

MA374 Financial Engineering lab: 06

Name: Naman Goyal

Roll No. 180123029

- To execute my .py file

Run **\$python3 180123029_NamanGoyal.py** on the terminal. The snapshot is shown below:

```
neo@Neo:~/Desktop/FE_Labs/lab06$ python3 180123029_NamanGoyal.py
-----Q1-----
FOR BSE INDEXED COMPANIES -----
FOR NSE INDEXED COMPANIES -----
-----
-----Q2-----
NSE and BSE Daily Data
NSE and BSE Weekly Data
NSE and BSE Monthly Data
-----
-----Q3-----
NSE and BSE Daily Data
NSE and BSE Weekly Data
NSE and BSE Monthly Data
-----
-----Q4 && Q5-----
NSE and BSE Daily Data
NSE and BSE Weekly Data
NSE and BSE Monthly Data
-----
neo@Neo:~/Desktop/FE_Labs/lab06$ |
```

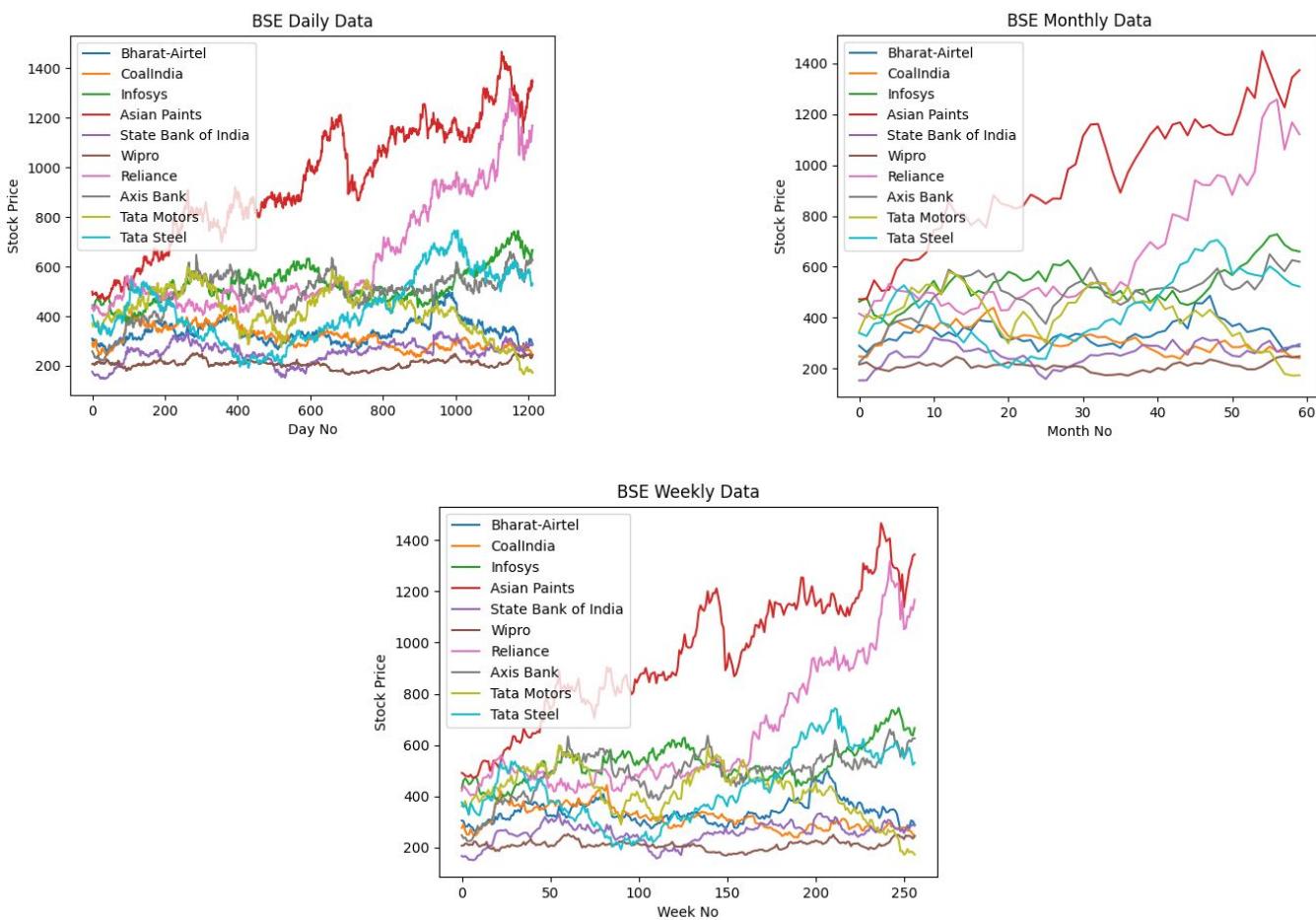
Ques.1

- The Companies considered for **BSE (SENSEX) Exchange** are:
 - **Bharat-Airtel**
 - **Coal India**
 - **Infosys**
 - **Asian Paints**
 - **State Bank Of India**
 - **Wipro**
 - **Reliance**

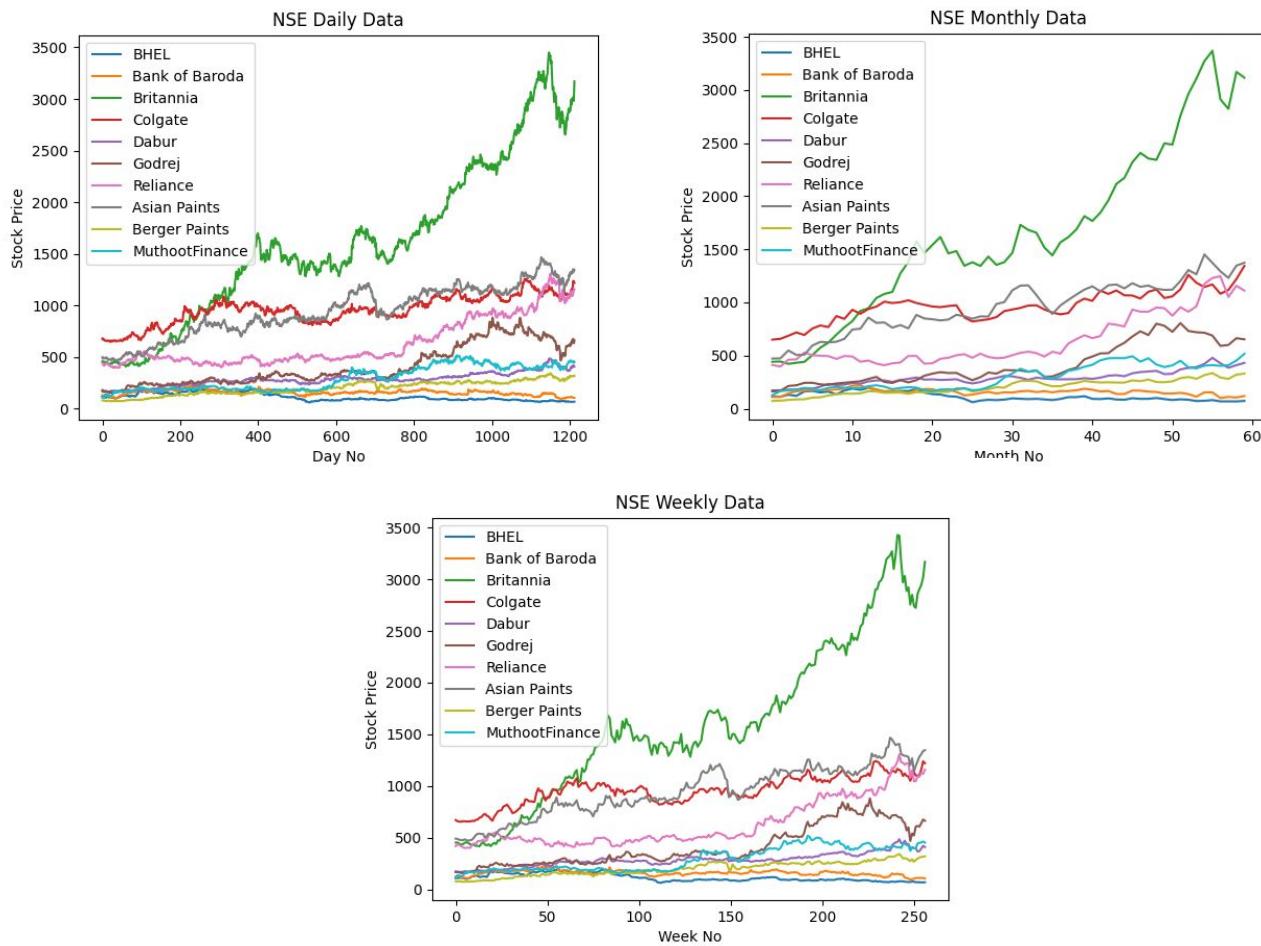
- **Axis Bank**
- **Tata Motors**
- **Tata Steel**

- The Companies taken for **NSE (NIFTY) Exchange** are:
 - **BHEL**
 - **Bank of Baroda**
 - **Britannia**
 - **Colgate**
 - **Dabur**
 - **Godrej**
 - **Reliance**
 - **Asian Paints**
 - **Berger Paints**
 - **Muthoot Finance**

- Plots of prices v/s time :: **BSE** ::



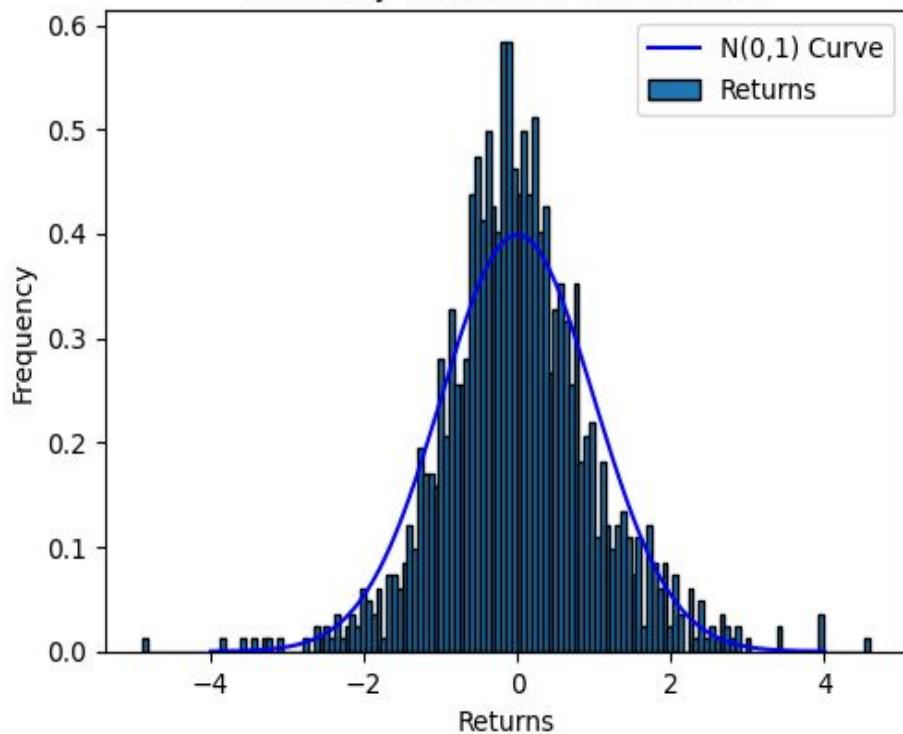
- Plots of prices v/s time :: **NSE** ::



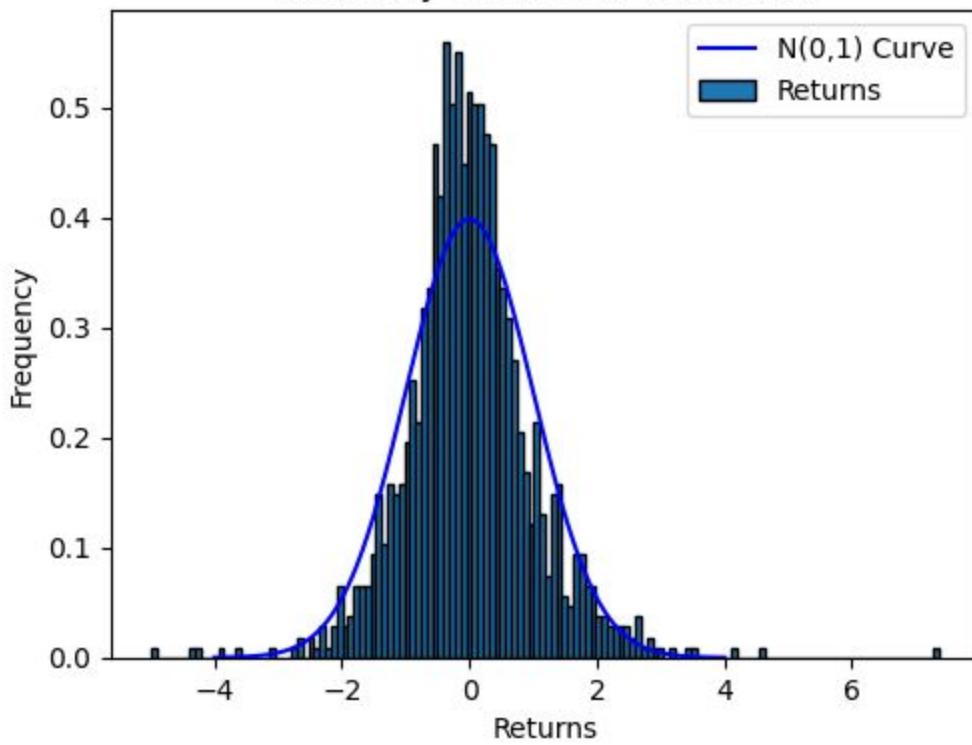
Ques.2

- Plots for Ri_cap are shown below for each category below:
 - **Daily BSE**

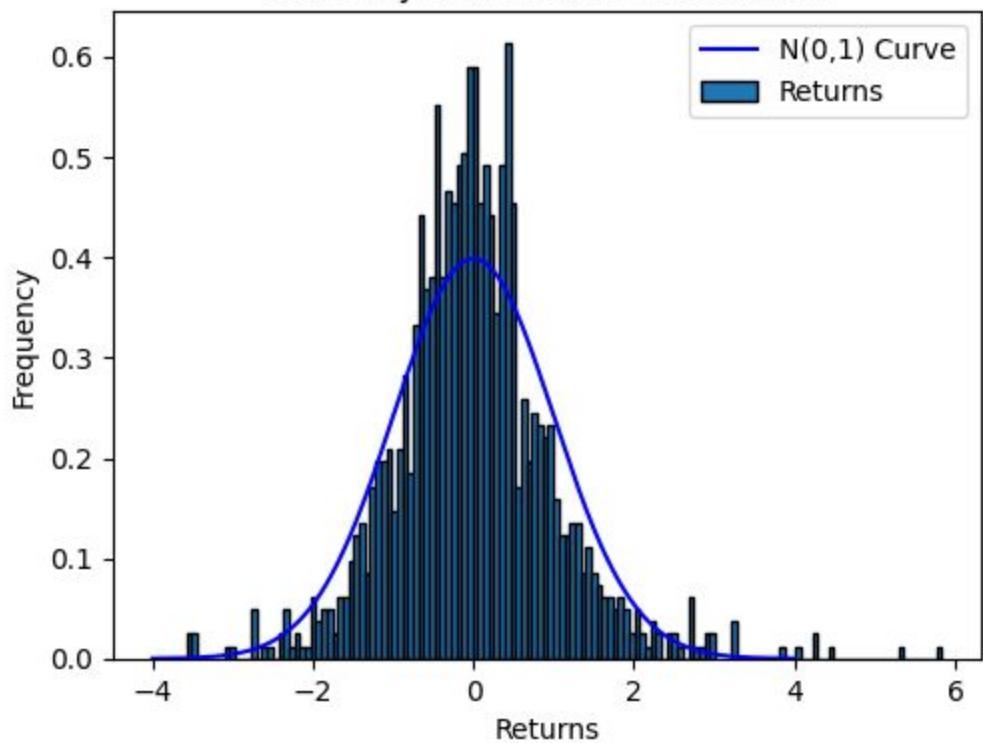
BSE Daily Returns for Asian Paints



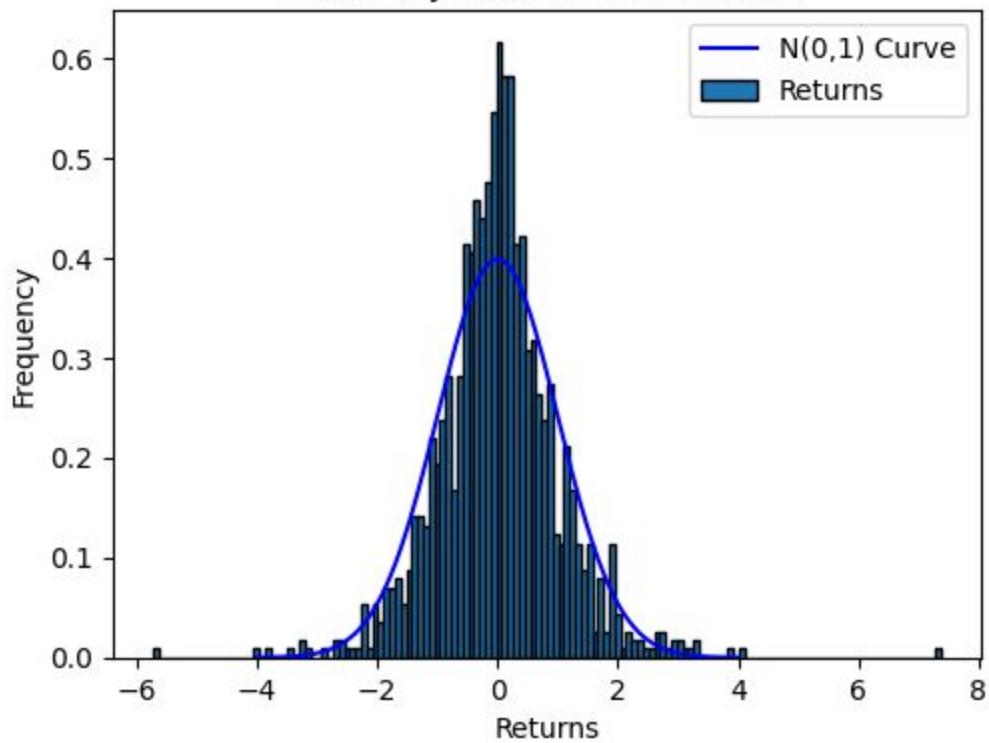
BSE Daily Returns for Axis Bank



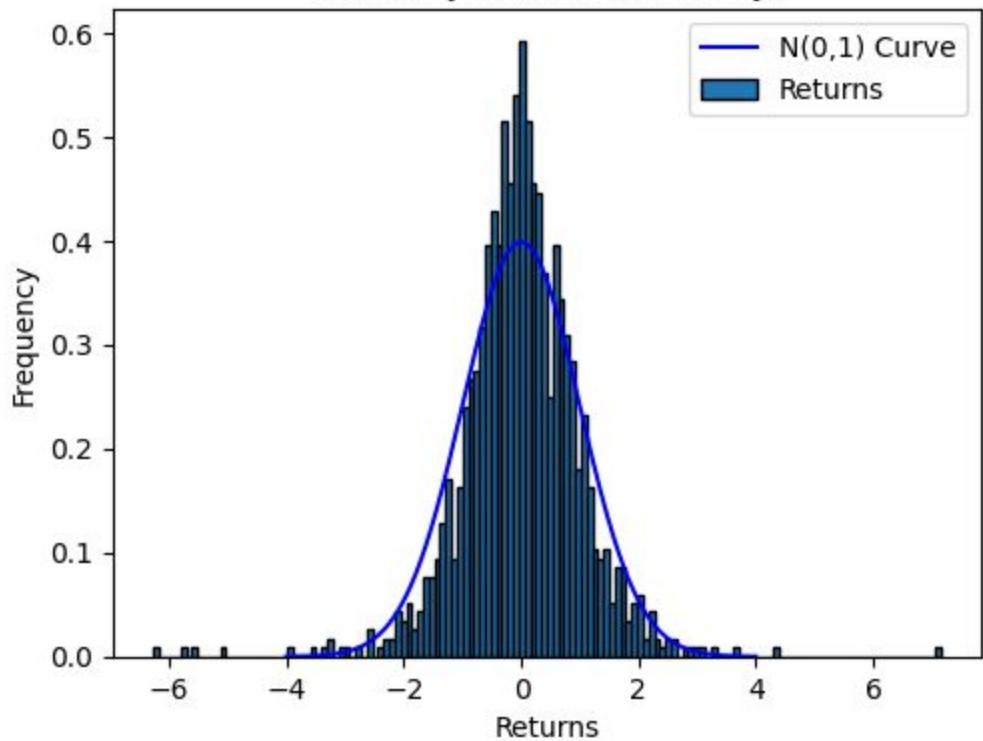
BSE Daily Returns for Bharat-Airtel



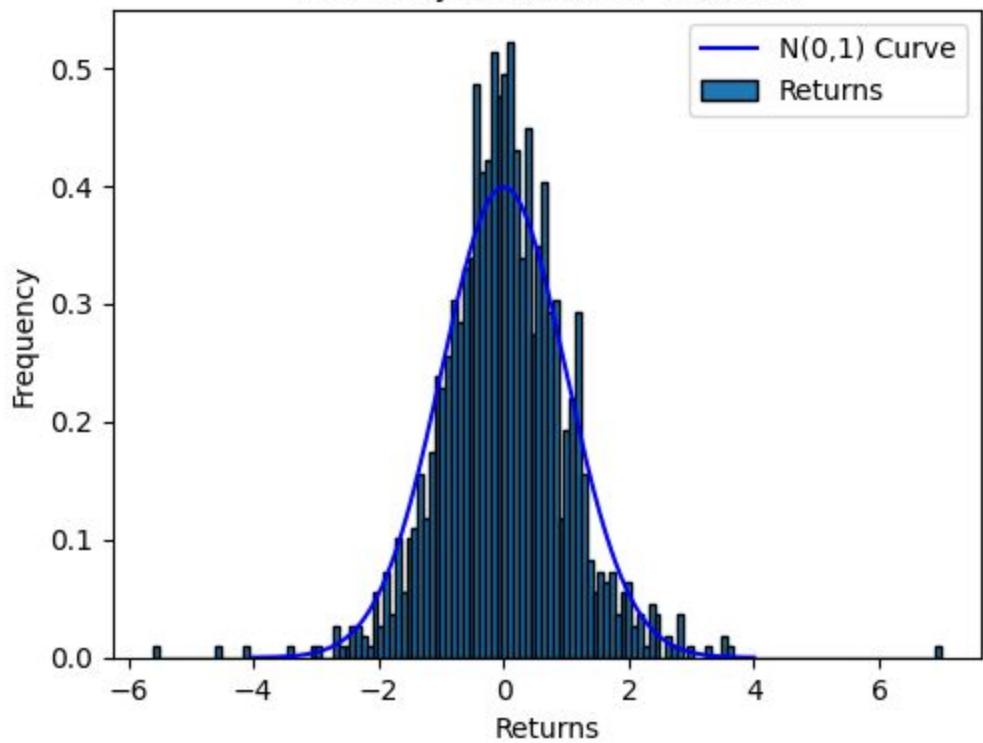
BSE Daily Returns for CoalIndia



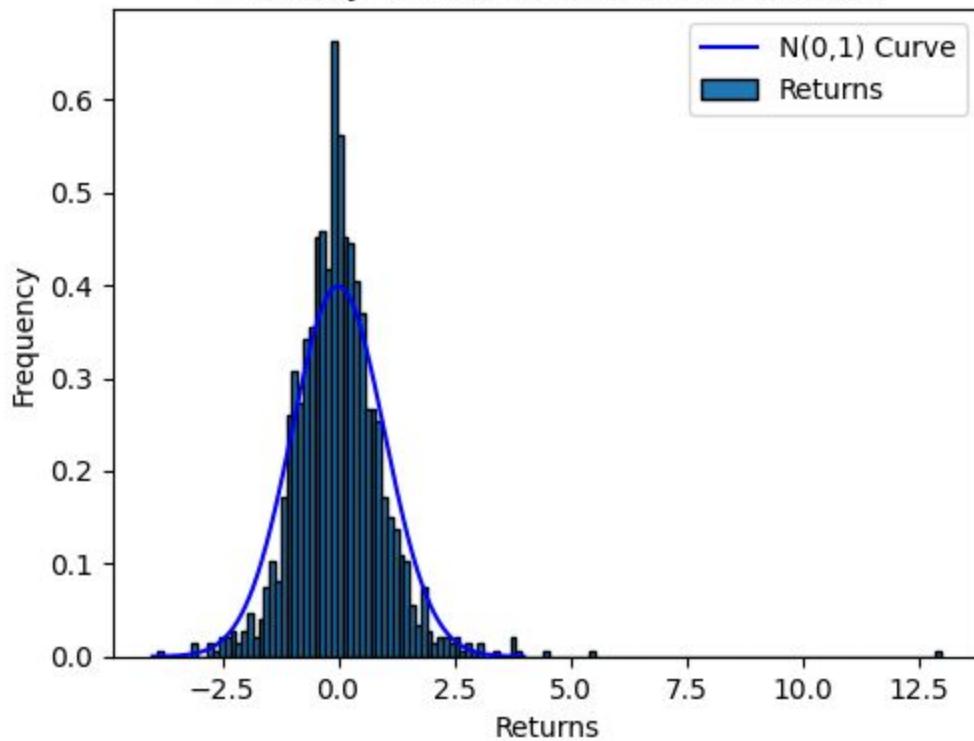
BSE Daily Returns for Infosys



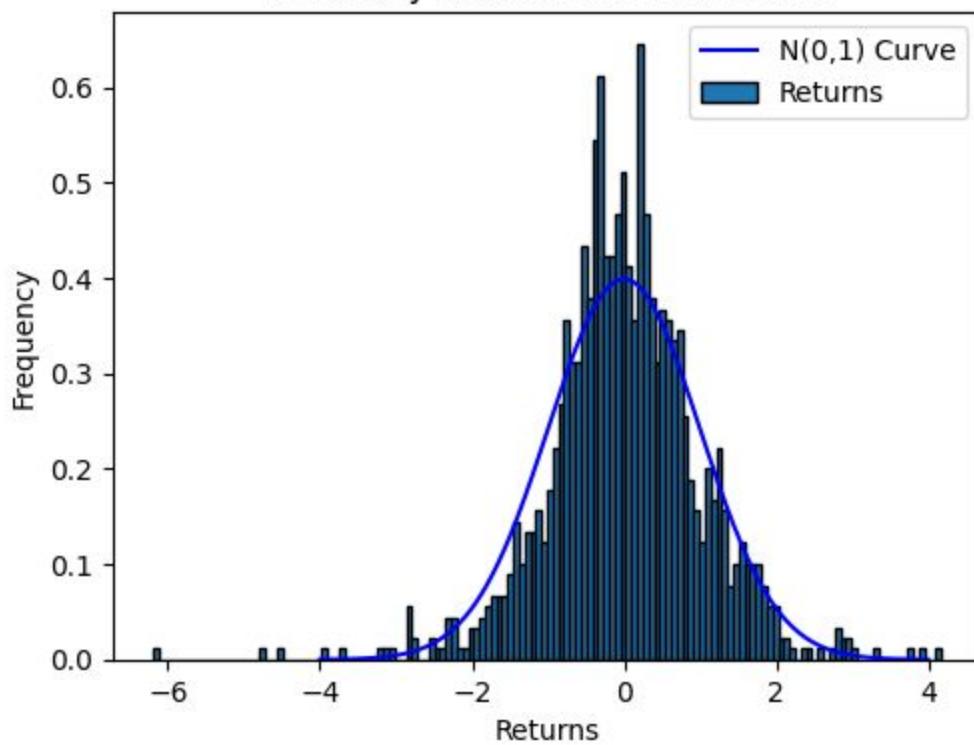
BSE Daily Returns for Reliance



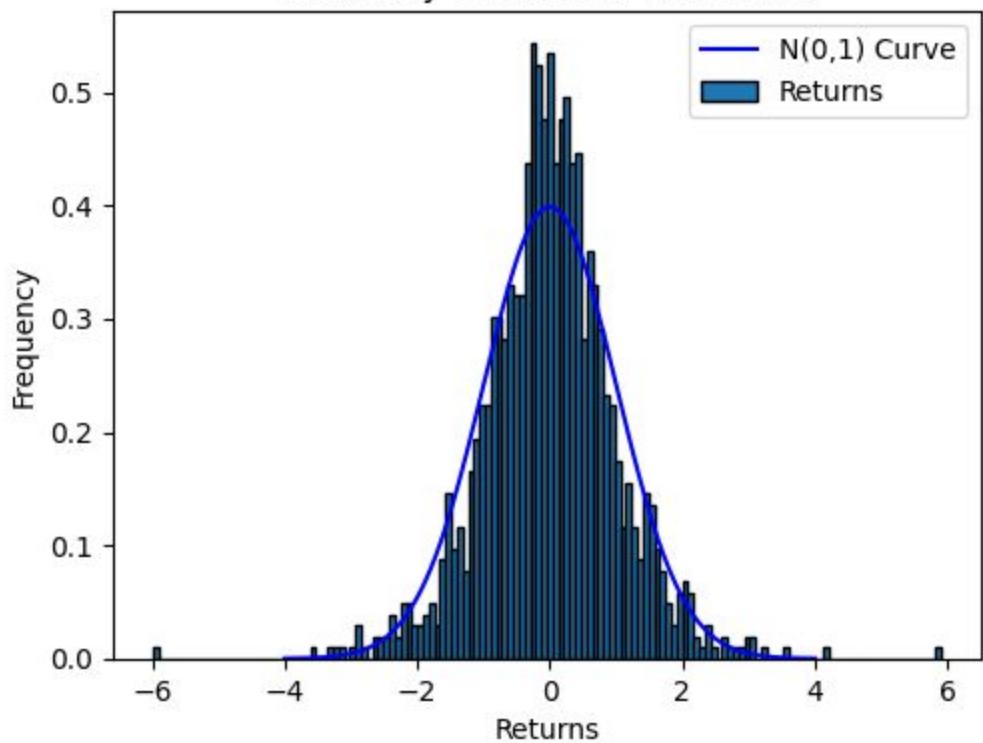
BSE Daily Returns for State Bank of India



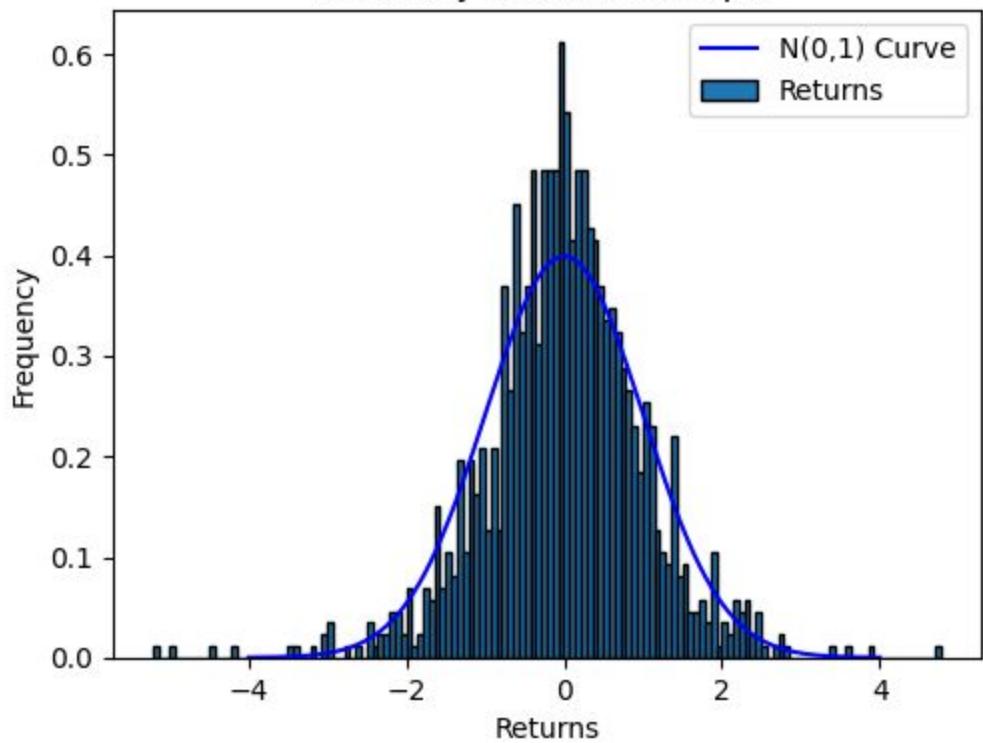
BSE Daily Returns for Tata Motors



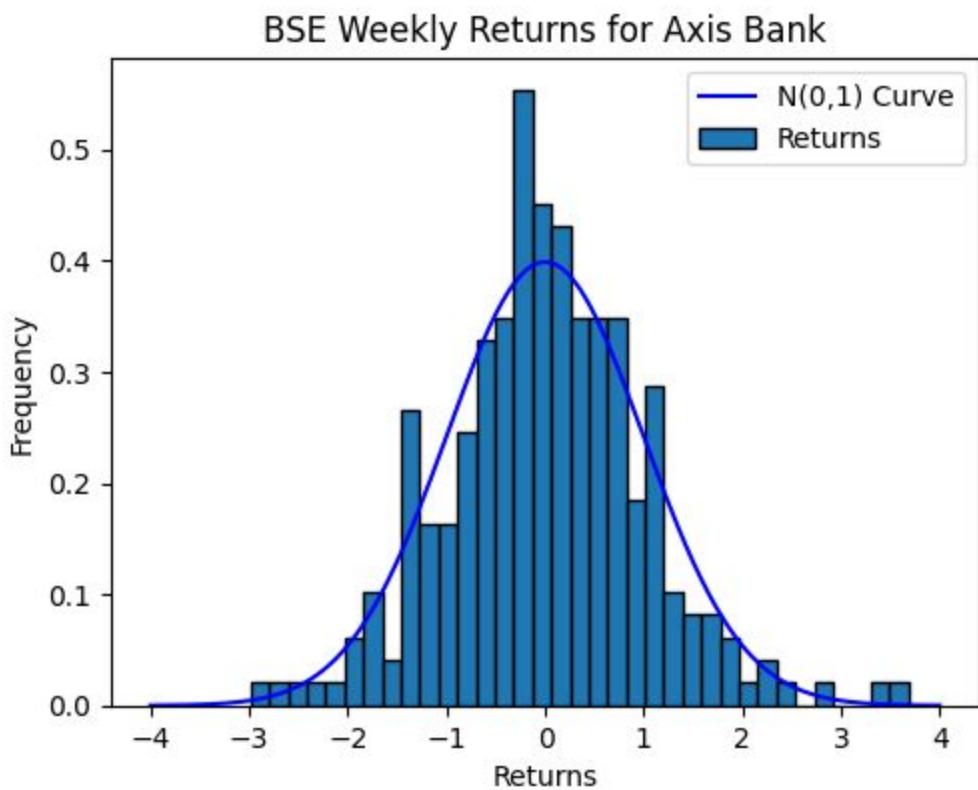
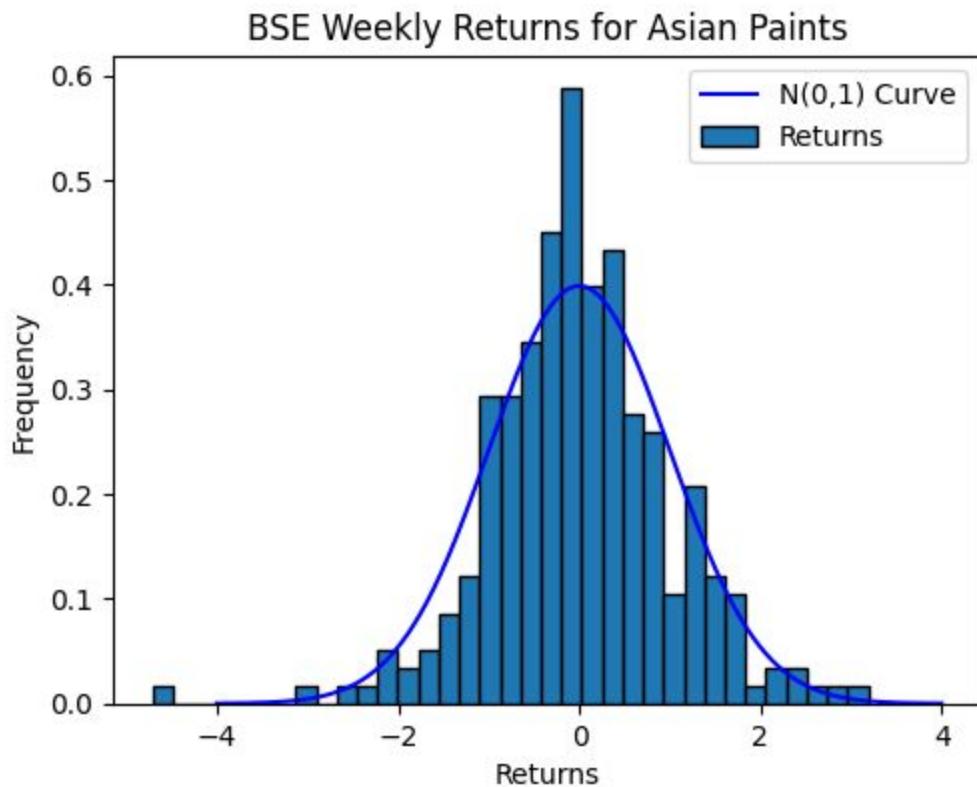
BSE Daily Returns for Tata Steel



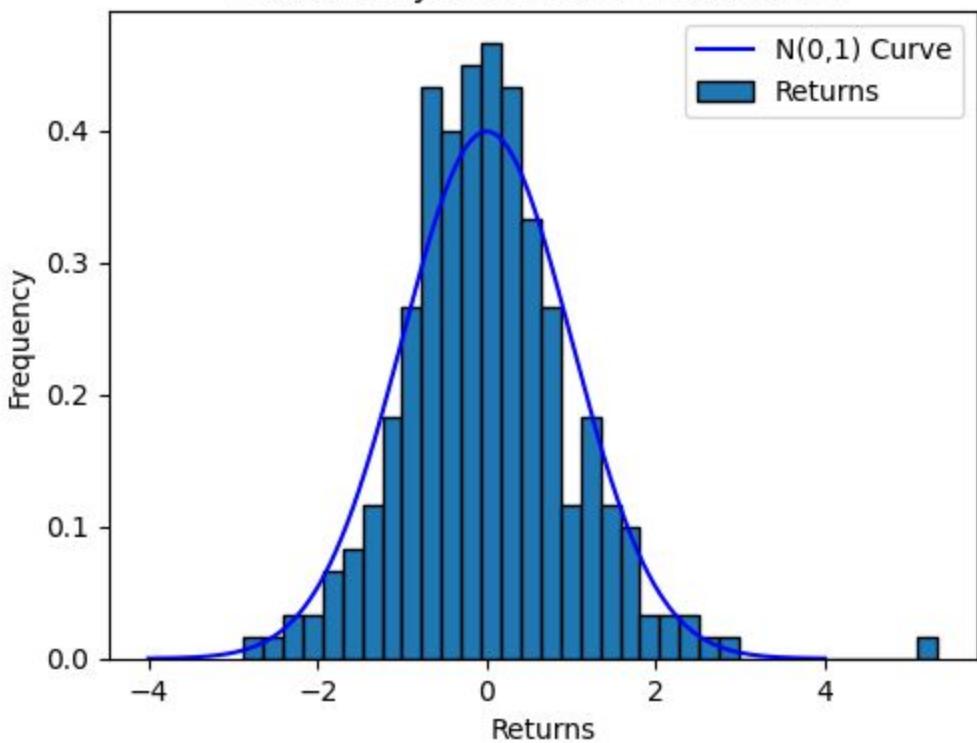
BSE Daily Returns for Wipro



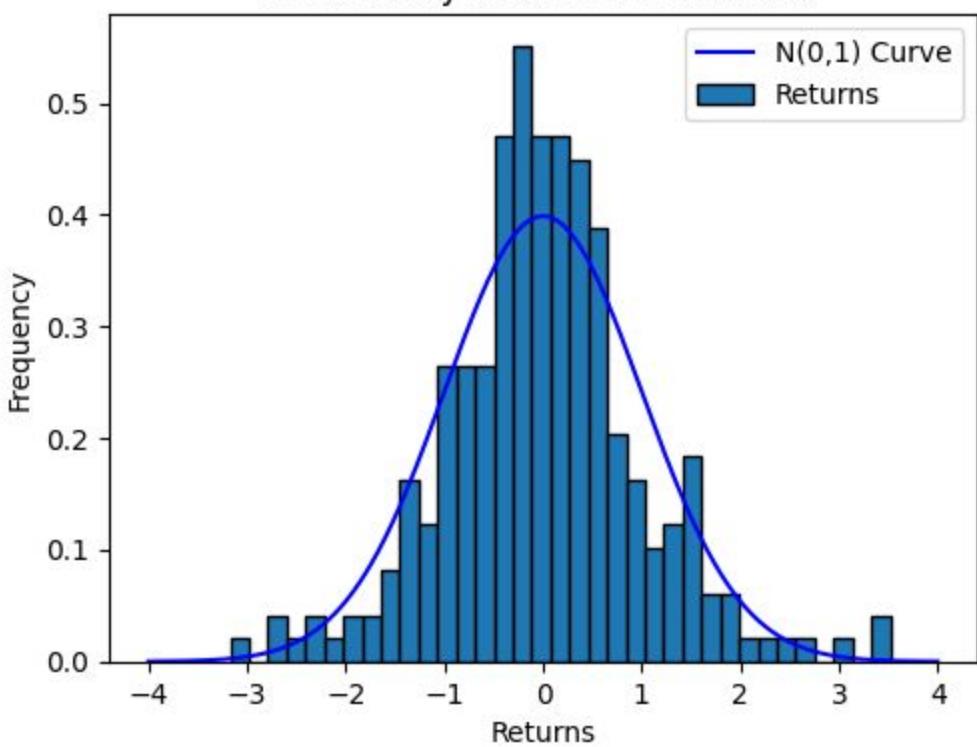
- Weekly BSE



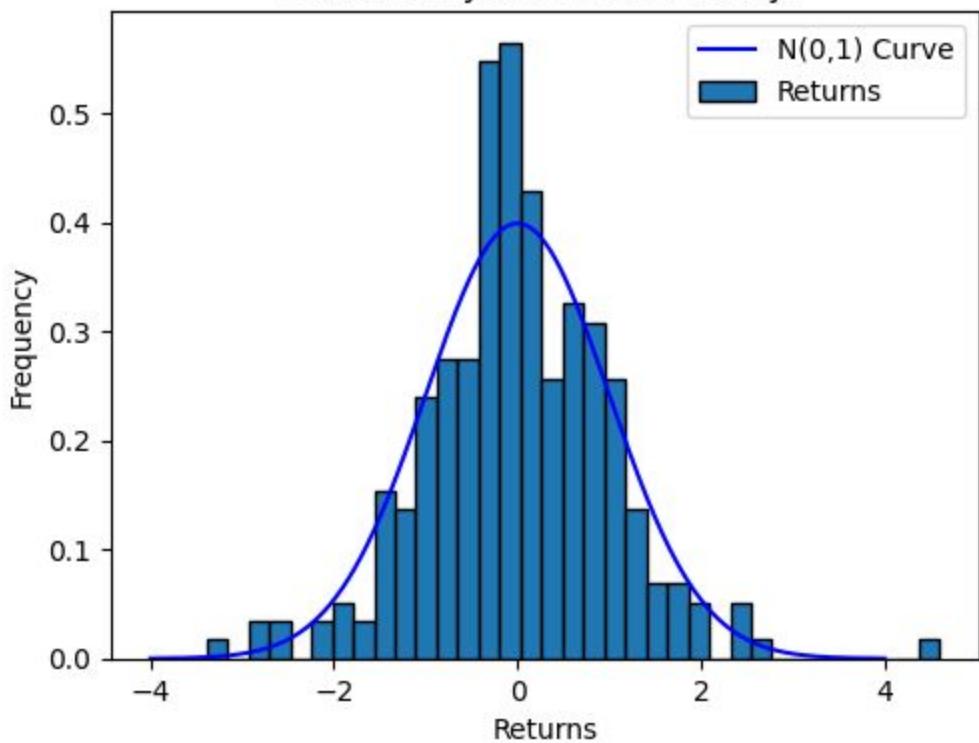
BSE Weekly Returns for Bharat-Airtel



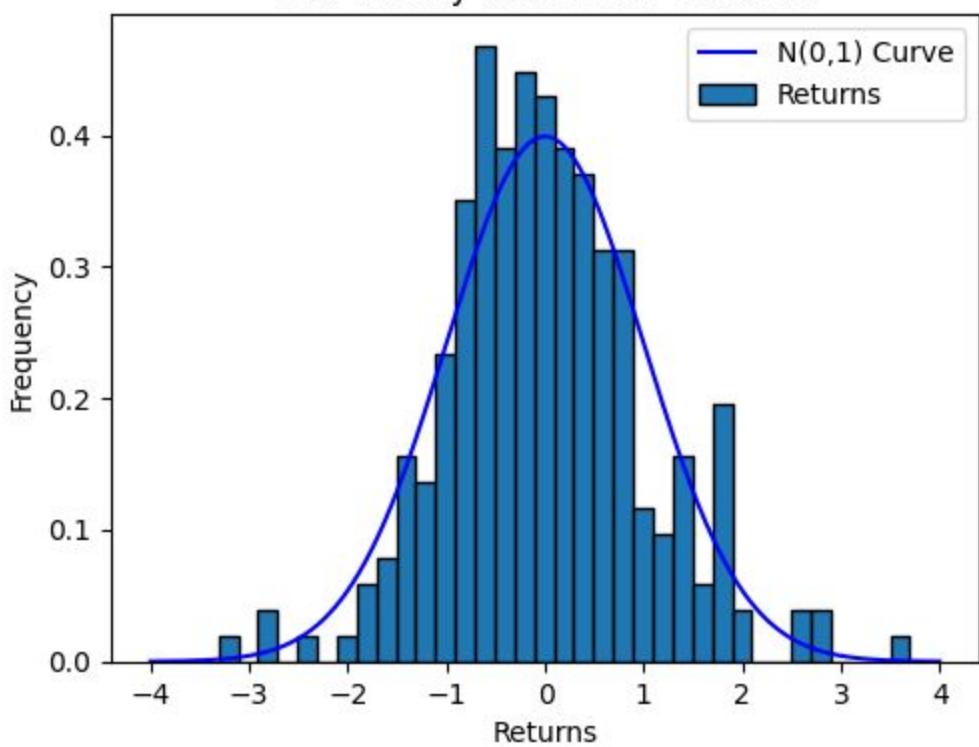
BSE Weekly Returns for CoalIndia



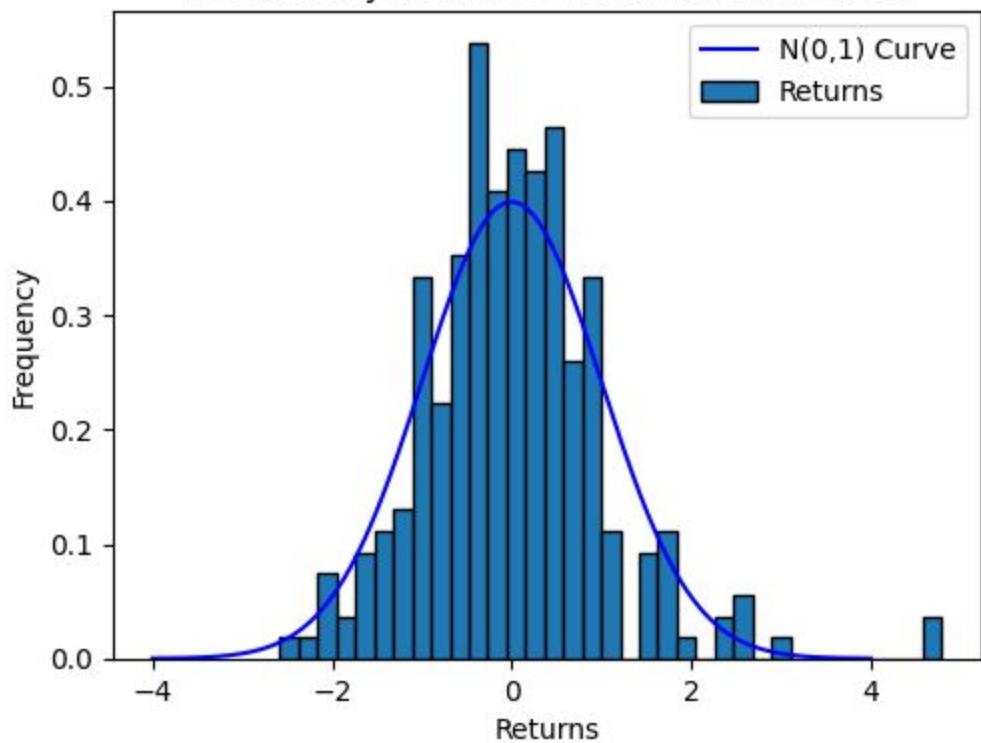
BSE Weekly Returns for Infosys



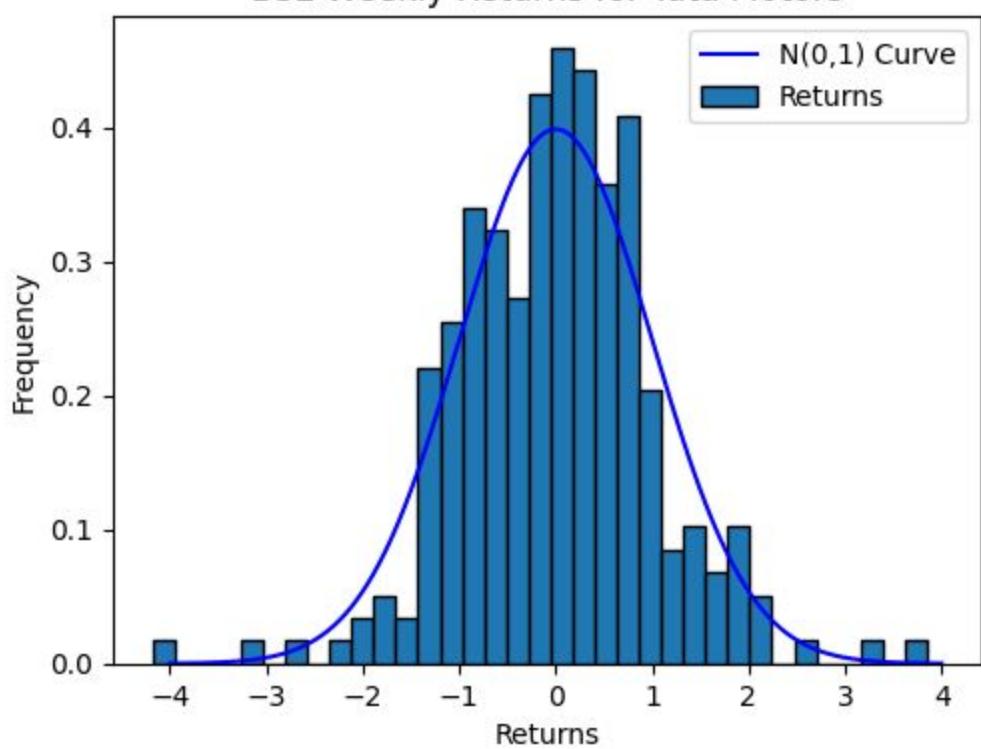
BSE Weekly Returns for Reliance



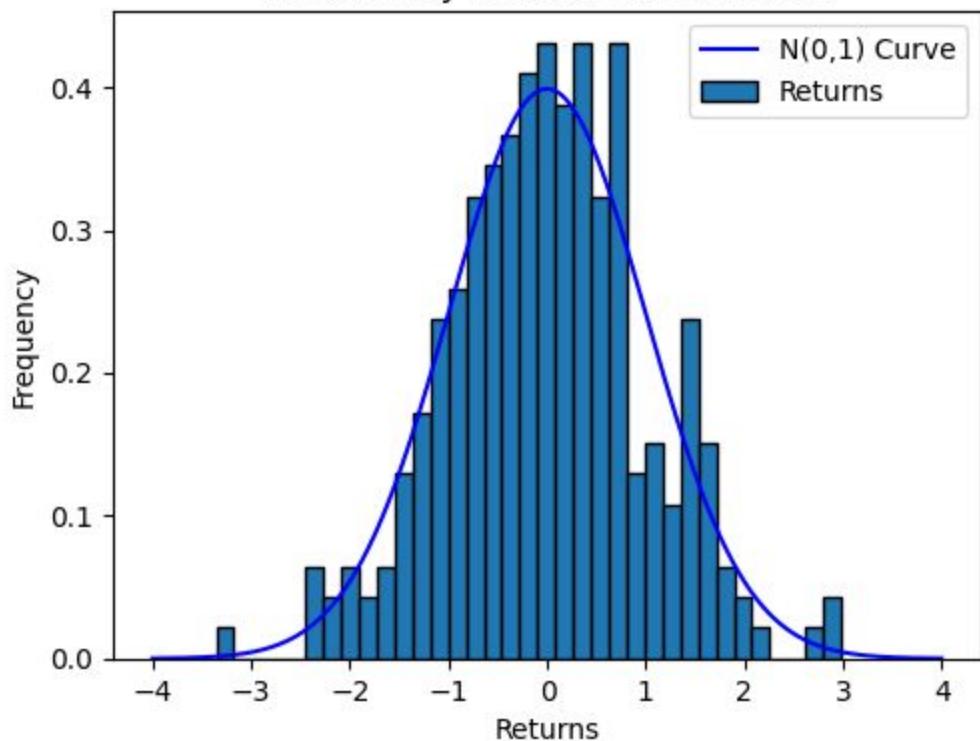
BSE Weekly Returns for State Bank of India



