.55	31.05	3.80%	16.83%
24-Apr-18	636	28.26	-1.02%	-9.42%
25-Apr-18	624.1	28.76	-1.89%	1.75%
26-Apr-18	629.3	30.25	0.83%	5.05%
27-Apr-18	630.65	22.67	0.21%	-28.85%
30-Apr-18	642	28.67	1.78%	23.48%
20-Mar-20	346.7	40.79	0.20%	25.78%
23-Mar-20	294.7	49.29	-16.25%	18.93%
24-Mar-20	326.15	26.41	10.14%	-62.40%
25-Mar-20	333.65	28.27	2.27%	6.81%
26-Mar-20	361.4	26.05	7.99%	-8.18%
27-Mar-20	392.25	26.77	8.19%	2.73%
30-Mar-20	389.5	13.15	-0.70%	-71.09%
31-Mar-20	413.15	27.85	5.89%	75.04%

Source: Secondary ([www.nseindia.com](http://www.nseindia.com)) | Spreadsheet Analysis (MS-Excel)

**Descriptive Statistics @ M/s Aurobindo Pharma Ltd (2018-20)**

Mean	-0.00073
Standard Error	0.001351
Standard Deviation	0.03002
Sample Variance	0.000901
Kurtosis	14.41864
Skewness	-1.29721
Range	0.394941
Minimum	-0.21034
Maximum	0.1846
Sum	-0.36062
Count   Observations	494
Confidence Level (95.0%)	0.002654

(Source: Spreadsheet Analysis)

**Regression Statistical Analysis**

Multiple R	0.100107
R Square	0.010021
Adjusted R Square	0.008009
Standard Error	0.399116
Observations	494

(Source: Spreadsheet Analysis)

**ANOVA**

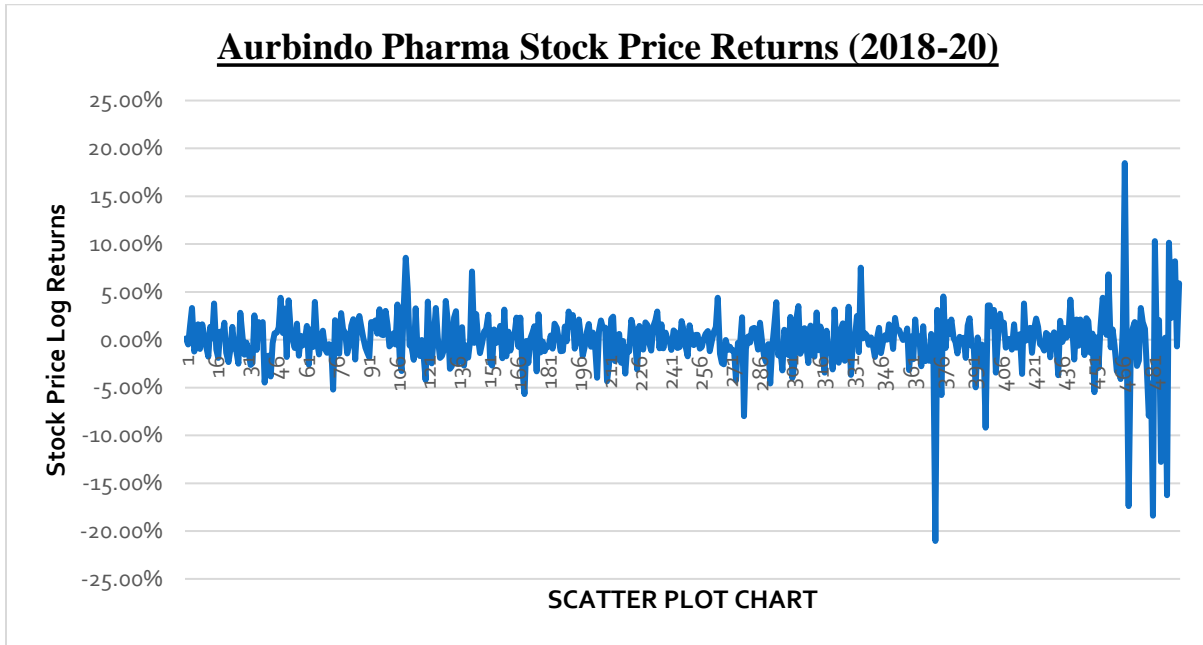
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
<b>Regression</b>	1	0.7933	0.7933	4.98	0.0261
<b>Residual</b>	492	78.37	0.1593		
<b>Total</b>	493	79.17			