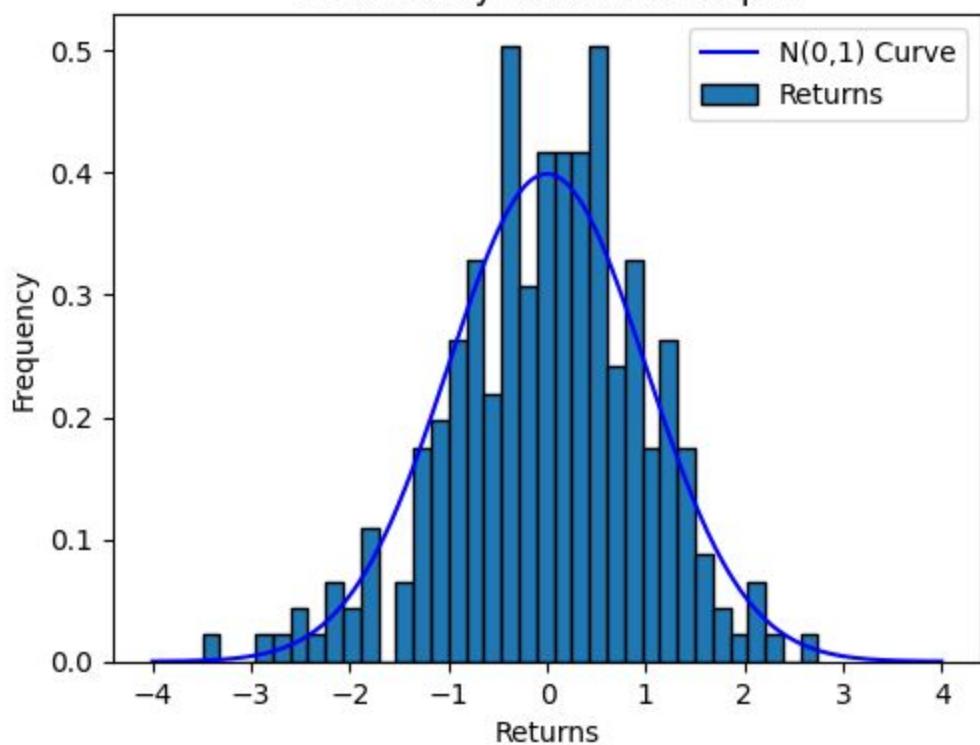
BSE Weekly Returns for Tata Motors



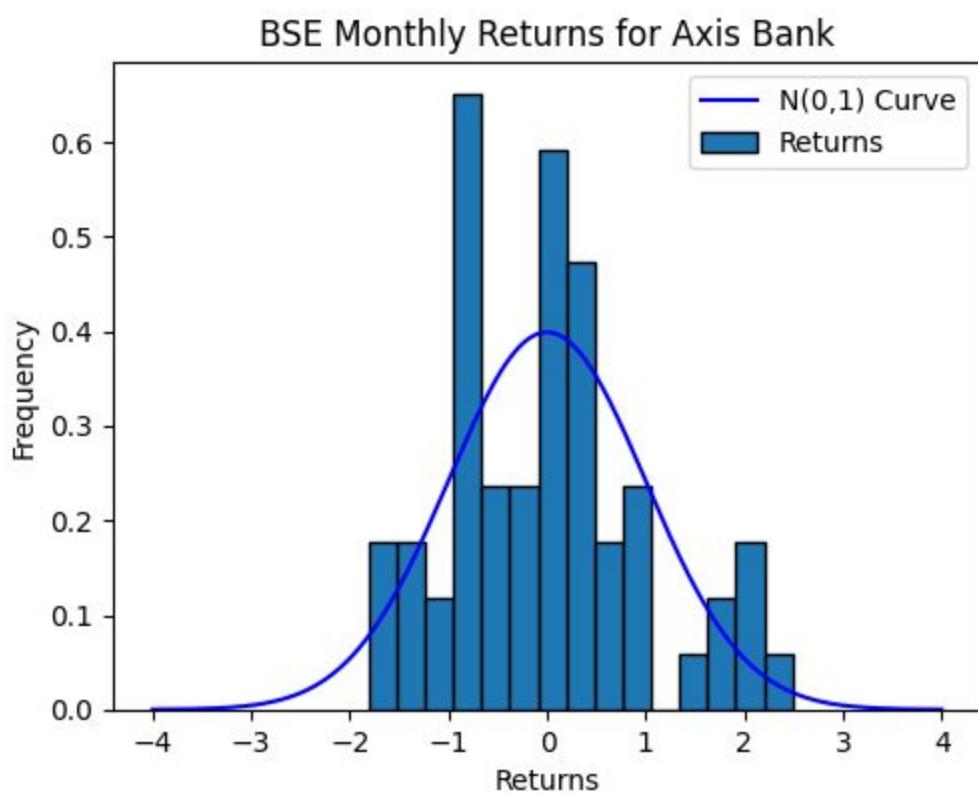
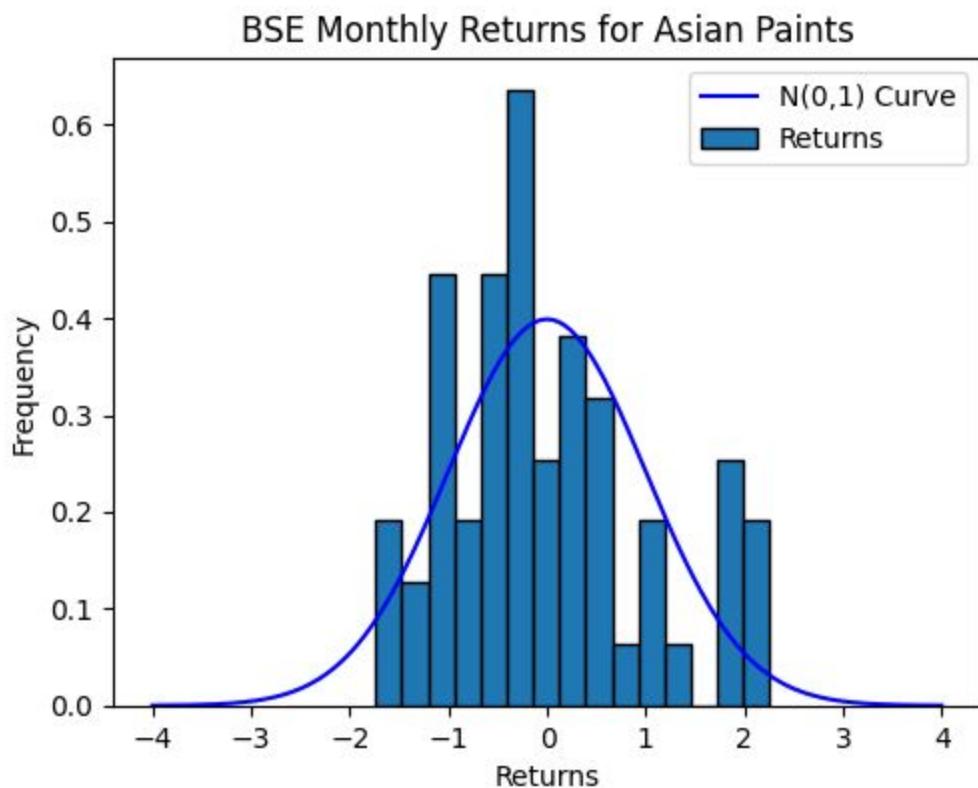
BSE Weekly Returns for Tata Steel



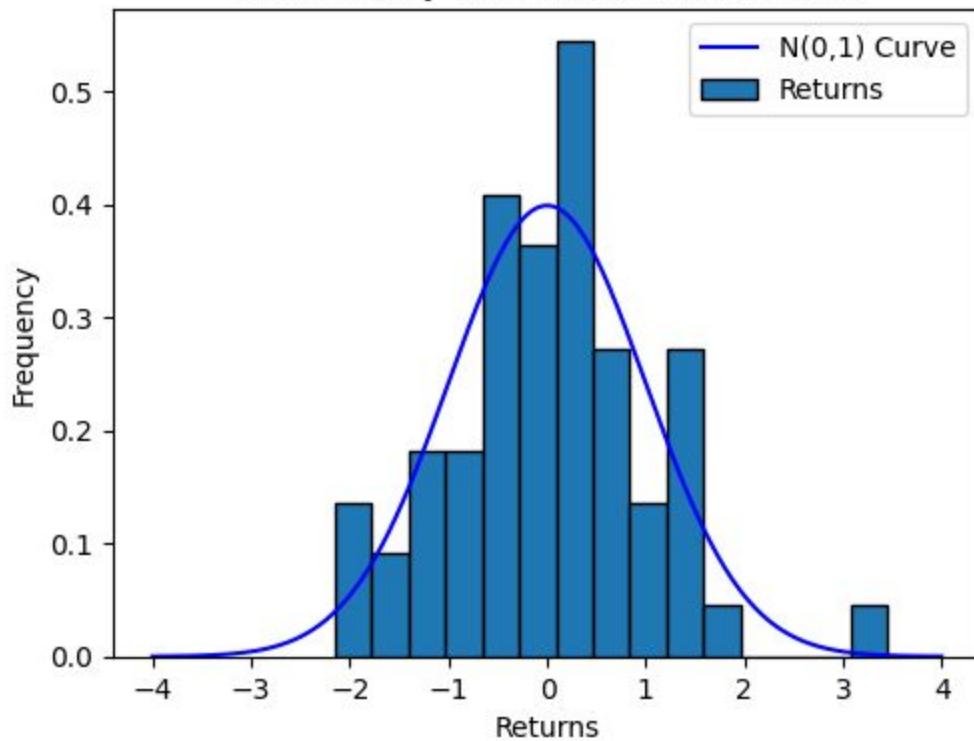
BSE Weekly Returns for Wipro



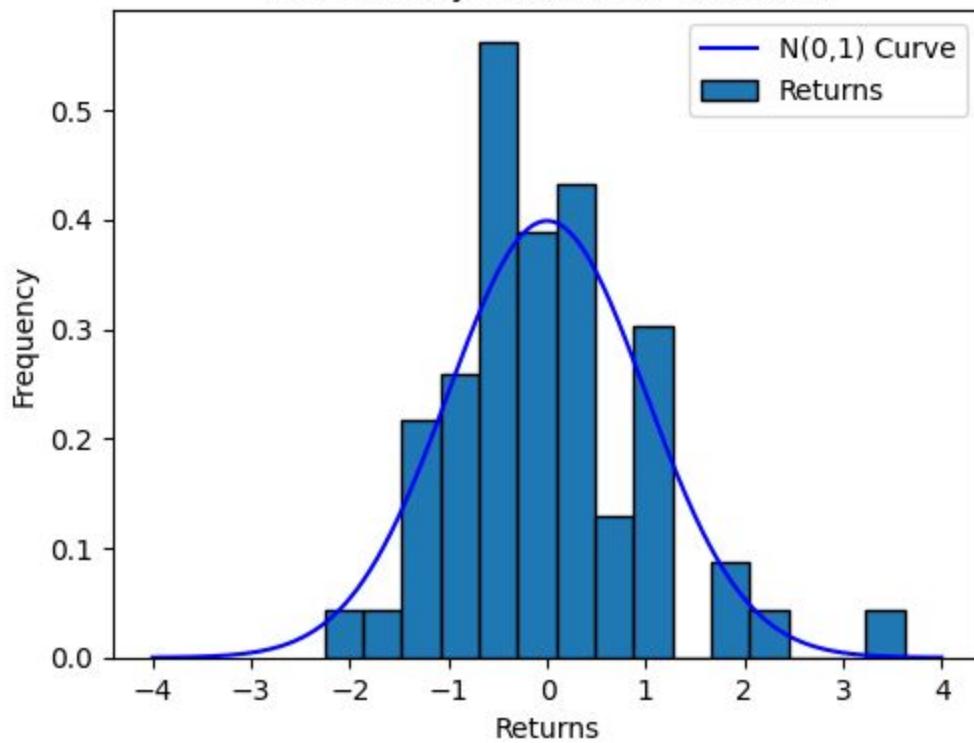
- Monthly BSE



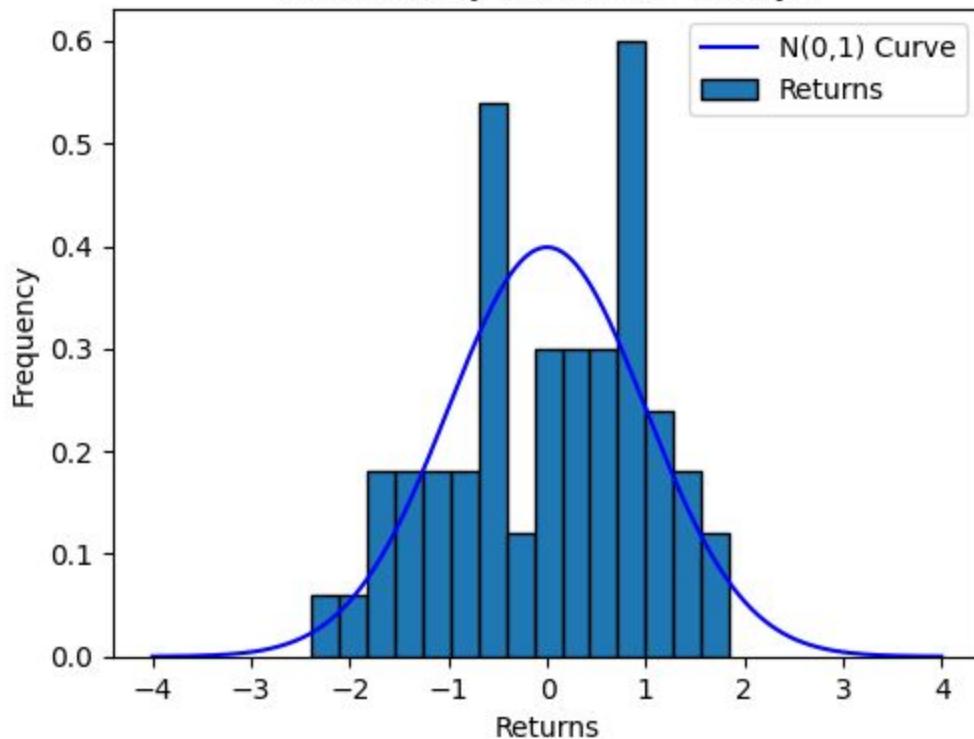
BSE Monthly Returns for Bharat-Airtel



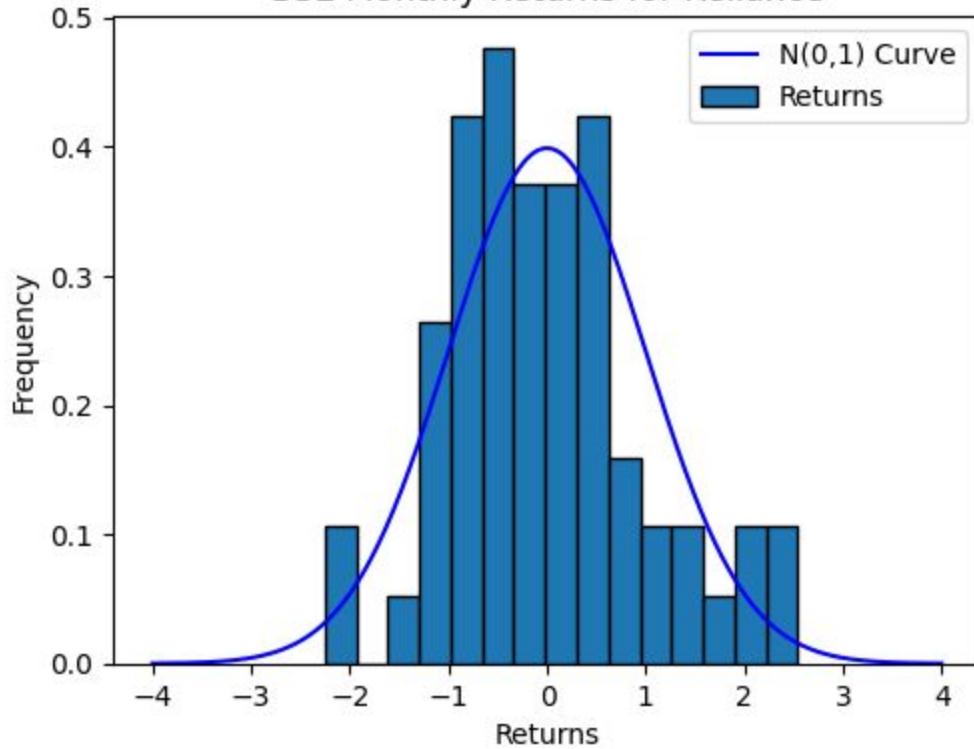
BSE Monthly Returns for CoalIndia



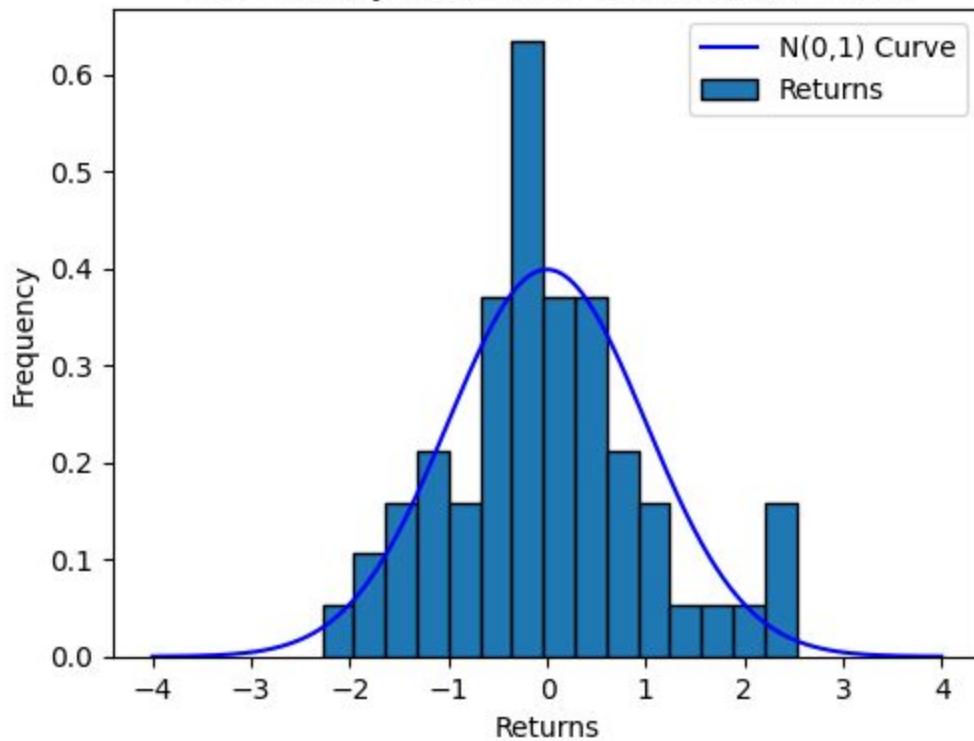
BSE Monthly Returns for Infosys



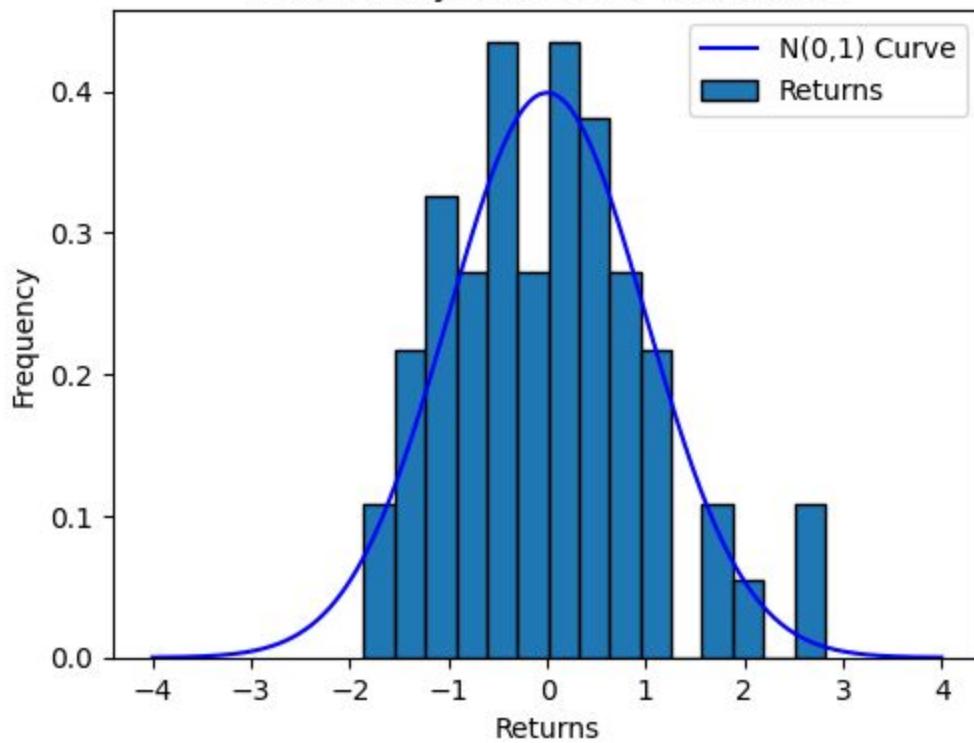
BSE Monthly Returns for Reliance



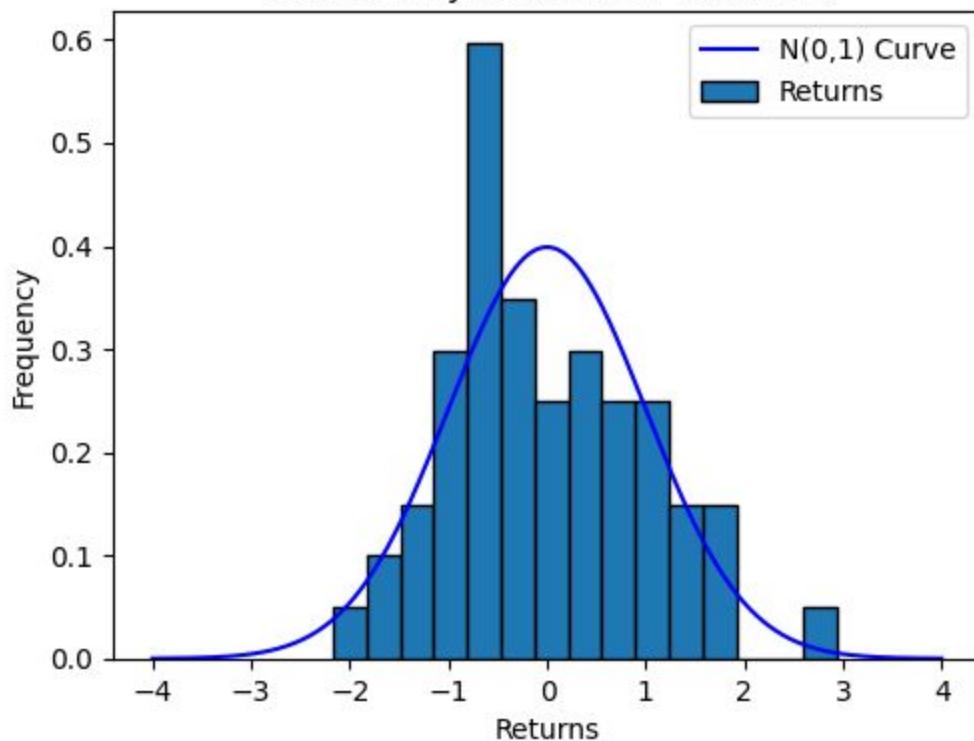
BSE Monthly Returns for State Bank of India



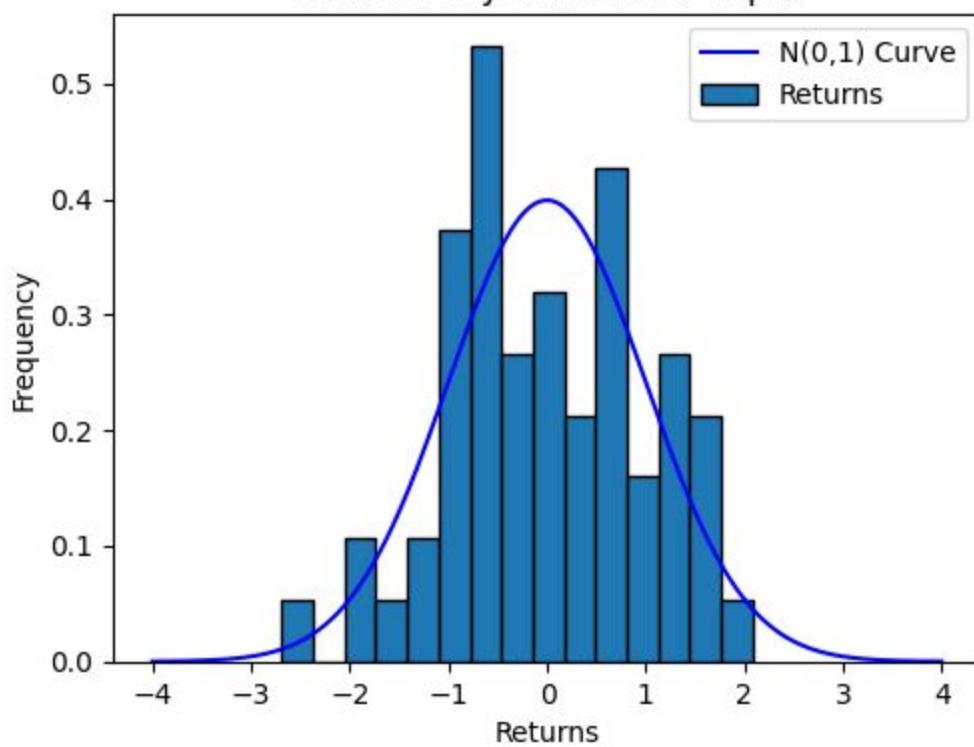
BSE Monthly Returns for Tata Motors



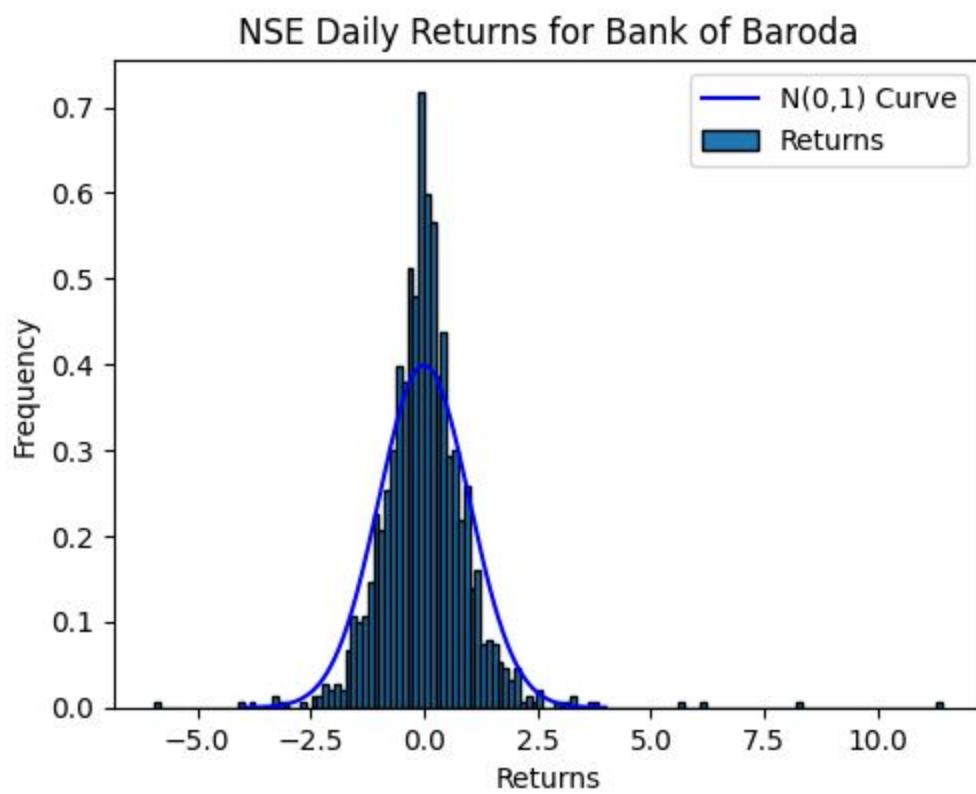
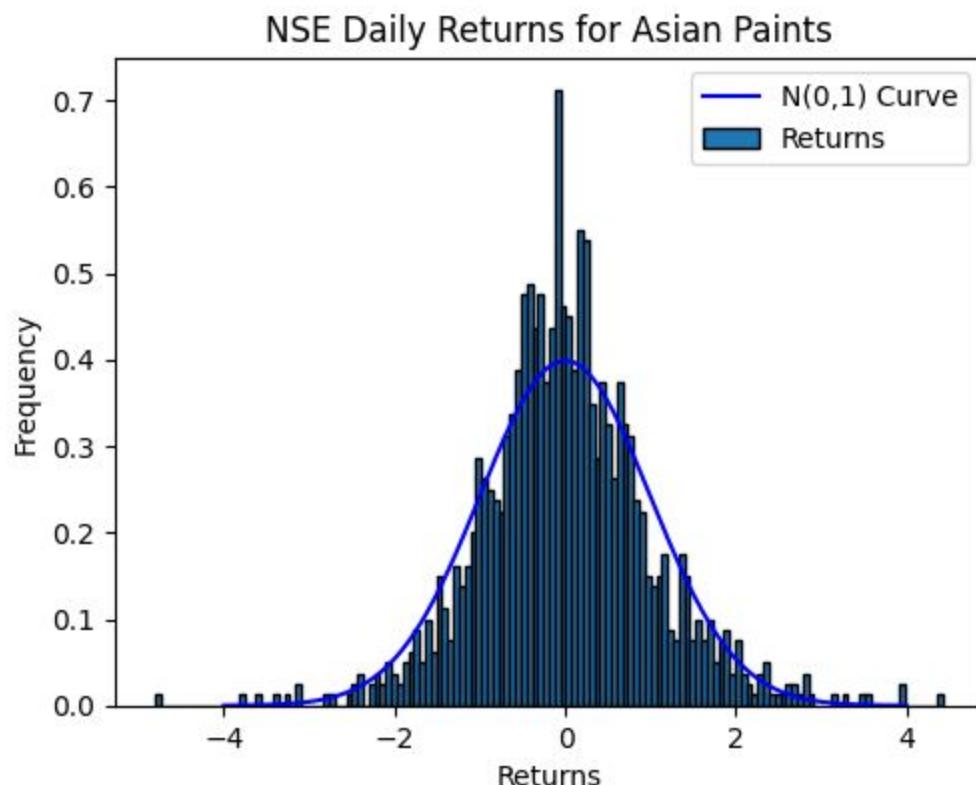
BSE Monthly Returns for Tata Steel



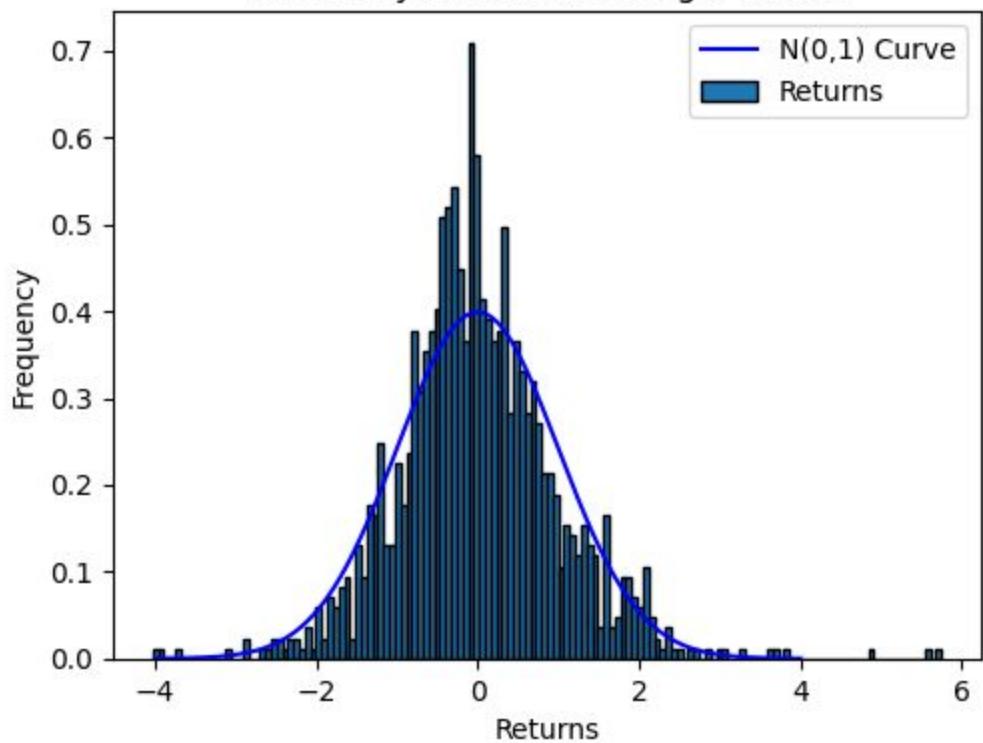
BSE Monthly Returns for Wipro



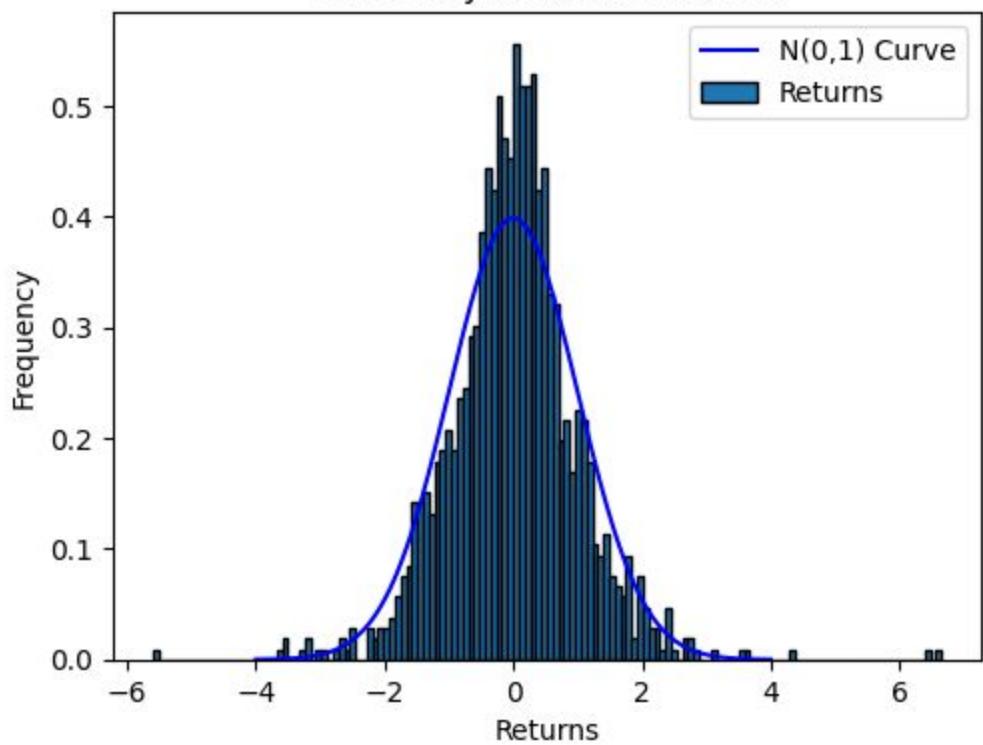
- Daily NSE



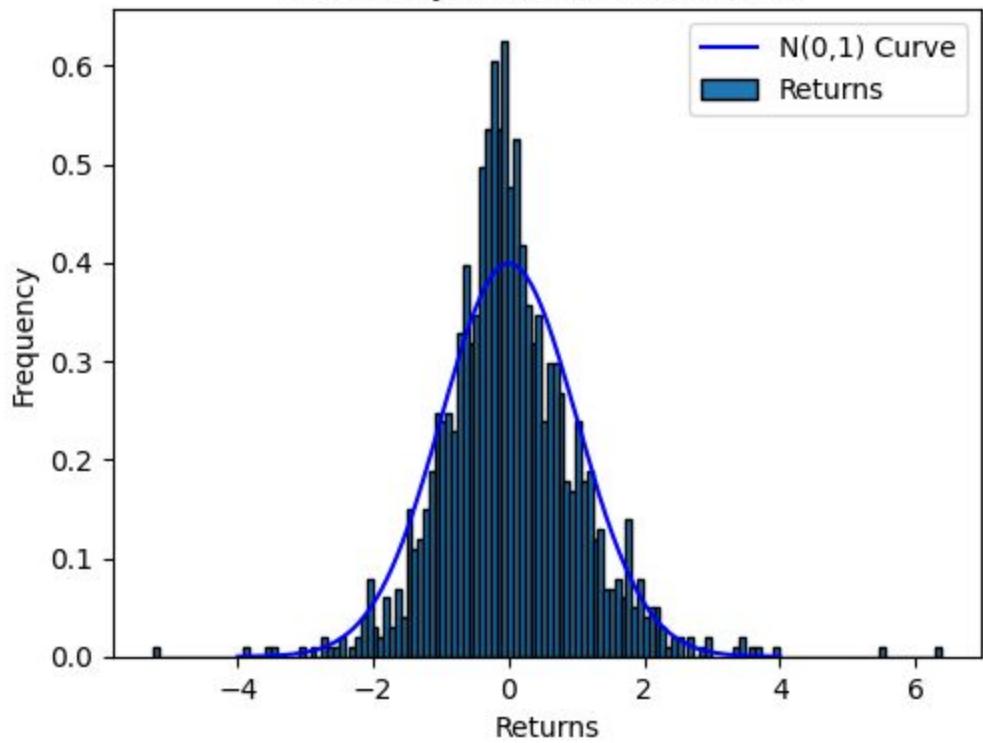
NSE Daily Returns for Berger Paints



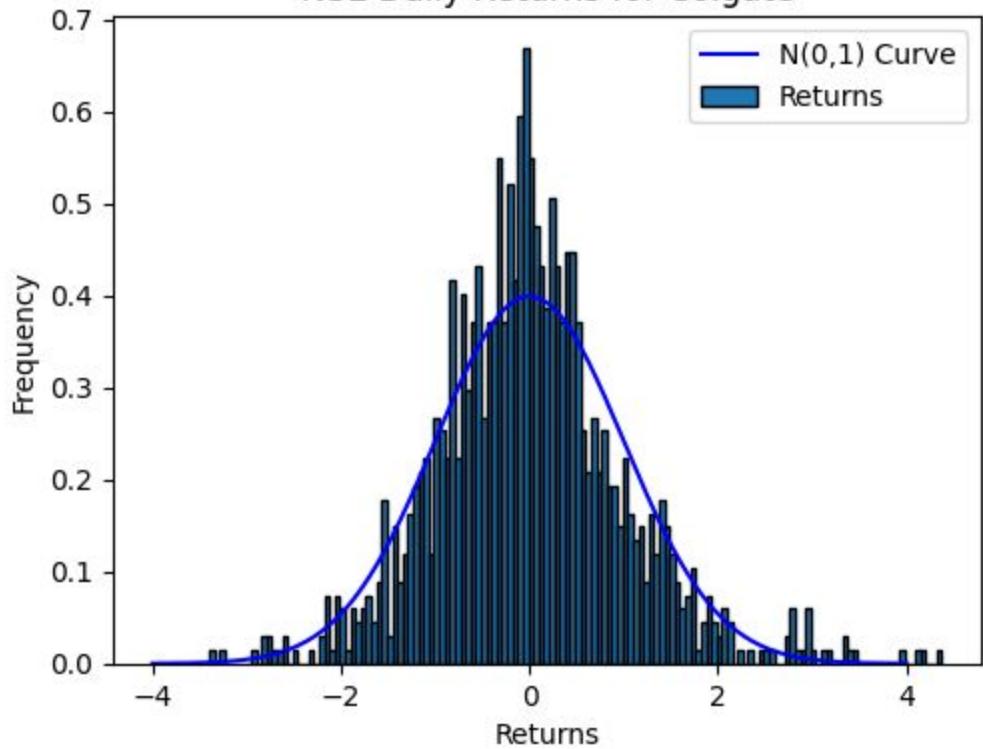
NSE Daily Returns for BHEL



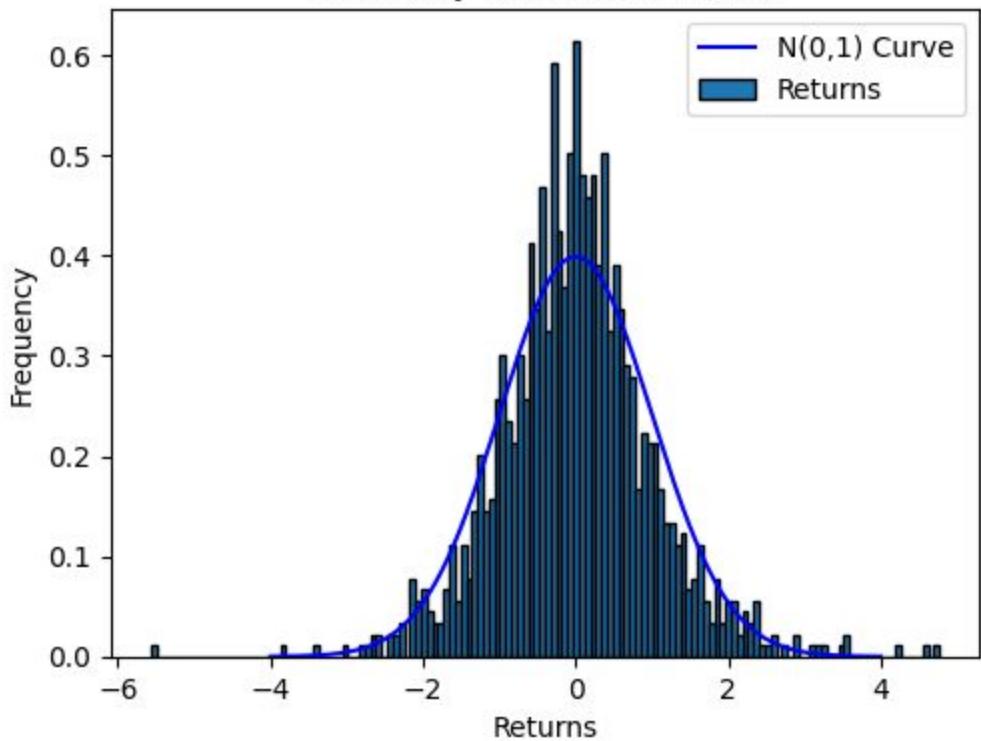
NSE Daily Returns for Britannia



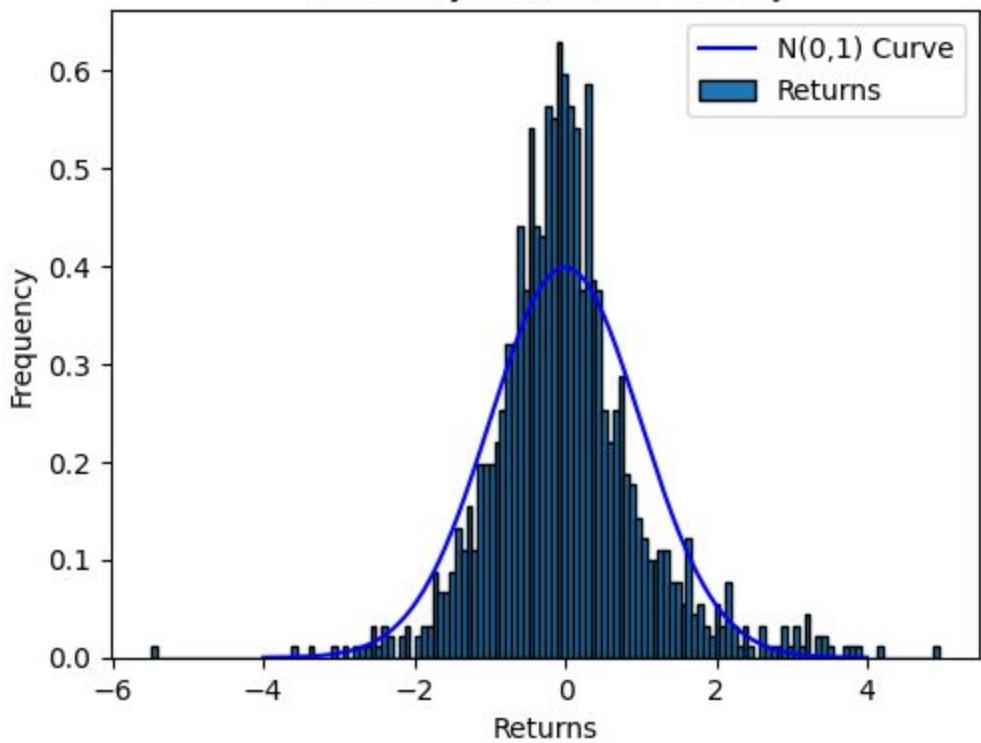
NSE Daily Returns for Colgate



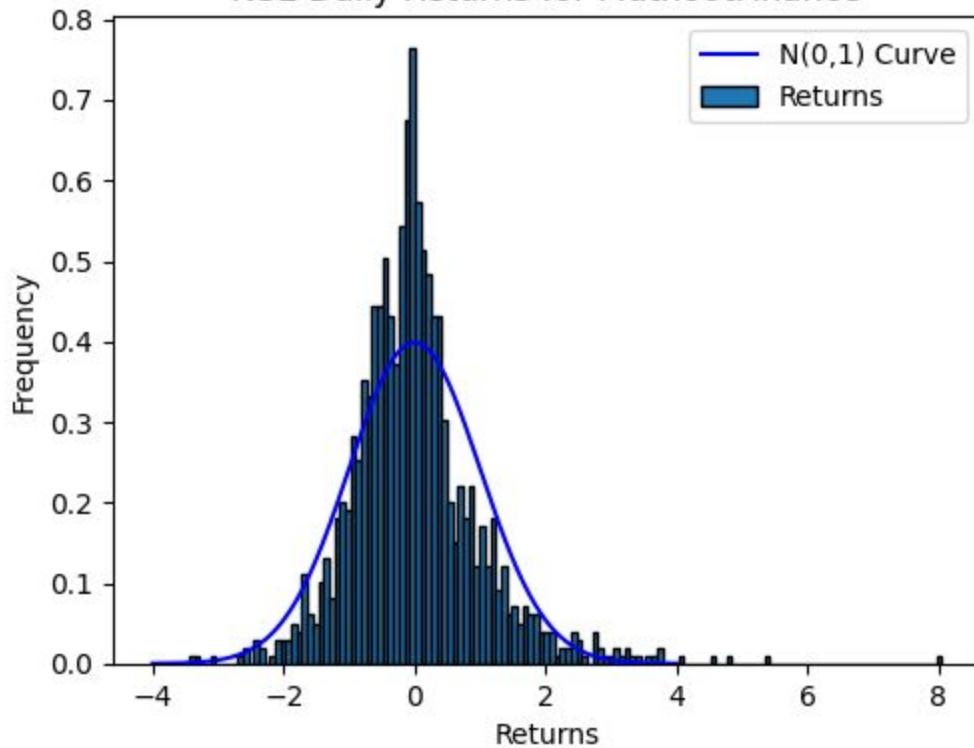
NSE Daily Returns for Dabur



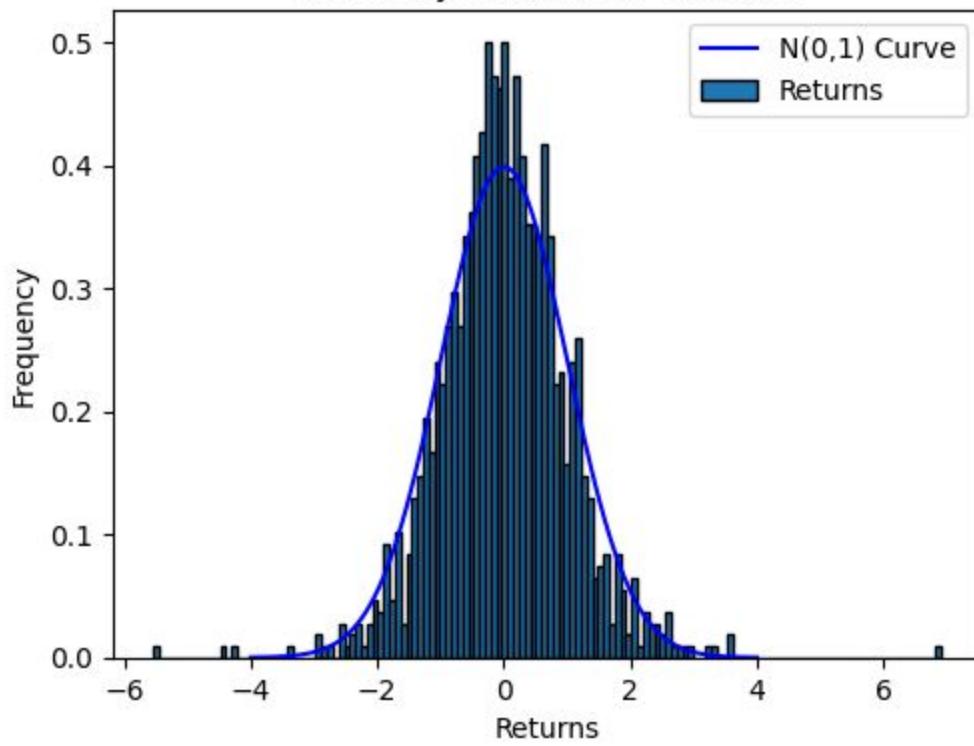
NSE Daily Returns for Godrej



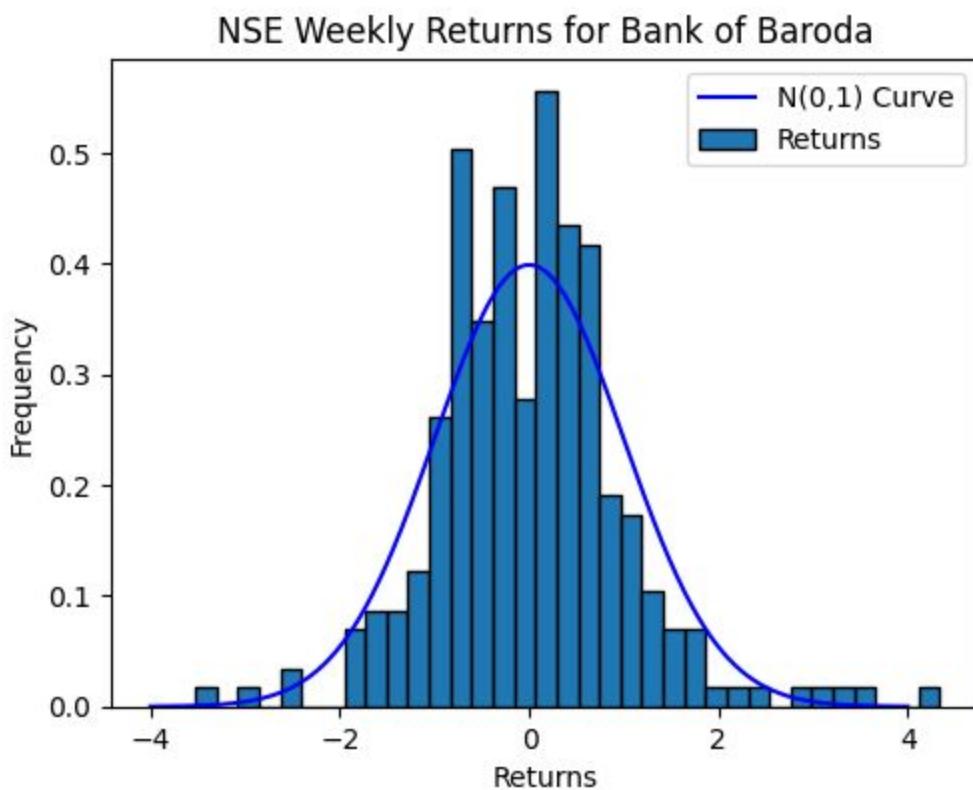
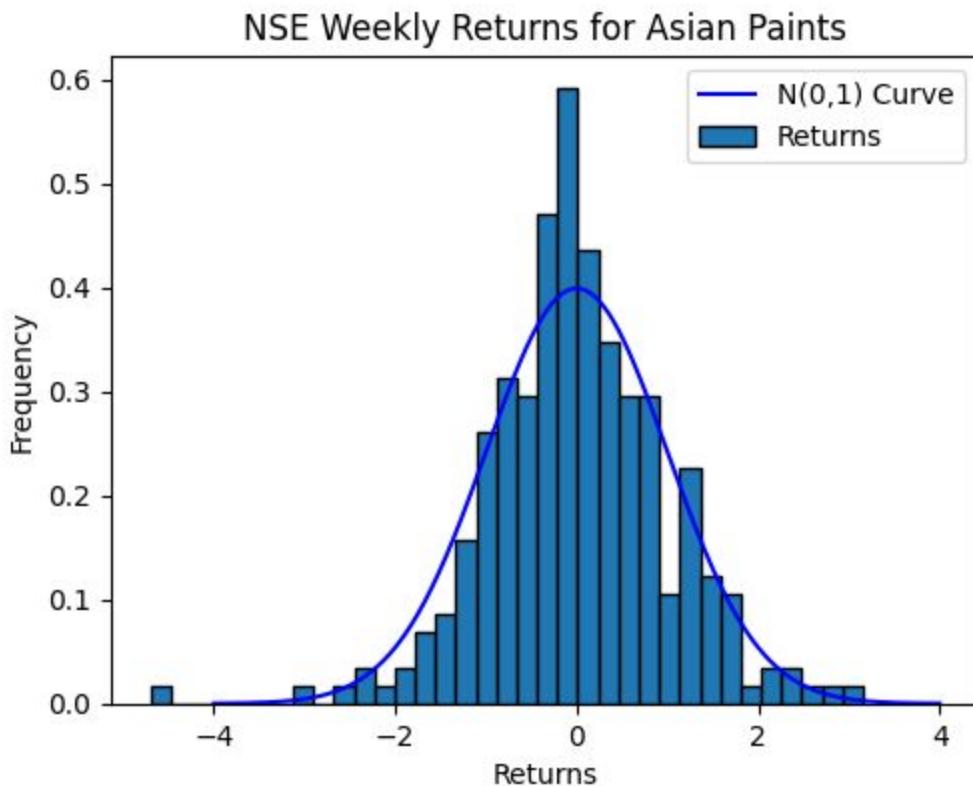
NSE Daily Returns for MuthootFinance



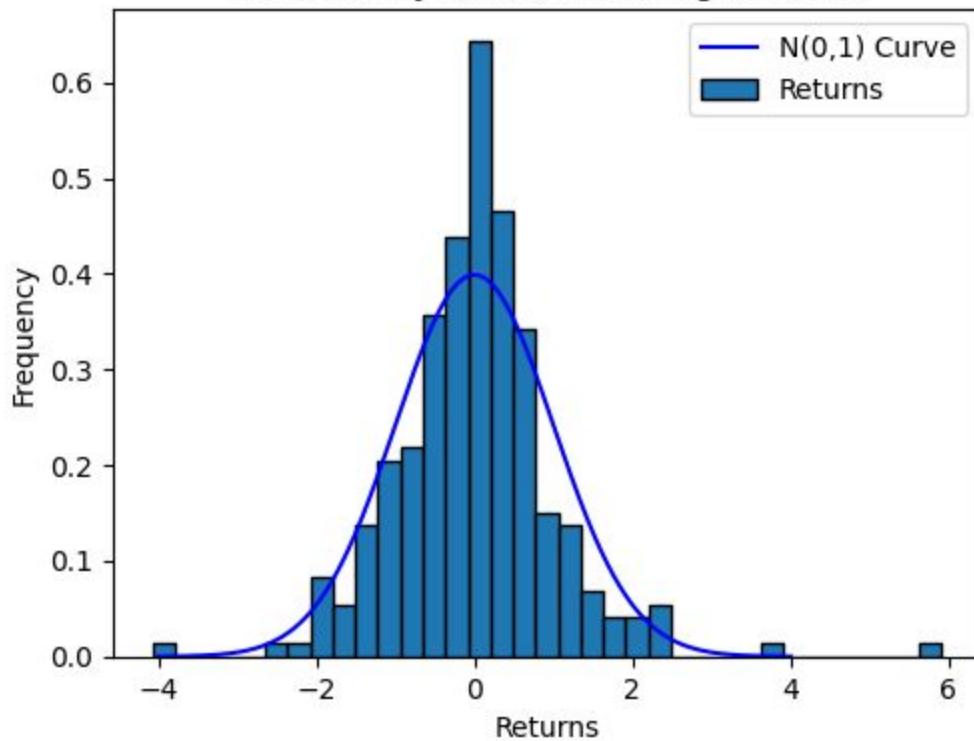
NSE Daily Returns for Reliance



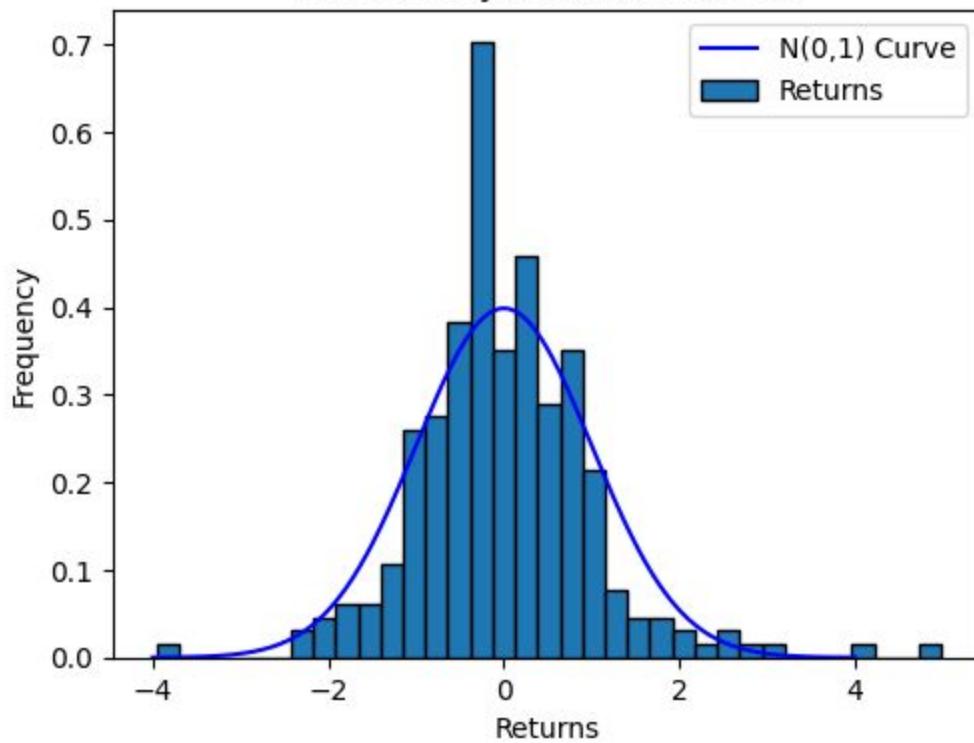
- Weekly NSE



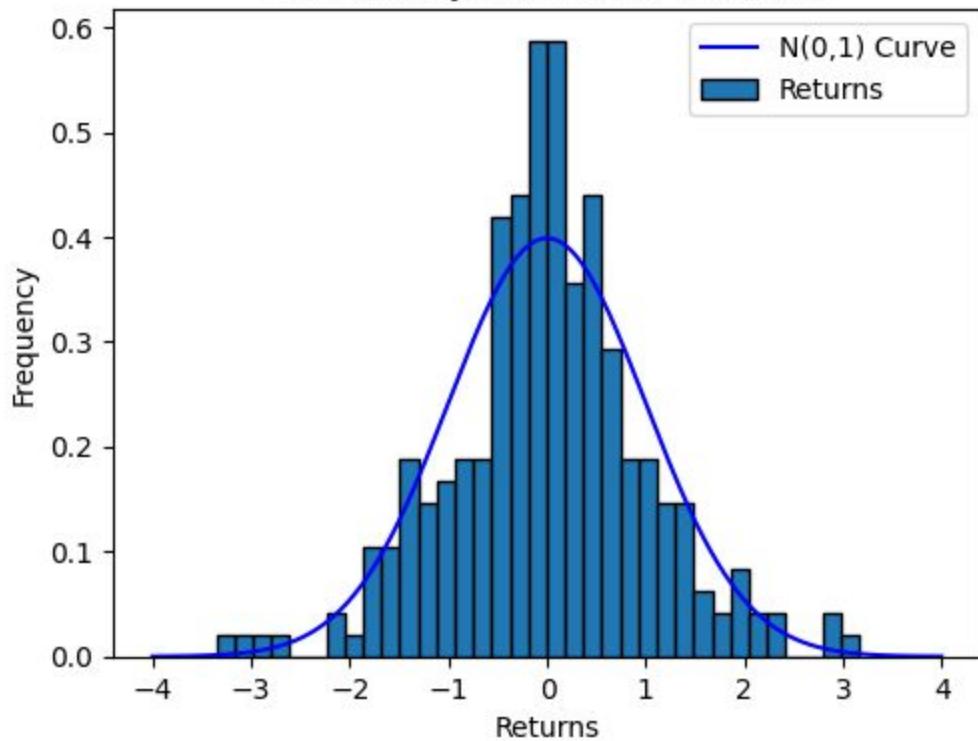
NSE Weekly Returns for Berger Paints



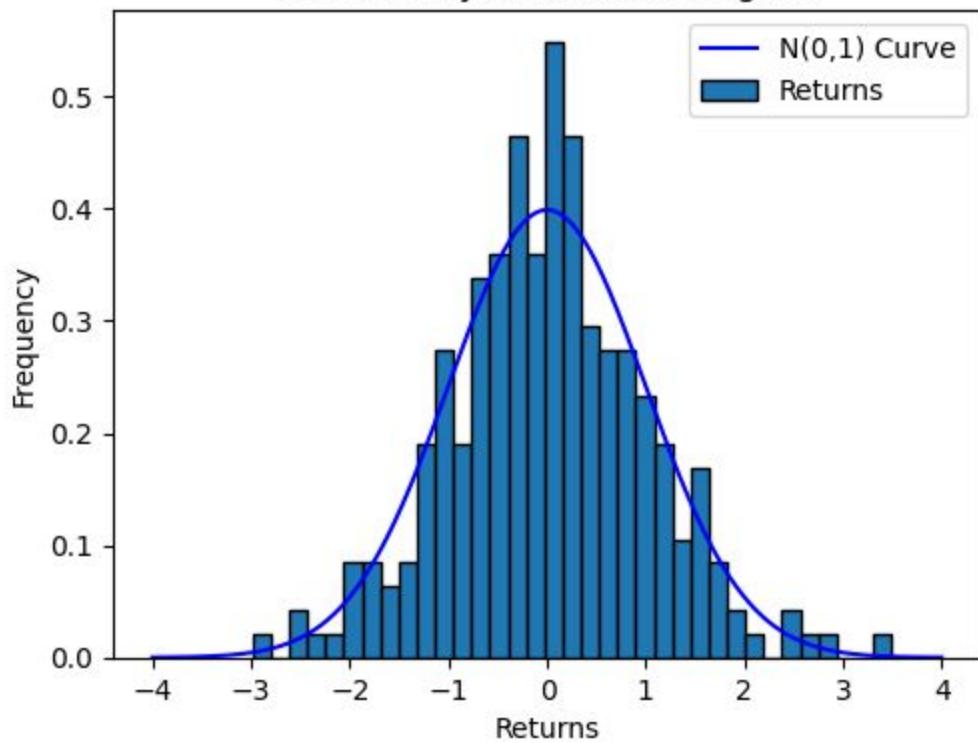
NSE Weekly Returns for BHEL



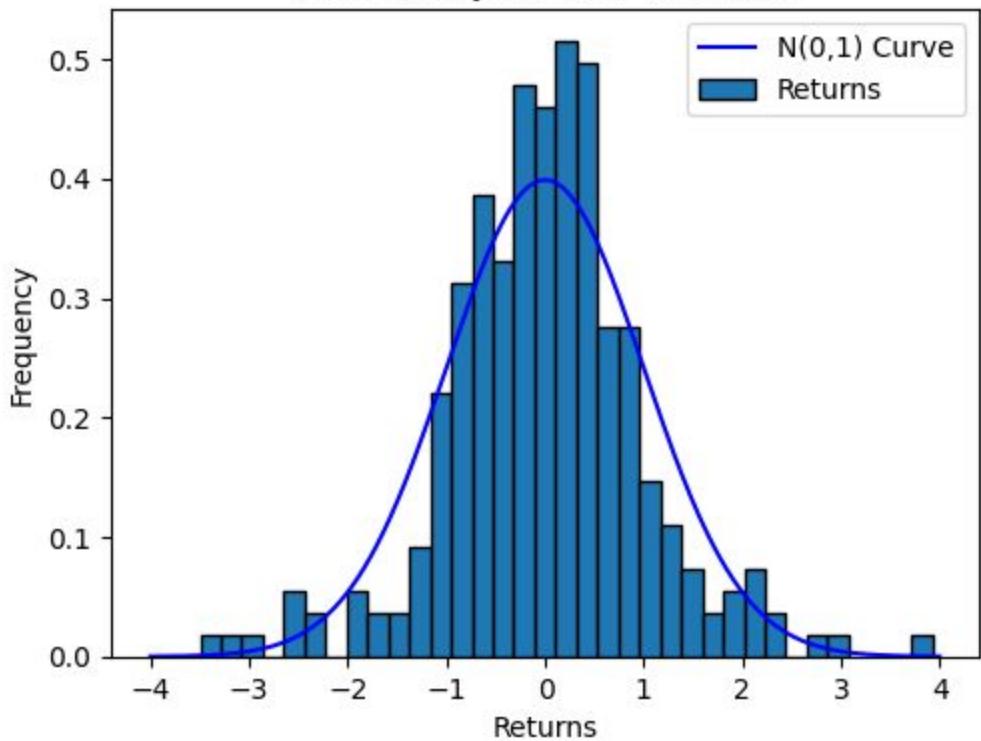
NSE Weekly Returns for Britannia



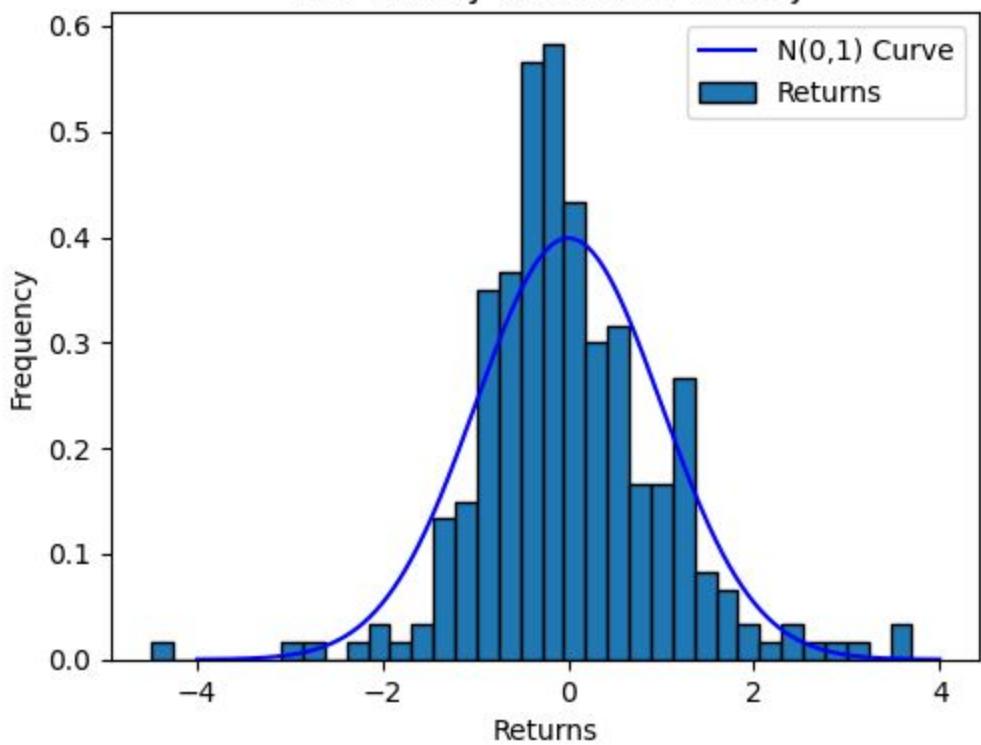
NSE Weekly Returns for Colgate



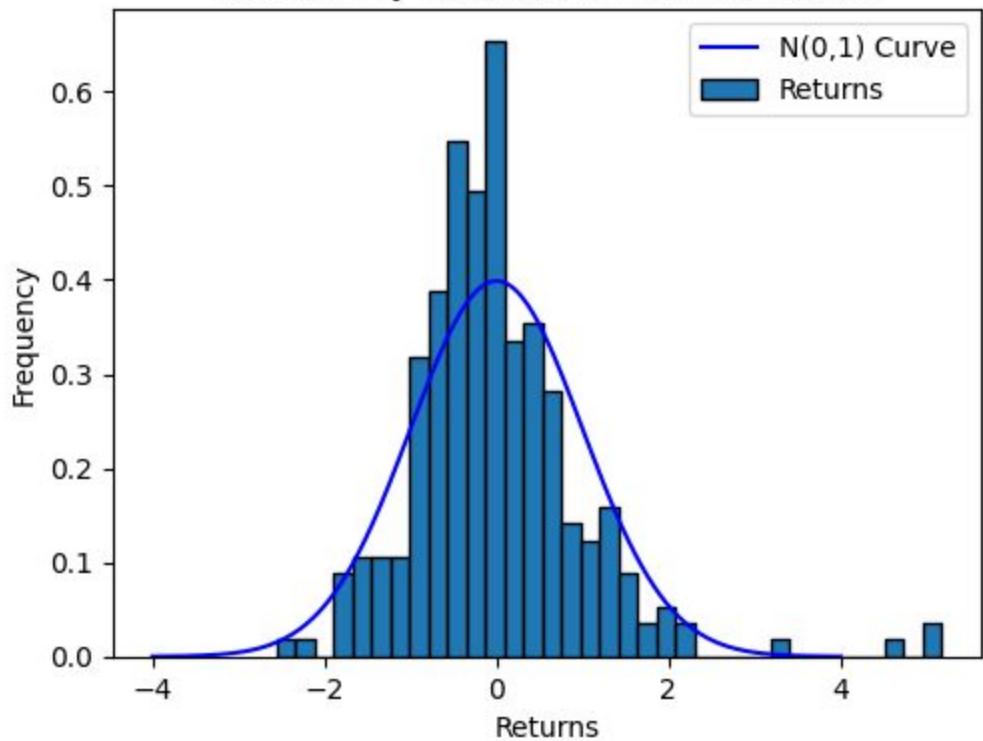
NSE Weekly Returns for Dabur



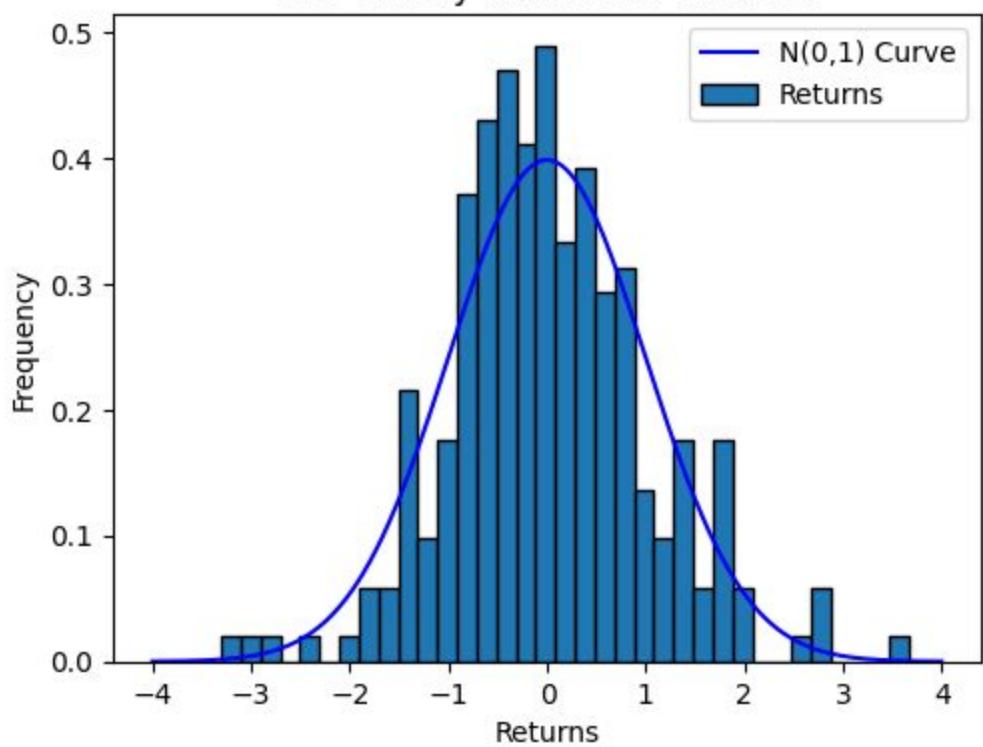
NSE Weekly Returns for Godrej



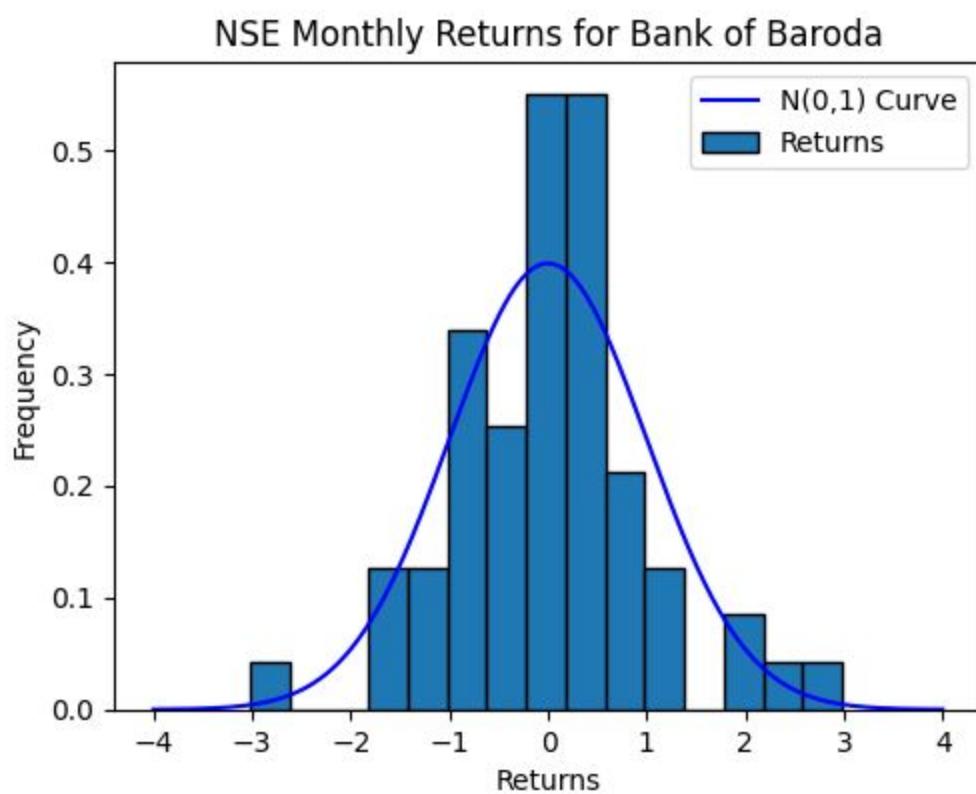
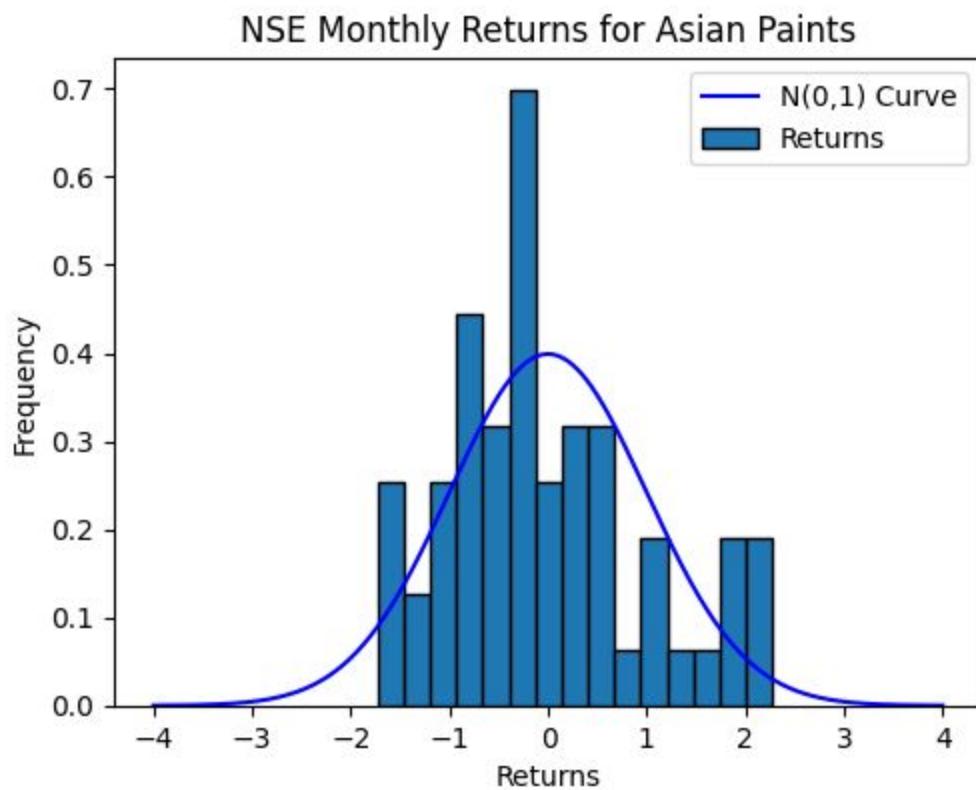
NSE Weekly Returns for MuthootFinance

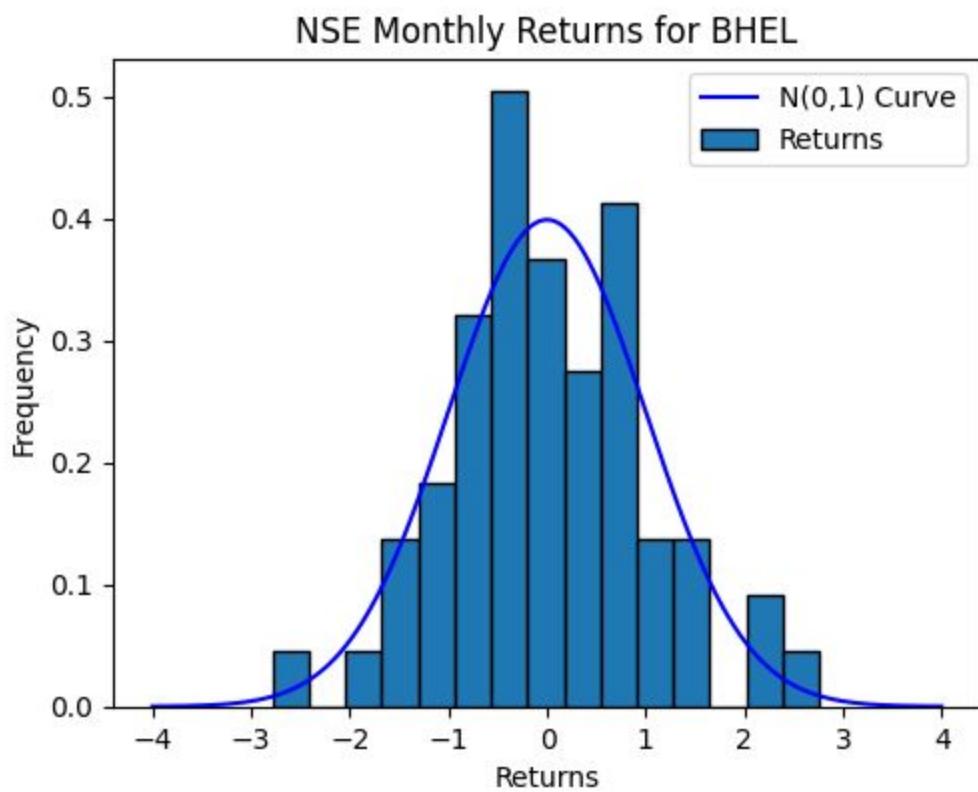
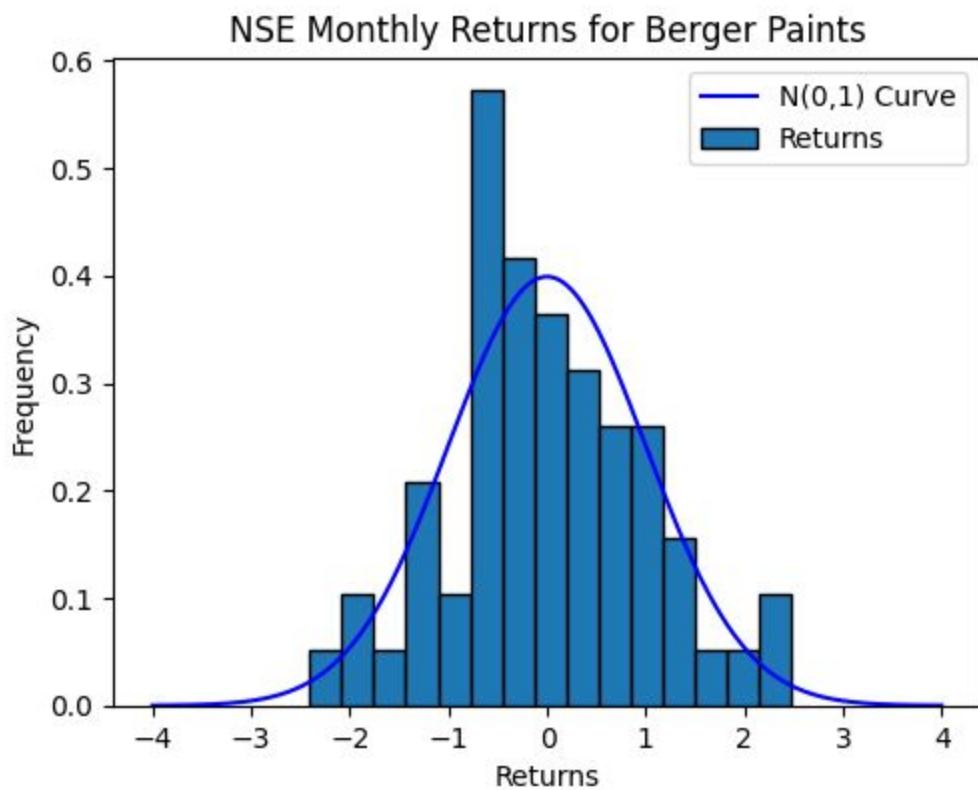


NSE Weekly Returns for Reliance

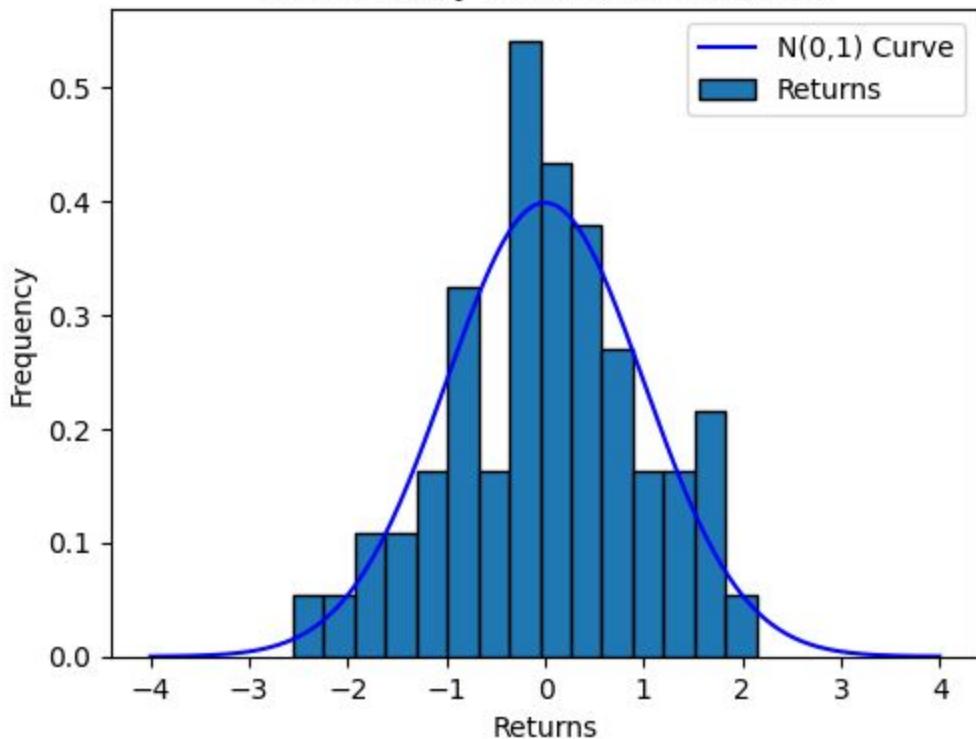


- Monthly NSE

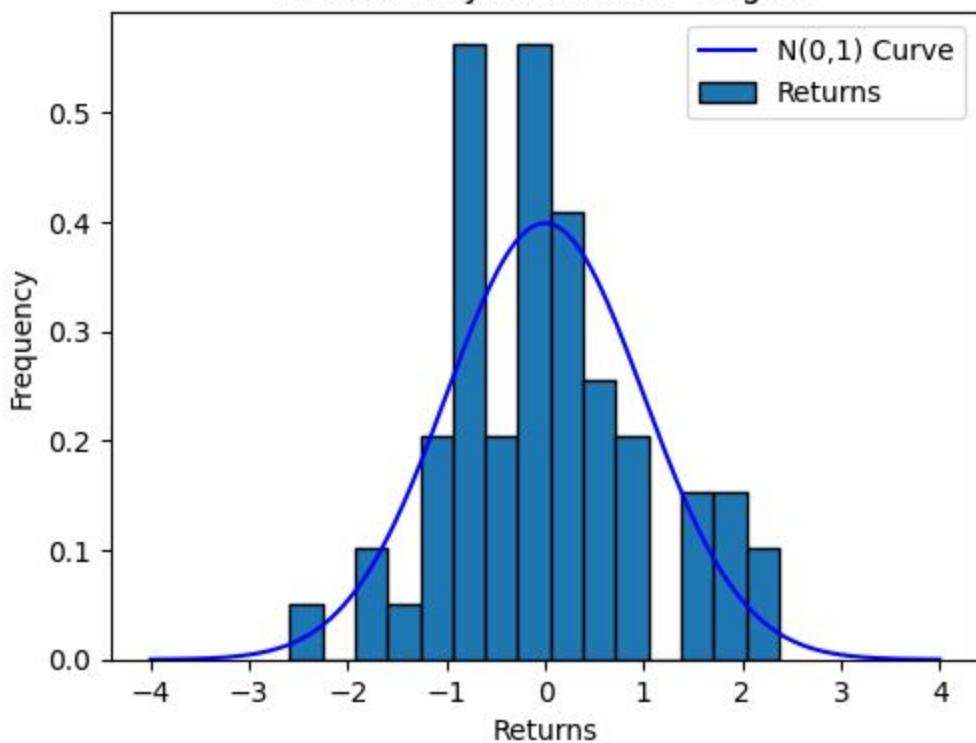




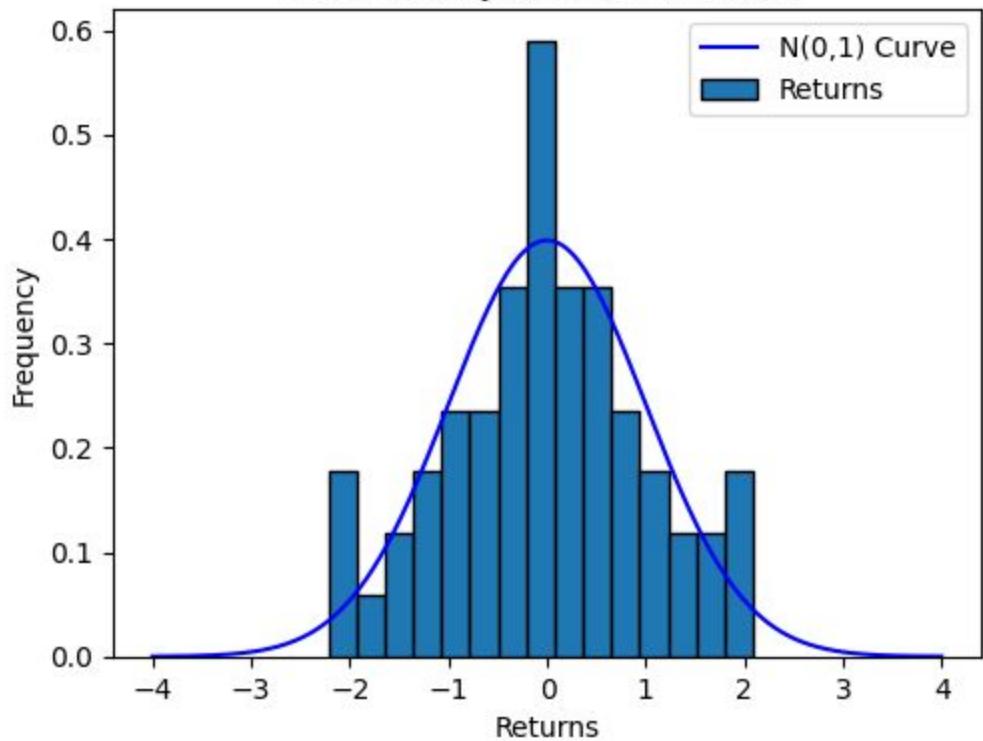
NSE Monthly Returns for Britannia



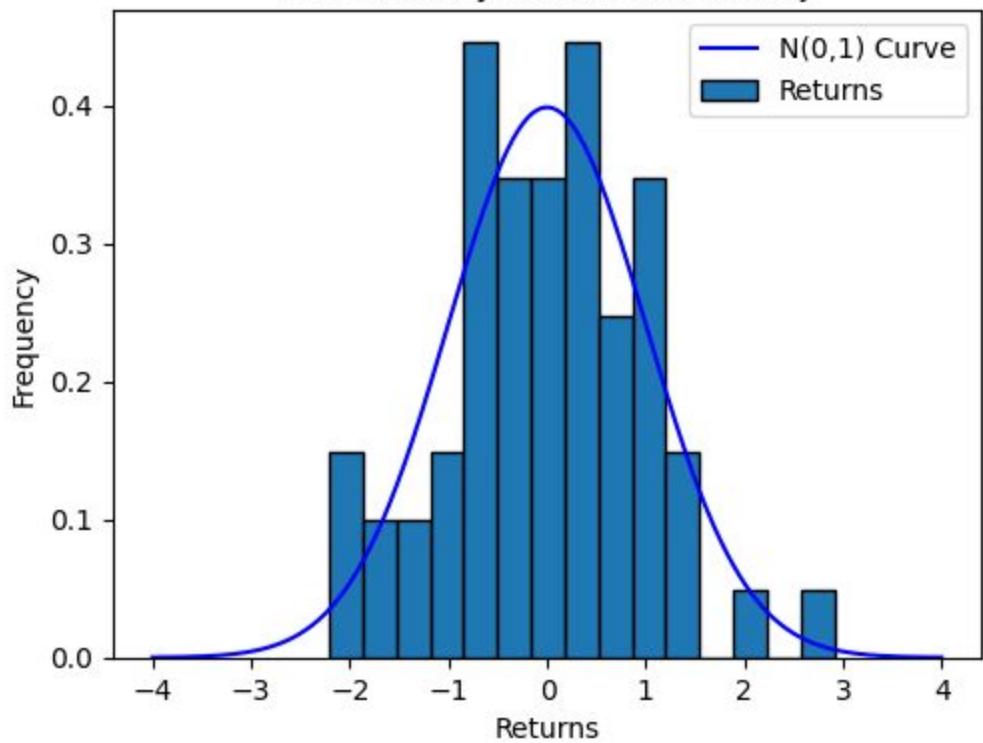
NSE Monthly Returns for Colgate



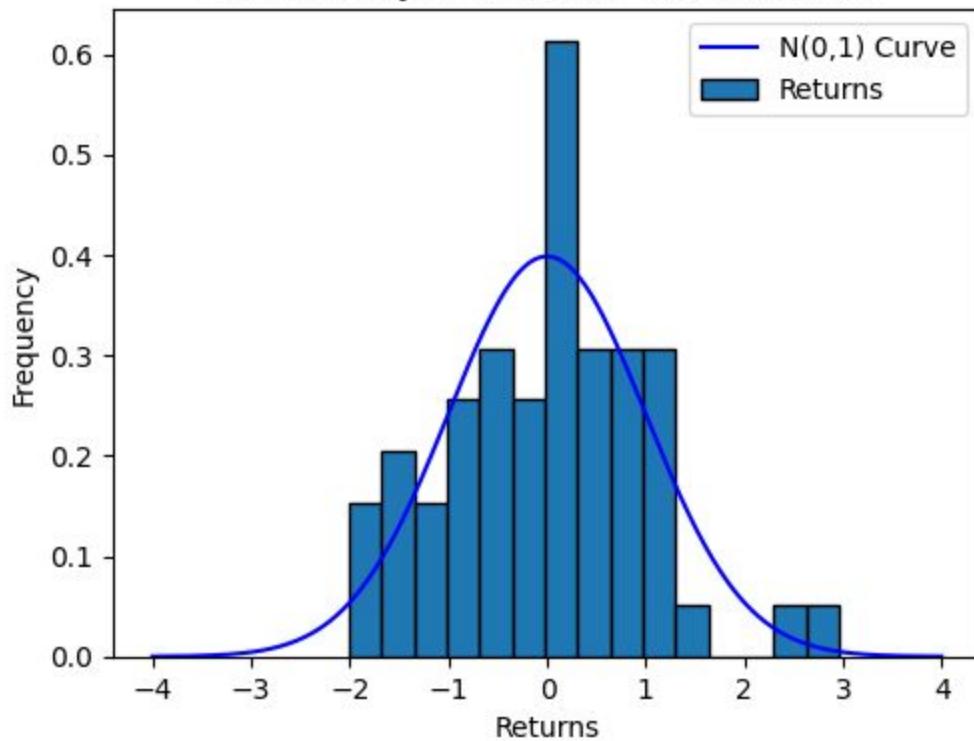
NSE Monthly Returns for Dabur



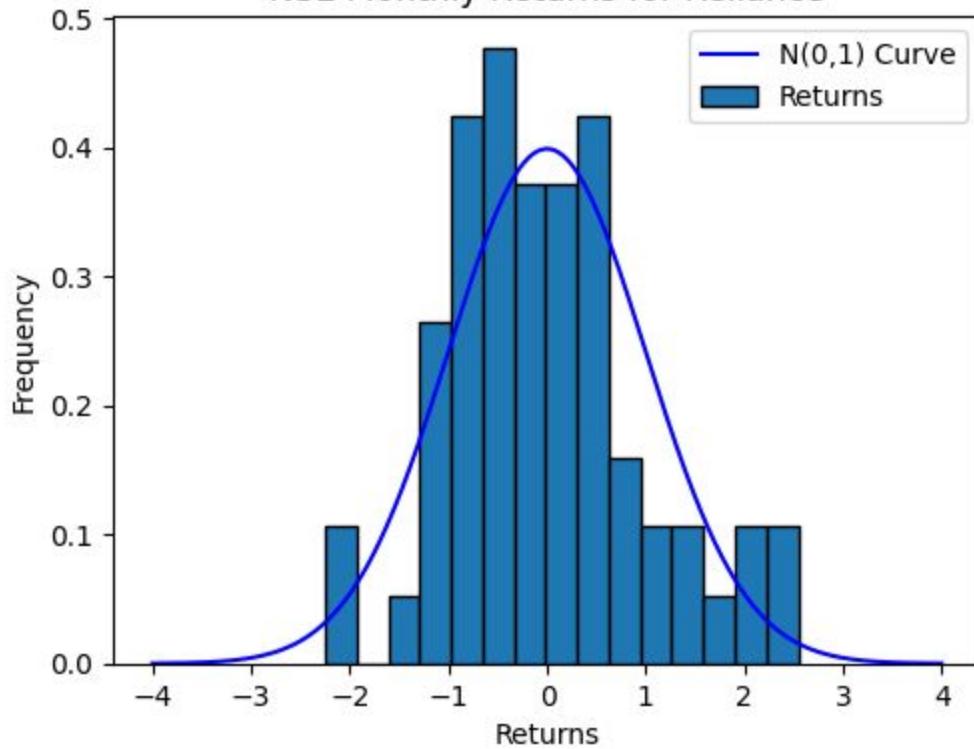
NSE Monthly Returns for Godrej



NSE Monthly Returns for MuthootFinance



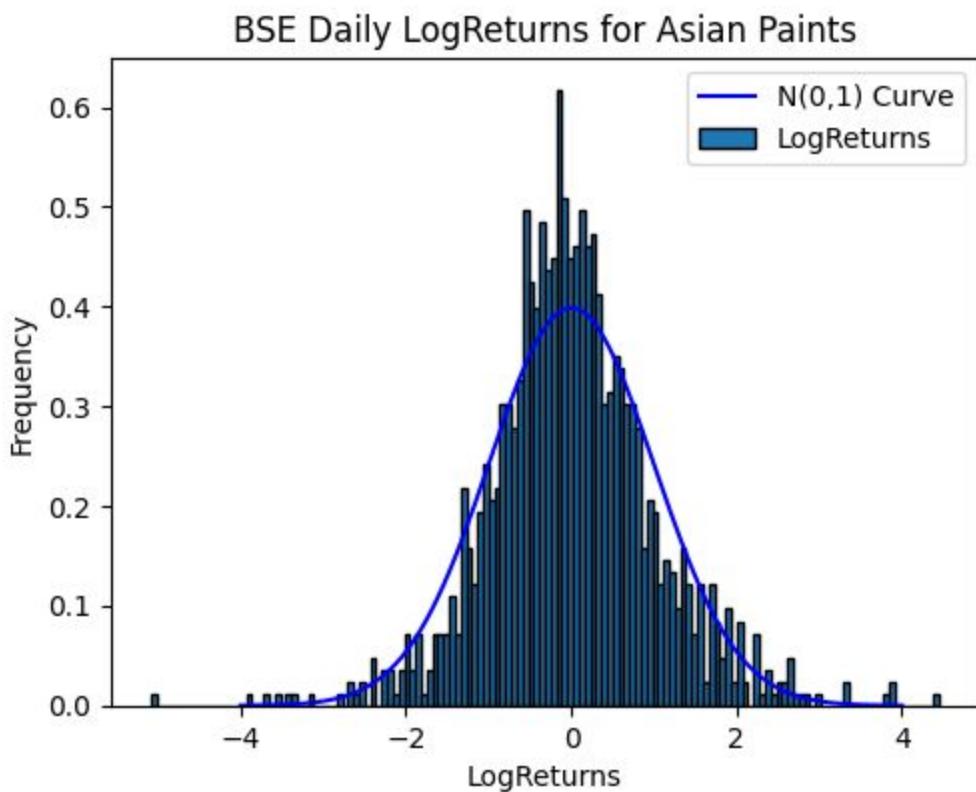
NSE Monthly Returns for Reliance



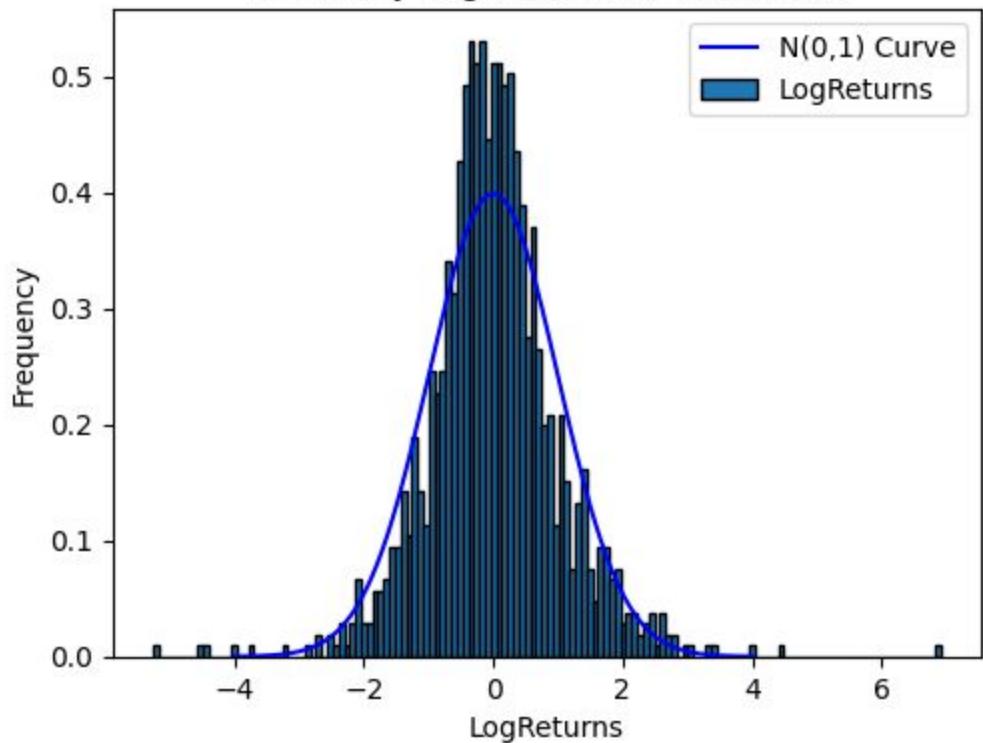
Observations : On zooming into tail, it is observed that on significant days there are high +ve and high -ve gains, which is not the ideal case as Gaussian distribution $\rightarrow 0$ near tail, but these high returns may be due to other factors as these are real life prices.