(Source: Spreadsheet Analysis)

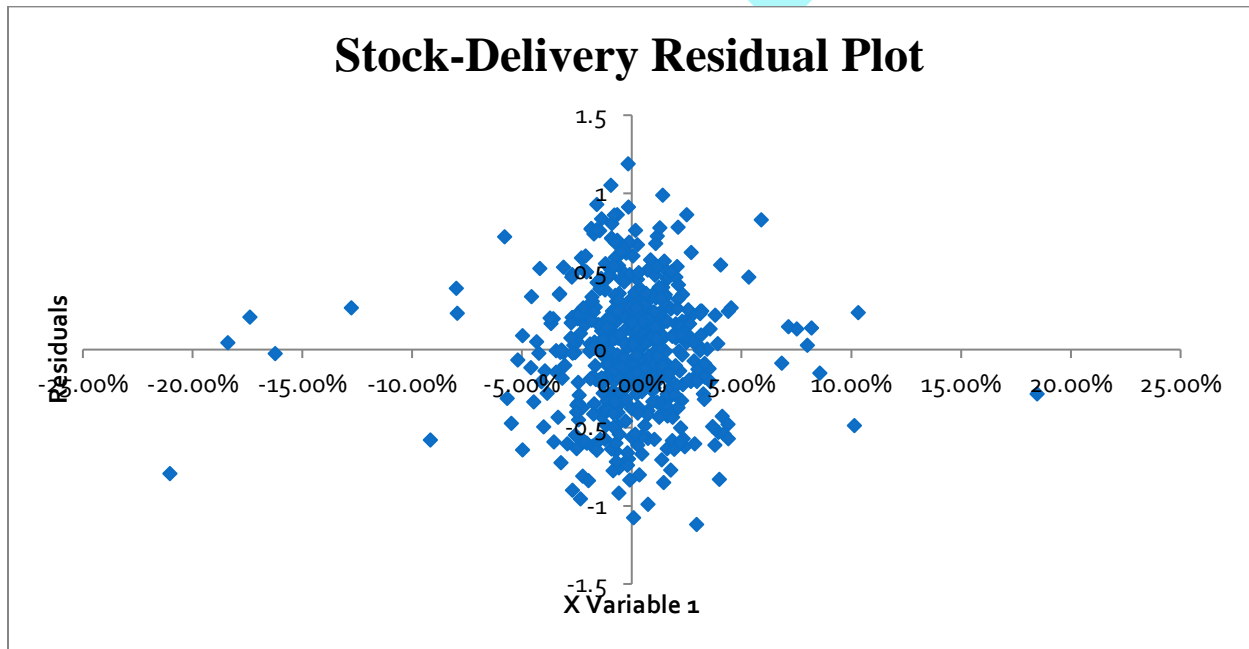
	<i>Coefficients</i>	<i>Std. Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
<b>Intercept</b>	-0.001	0.018	-0.063	0.950	-0.036	0.034	-0.036	0.034
<b>X Variable 1</b>	-1.336	0.599	-2.232	0.026	-2.513	-0.160	-2.513	-0.160

(Source: Spreadsheet Analysis)