Ques.3

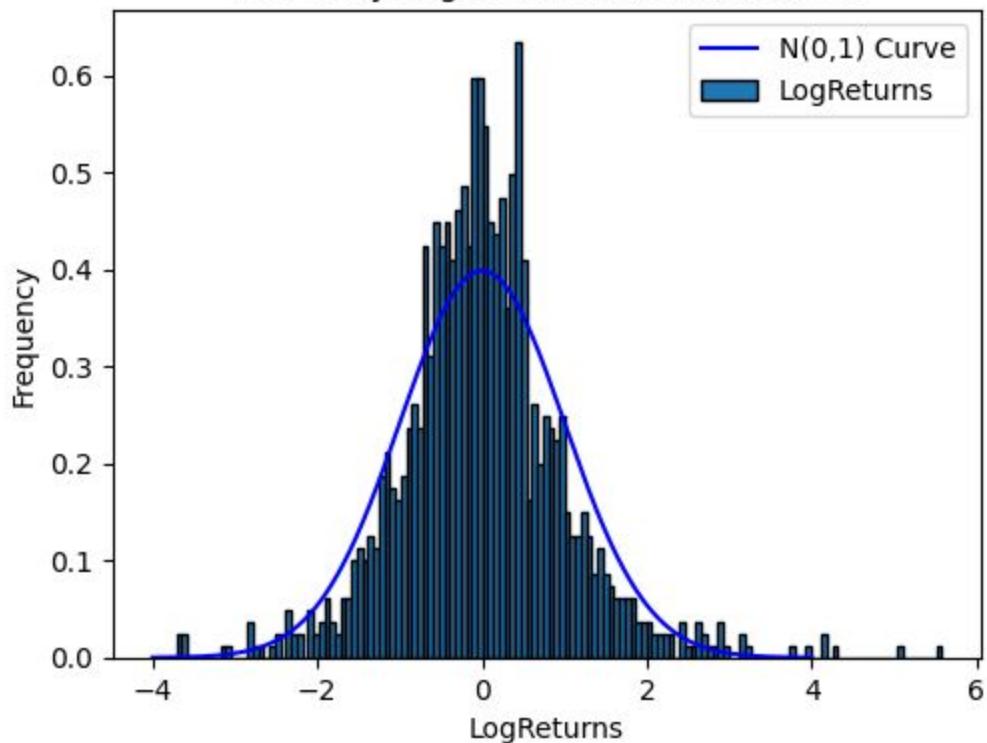
- Now LogNormal Returns are being used. The plots are shown below:
 - Daily BSE



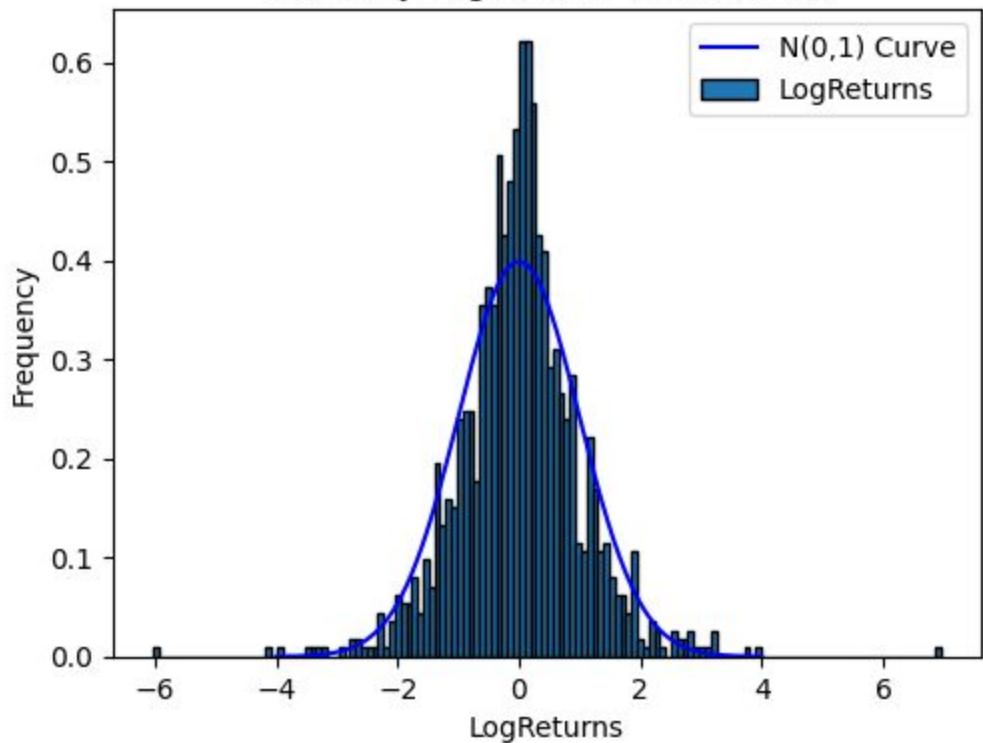
BSE Daily LogReturns for Axis Bank



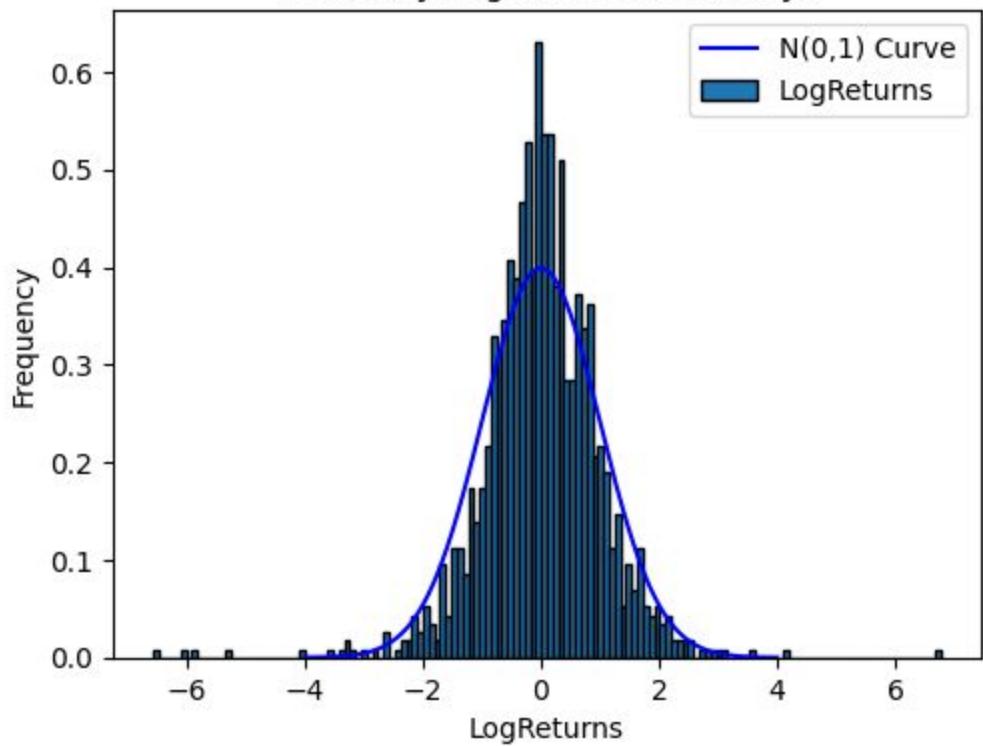
BSE Daily LogReturns for Bharat-Airtel



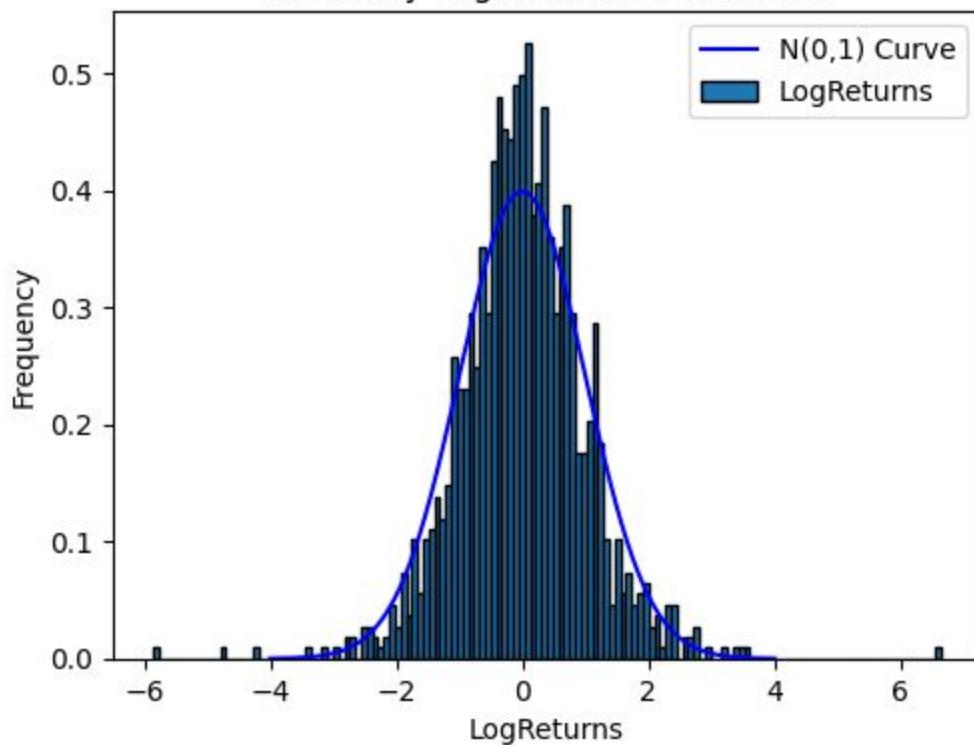
BSE Daily LogReturns for CoalIndia



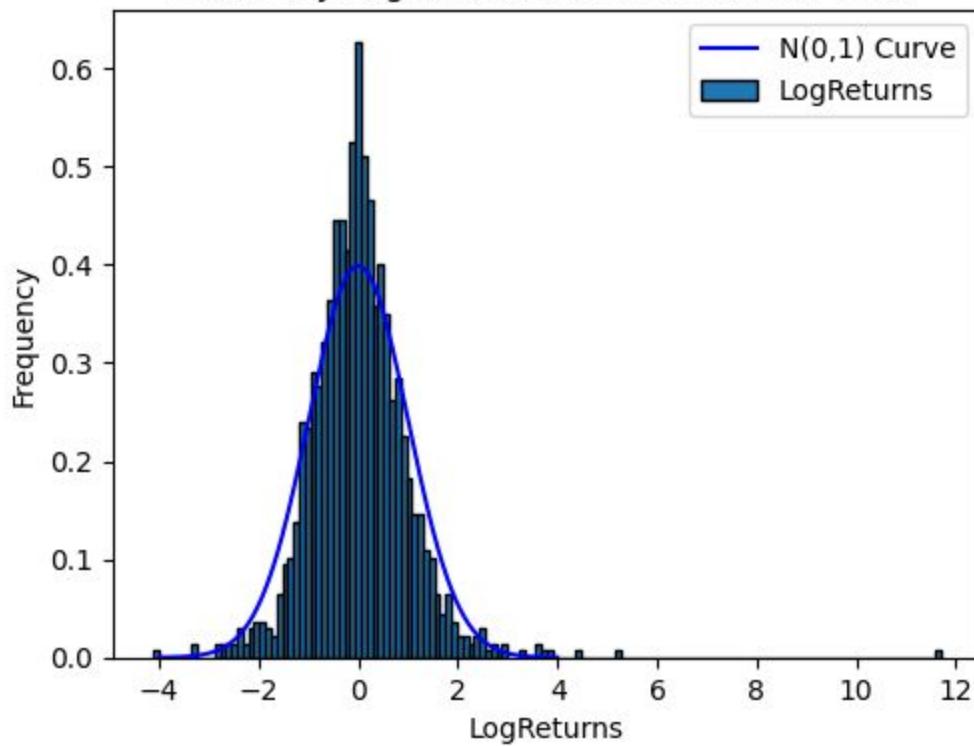
BSE Daily LogReturns for Infosys



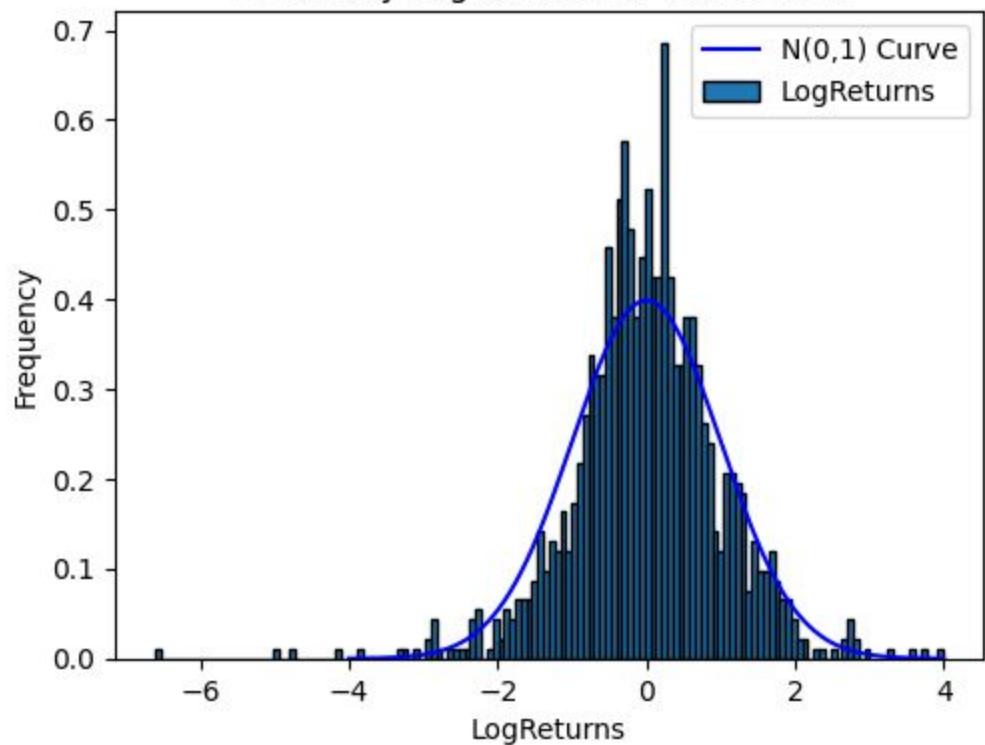
BSE Daily LogReturns for Reliance



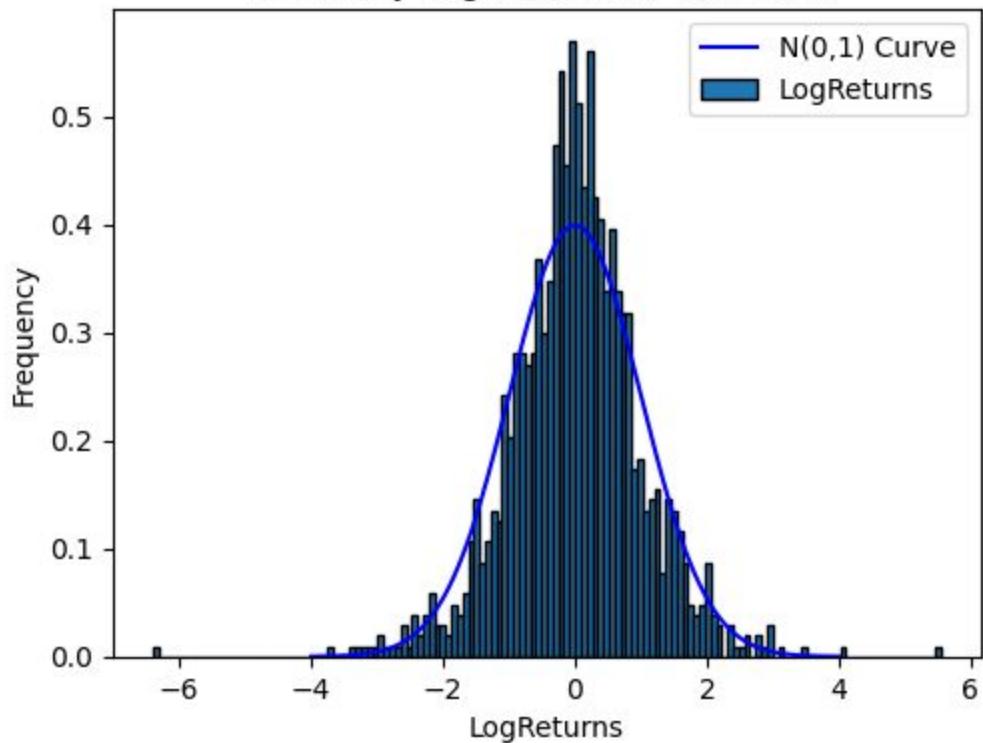
BSE Daily LogReturns for State Bank of India



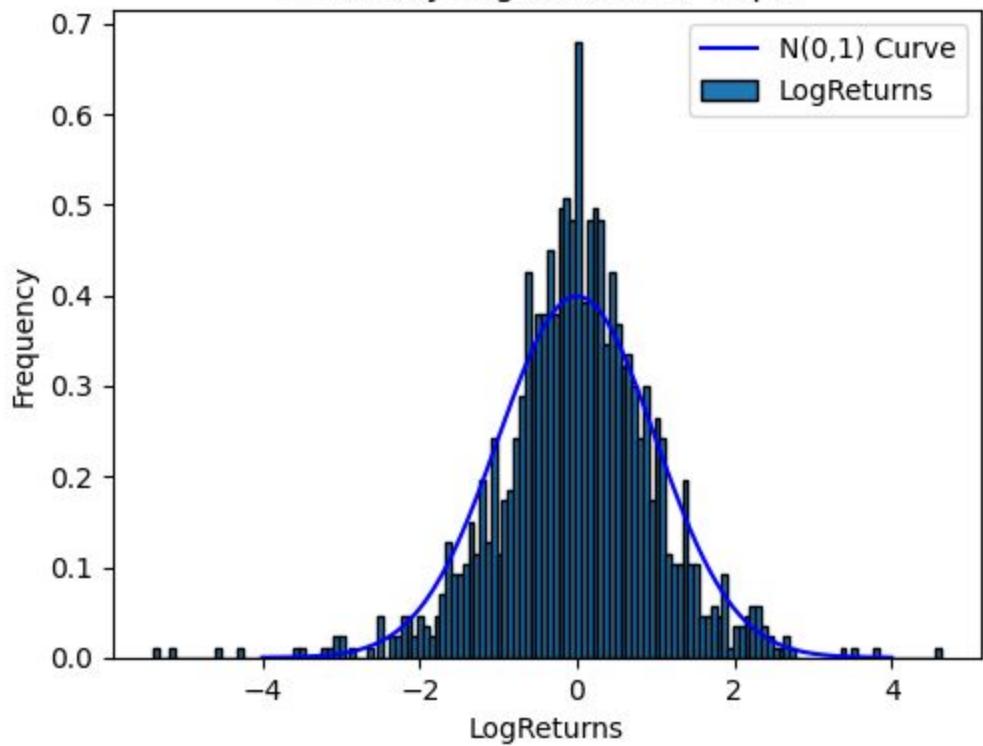
BSE Daily LogReturns for Tata Motors



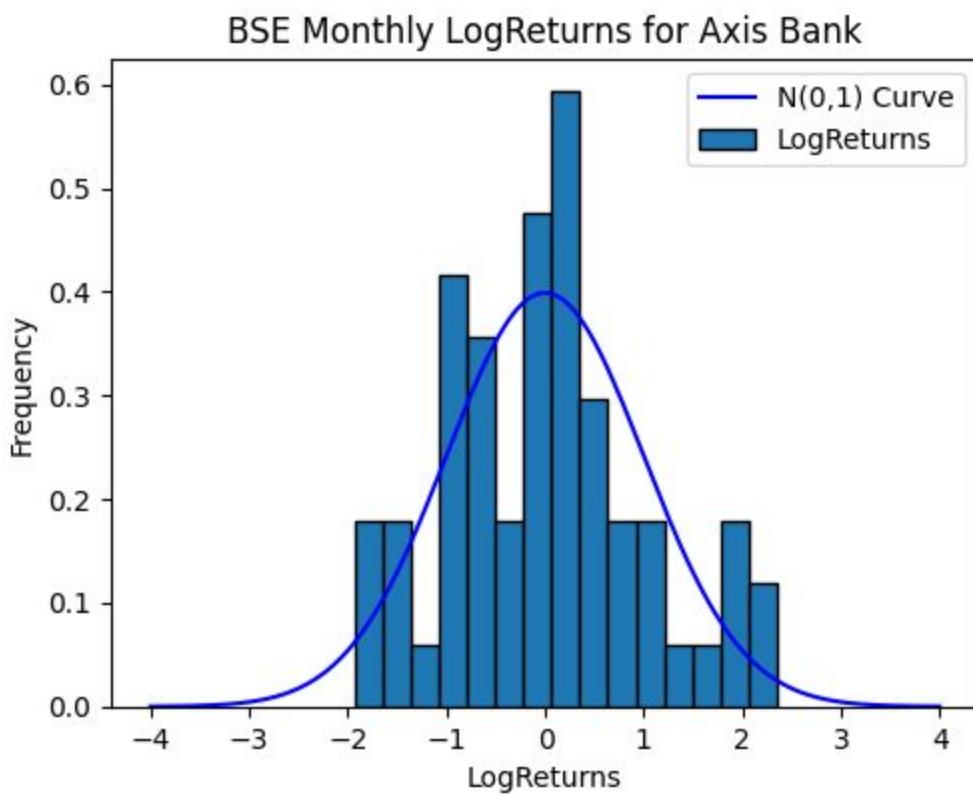
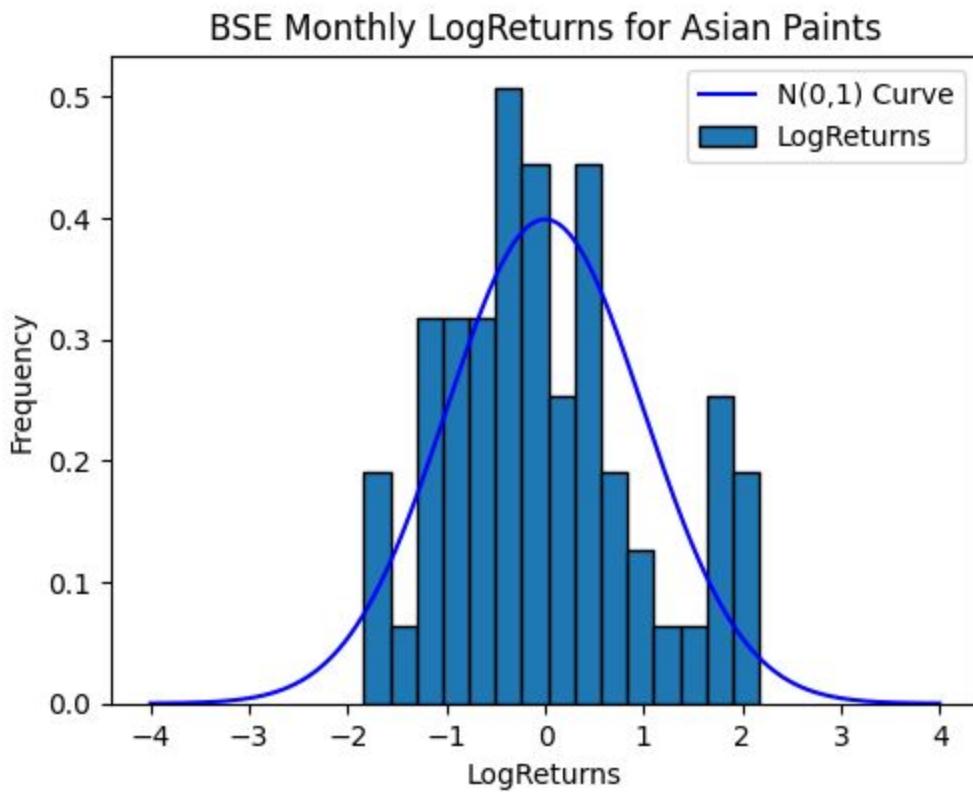
BSE Daily LogReturns for Tata Steel



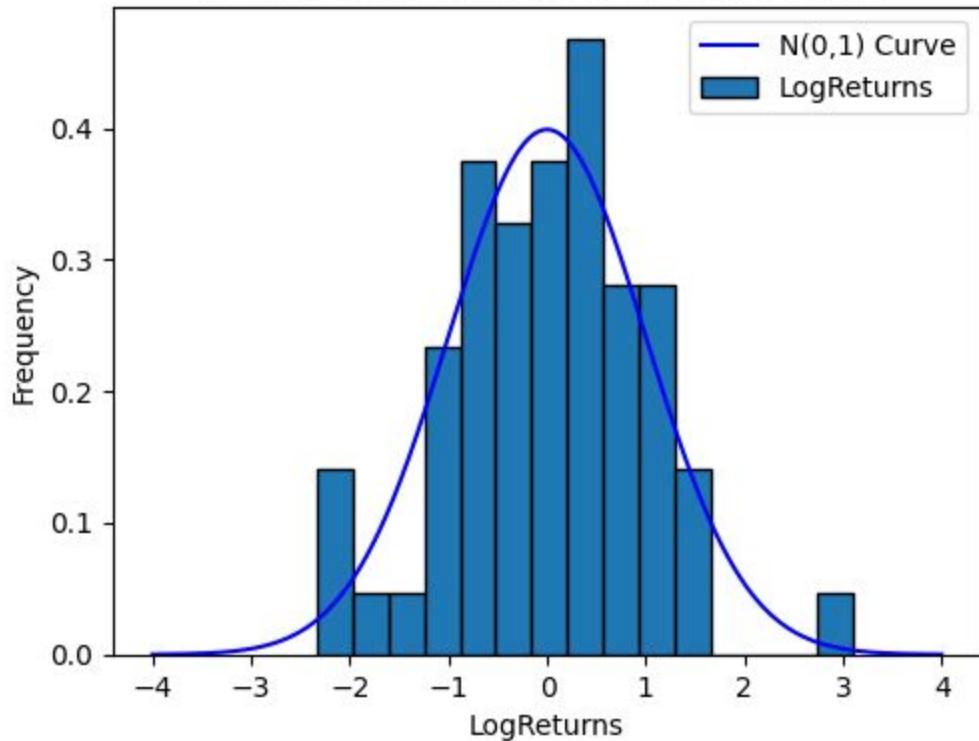
BSE Daily LogReturns for Wipro



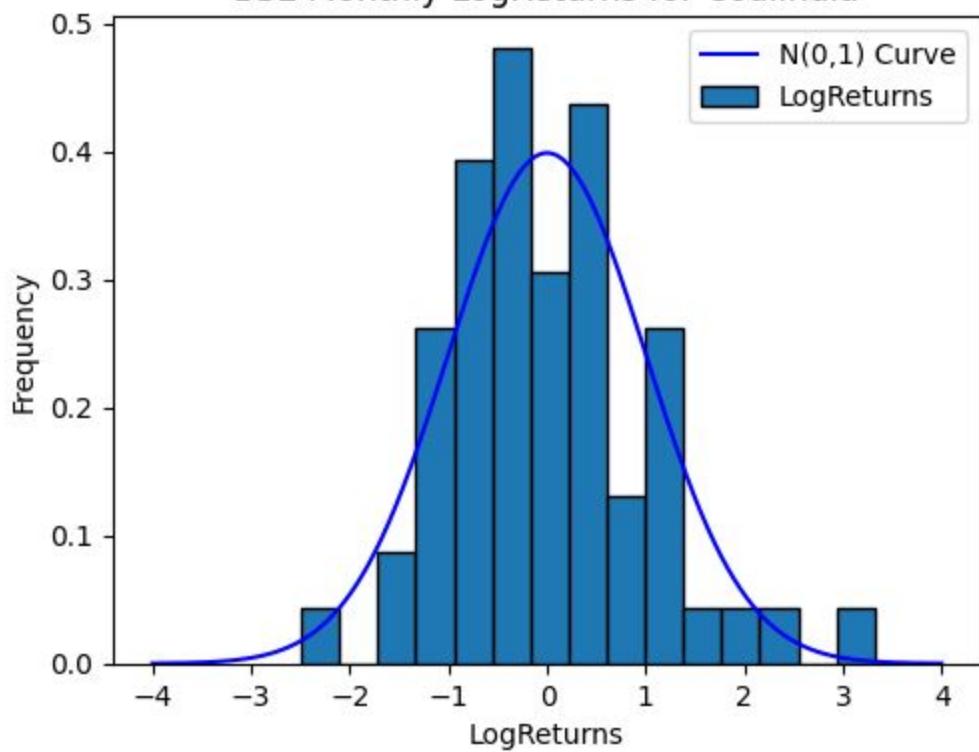
- Monthly BSE

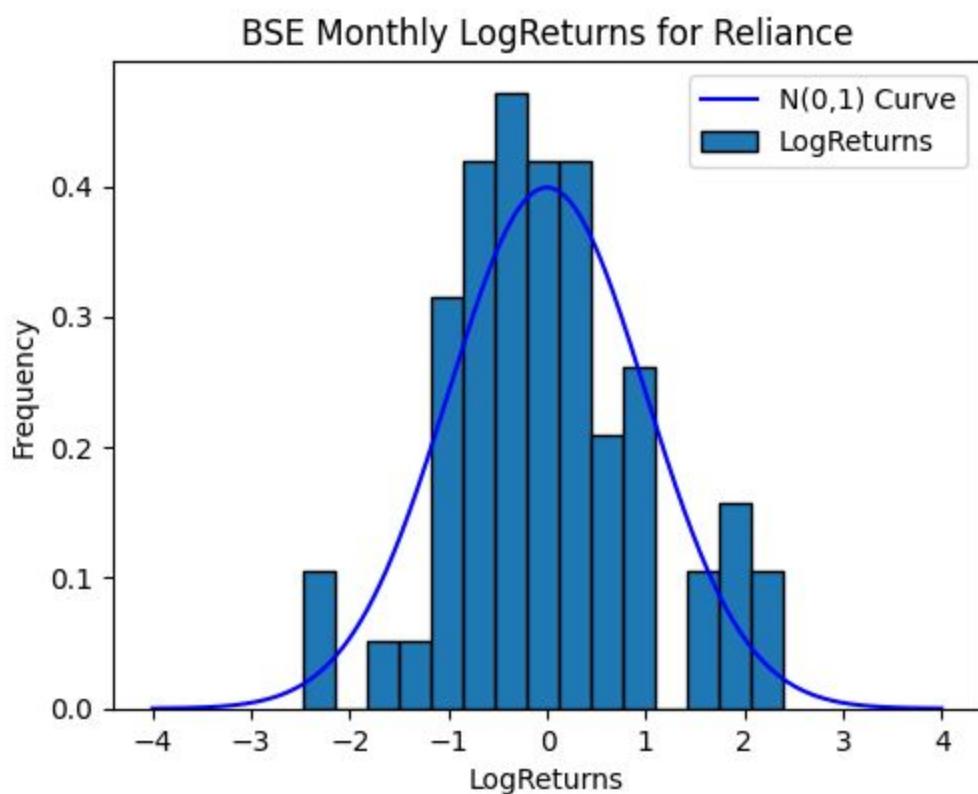
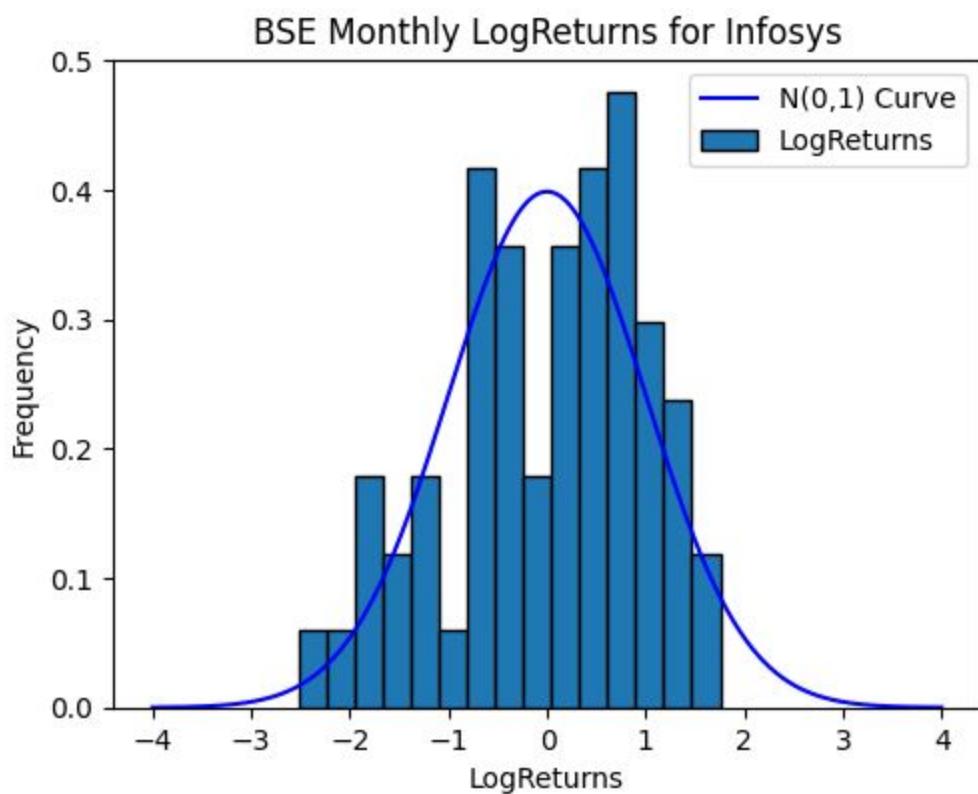


BSE Monthly LogReturns for Bharat-Airtel

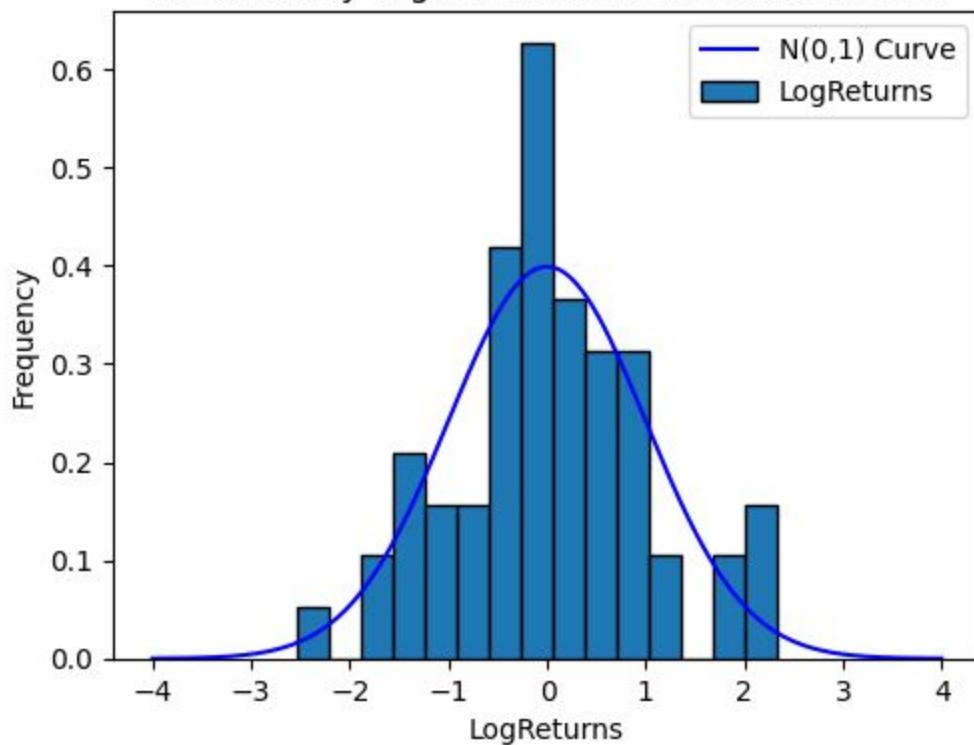


BSE Monthly LogReturns for CoalIndia

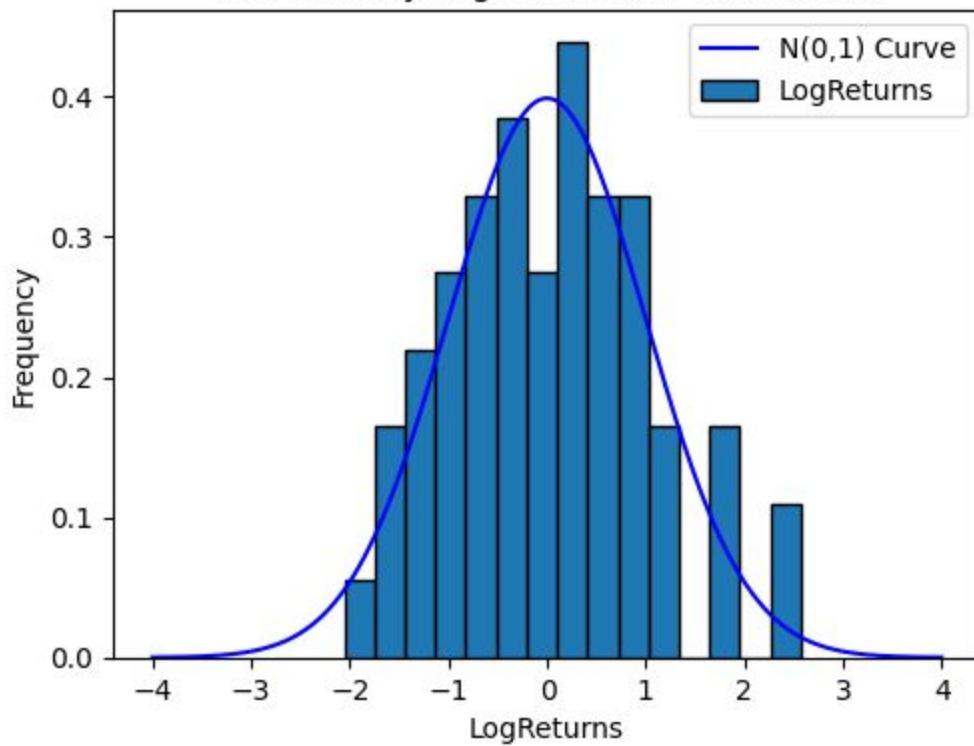




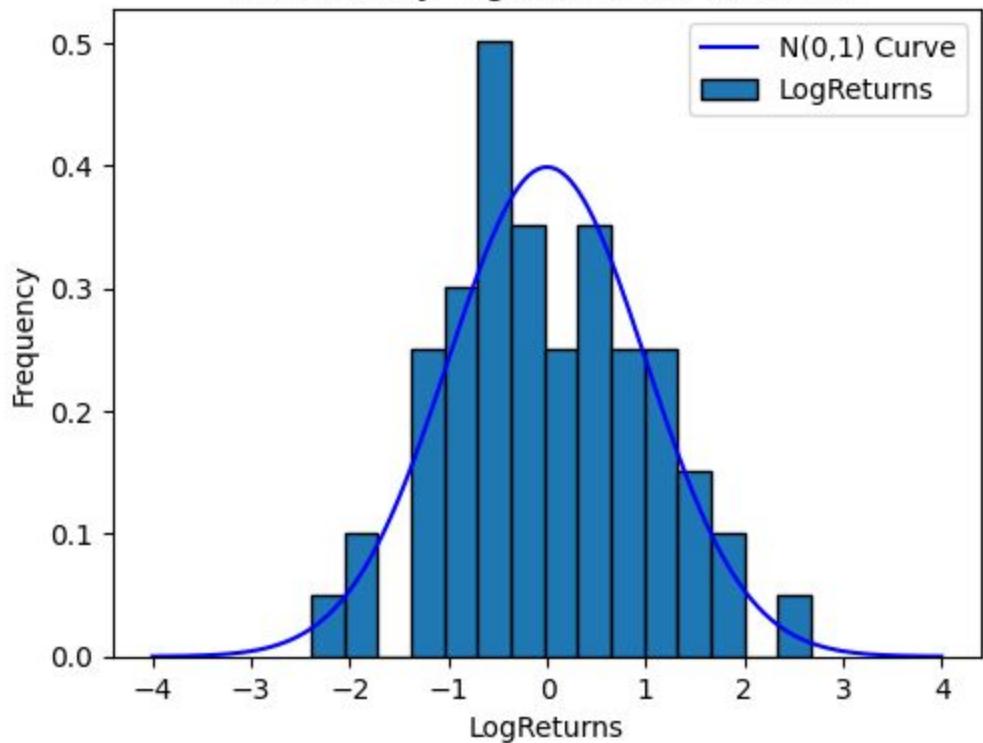
BSE Monthly LogReturns for State Bank of India



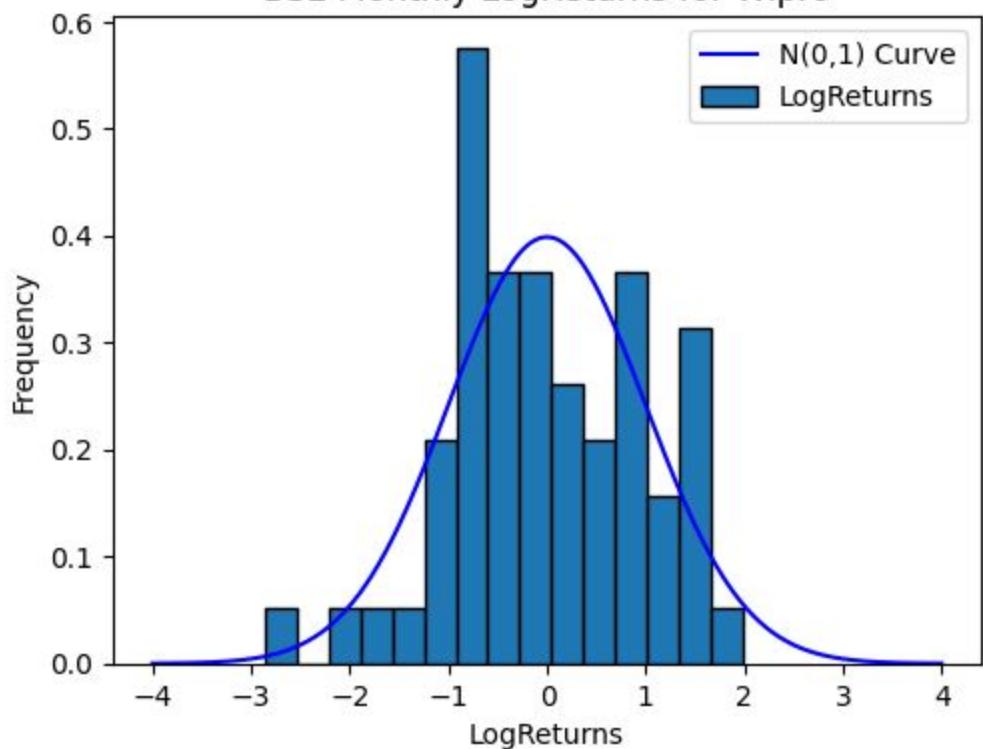
BSE Monthly LogReturns for Tata Motors



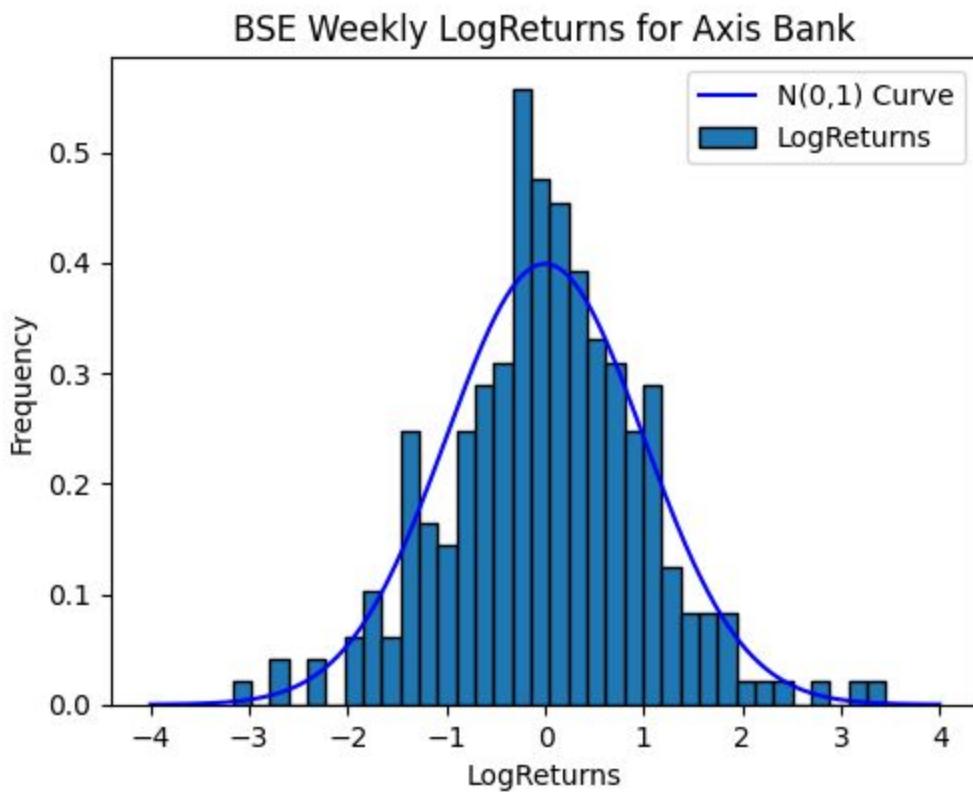
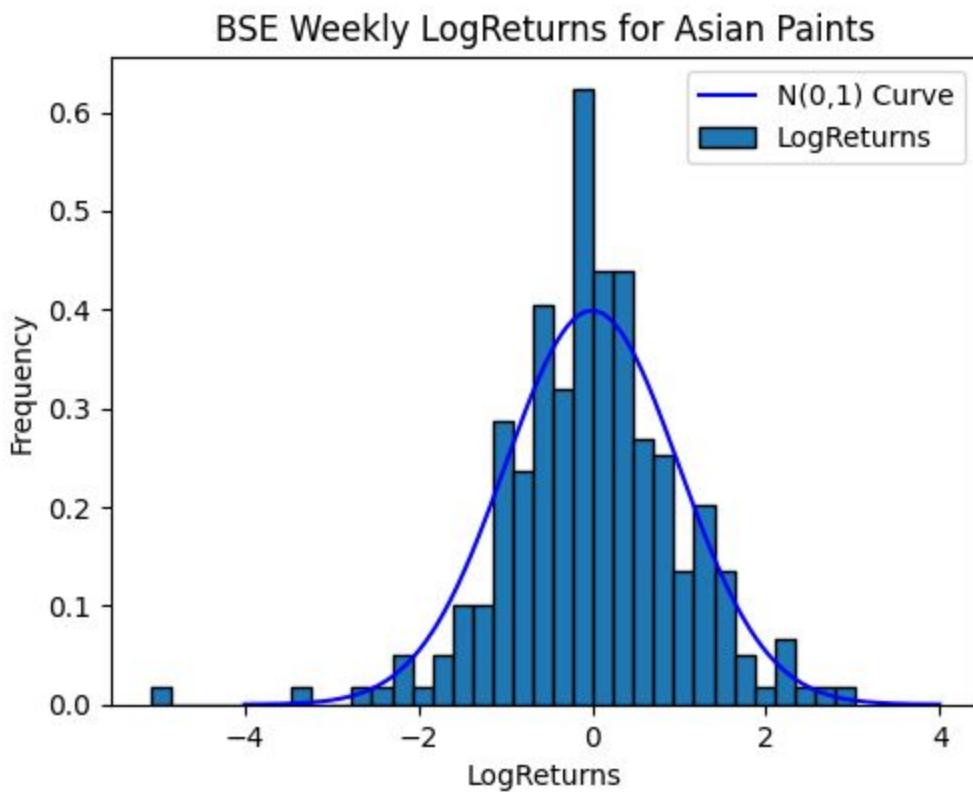
BSE Monthly LogReturns for Tata Steel



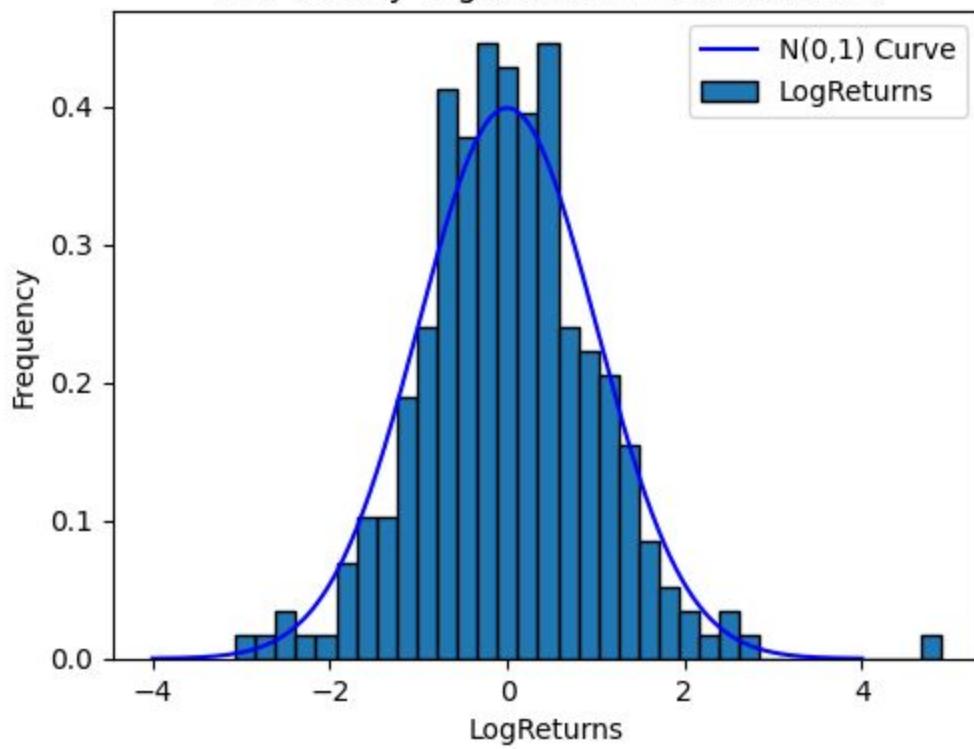
BSE Monthly LogReturns for Wipro



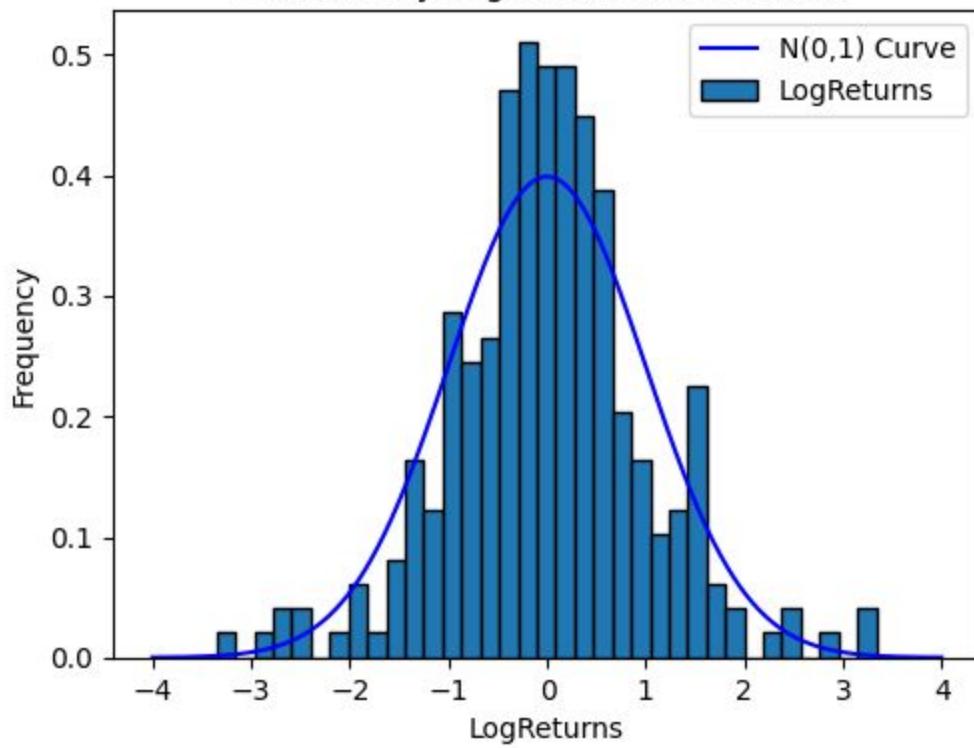
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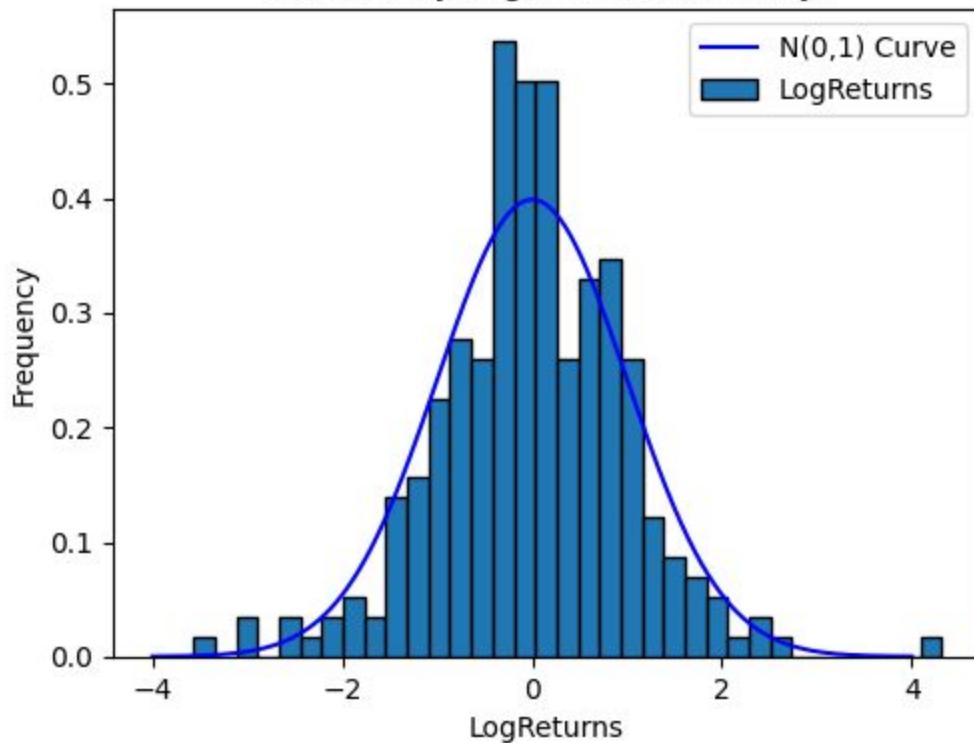
BSE Weekly LogReturns for Bharat-Airtel



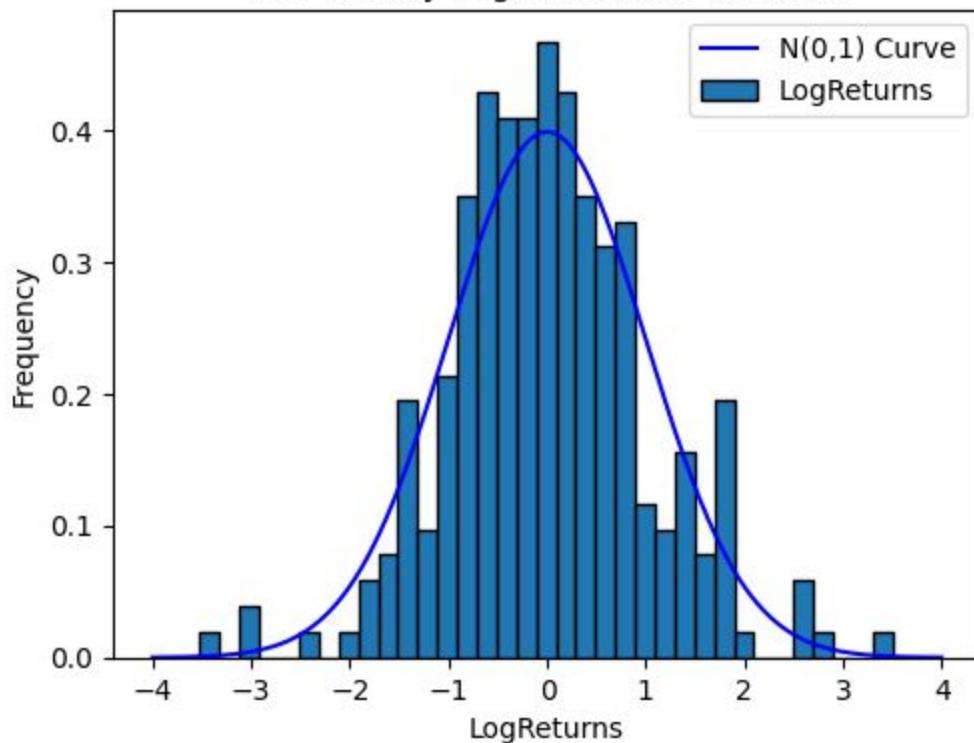
BSE Weekly LogReturns for CoalIndia



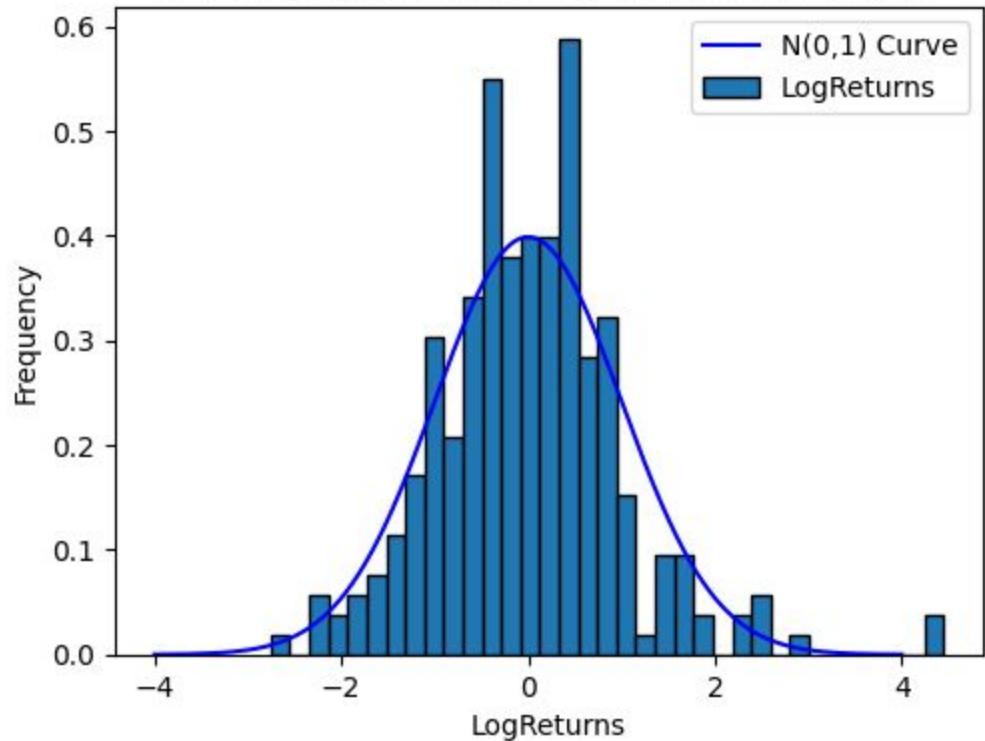
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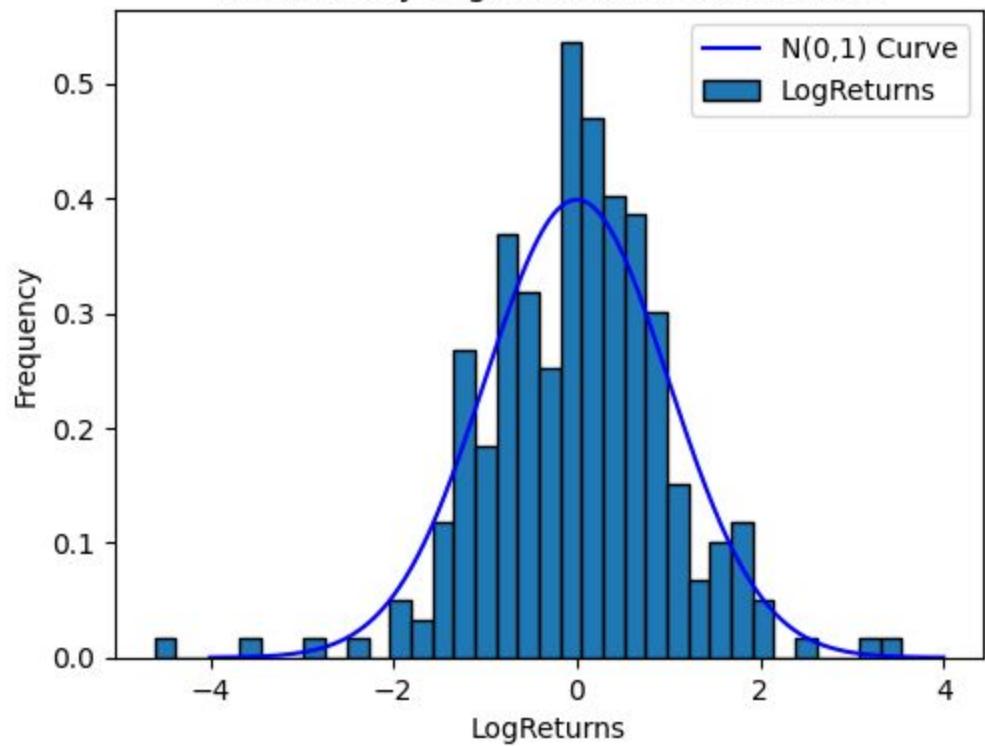
BSE Weekly LogReturns for Reliance



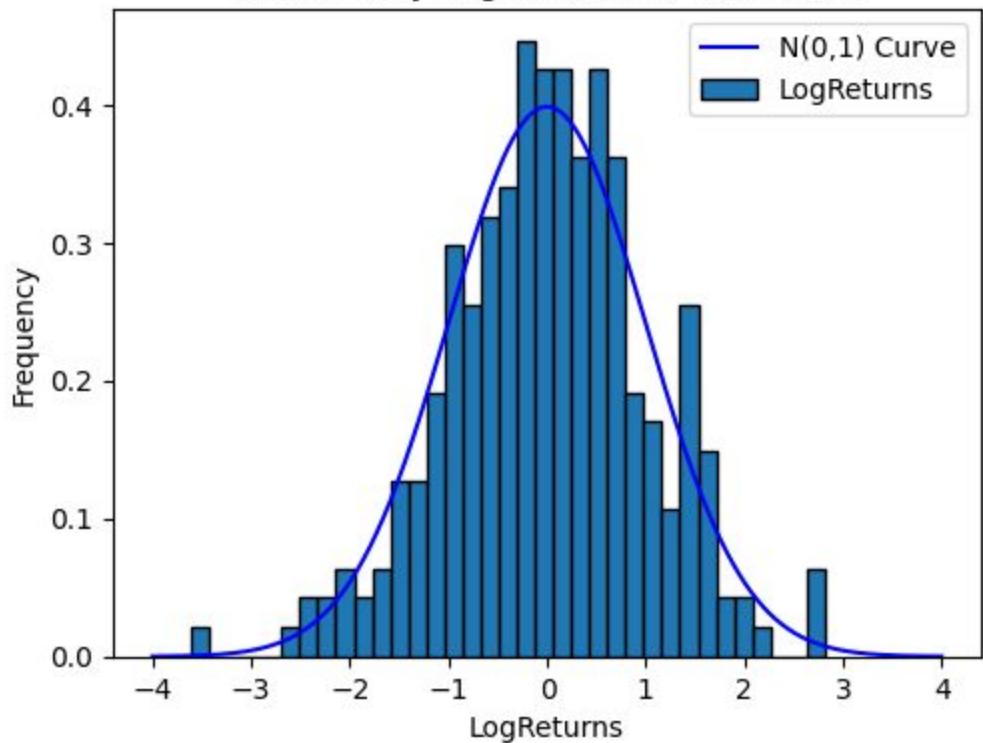
BSE Weekly LogReturns for State Bank of India



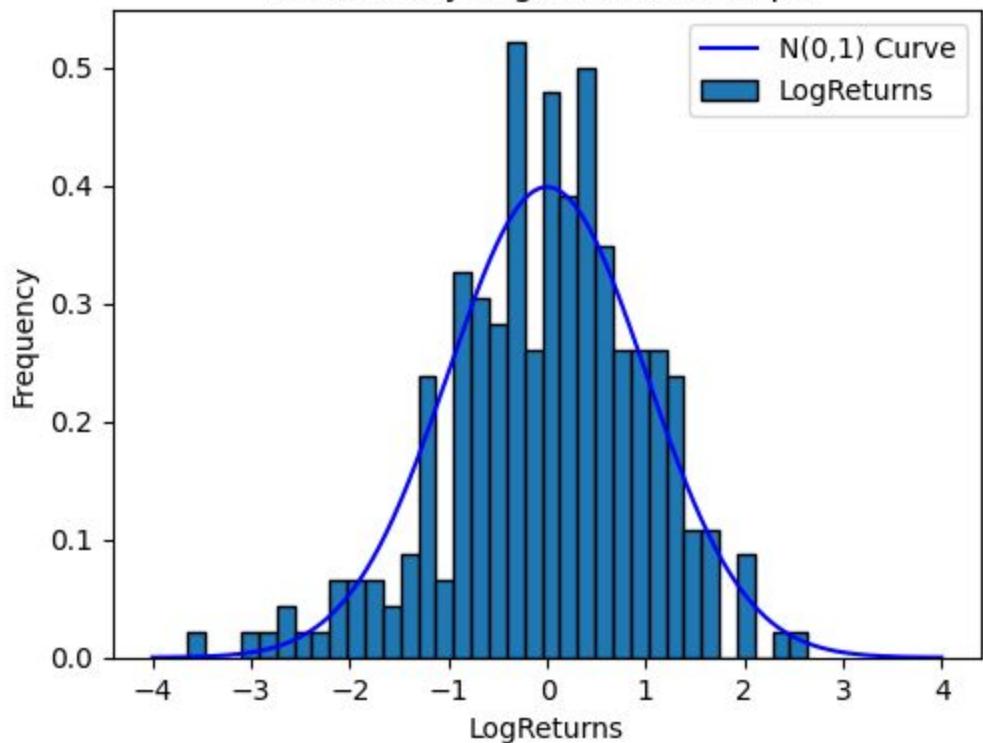
BSE Weekly LogReturns for Tata Motors



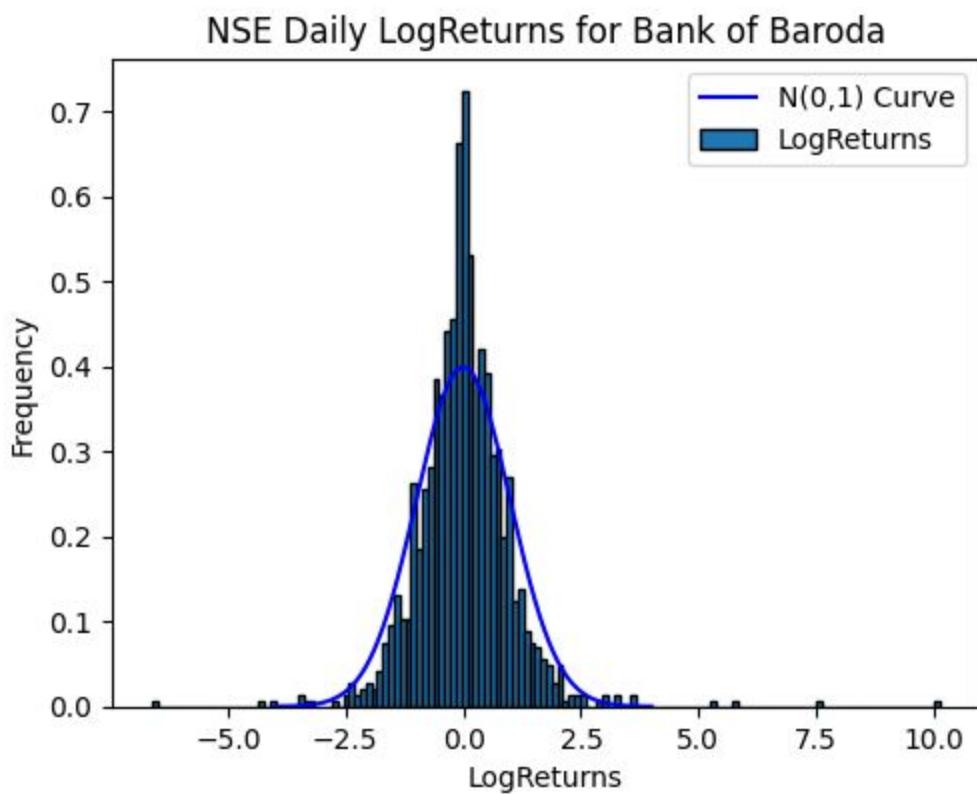
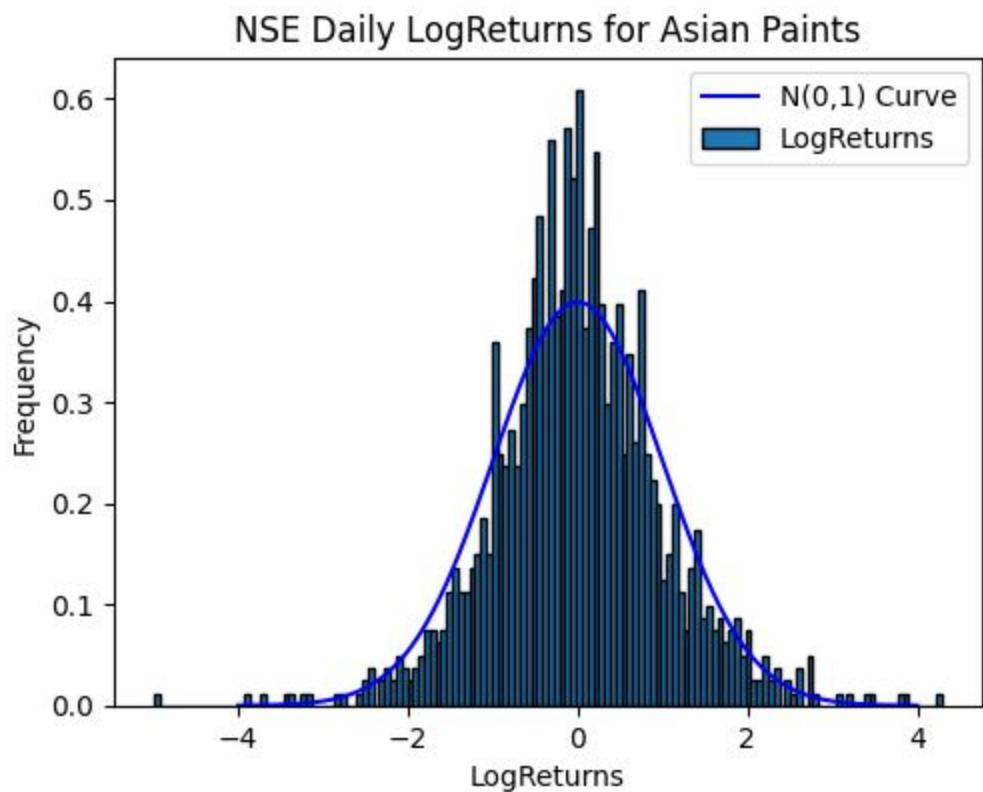
BSE Weekly LogReturns for Tata Steel



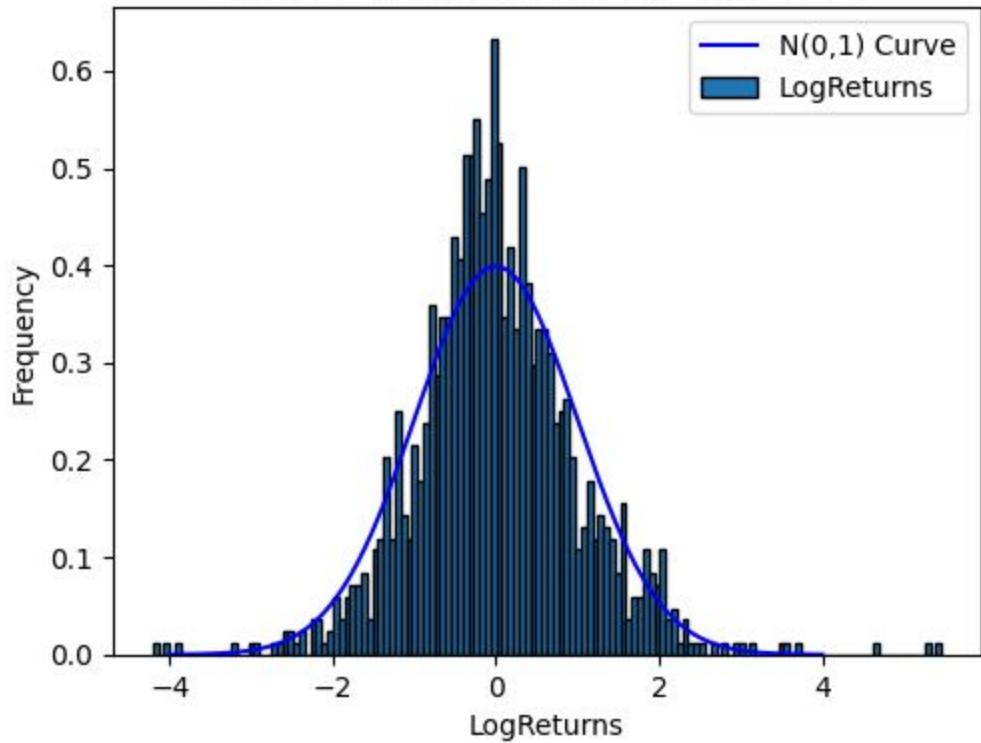
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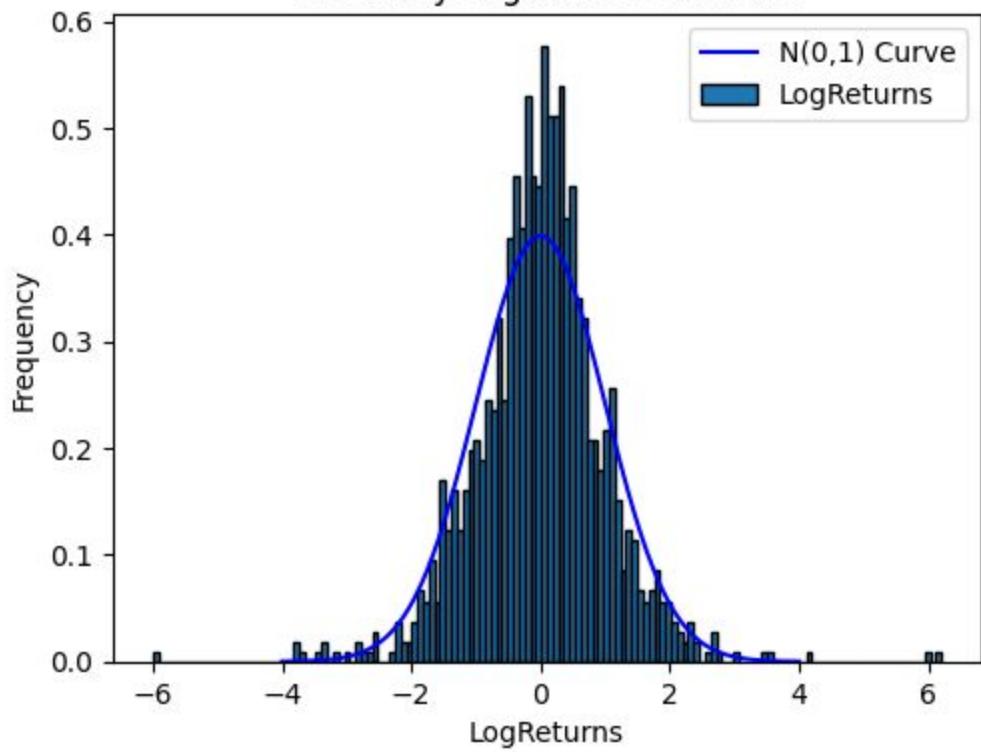
- Daily NSE



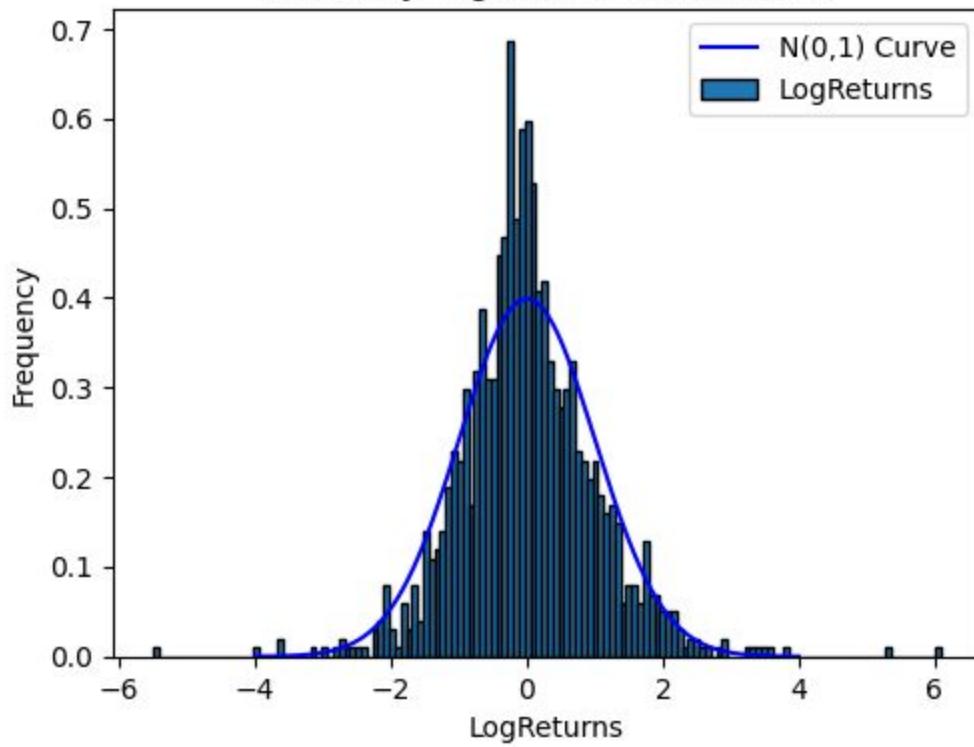
NSE Daily LogReturns for Berger Paints



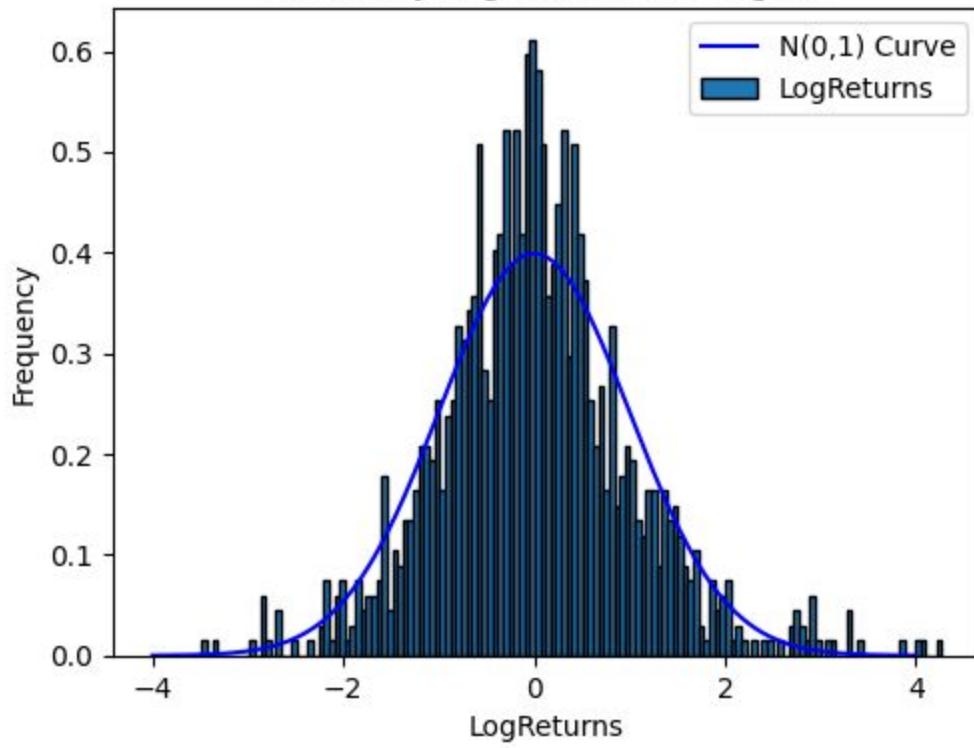
NSE Daily LogReturns for BHEL



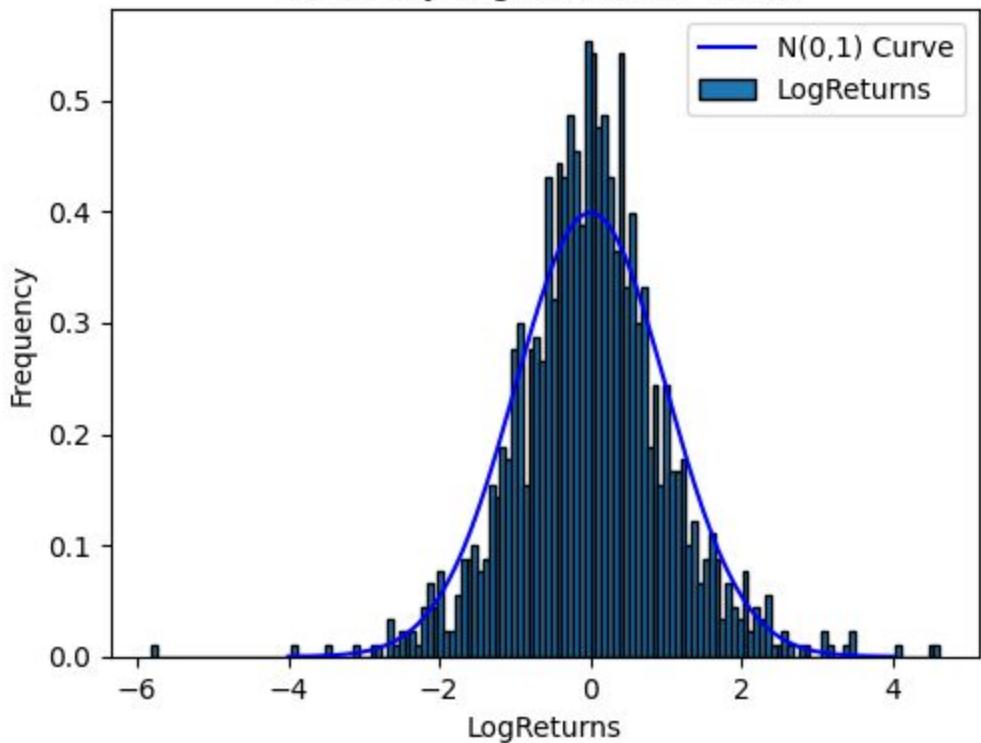
NSE Daily LogReturns for Britannia



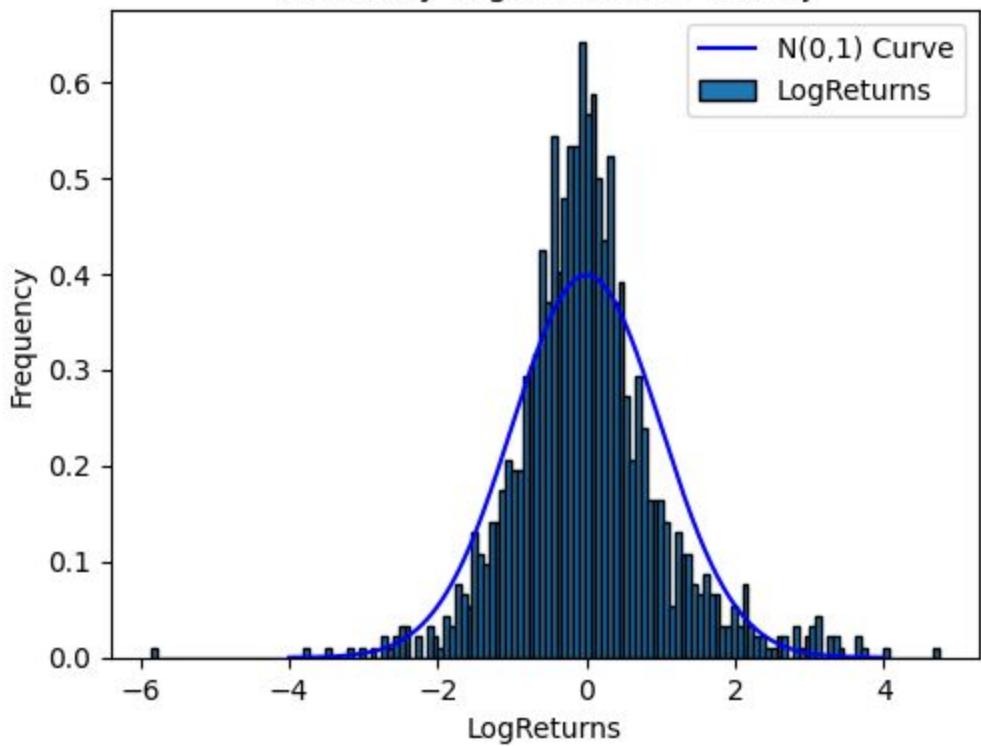
NSE Daily LogReturns for Colgate



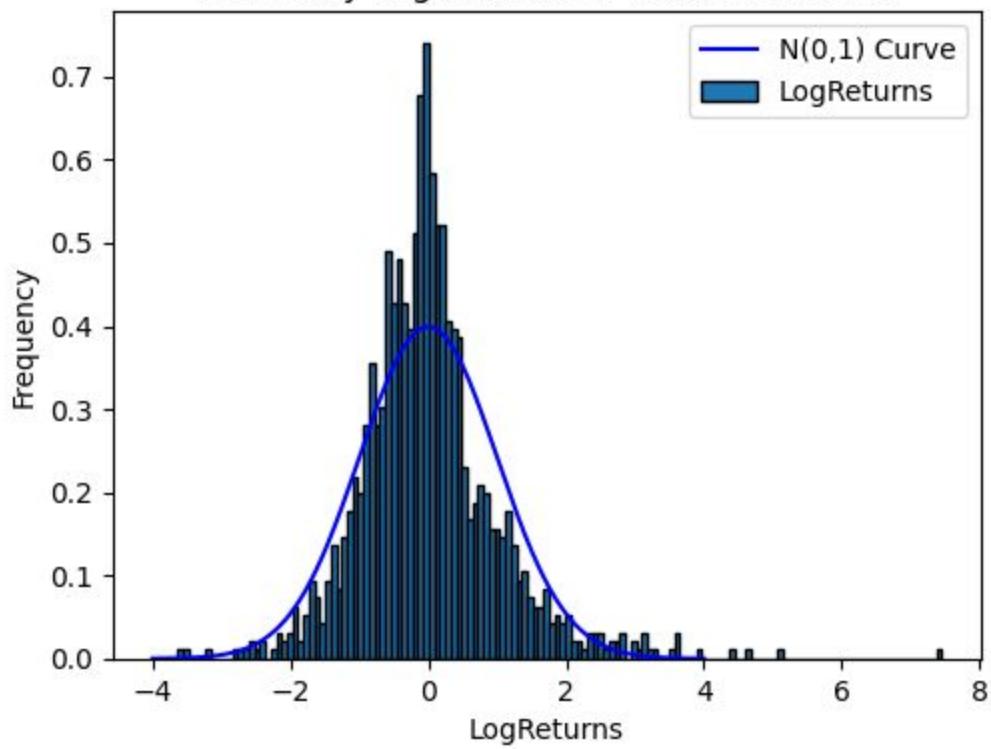
NSE Daily LogReturns for Dabur



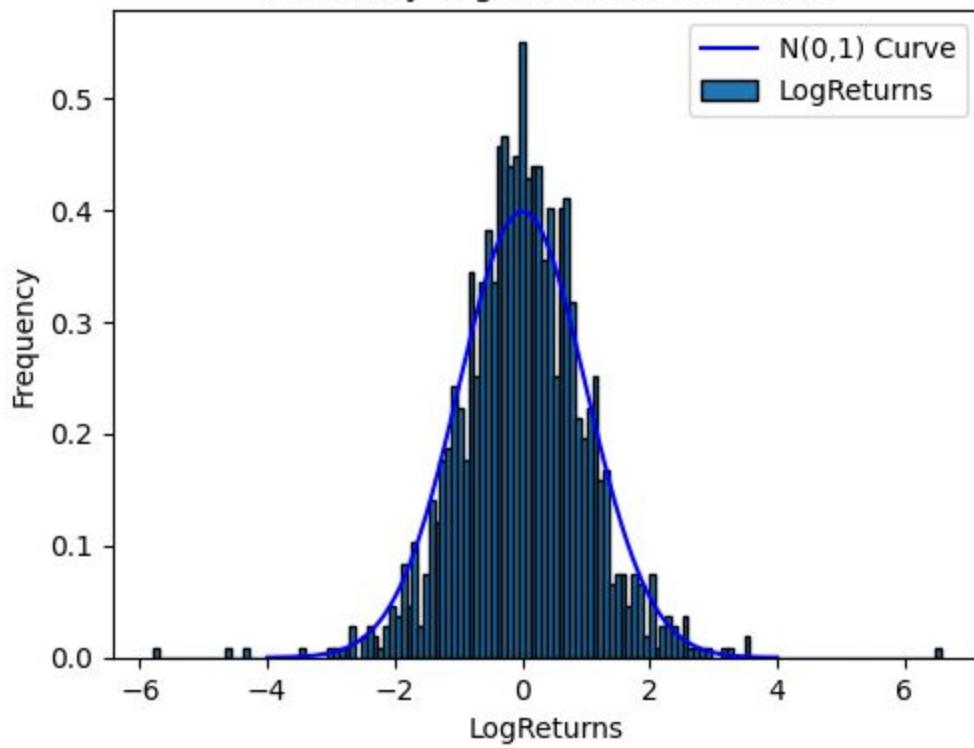
NSE Daily LogReturns for Godrej



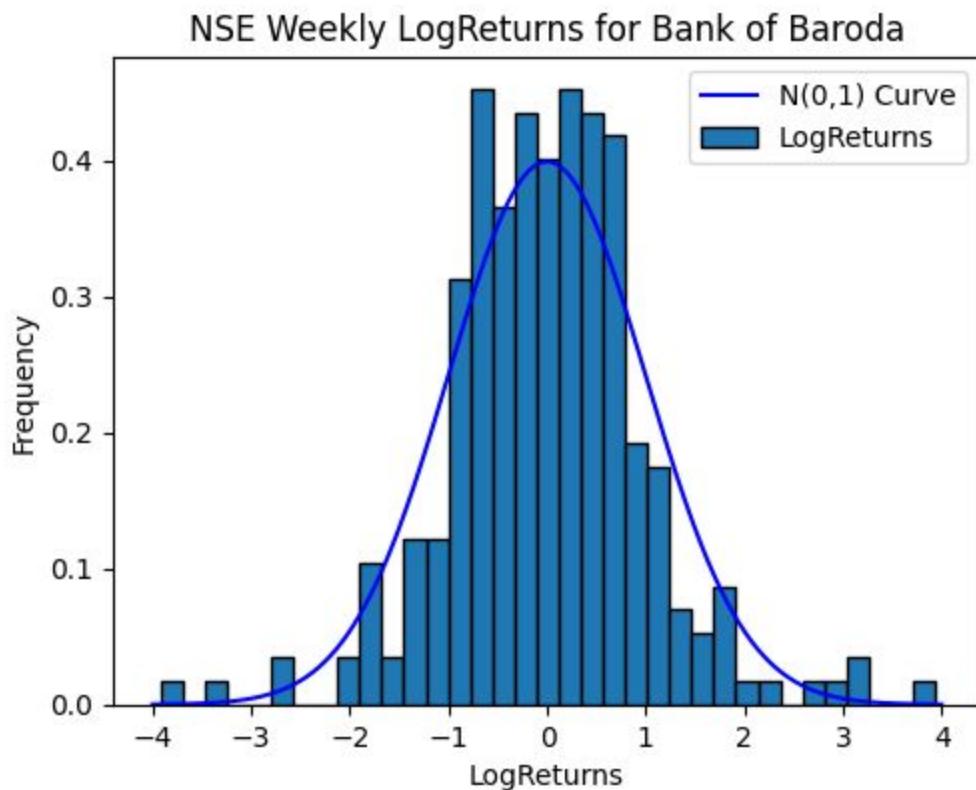
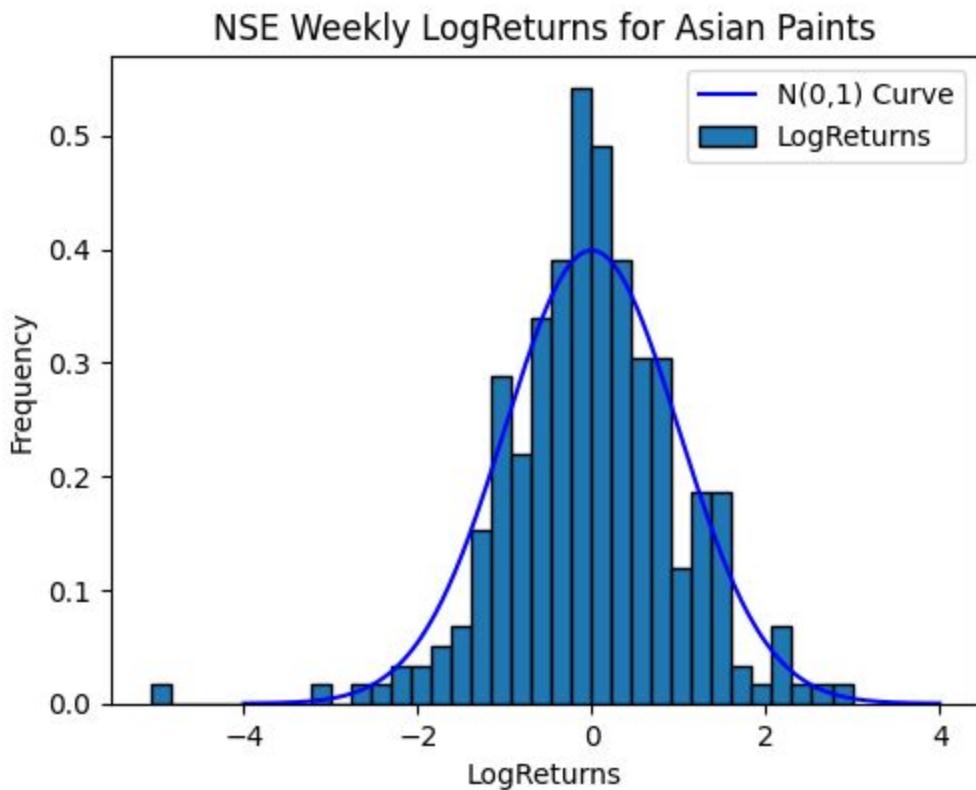
NSE Daily LogReturns for MuthootFinance



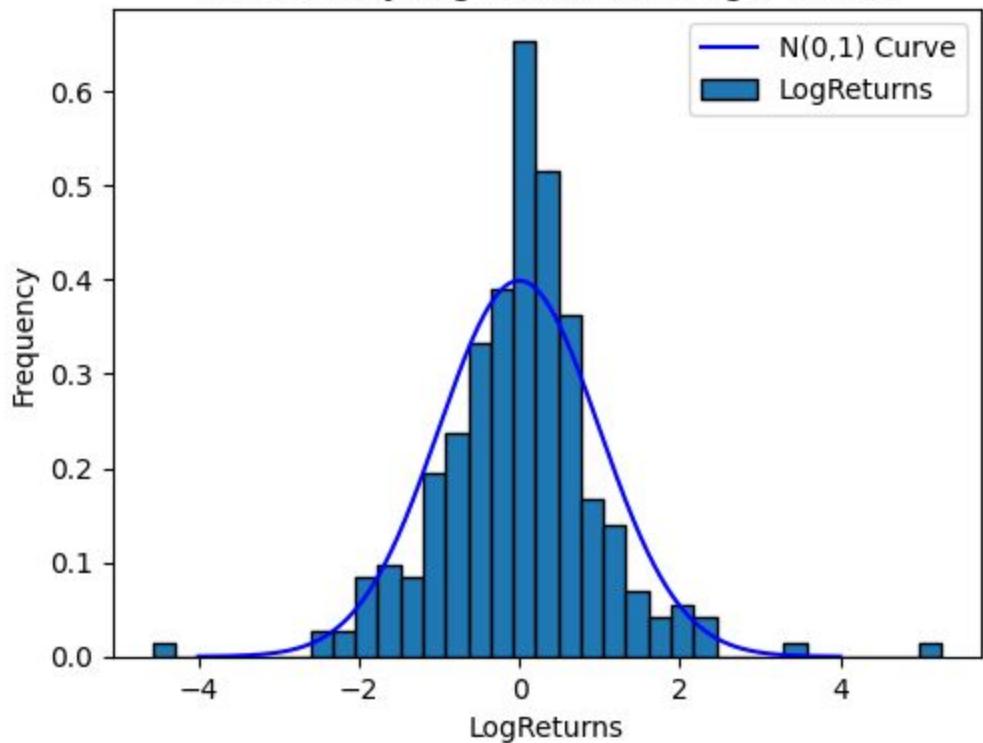
NSE Daily LogReturns for Reliance



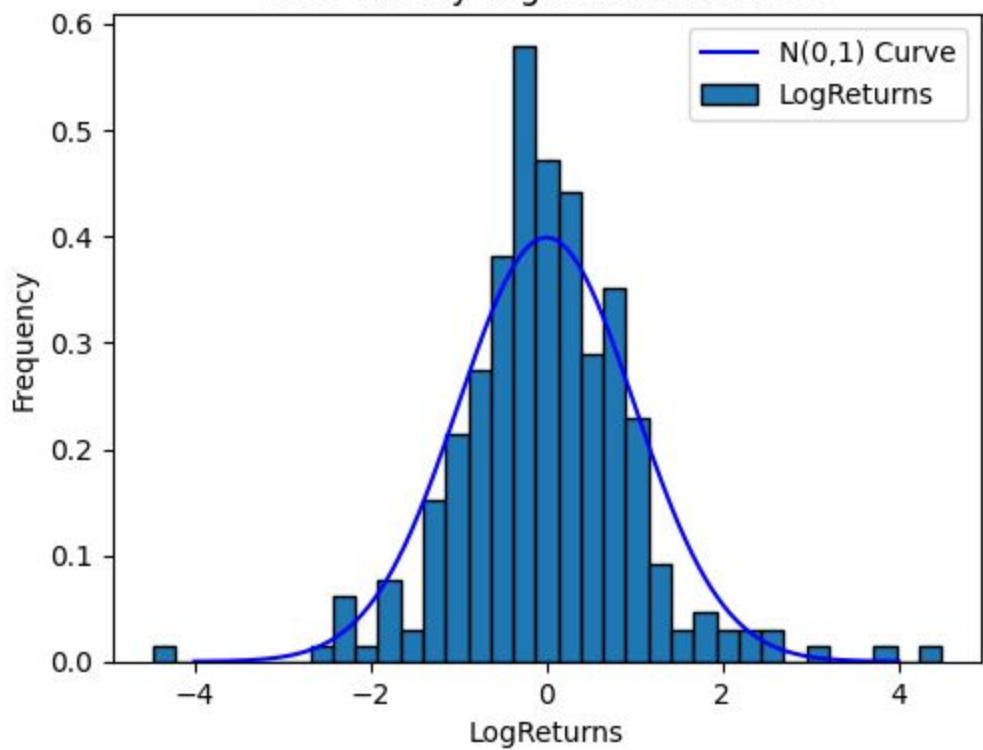
- Weekly NSE



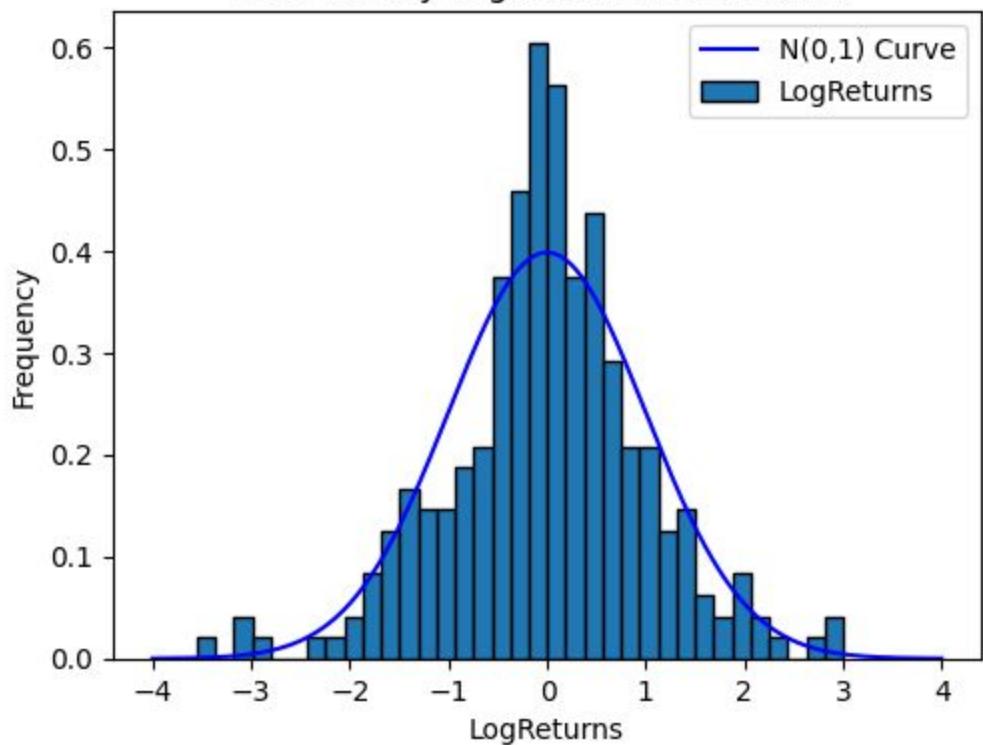
NSE Weekly LogReturns for Berger Paints



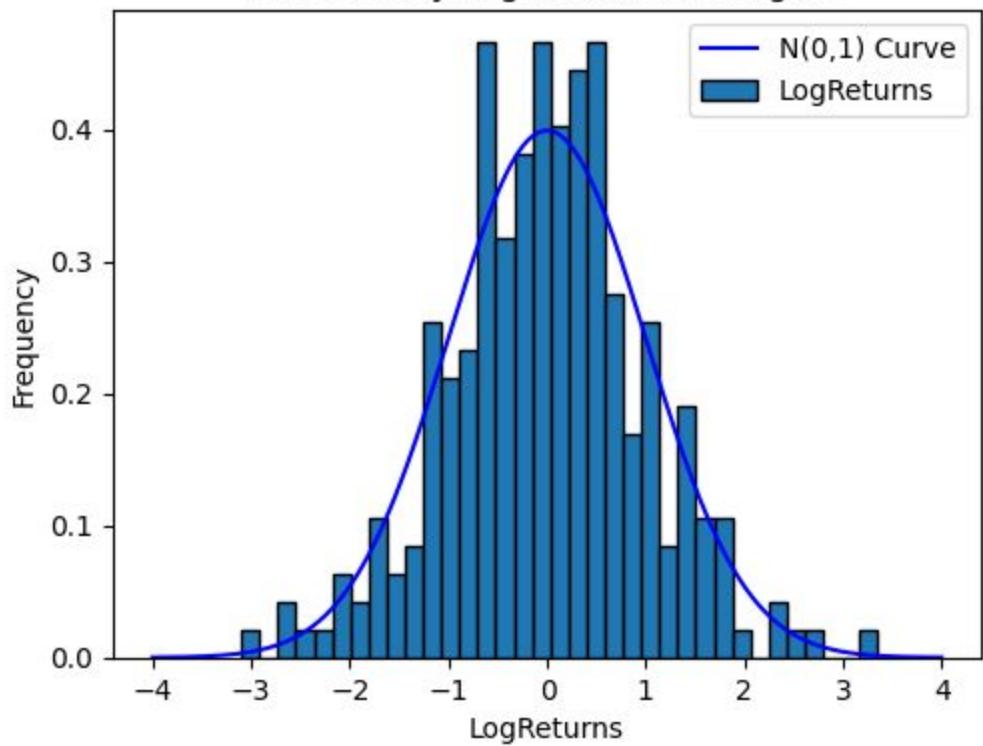
NSE Weekly LogReturns for BHEL



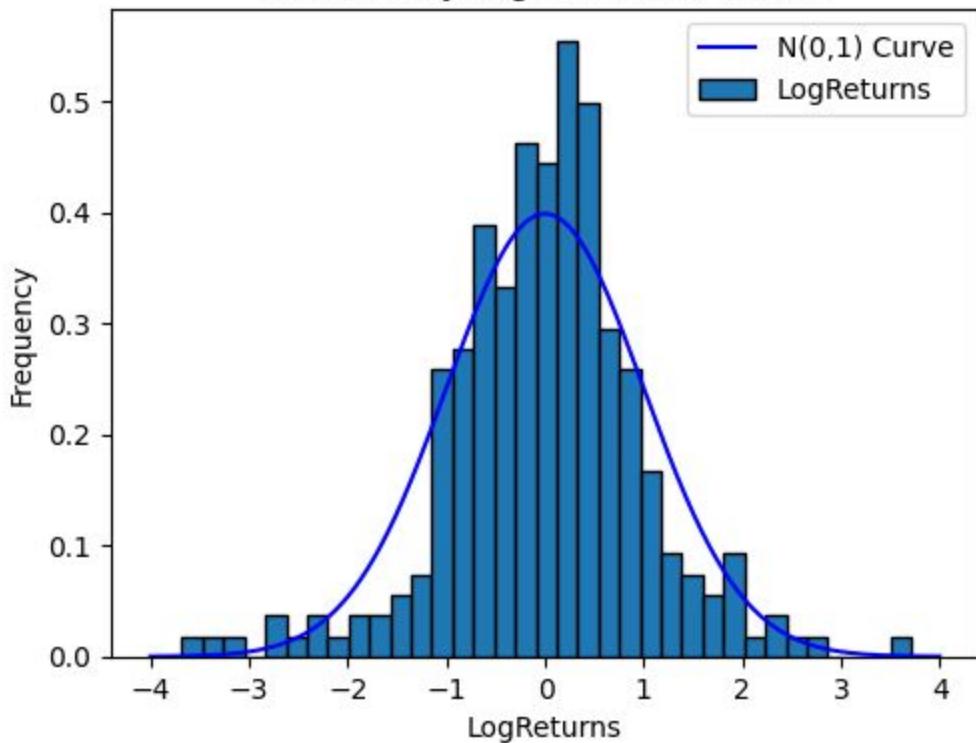
NSE Weekly LogReturns for Britannia



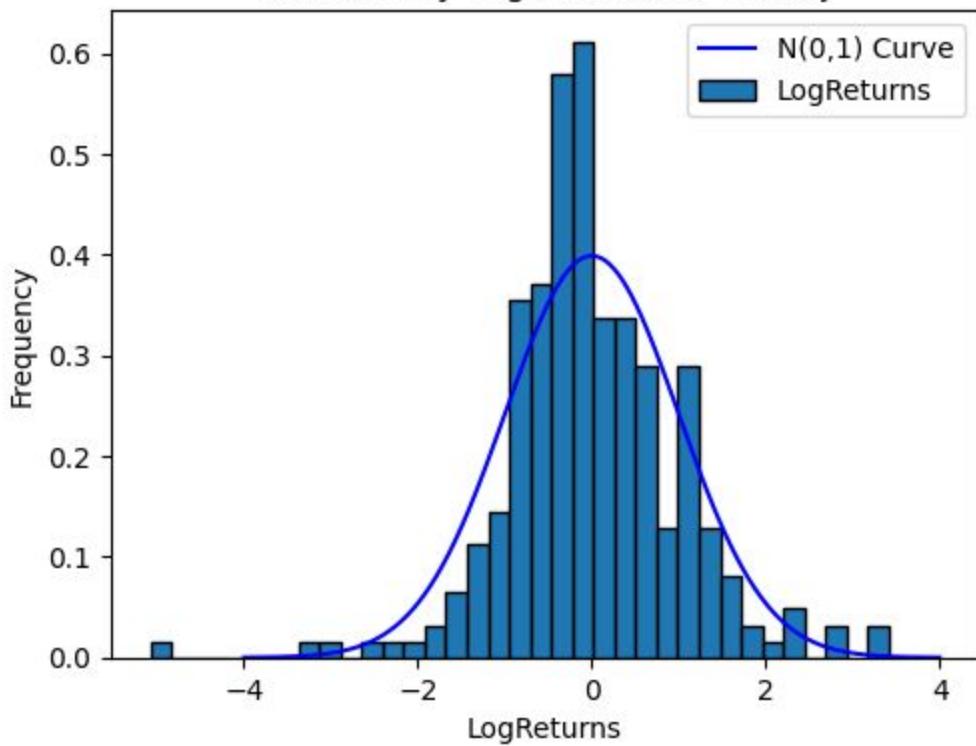
NSE Weekly LogReturns for Colgate

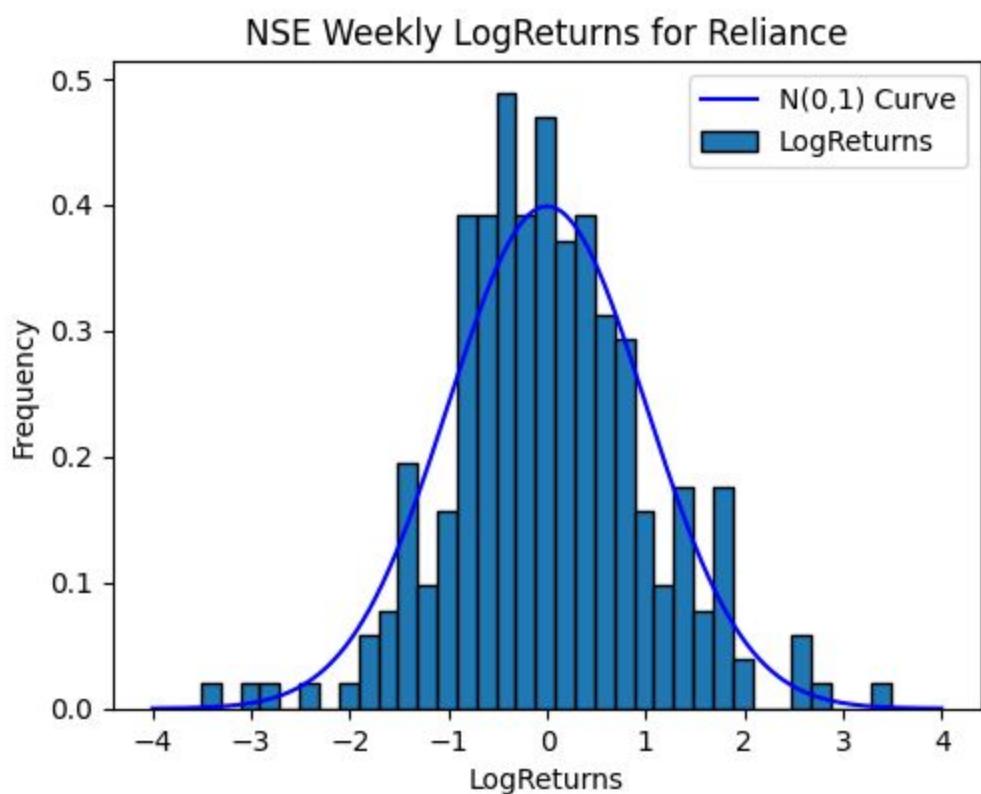
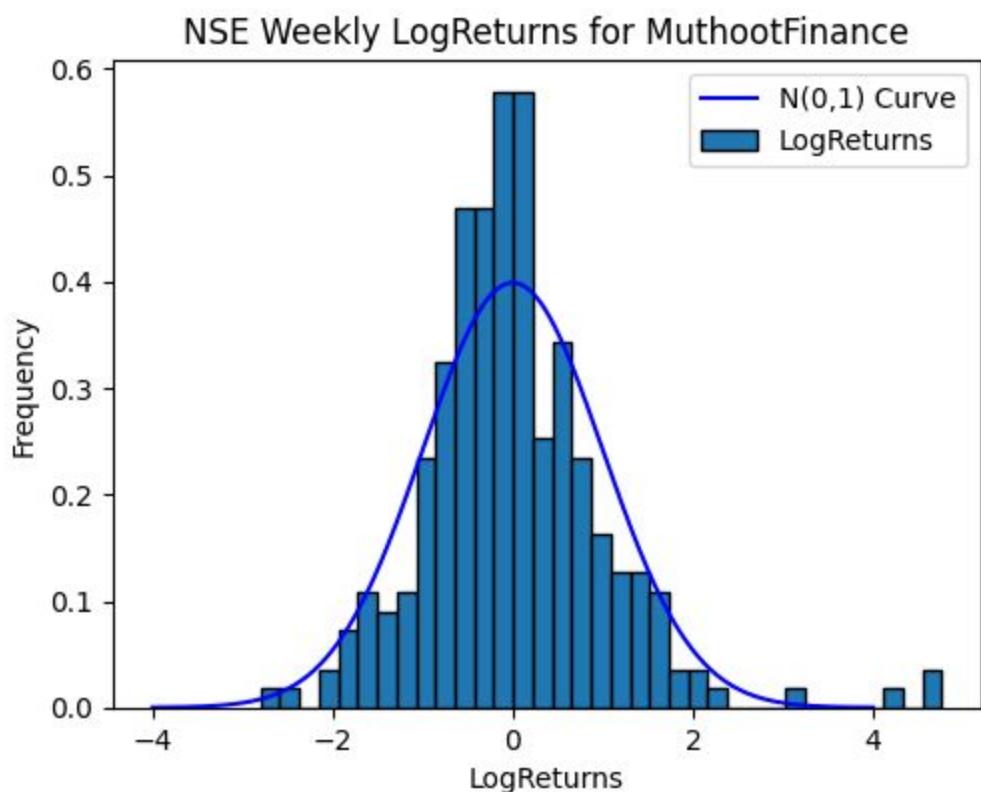