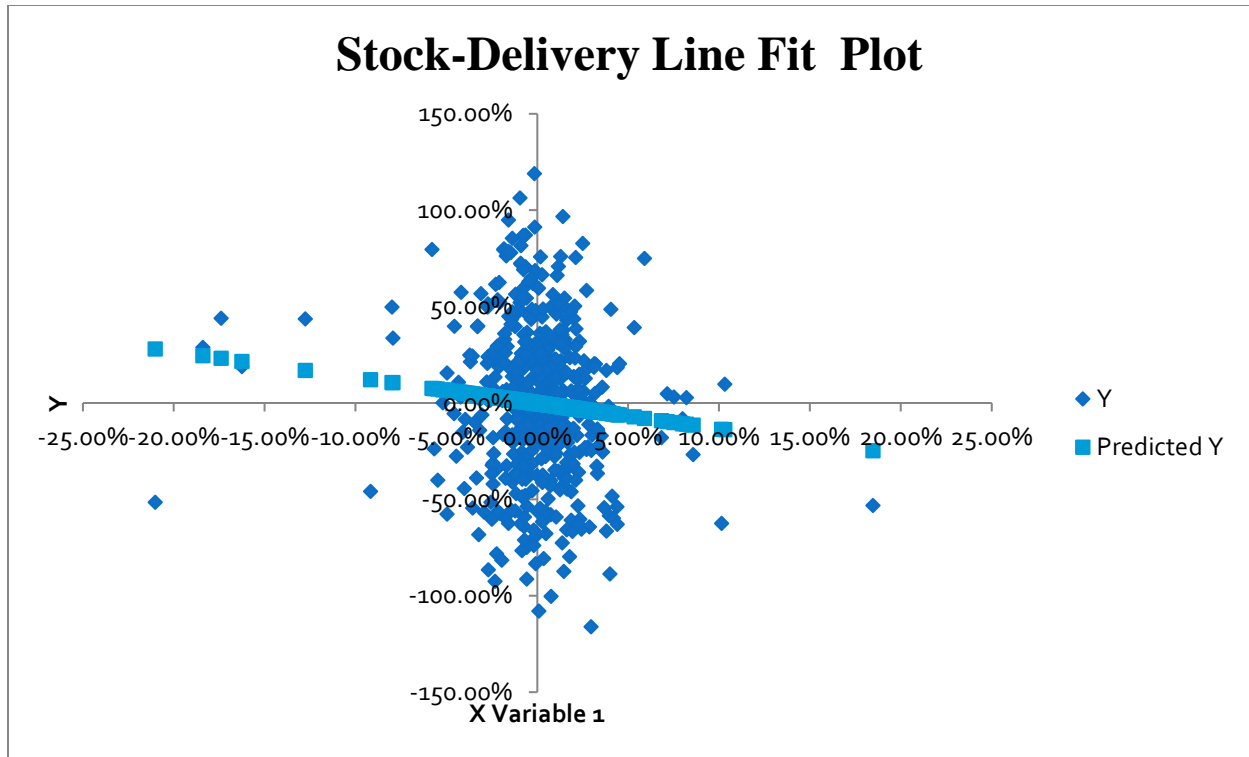
### Scatter Plot Graphical Analysis



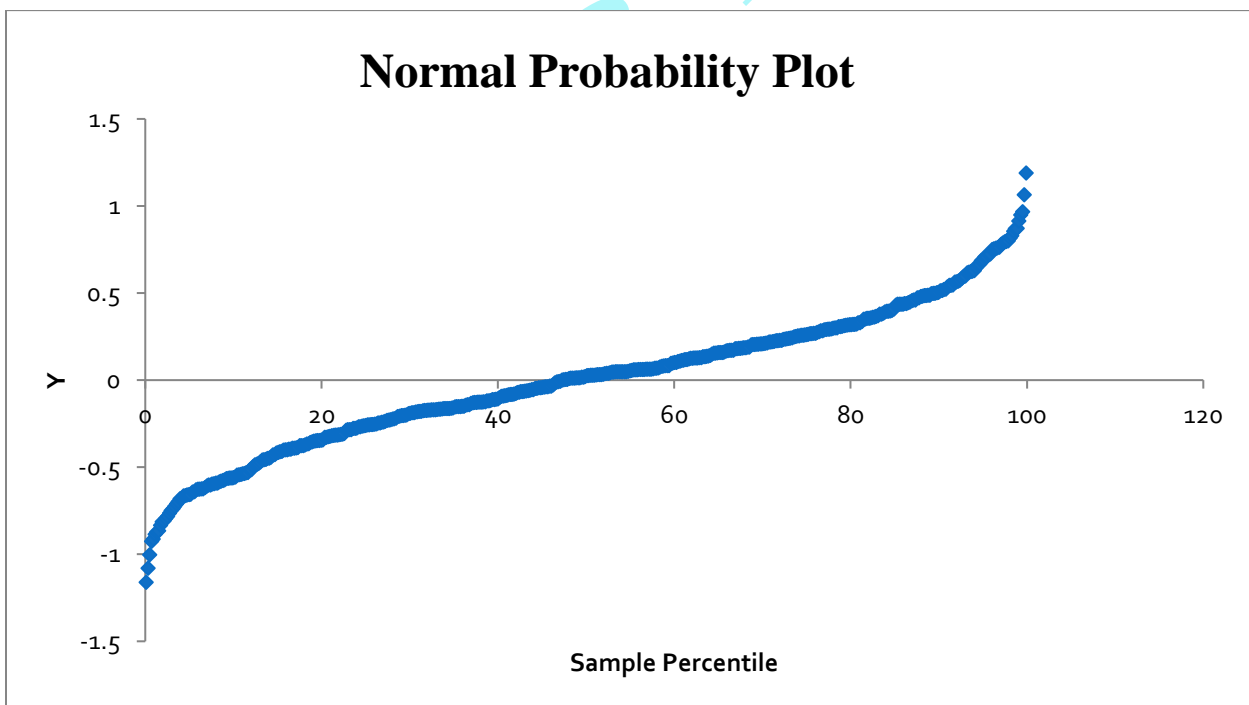
(Source: Spreadsheet Analysis)



(Source: Spreadsheet Analysis)



(Source: Spreadsheet Analysis)



(Source: Spreadsheet Analysis)

## Summary of Results, Findings and Recommendations

From the above data analysis and interpretations, the researcher would like to summarize the following results, findings and recommendations:

- Though there is a stock price oscillation, ultimately its win-win for any retail investor, who had invested in Aurobindo Pharma Ltd.
- Its evident and proved that whenever stock price increases, there is a dip in stock delivery percentage, similarly whenever stock price decreases, there is an increase in stock delivery percentage. So, whenever price decreases the investors are preferring to accumulate the stocks, by buying (increase in delivery is a proof)
- There exists a strong correlation between the stock price and positive news information in the market vice-versa its opposite, the price tumbles down.
- Predictive regression analysis shows a positive indication of upward price movement, from the past stock price data analysis
- As the company is keenly engaged in developing the Covid-19 vaccine the company's current market price is Rs.822.60 (as on 30<sup>th</sup> July 2020), keep on increasing from the price being Rs.413.20 on 31<sup>st</sup> March 2020; average stock price return of about 200%, within 4 months' time.
- It would be interesting to note the scatter plot graphical analysis on the past stock price data analysis, during the March 2020, highly volatile price movements.
- Stock Price-Delivery % residual plot and line-fit plot shows a positive trend, though the past stock price data-Delivery % looks volatile.
- Normal probability shows an oscillating trend, but still signals a 'buy' indication.

## Conclusion

As stated earlier, both the objectives were met and proven statistically and fundamentally (qualitative data). Aurobindo Pharma is sure shot investment stock for the retail investors, after making the past stock price data analysis and understanding the initiatives and efforts towards inventing Covid-19 Vaccine. Its recommended to buy and accumulate for retail investors, till October 2020; after looking at the results of Covid-19 vaccine invention, let the investors take the call of holding it or accumulating it further or selling it.



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