NSE Weekly LogReturns for Dabur

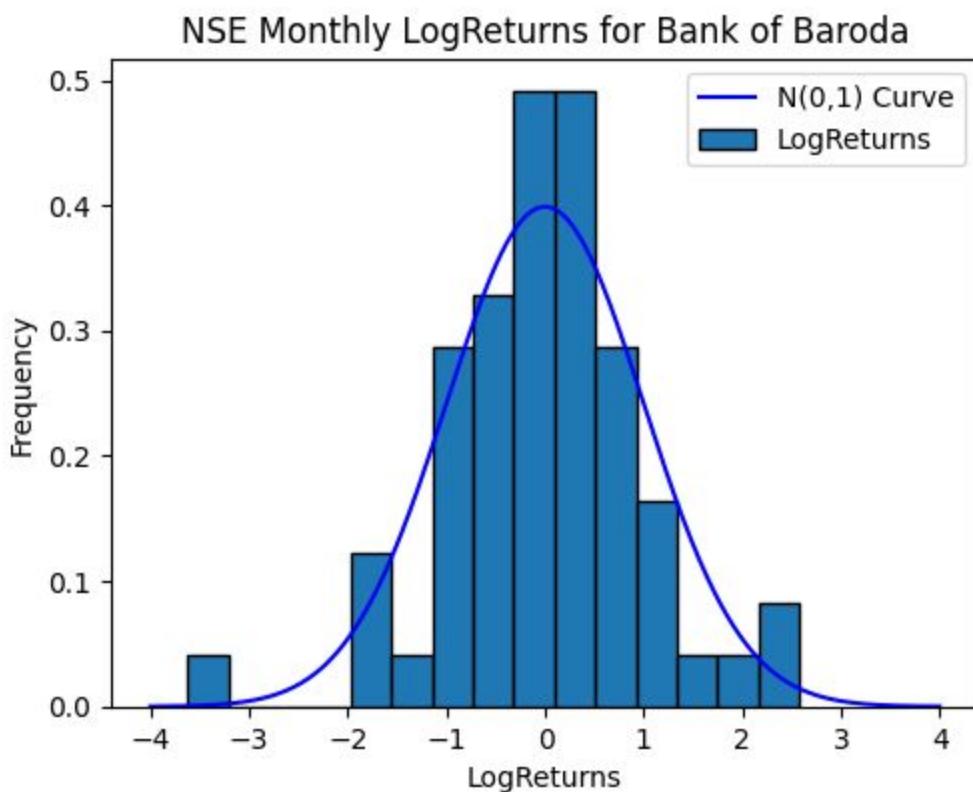
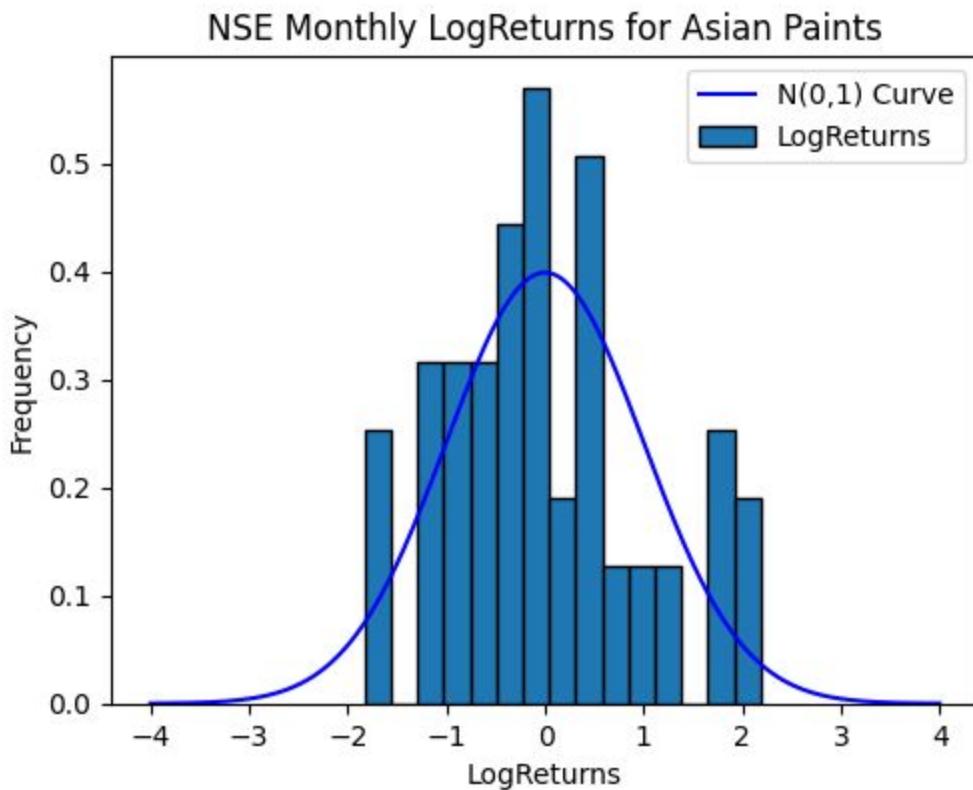


NSE Weekly LogReturns for Godrej

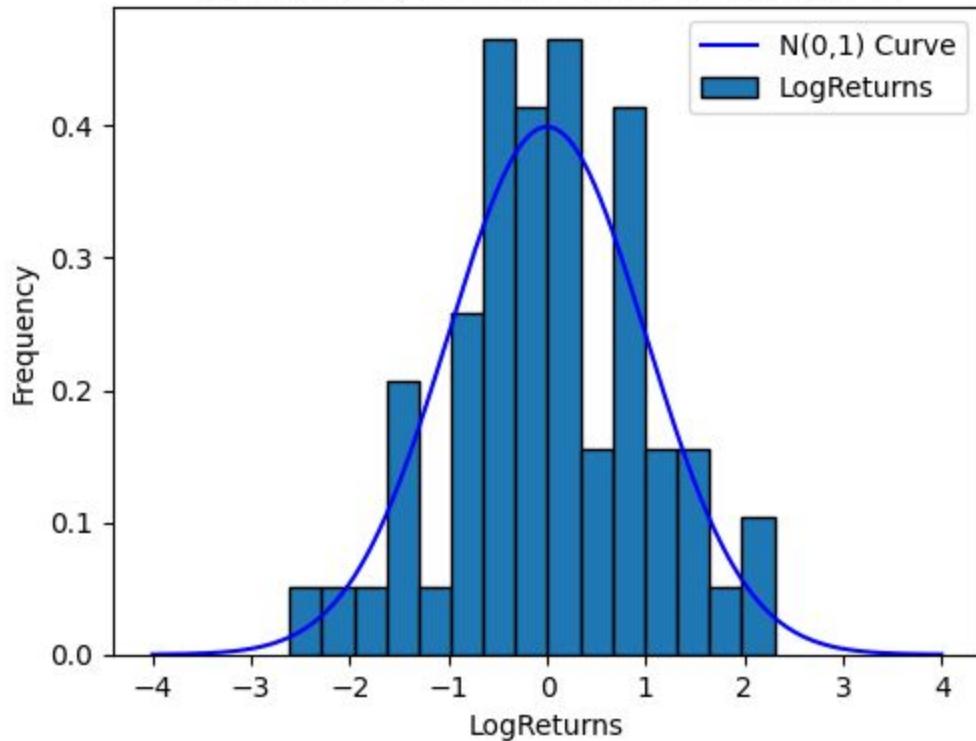




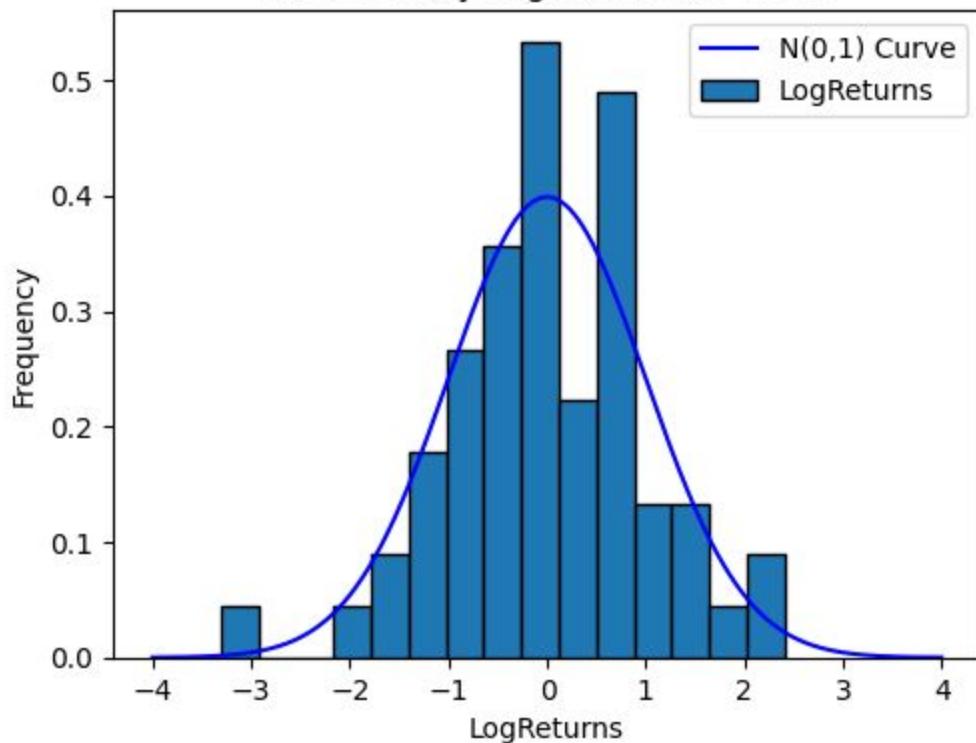
- Monthly NSE



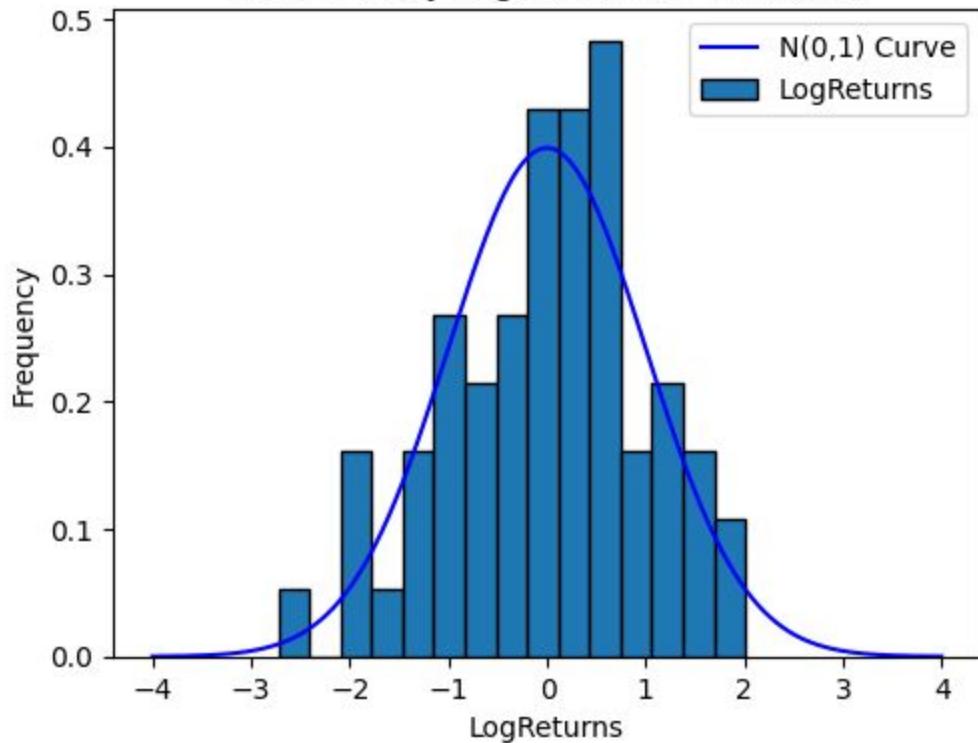
NSE Monthly LogReturns for Berger Paints



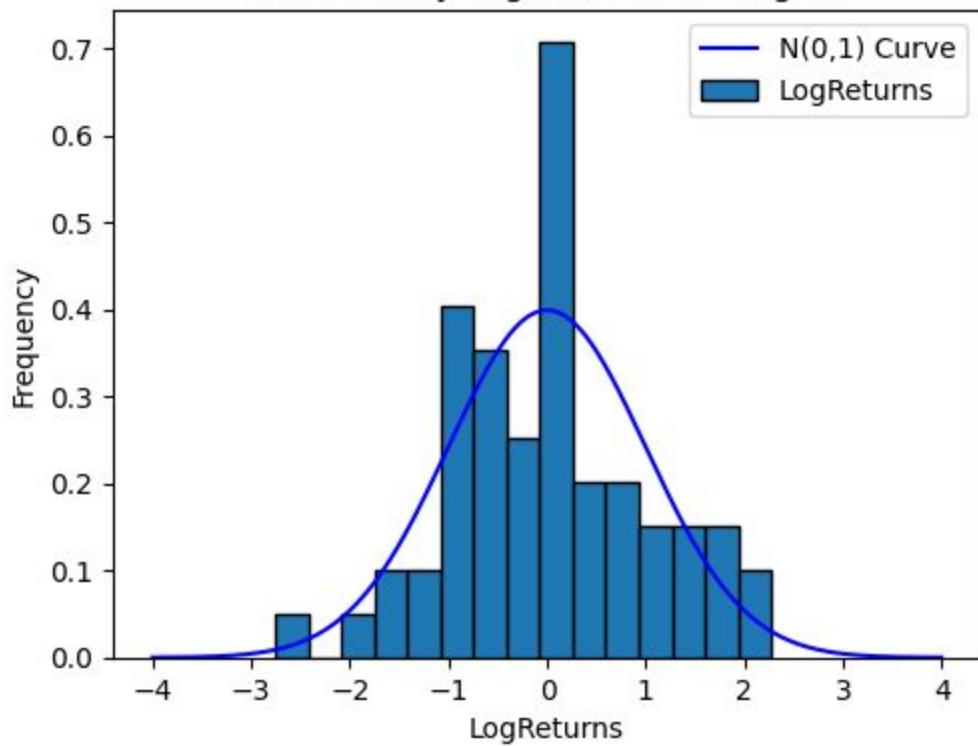
NSE Monthly LogReturns for BHEL



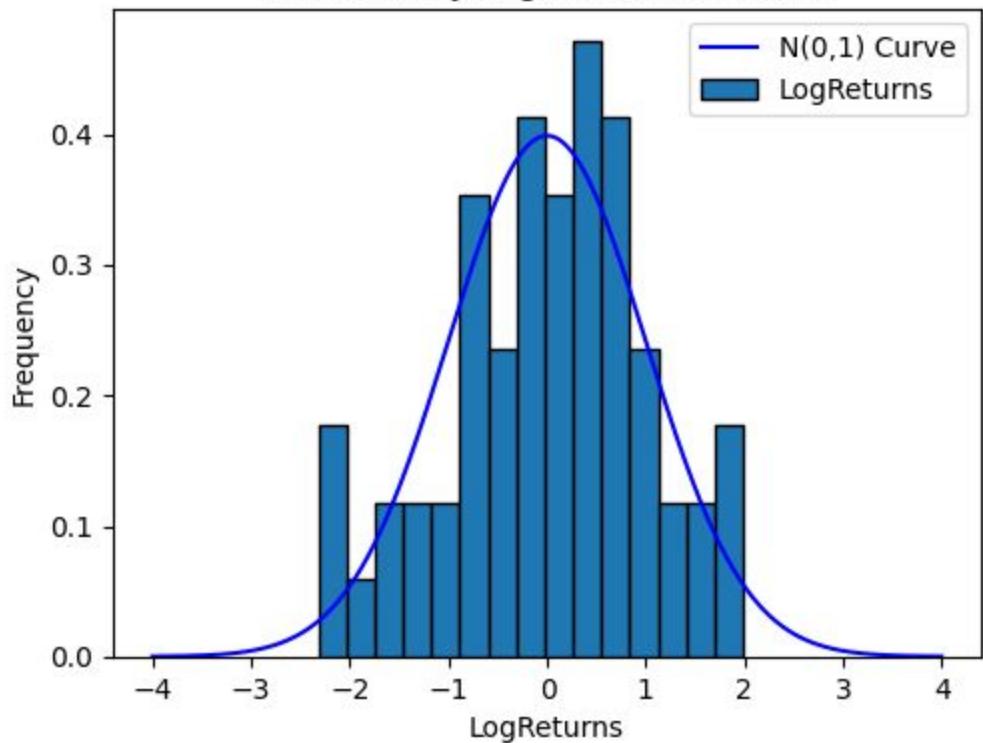
NSE Monthly LogReturns for Britannia



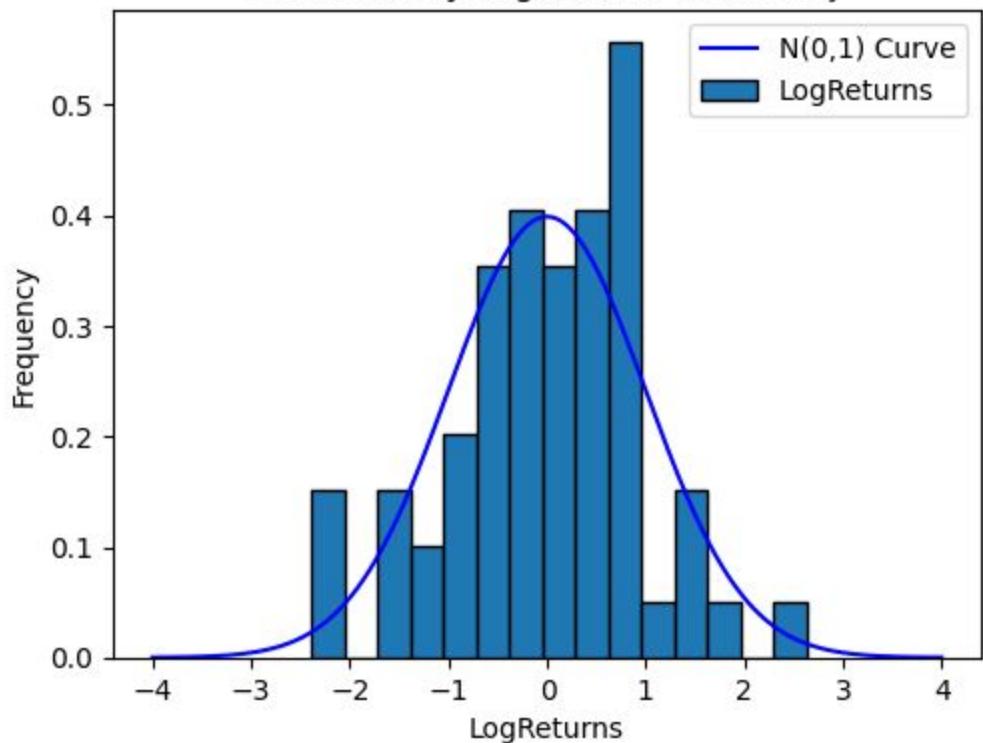
NSE Monthly LogReturns for Colgate



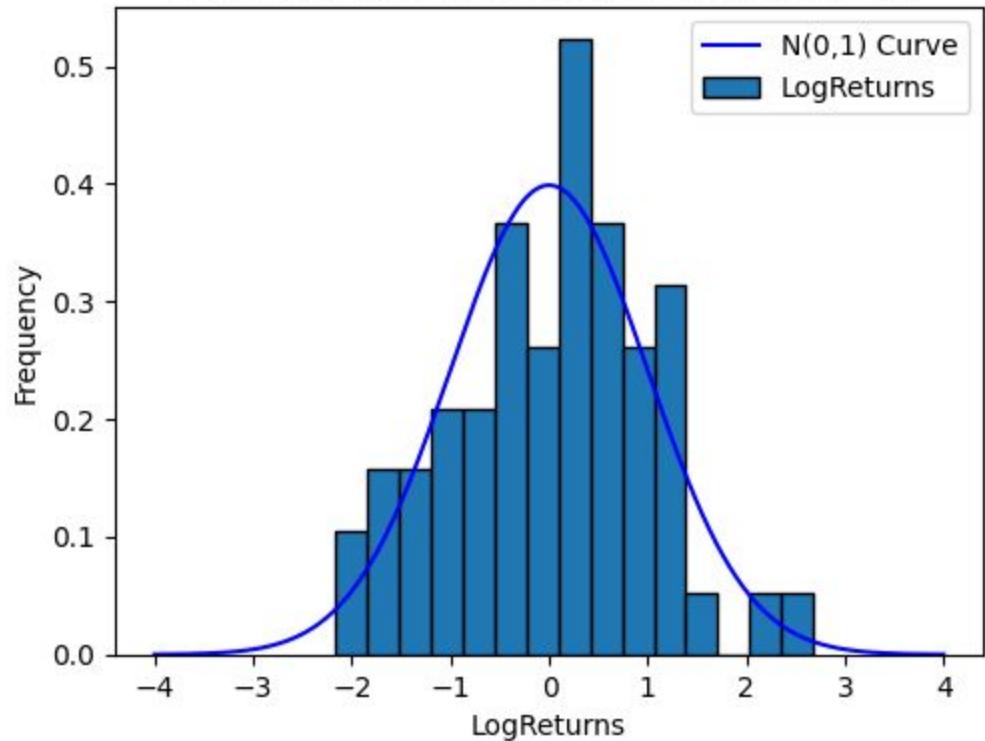
NSE Monthly LogReturns for Dabur



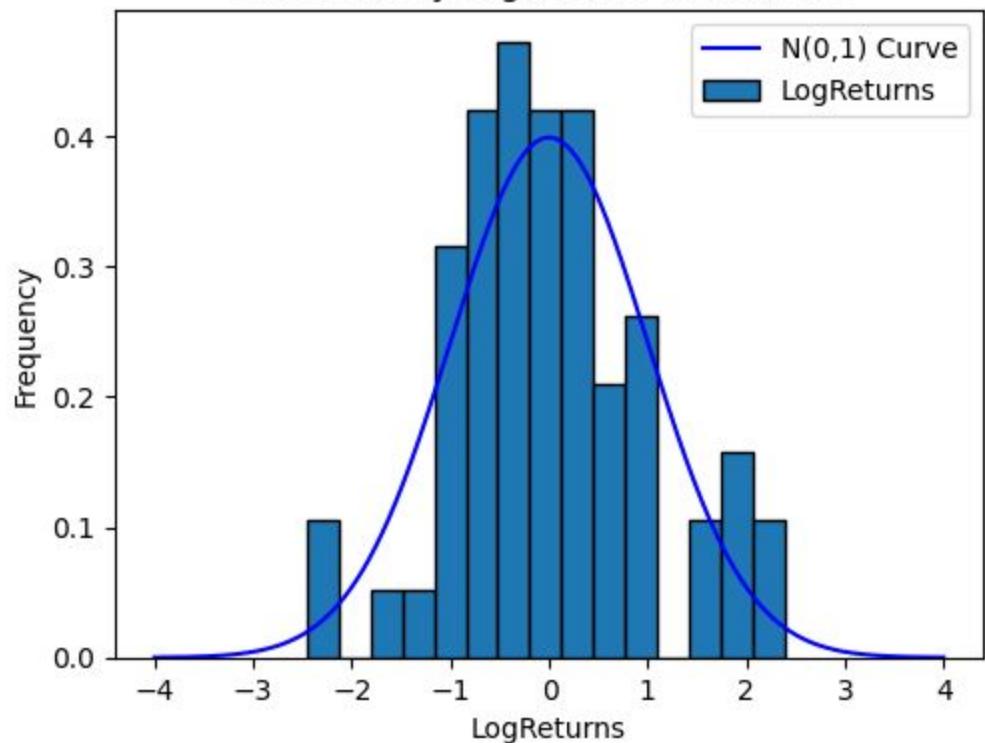
NSE Monthly LogReturns for Godrej



NSE Monthly LogReturns for MuthootFinance



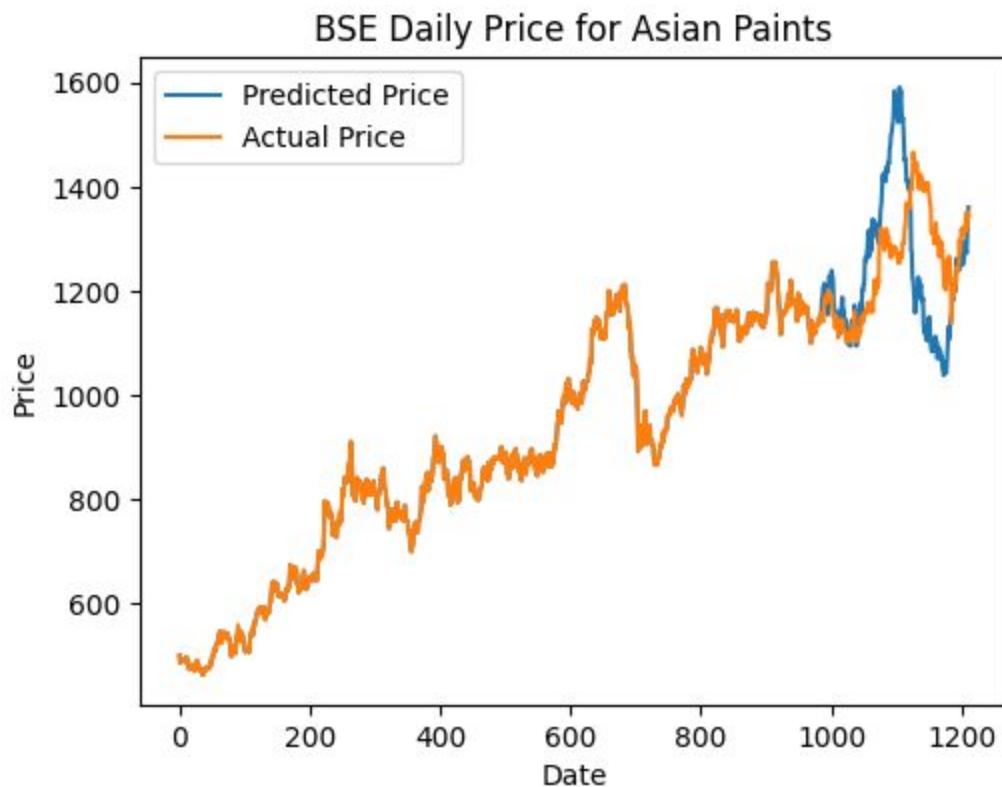
NSE Monthly LogReturns for Reliance



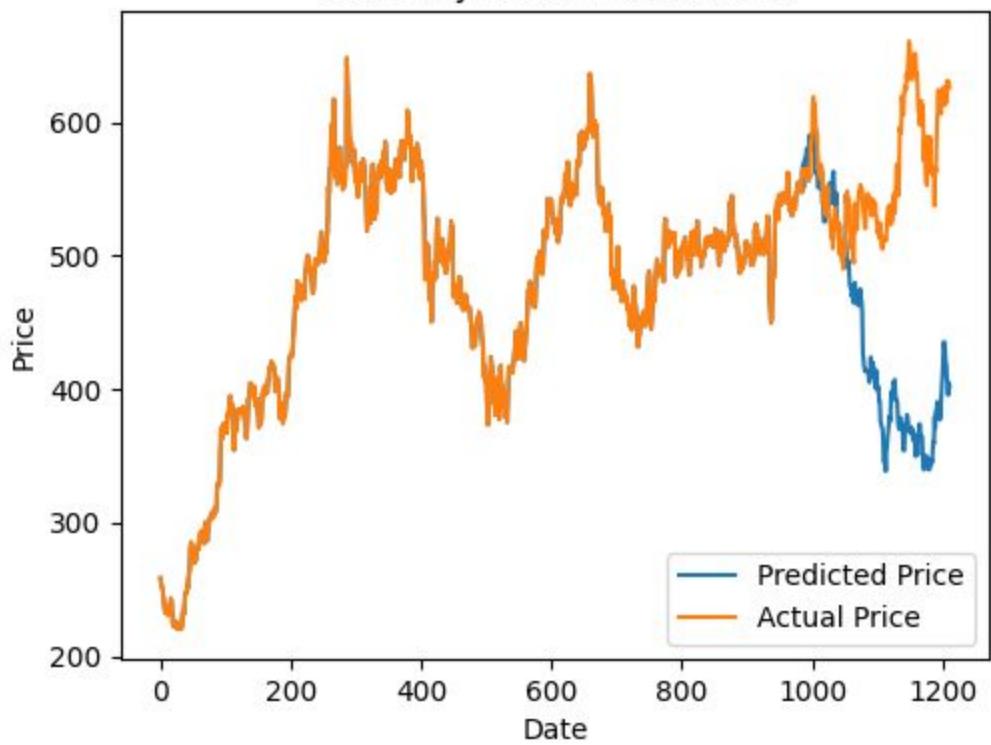
Observations: We just replaced R_i in case of Q2 with $\log(1+R_i)$. But for small R_i $\log(1+R_i)$ will be approximately R_i with a slight variation and we can see from the graphs above, they are very much similar.

Ques.4 & Ques.5

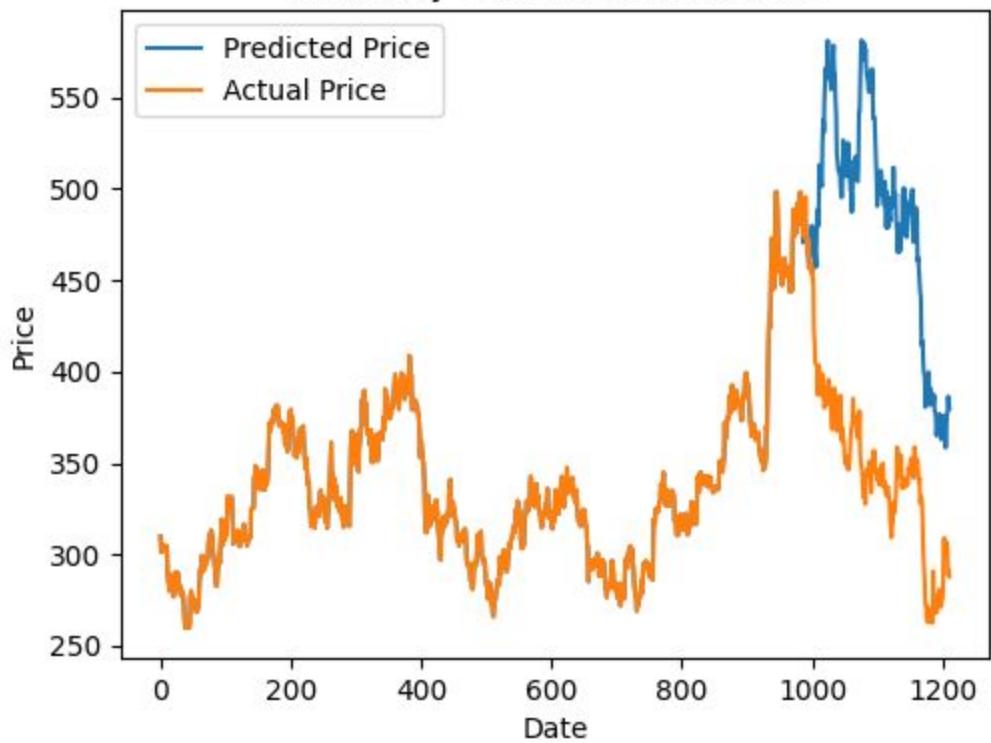
- The values of **mean and sigma** are calculated, using the **log return's** value. The values of **Stock Prices $S(t)$** can be calculated using the **jump-diffusion model** process assuming the **fixed dates** method.
- Predicting Plots for the stock prices from 1 Jan, 2018 to 31 Dec, 2018 are shown using daily, weekly and monthly:
 - **Daily BSE**
 - The **blue line shows my predictions** for the period from Jan 1, 2018 to Dec 31, 2018 and the **golden line shows the exact Stock Price** at the time.

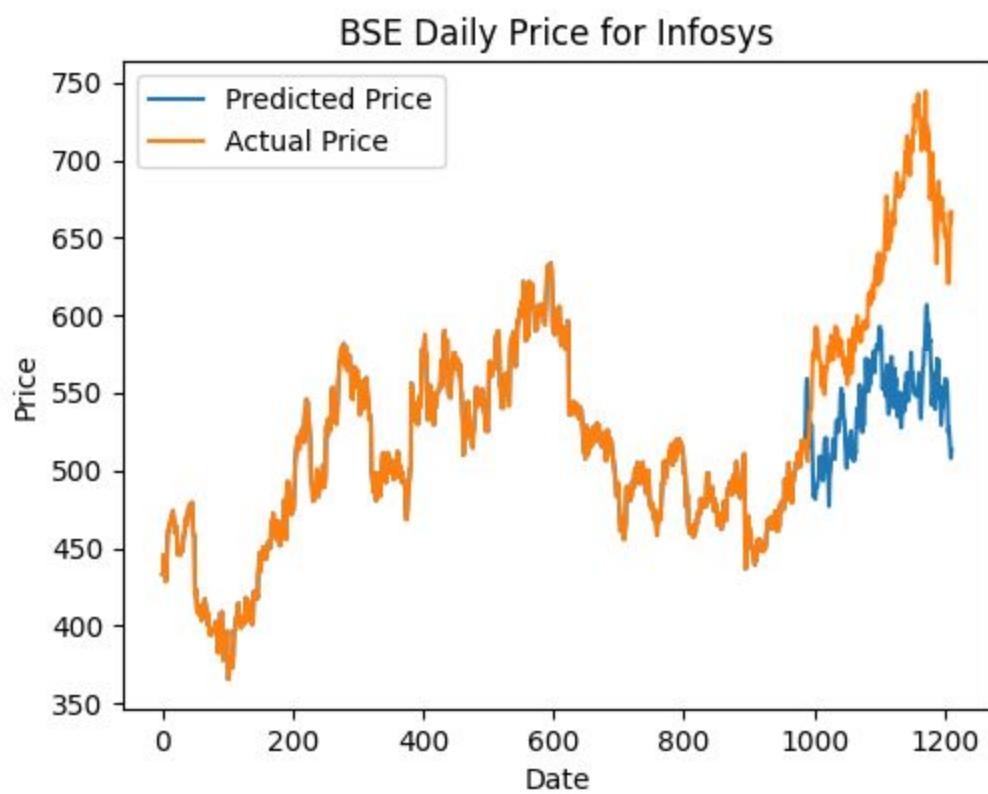
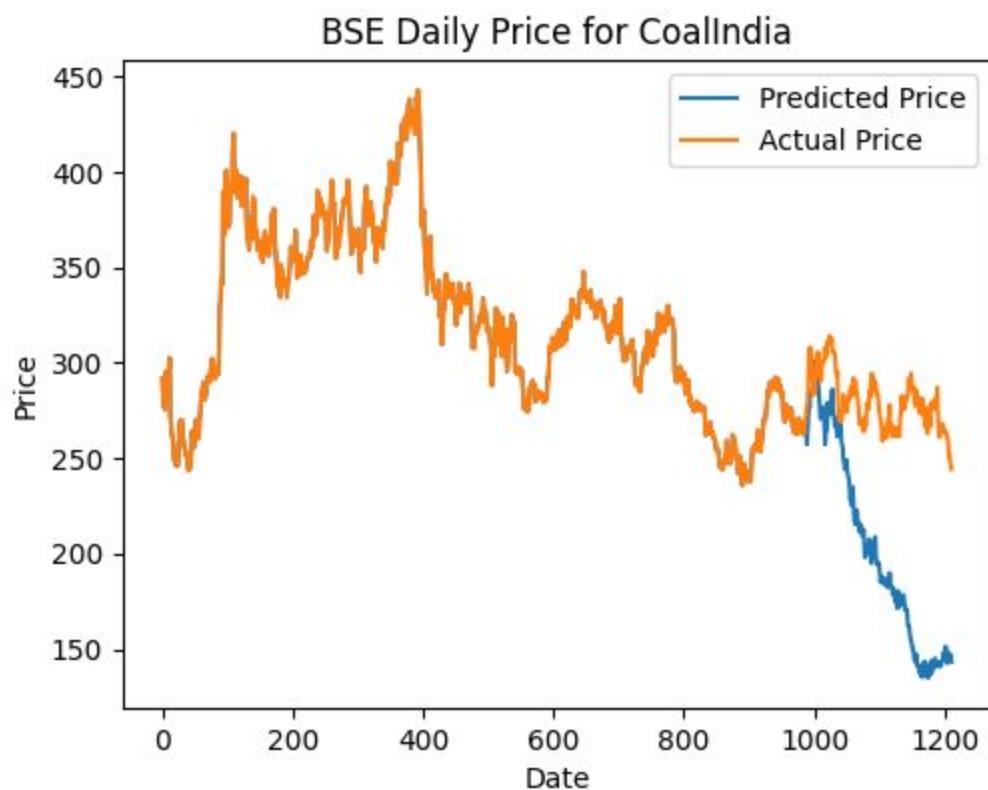


BSE Daily Price for Axis Bank

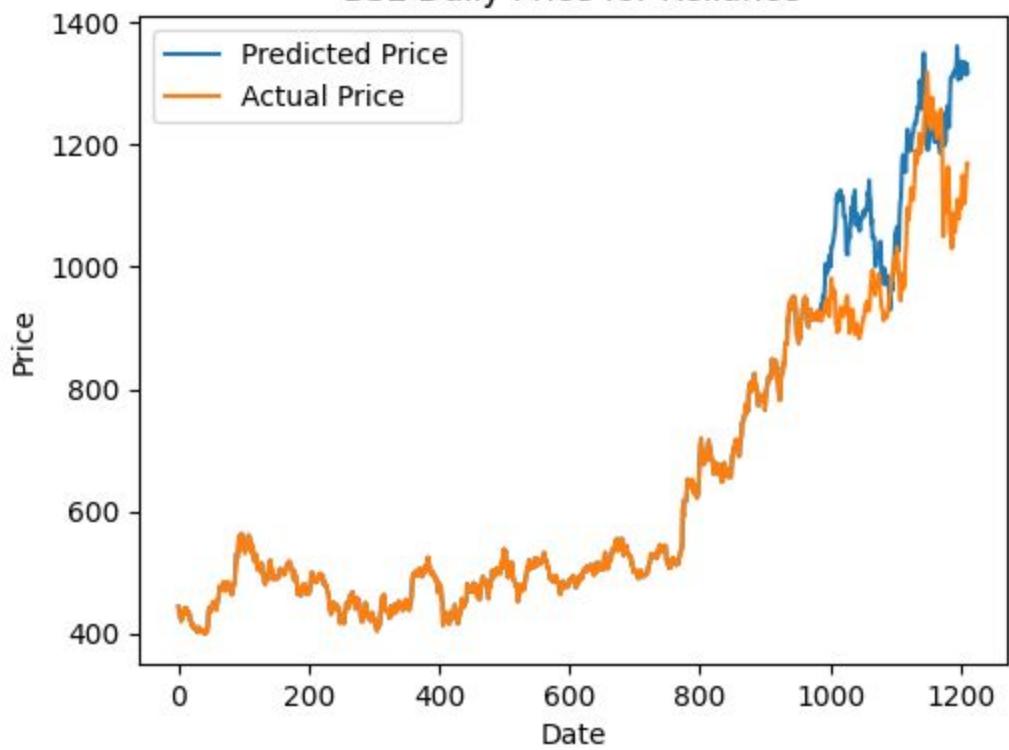


BSE Daily Price for Bharat-Airtel

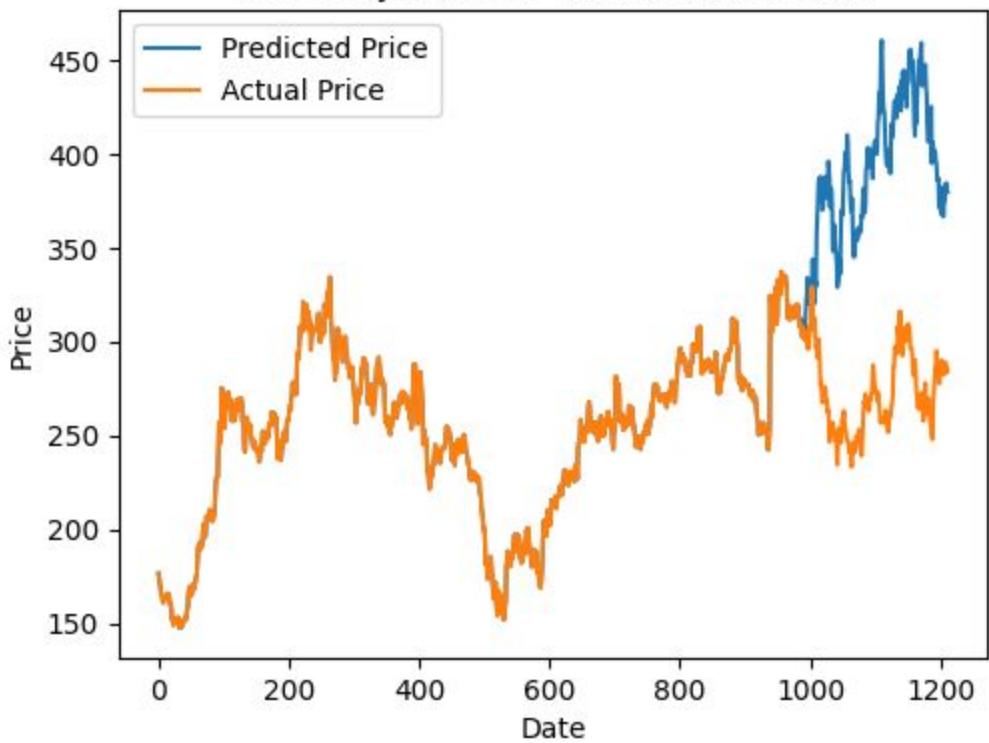


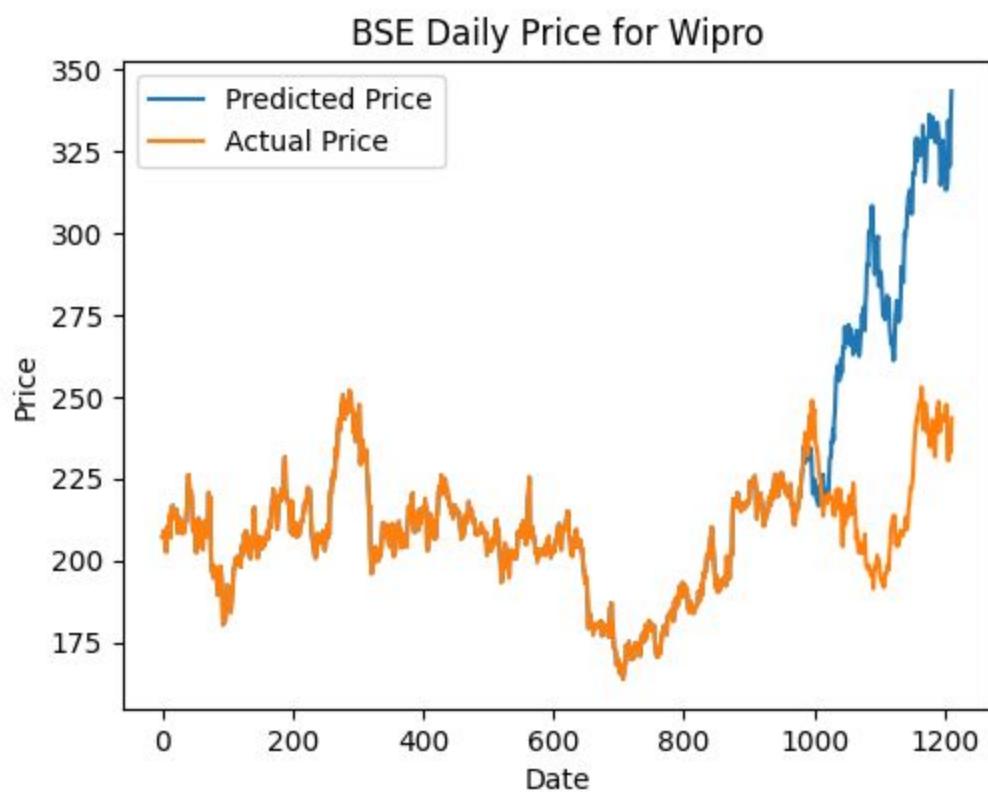
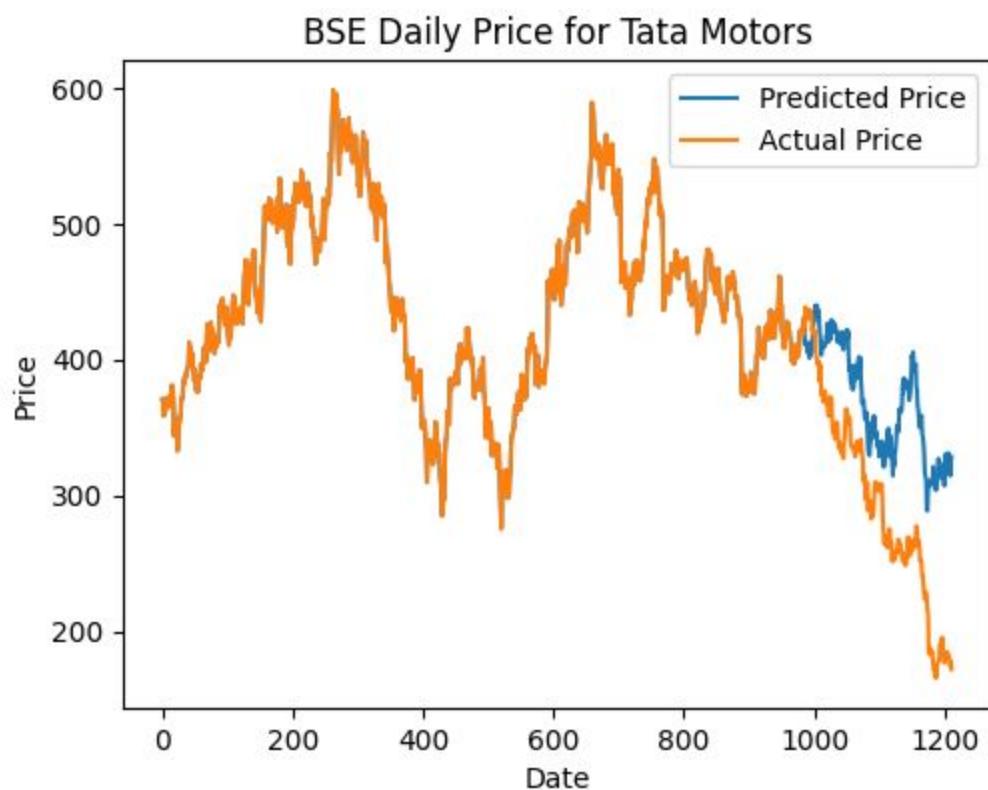


BSE Daily Price for Reliance

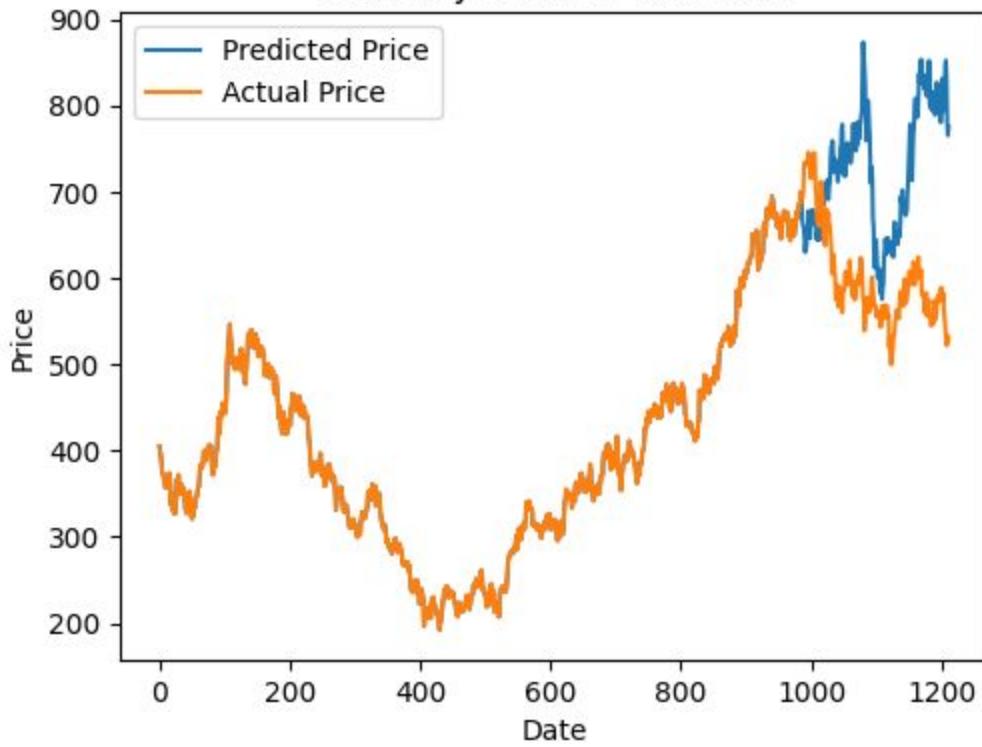


BSE Daily Price for State Bank of India



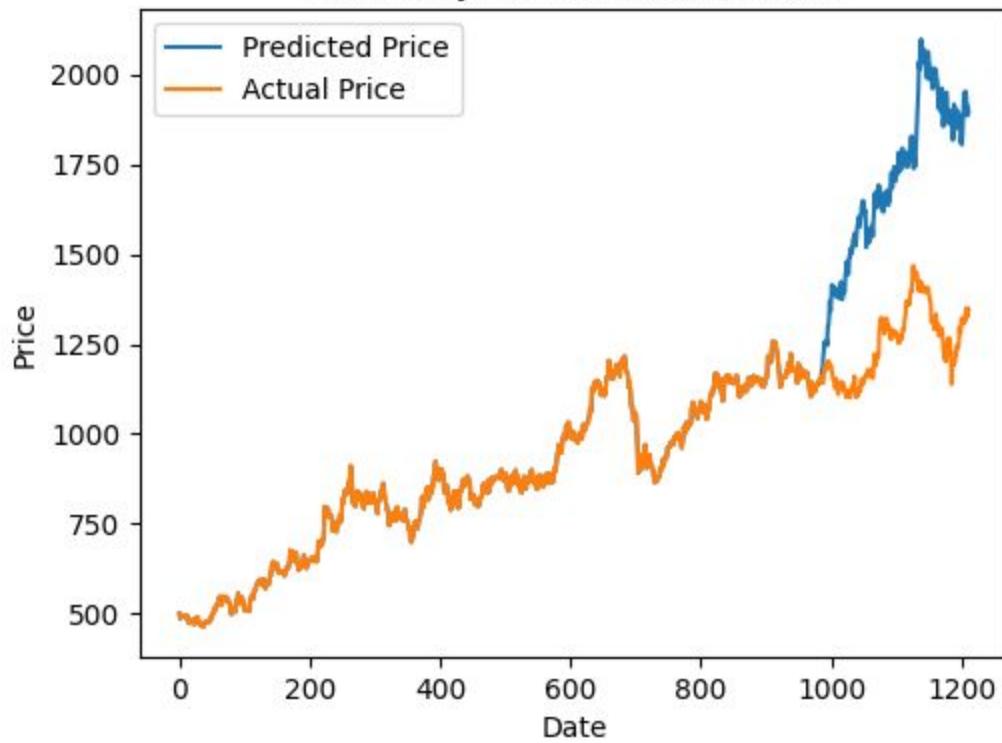


BSE Daily Price for Tata Steel

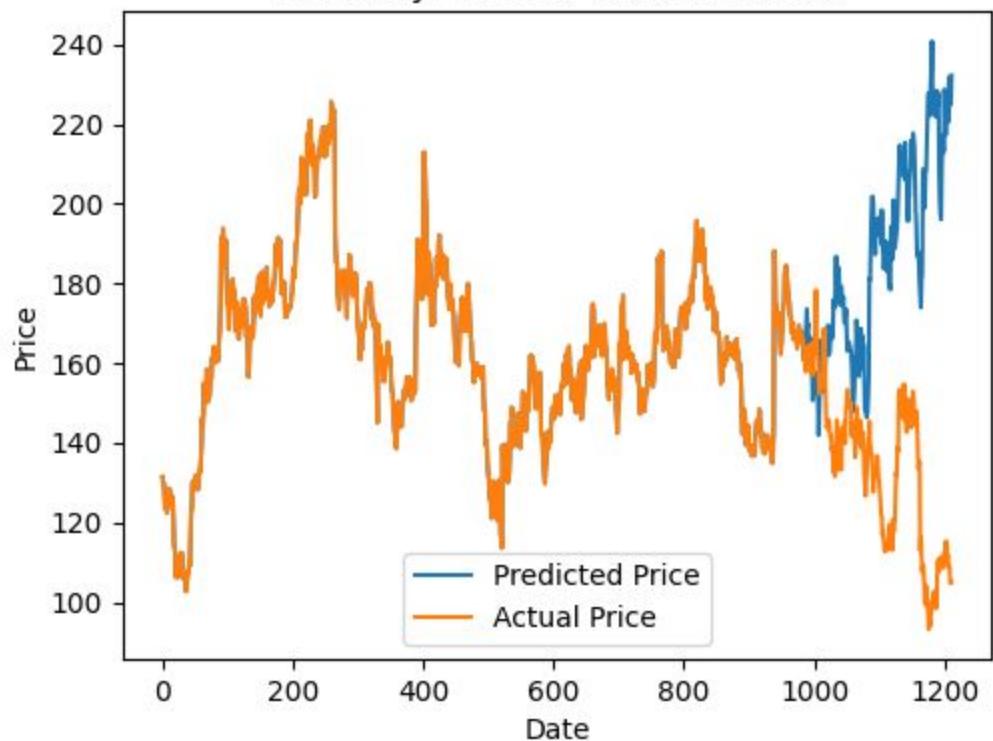


- **Daily NSE**

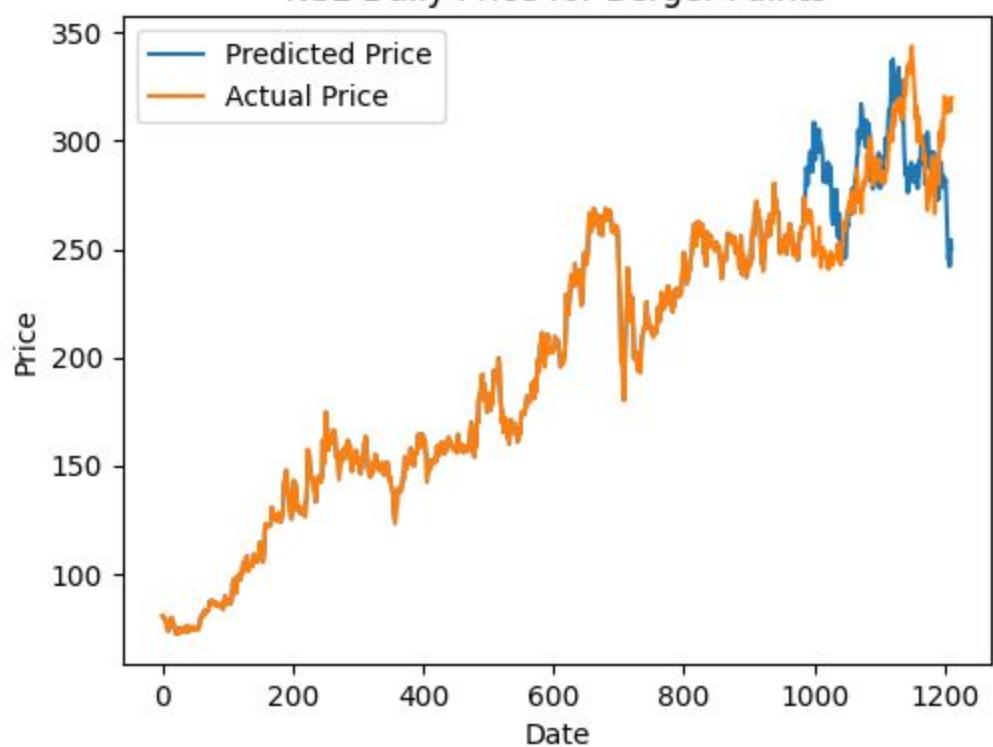
NSE Daily Price for Asian Paints



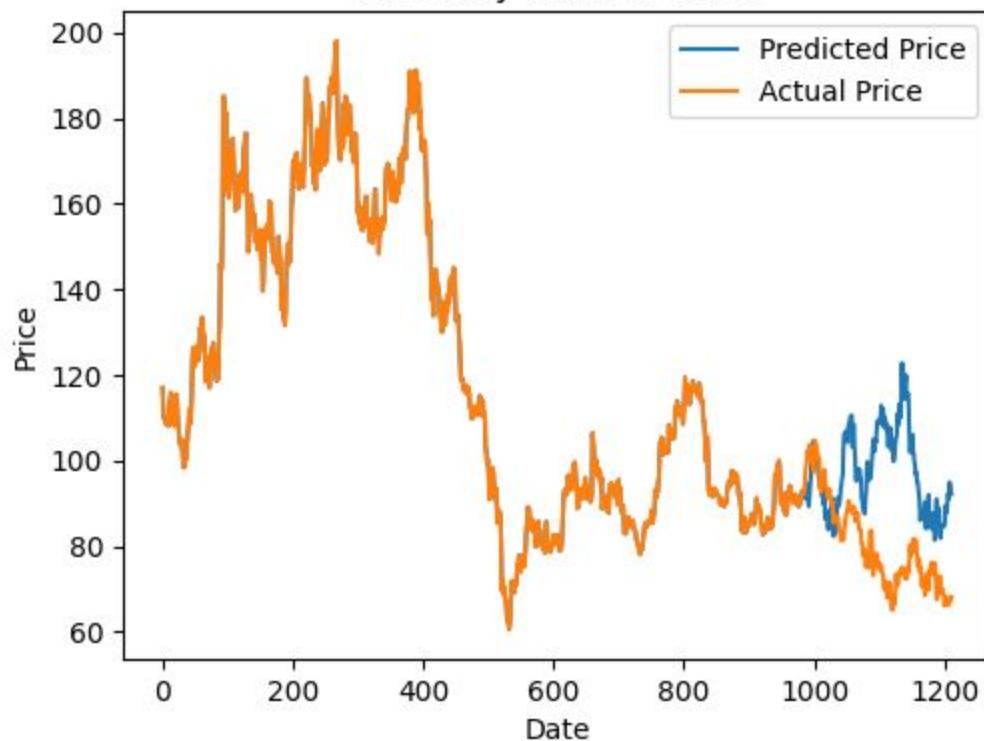
NSE Daily Price for Bank of Baroda



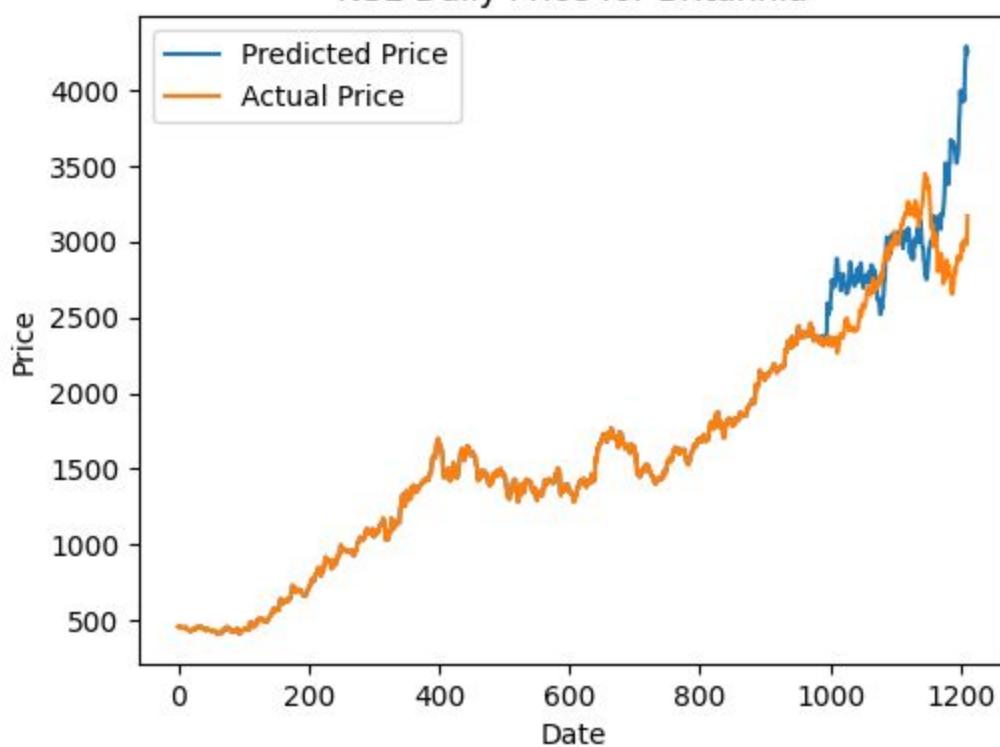
NSE Daily Price for Berger Paints



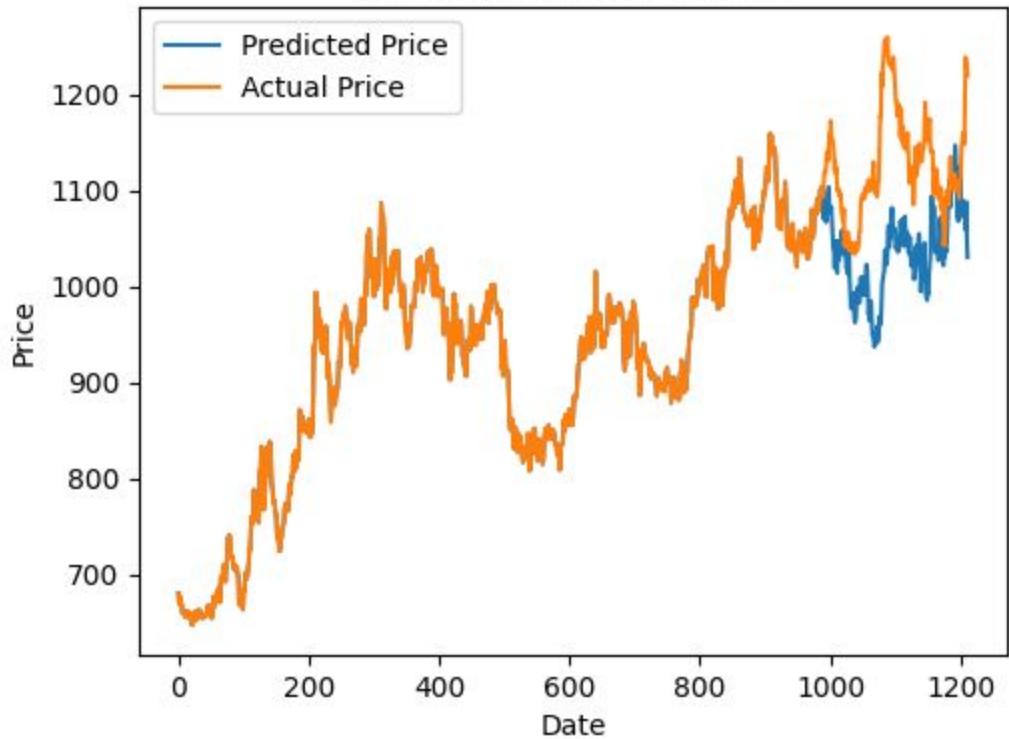
NSE Daily Price for BHEL



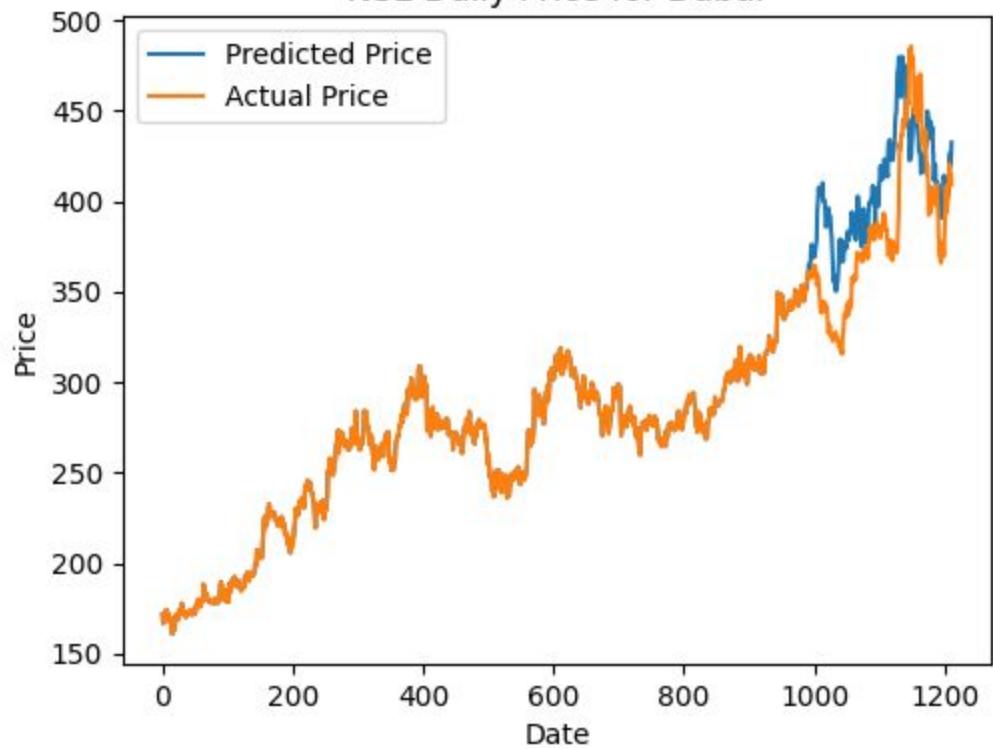
NSE Daily Price for Britannia



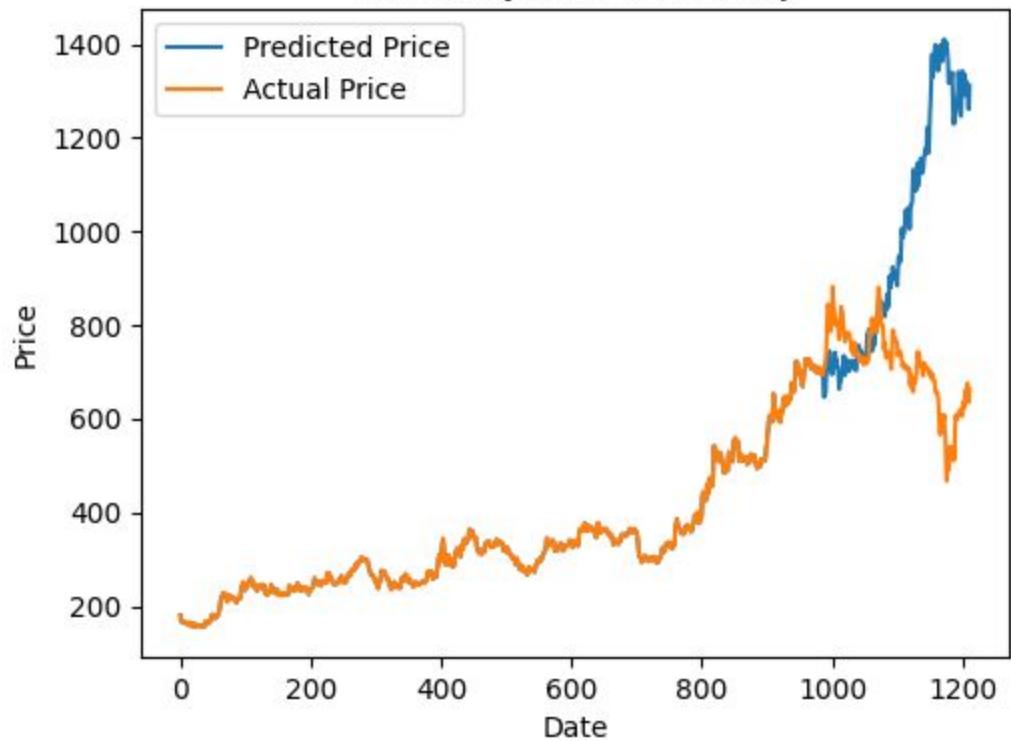
NSE Daily Price for Colgate



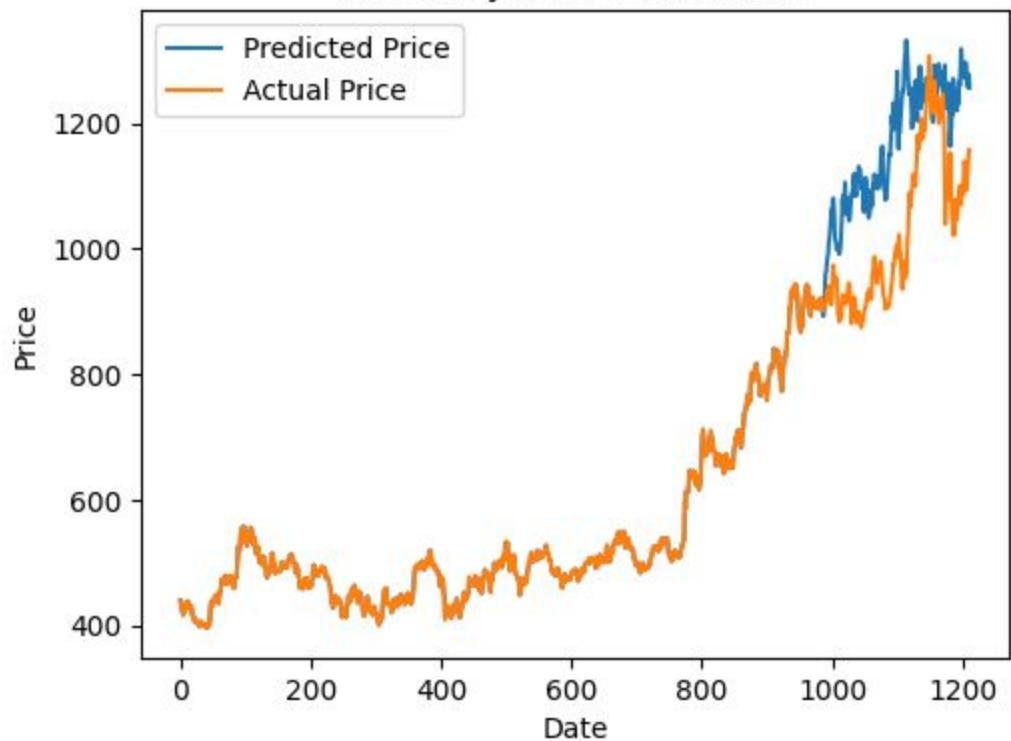
NSE Daily Price for Dabur



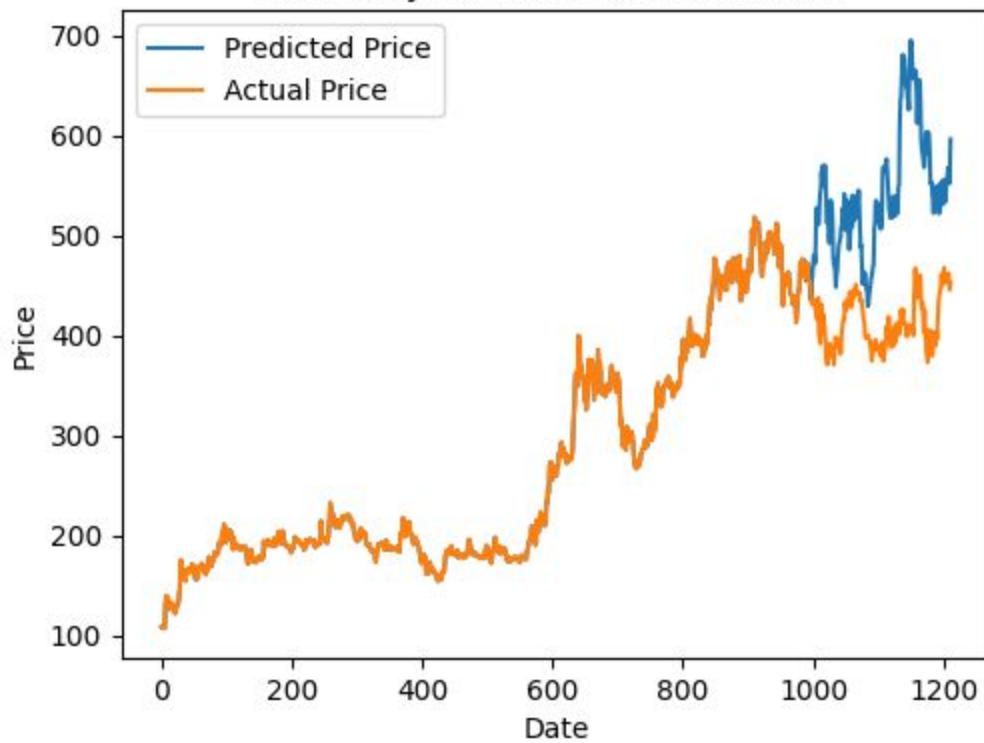
NSE Daily Price for Godrej



NSE Daily Price for Reliance

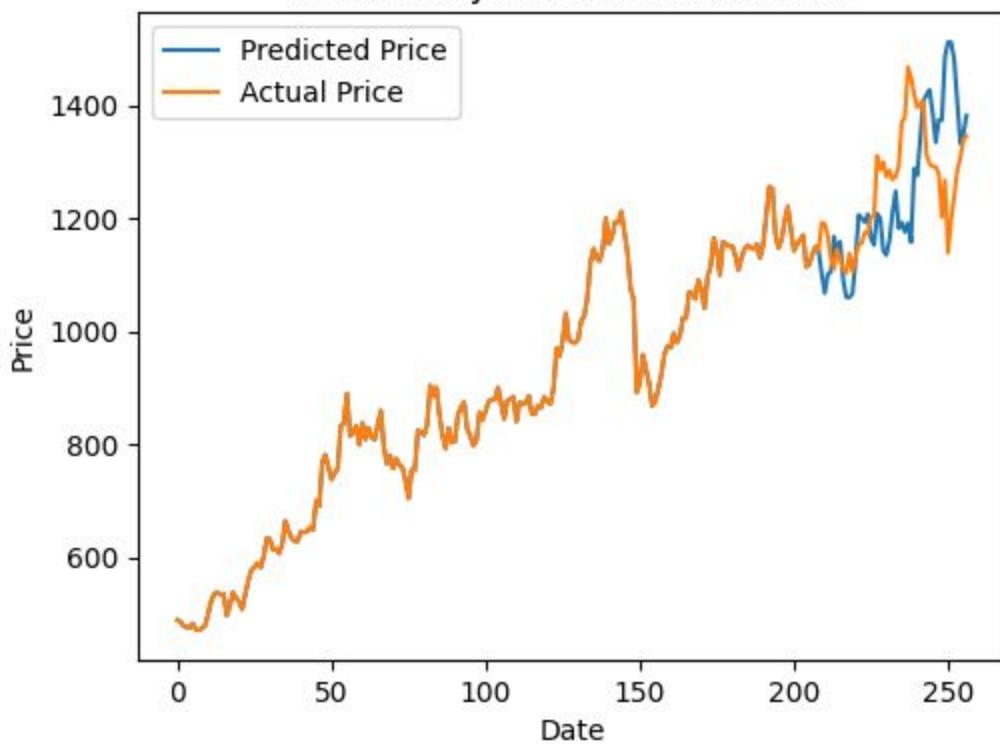


NSE Daily Price for MuthootFinance

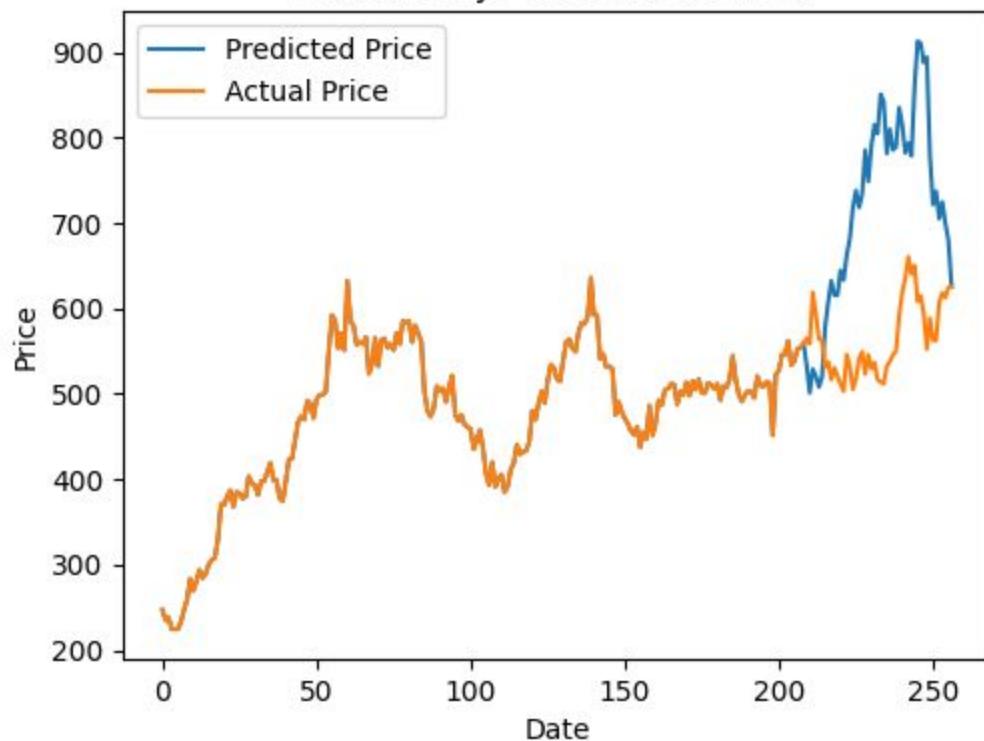


- **Weekly BSE**

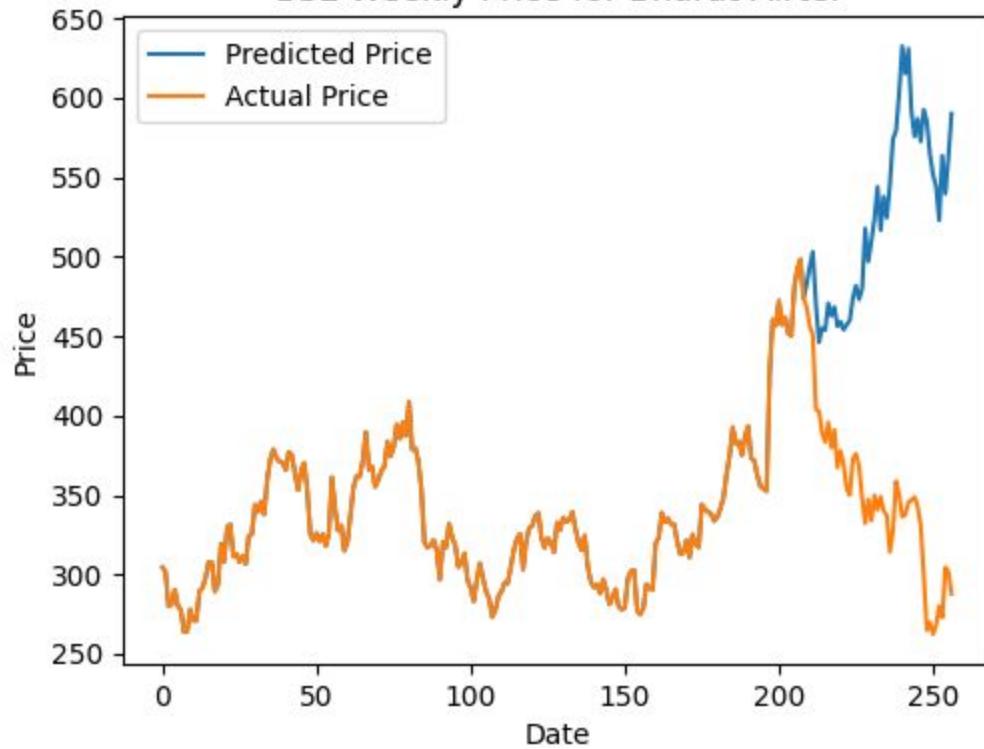
BSE Weekly Price for Asian Paints

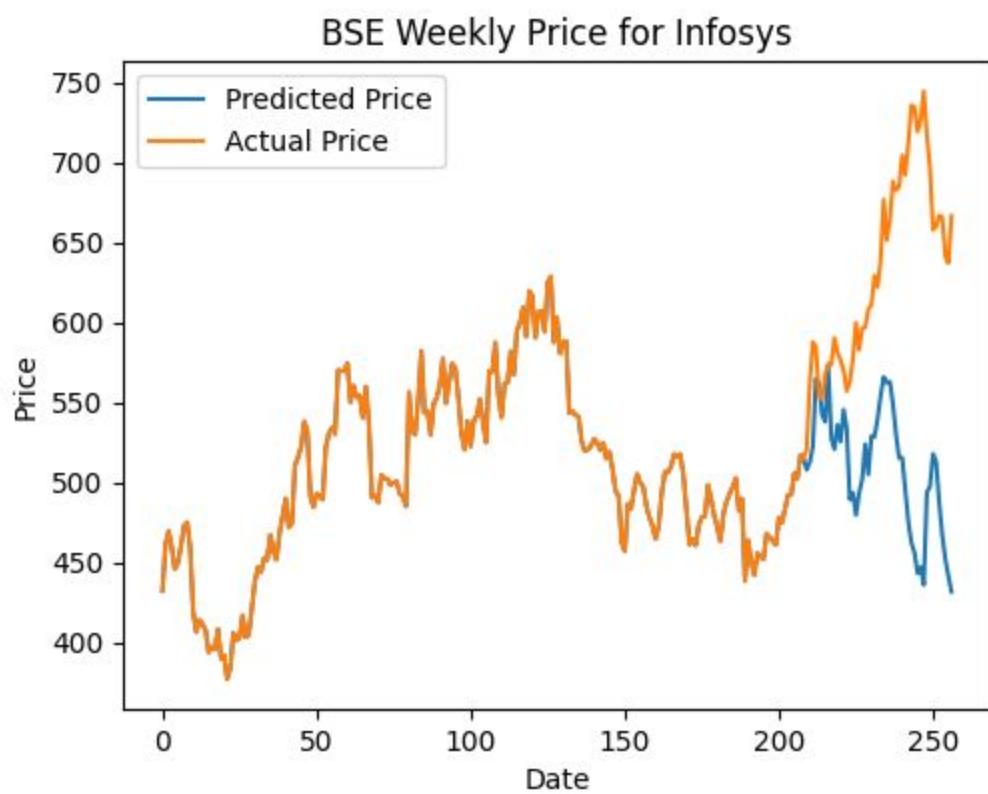
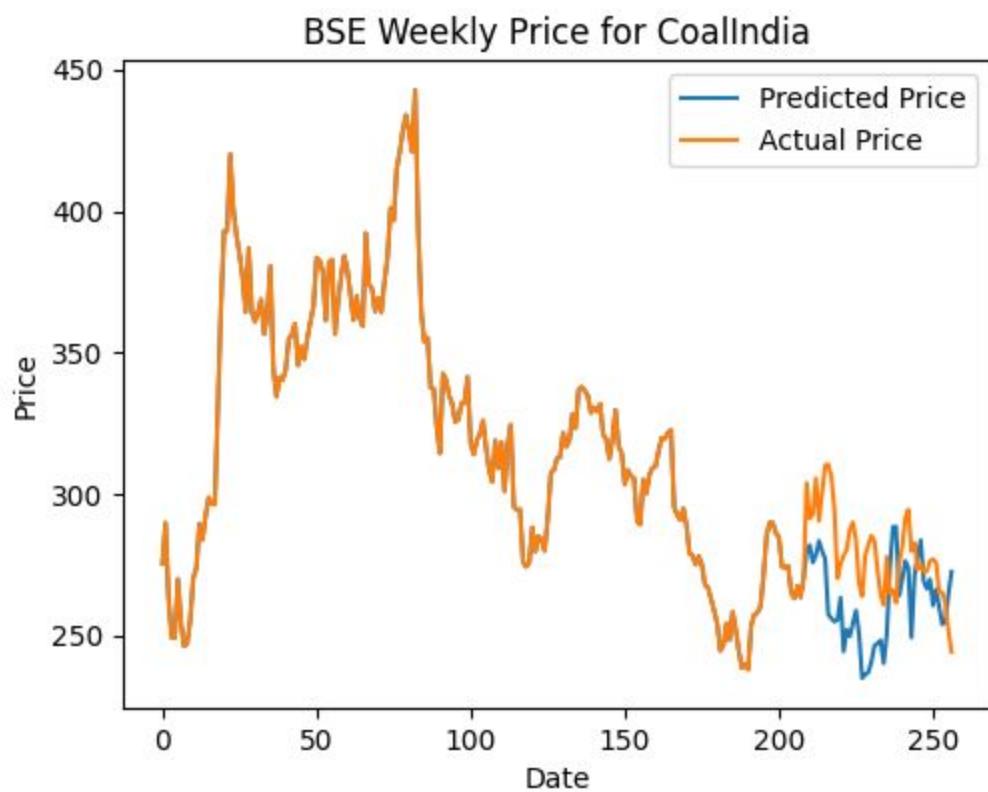


BSE Weekly Price for Axis Bank

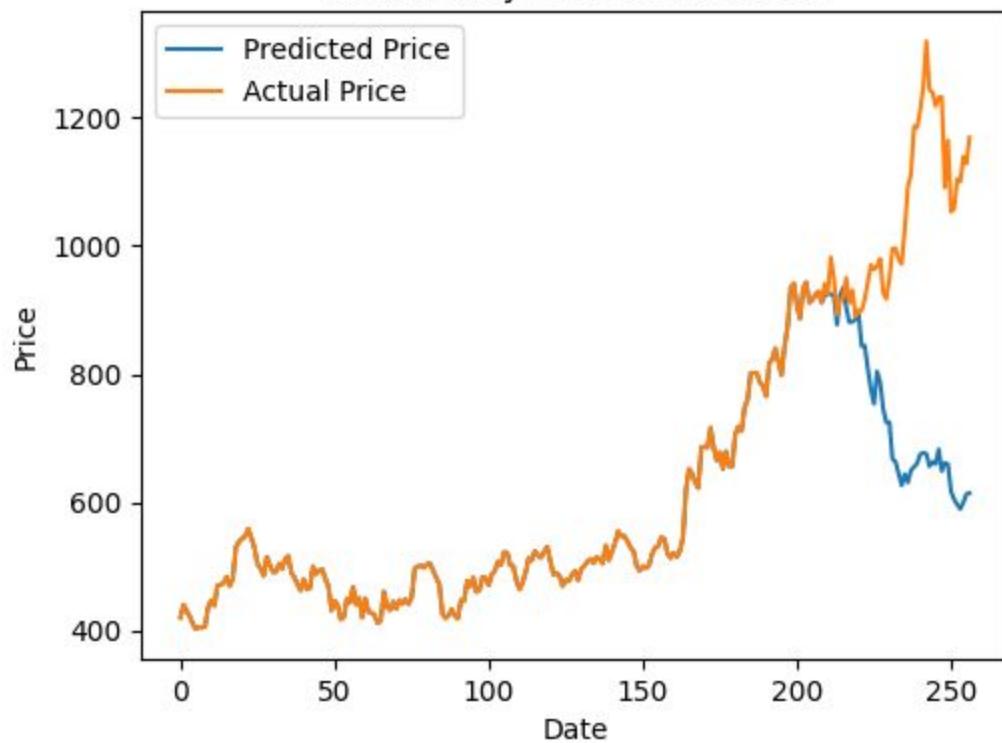


BSE Weekly Price for Bharat-Airtel

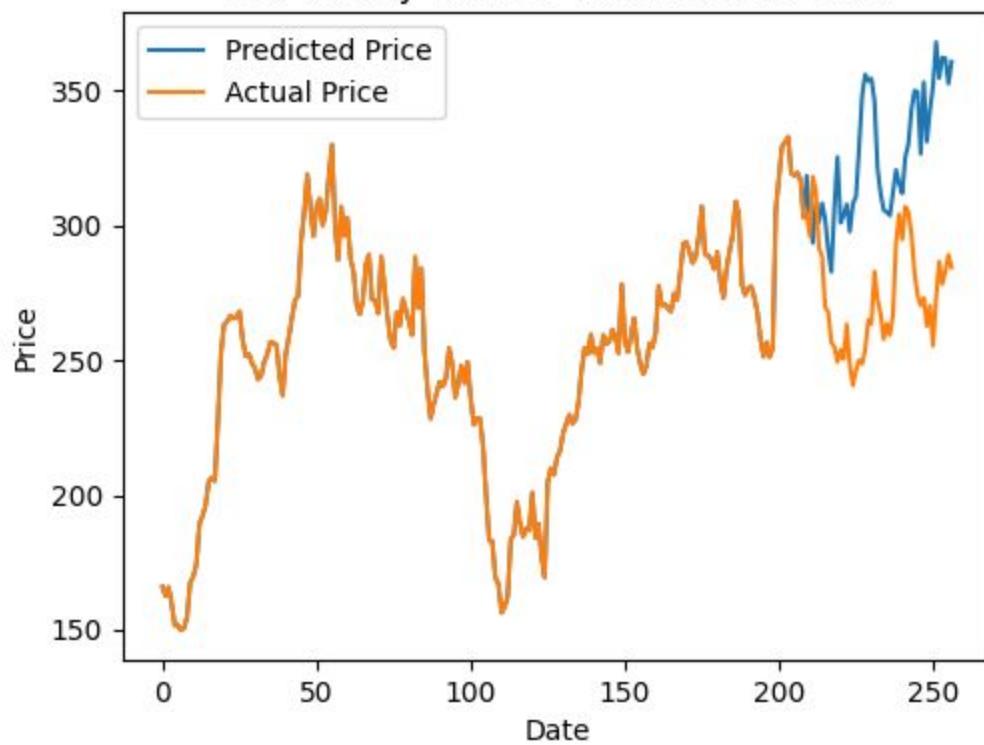


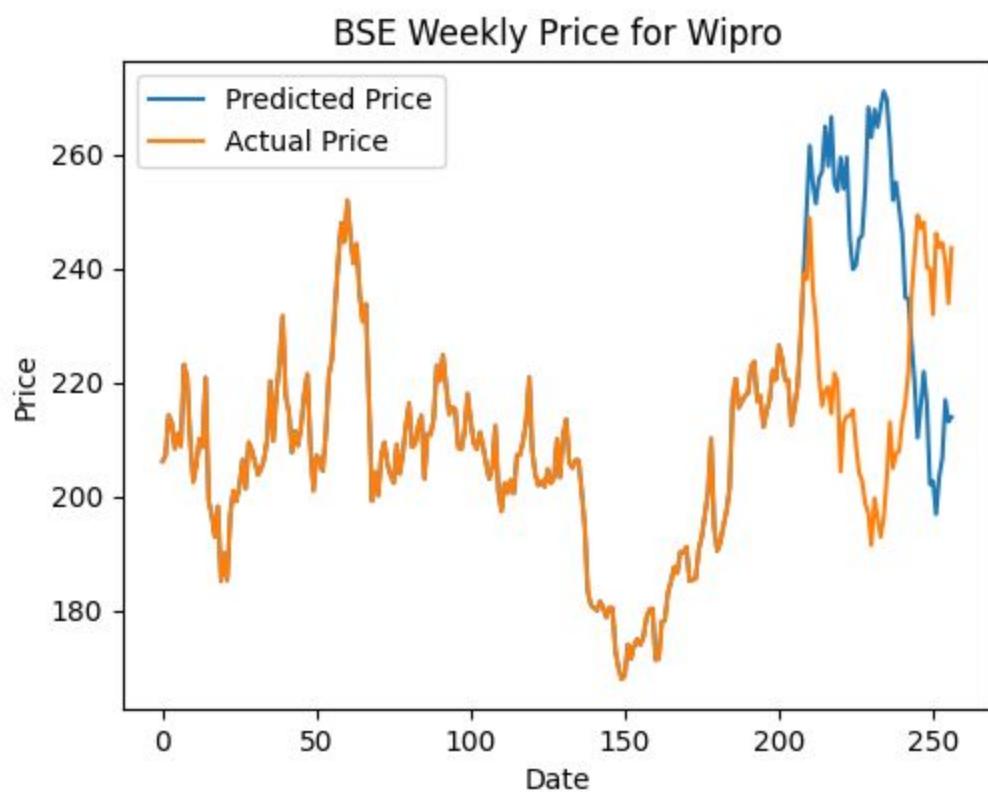
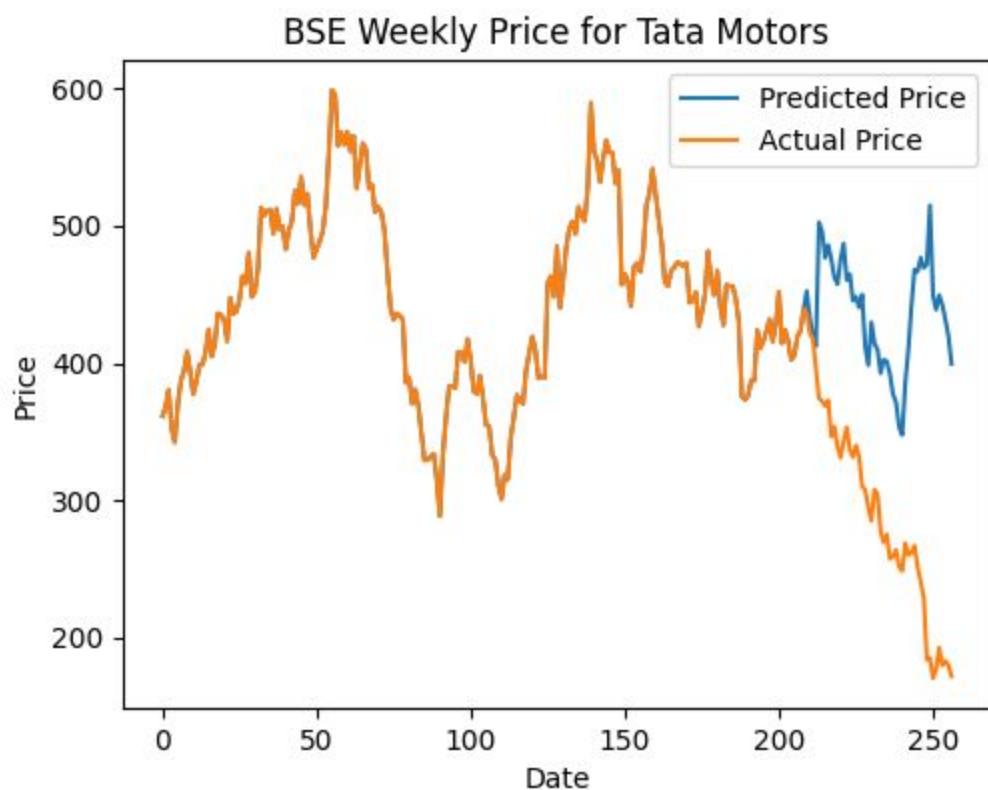


BSE Weekly Price for Reliance

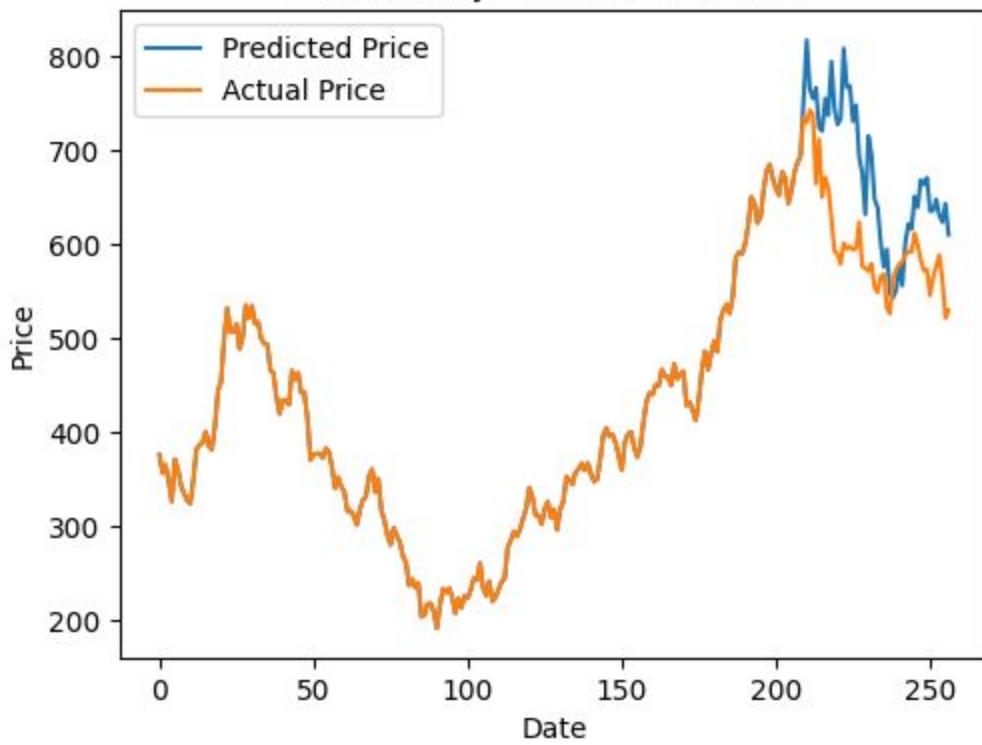


BSE Weekly Price for State Bank of India



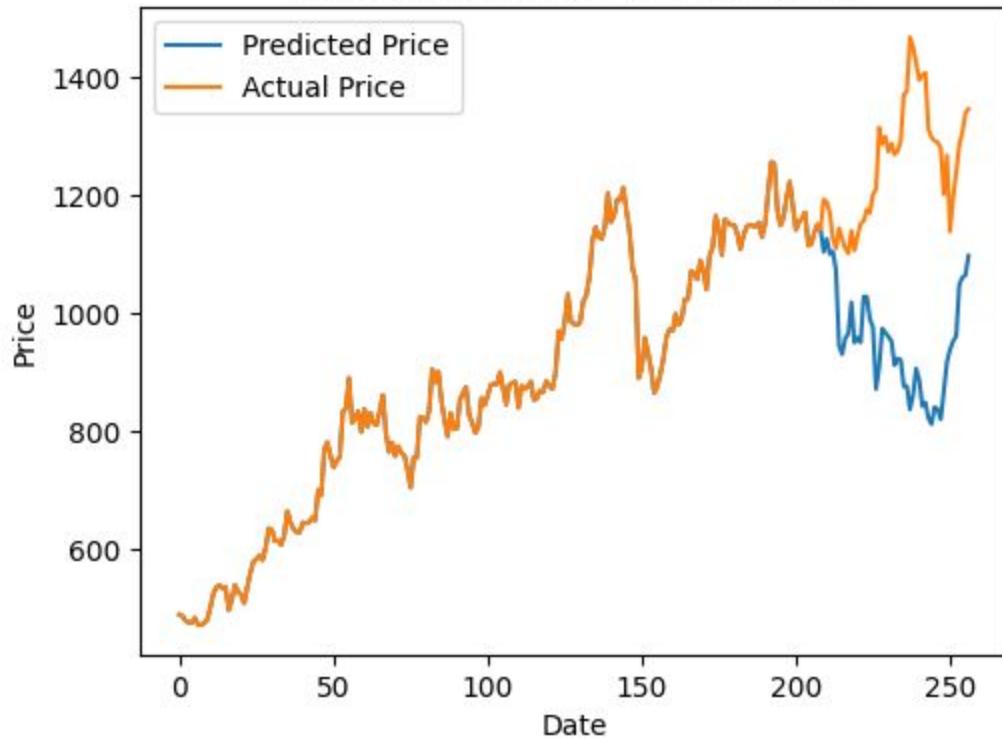


BSE Weekly Price for Tata Steel

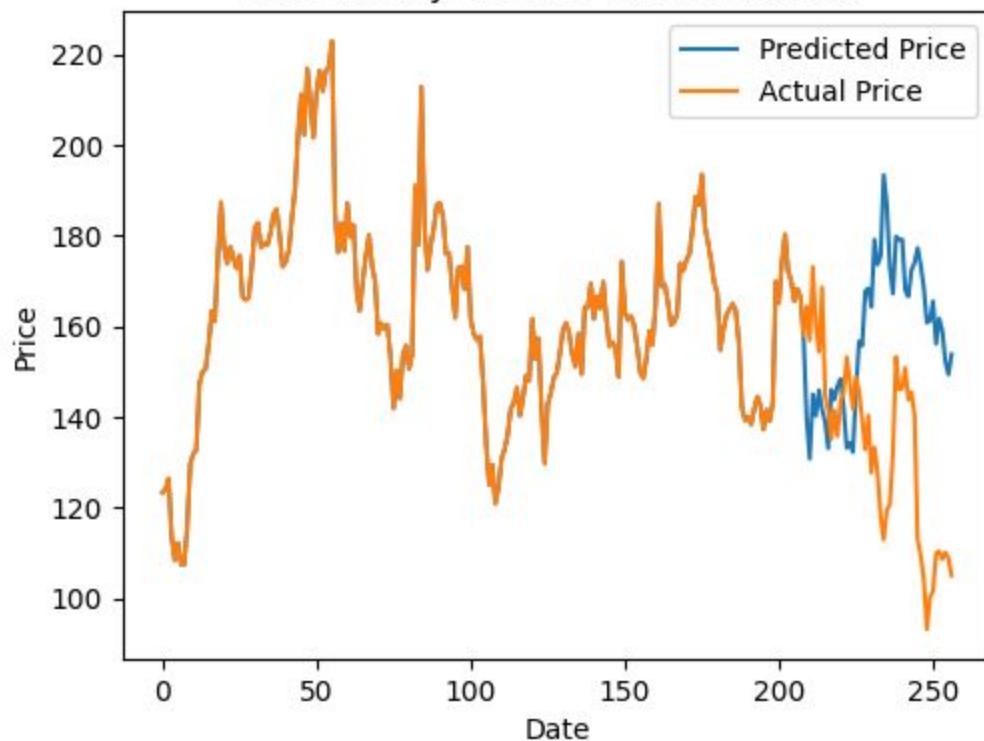


- **Weekly NSE**

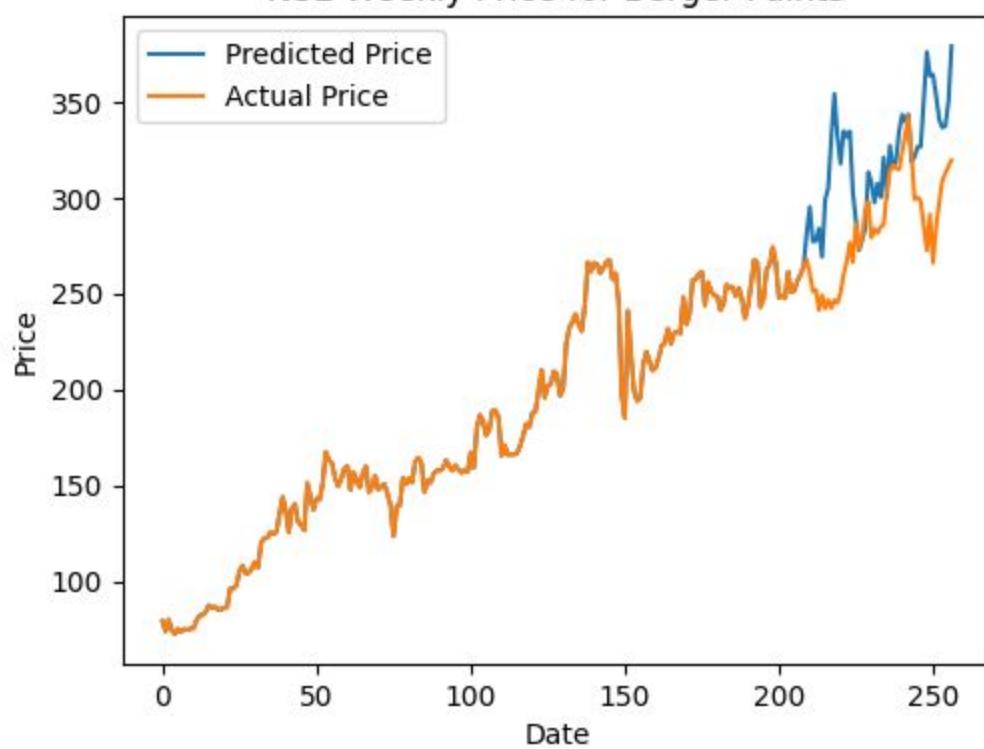
NSE Weekly Price for Asian Paints



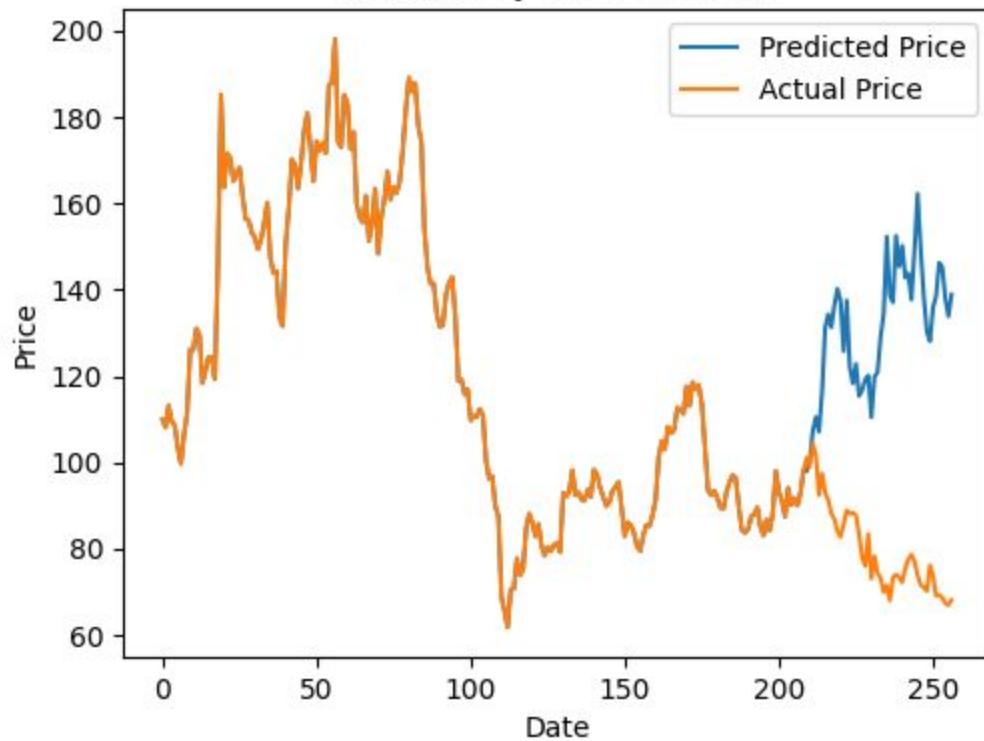
NSE Weekly Price for Bank of Baroda



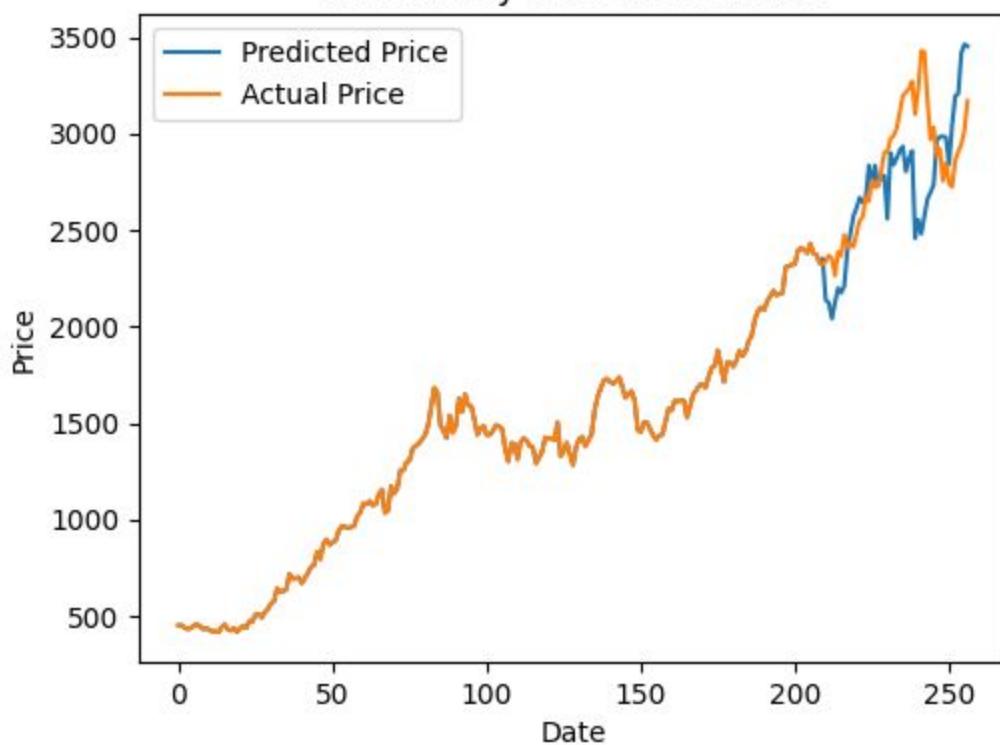
NSE Weekly Price for Berger Paints



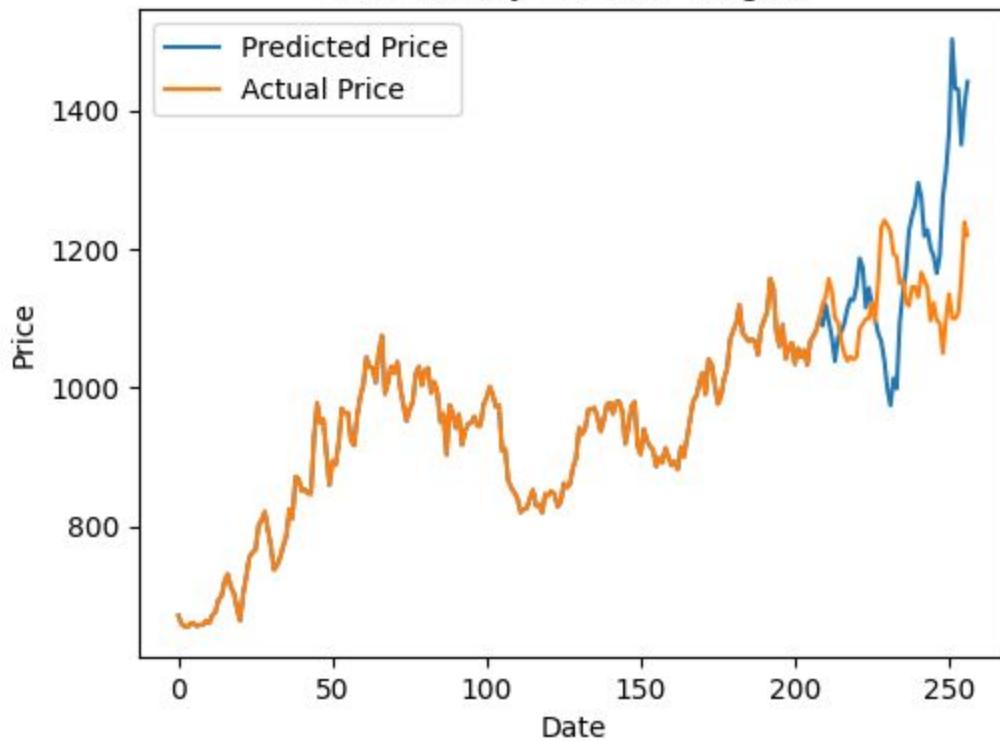
NSE Weekly Price for BHEL



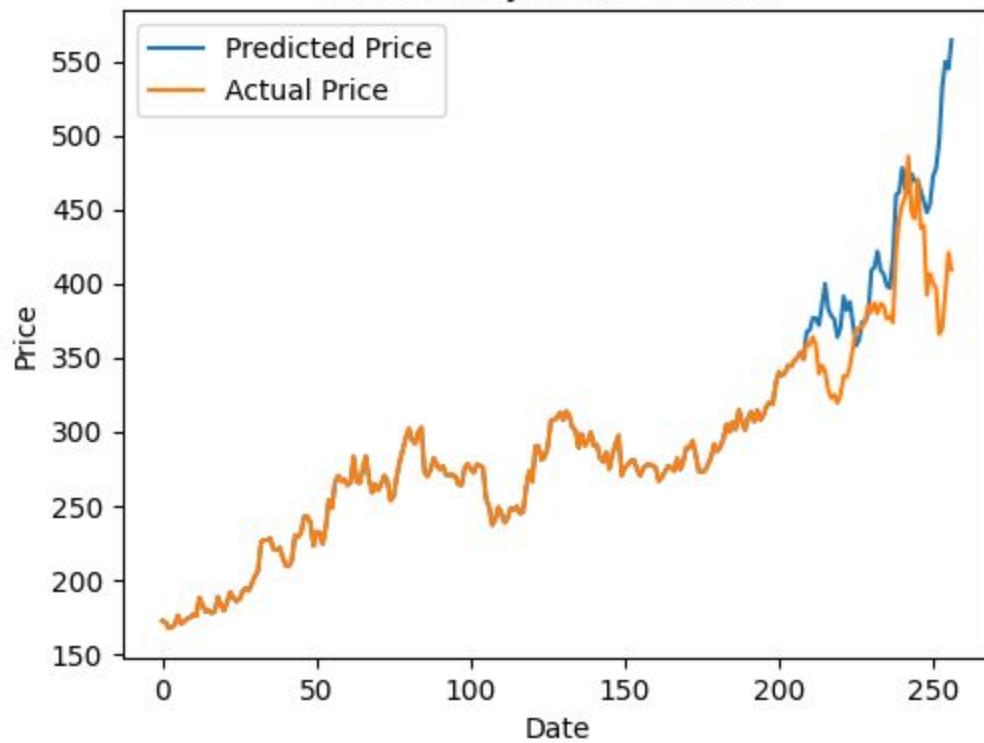
NSE Weekly Price for Britannia

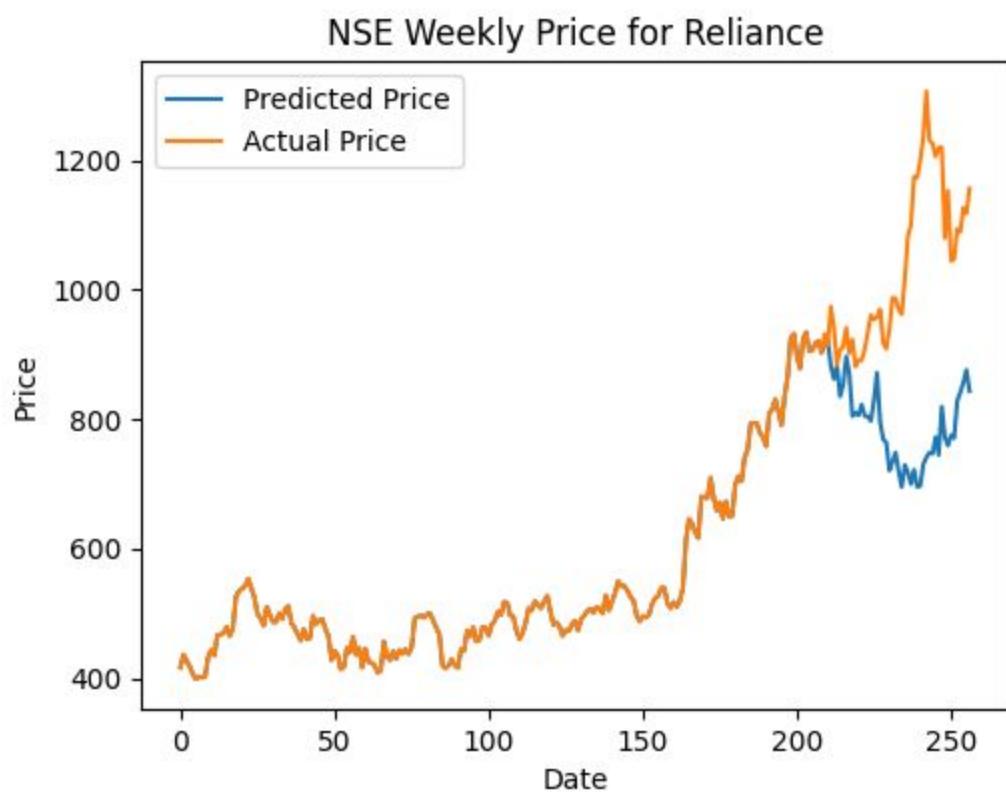
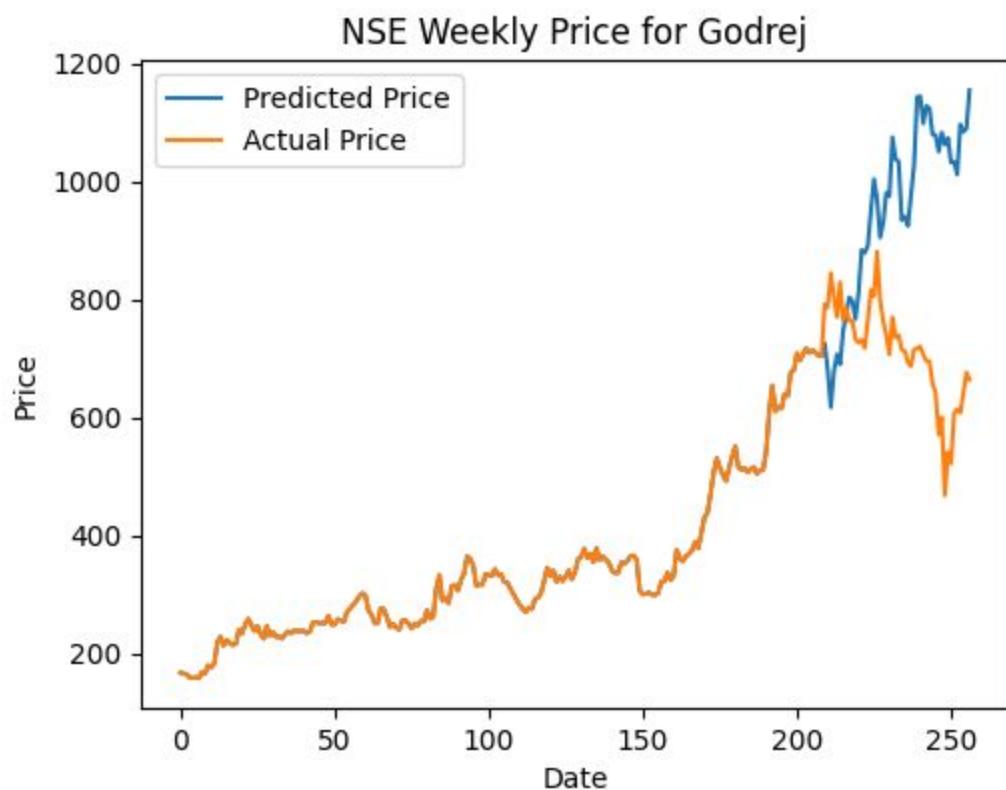


NSE Weekly Price for Colgate

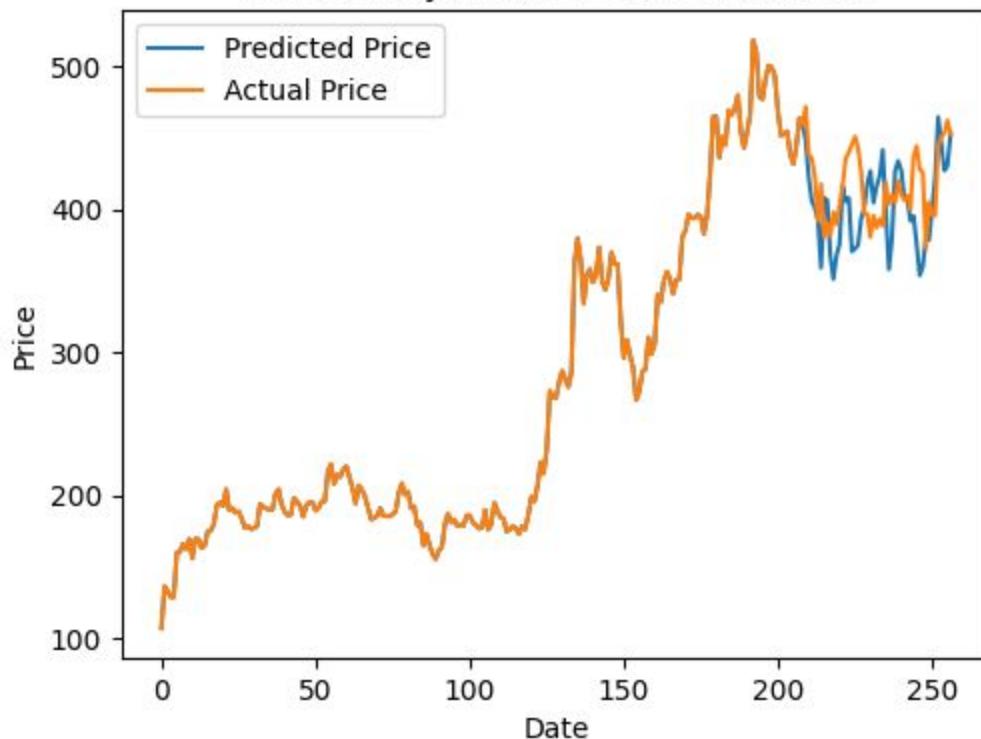


NSE Weekly Price for Dabur



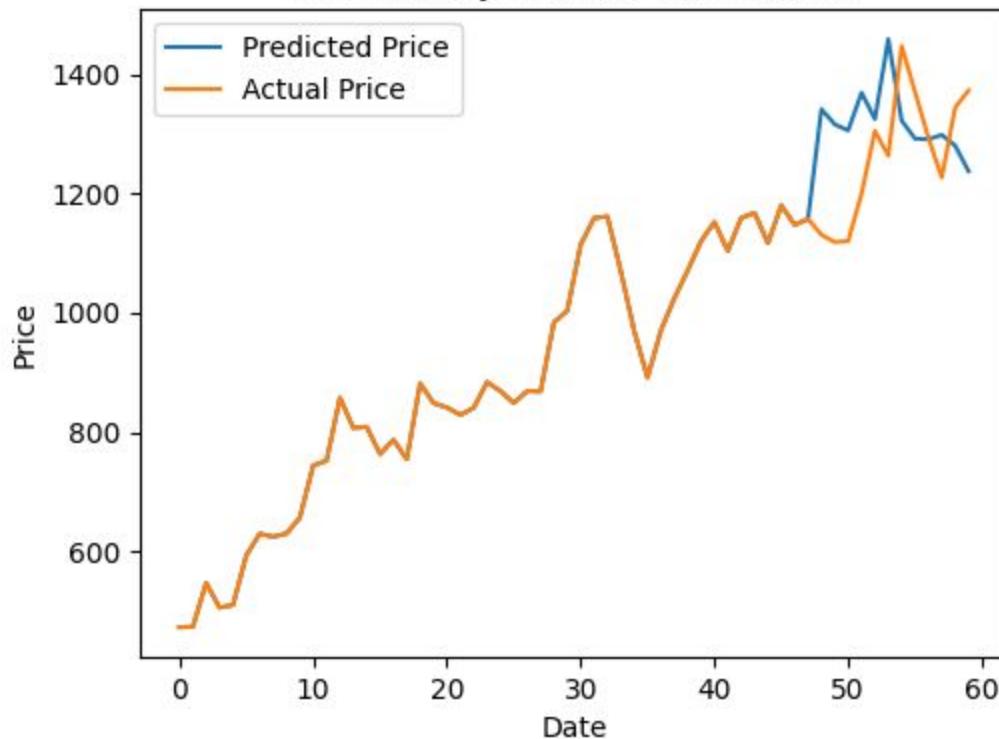


NSE Weekly Price for MuthootFinance

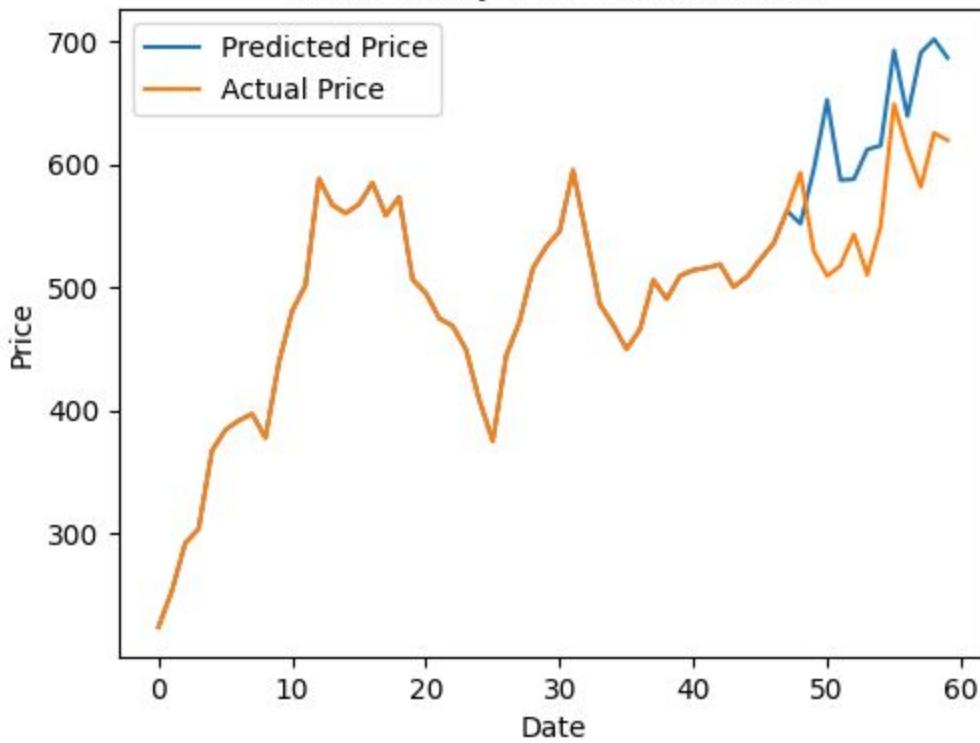


- **Monthly BSE**

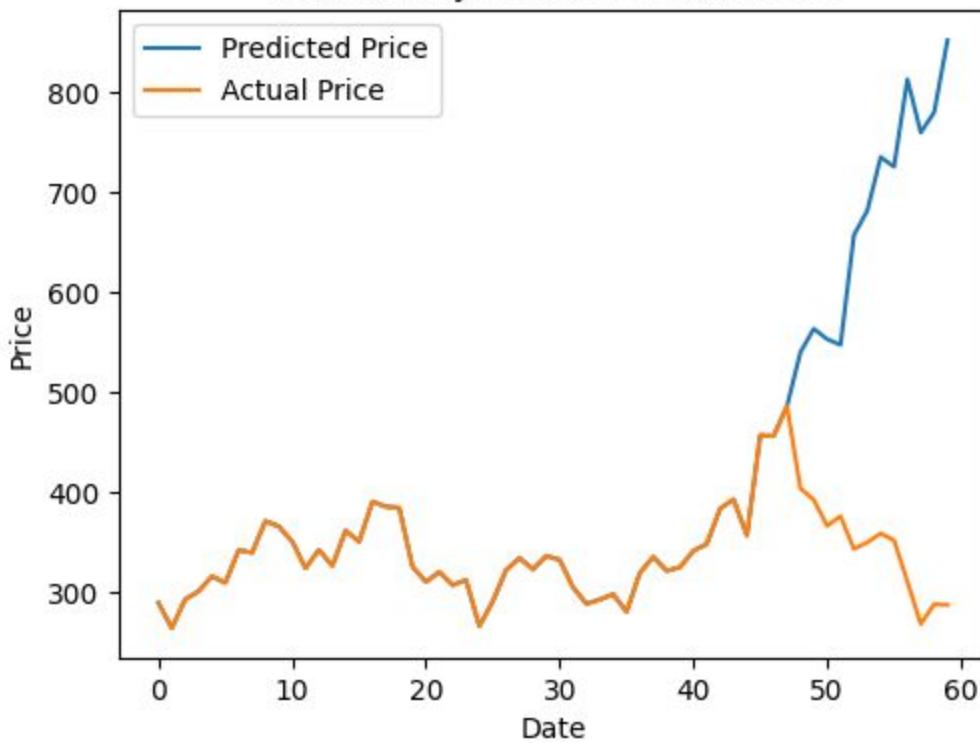
BSE Monthly Price for Asian Paints



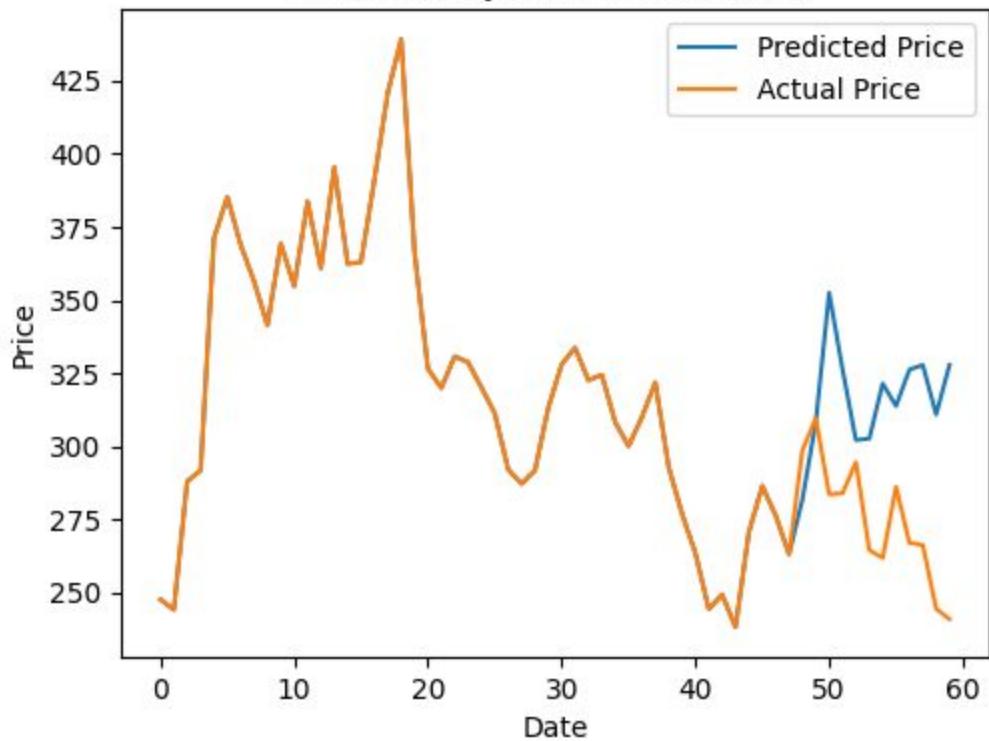
BSE Monthly Price for Axis Bank



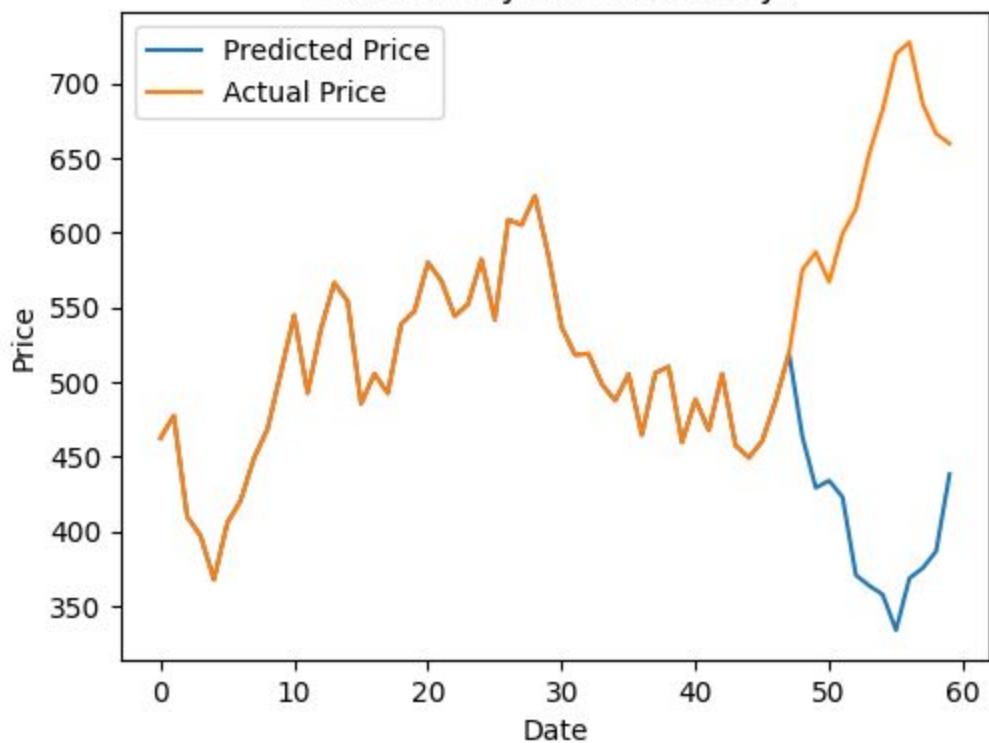
BSE Monthly Price for Bharat-Airtel



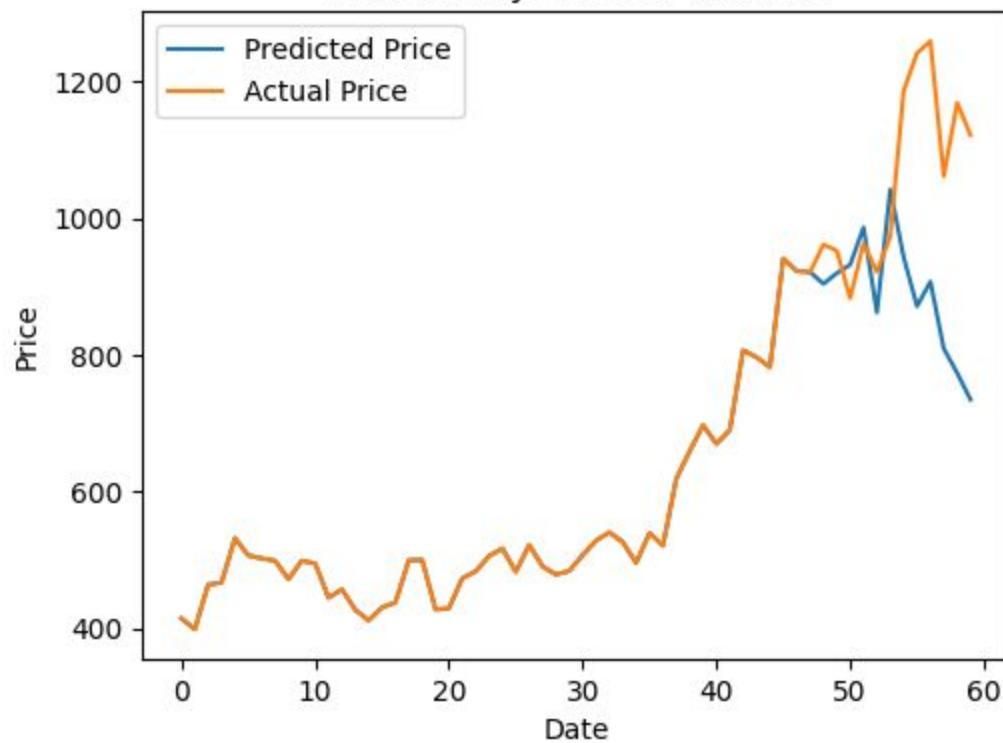
BSE Monthly Price for CoalIndia



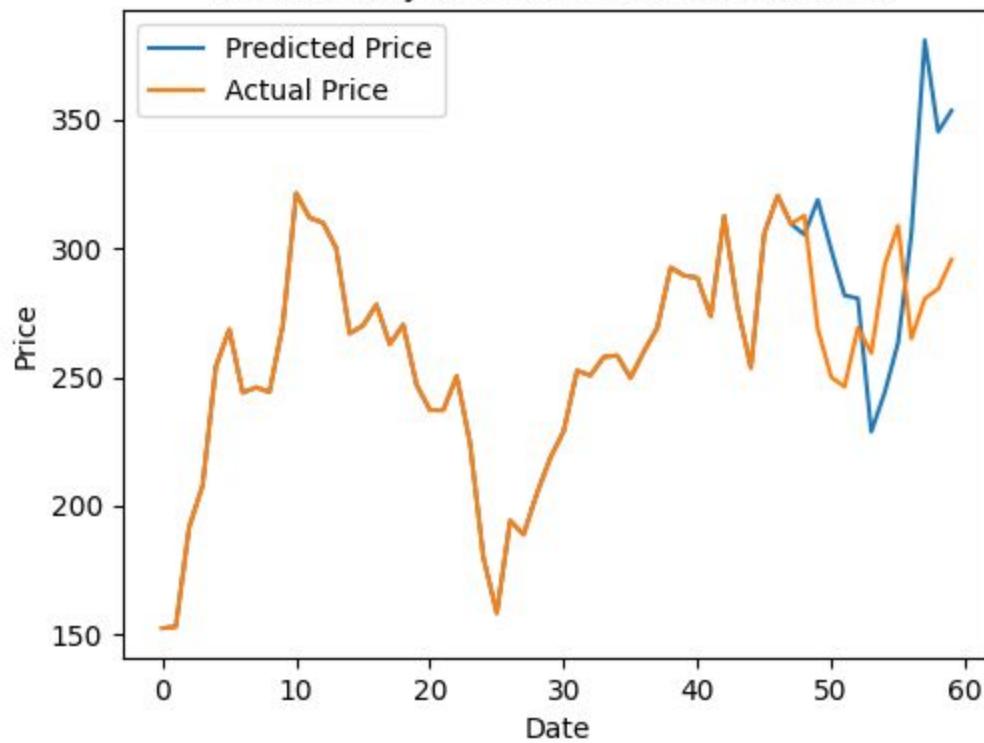
BSE Monthly Price for Infosys



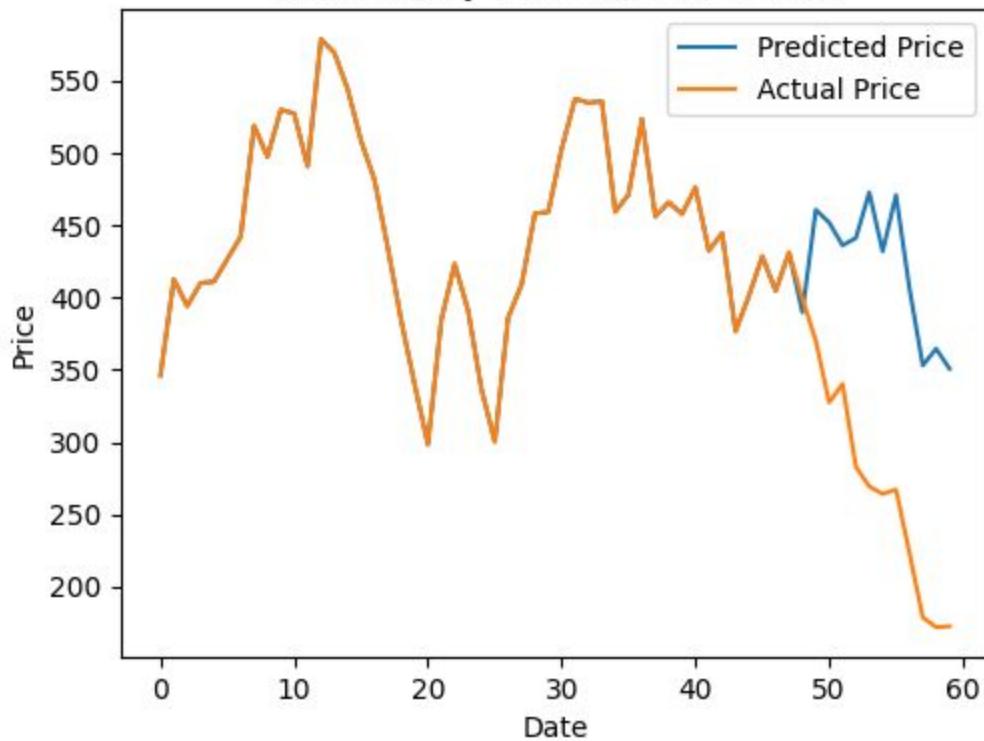
BSE Monthly Price for Reliance



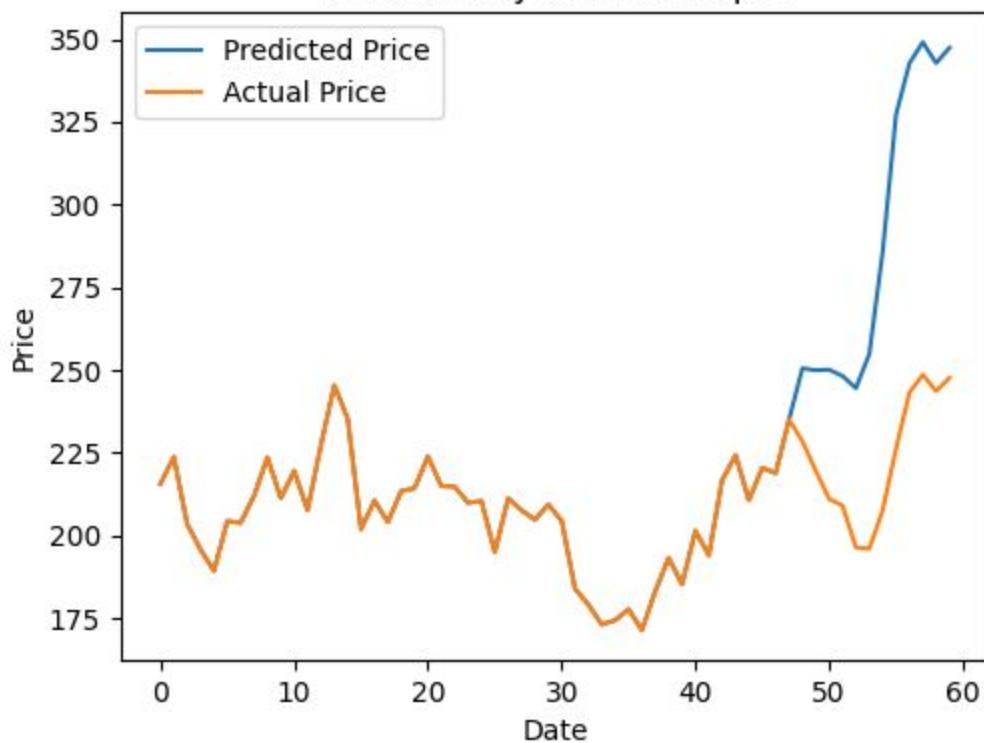
BSE Monthly Price for State Bank of India

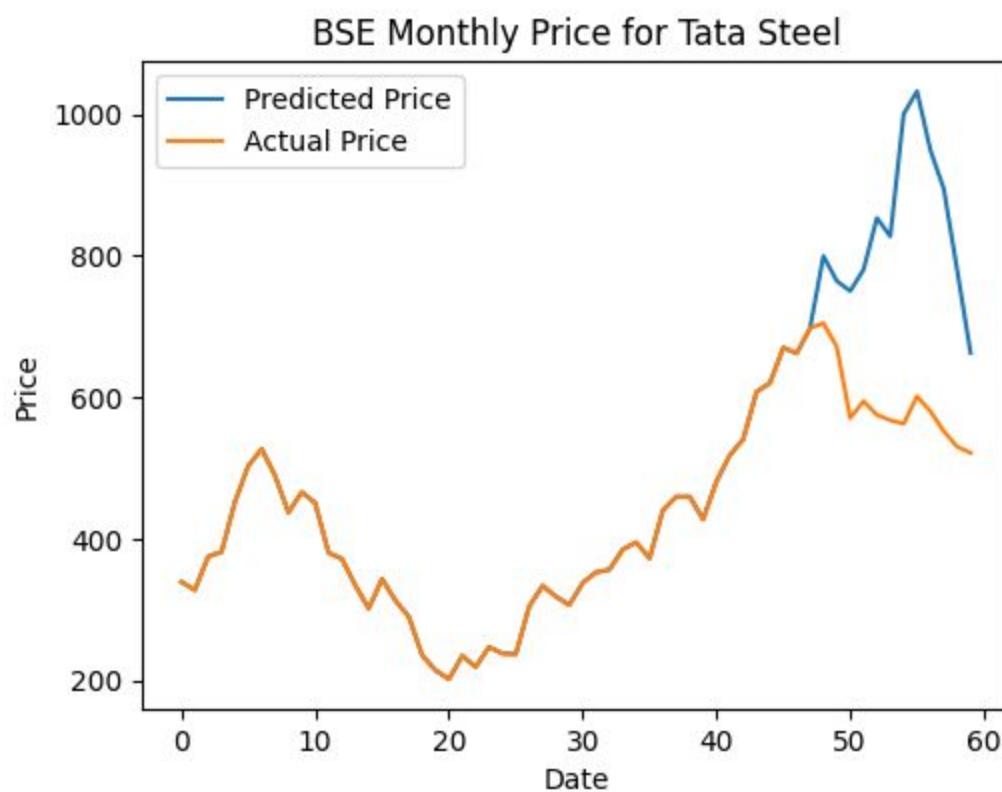


BSE Monthly Price for Tata Motors

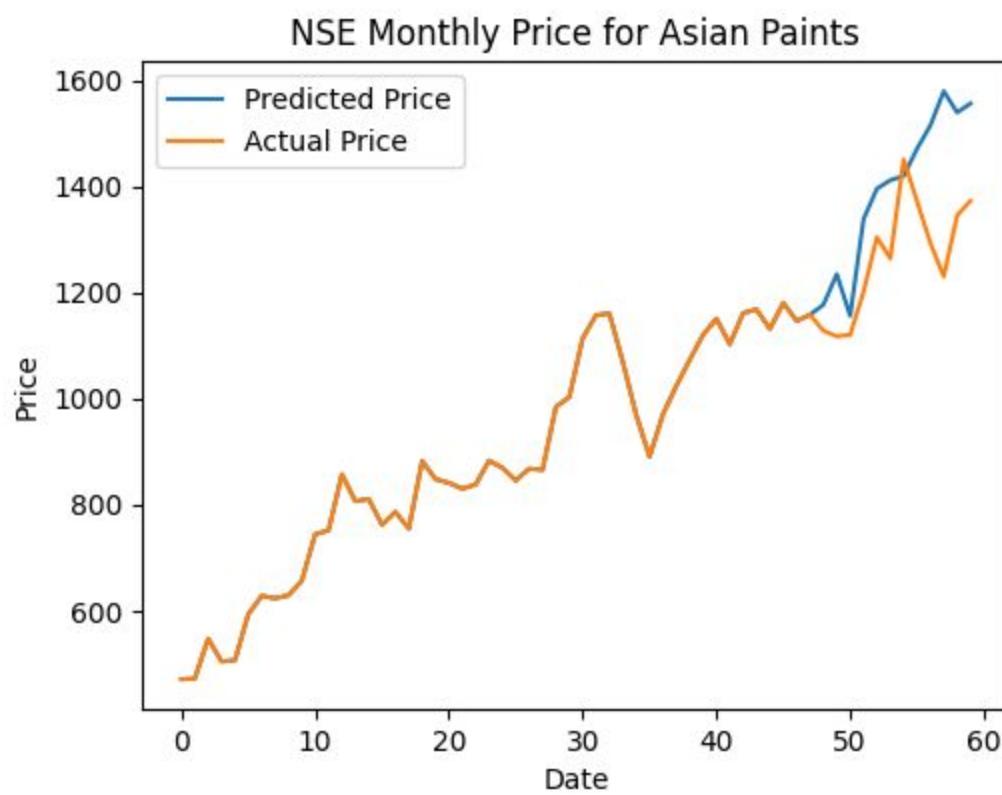


BSE Monthly Price for Wipro

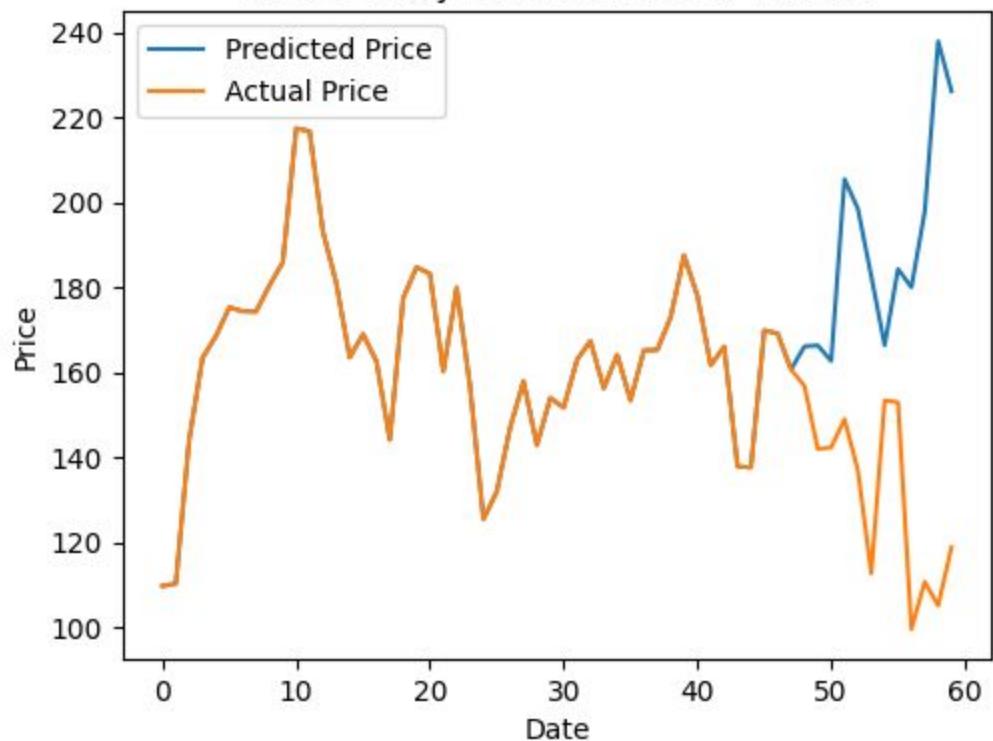




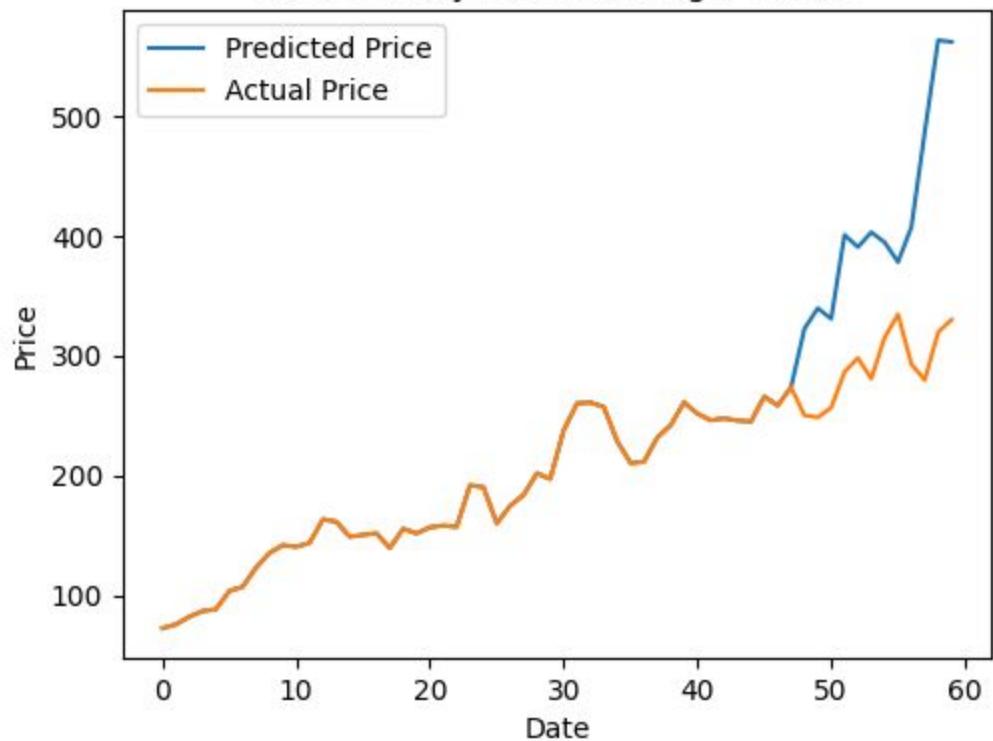
- **Monthly NSE**

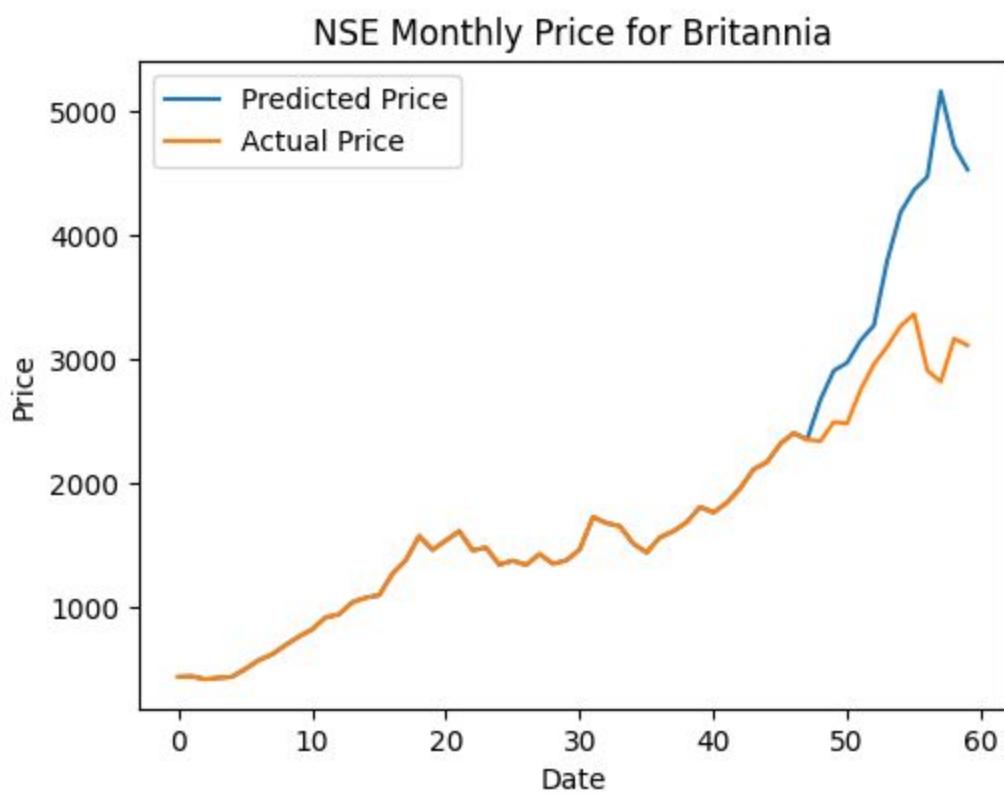
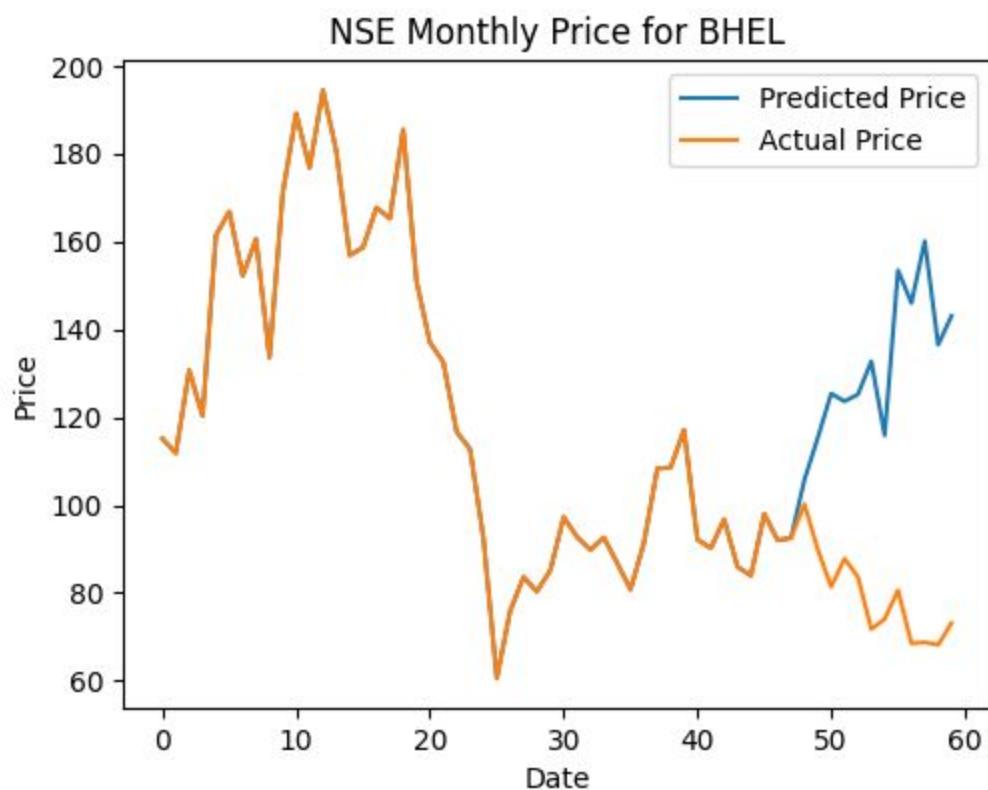


NSE Monthly Price for Bank of Baroda

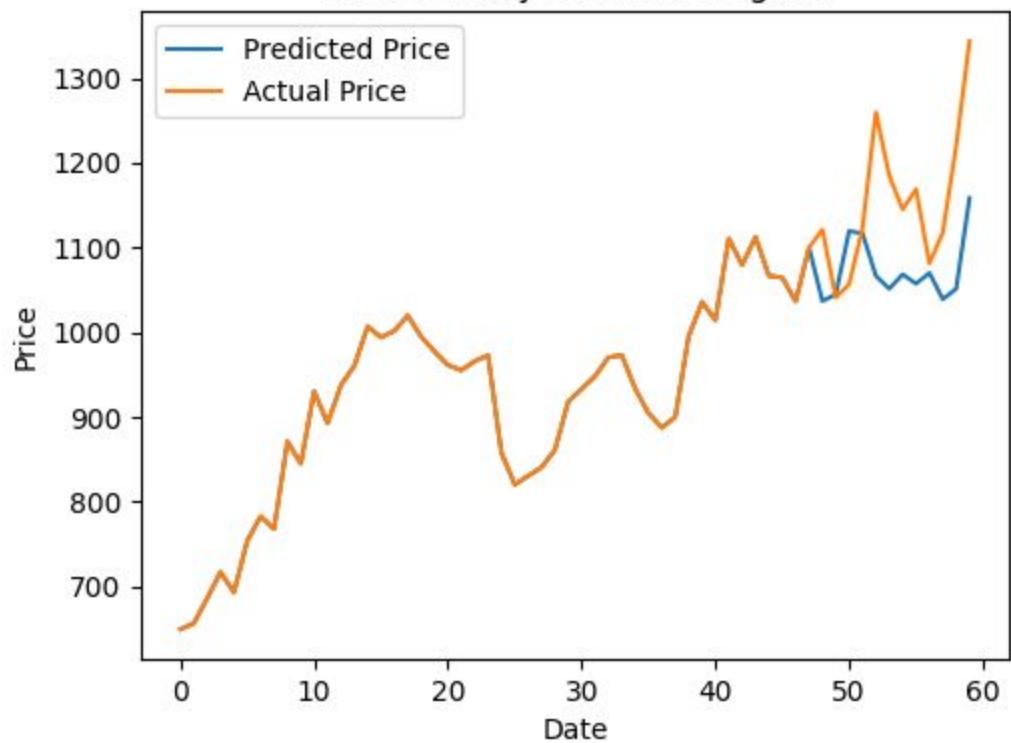


NSE Monthly Price for Berger Paints

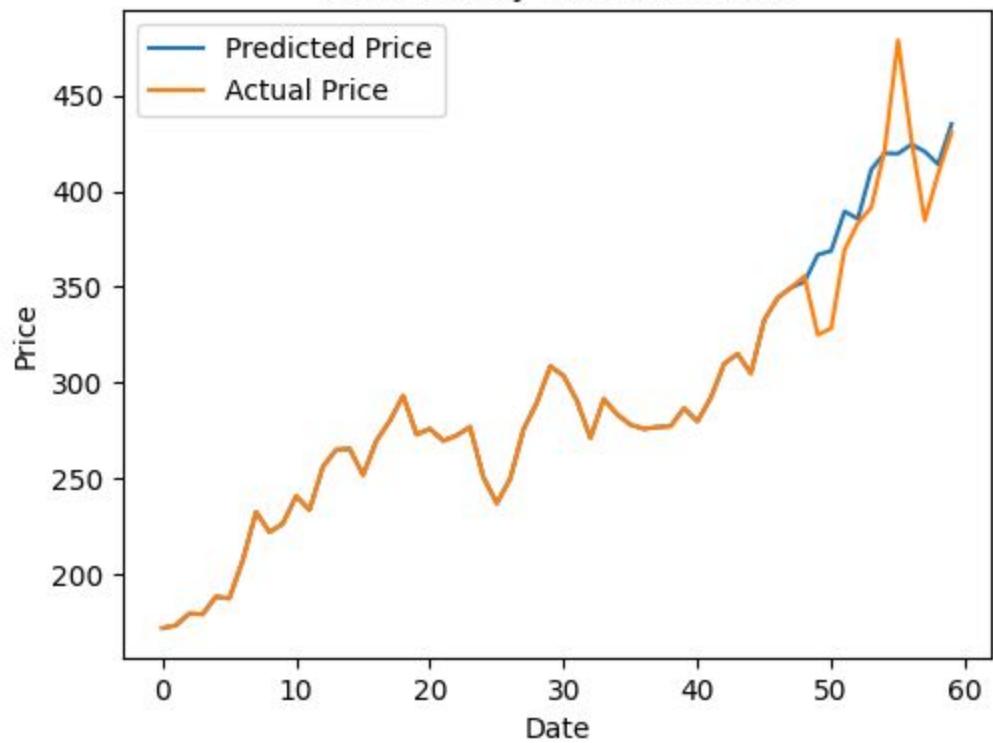




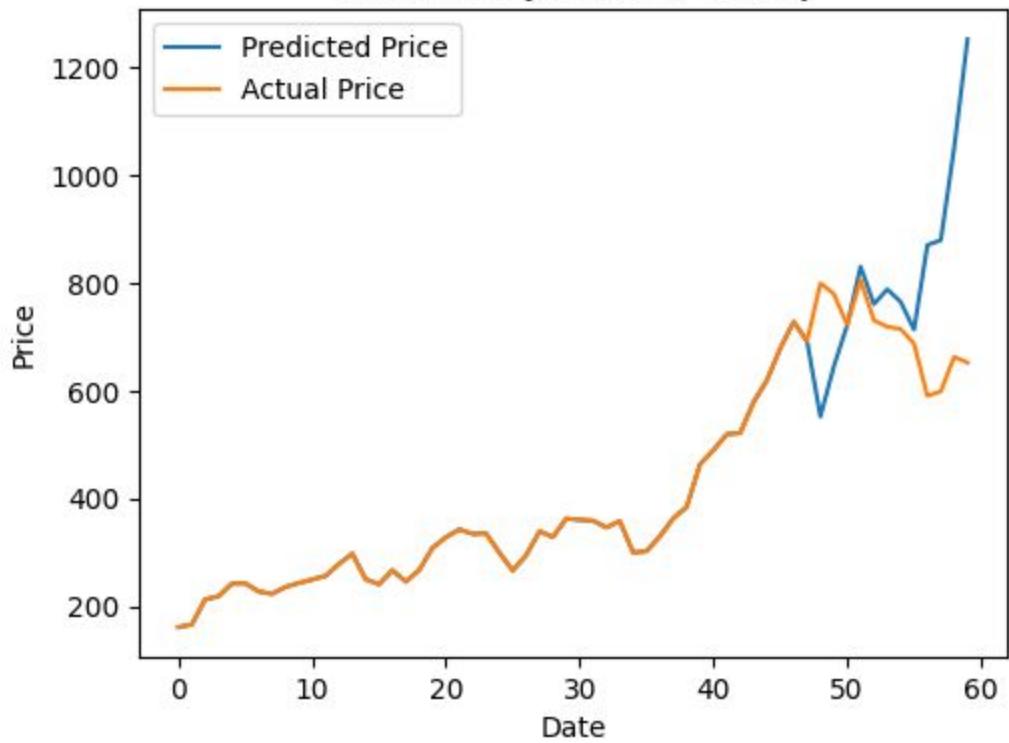
NSE Monthly Price for Colgate



NSE Monthly Price for Dabur



NSE Monthly Price for Godrej



NSE Monthly Price for Reliance

