

Lab 06

Naveen Kumar A G

210123075

BSE Sensex 30 and NSE Nifty 50 index values from Jan 1st 2019 to Dec 31st 2023 (5 yr period) is treated as the data from market index.

10 stocks in BSE Sensex 30 with tickers in brackets: Sun Pharmaceutical (**SUNPHARMA.BO**), Titan (**TITAN.BO**), Wipro (**WIPRO.BO**), SBI (**SBIN.BO**), UltraTech Cement (**ULTRACEMCO.BO**), Reliance Industries (**RELIANCE.BO**), Maruti Suzuki (**MARUTI.BO**), Larsen & Toubro (**LT.BO**), NTPC (**NTPC.BO**), Hindustan Unilever (**HINDUNILVR.BO**)

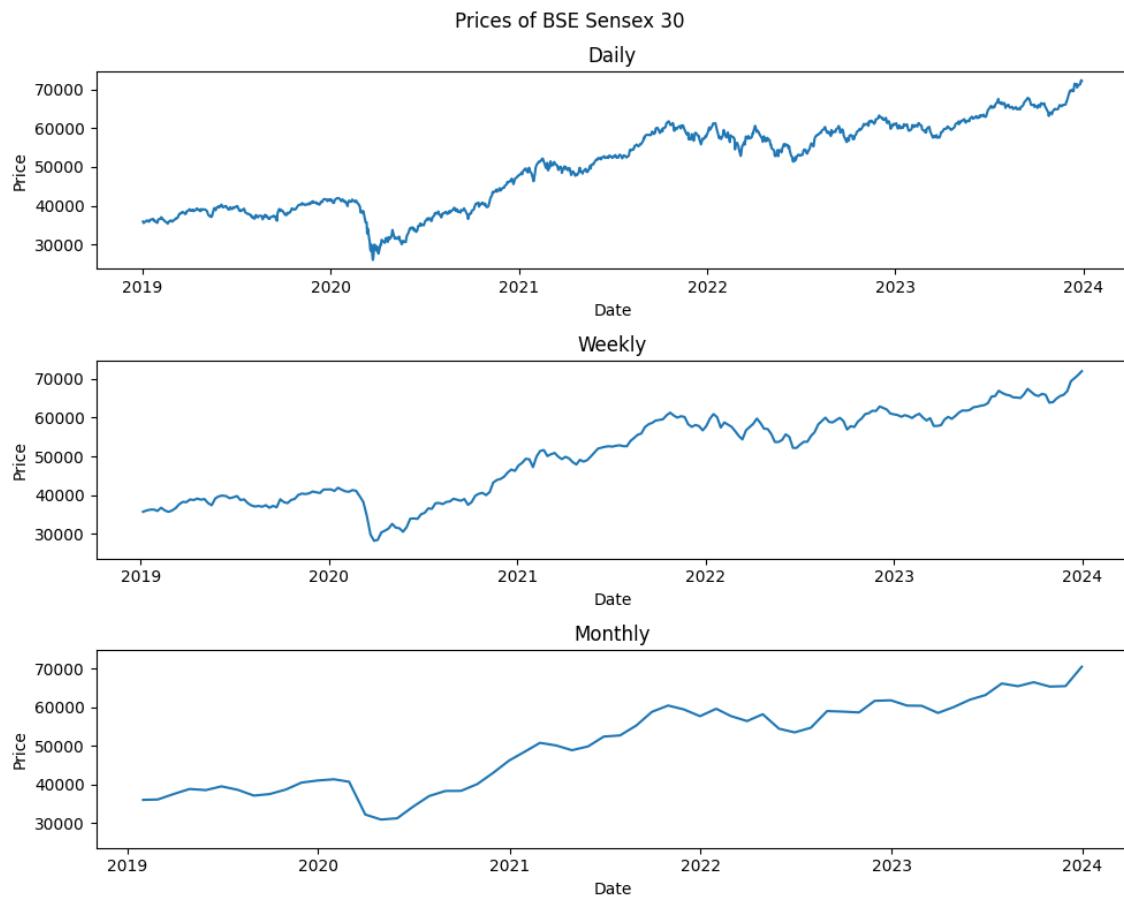
10 stocks in NSE Nifty 50 with tickers in brackets: Adani Enterprises (**ADANIENT.NS**), Asian Paints (**ASIANPAINT.NS**), Axis Bank (**AXISBANK.NS**), Bajaj Auto (**BAJAJ-AUTO.NS**), Bharat Petroleum (**BPCL.NS**), Bharti Airtel (**BHARTIARTL.NS**), Britannia Industries (**BRITANNIA.NS**), Cipla (**CIPLA.NS**), HCL Technologies (**HCLTECH.NS**), Tata Steel (**TATASTEEL.NS**)

10 stocks not in BSE Sensex 30 with tickers in brackets: Zomato (**ZOMATO.BO**), Zee Entertainment (**ZEEL.BO**), TVS (**TVSMOTOR.BO**), Pidlite Industries (**PIDLITIND.BO**), Info Edge (**NAUKRI.BO**), IRCTC (**IRCTC.BO**), DLF (**DLF.BO**), Bank of Baroda (**BANKBARODA.BO**), Max Life Insurance (**MFSL.BO**), Colgate India (**COLPAL.BO**)

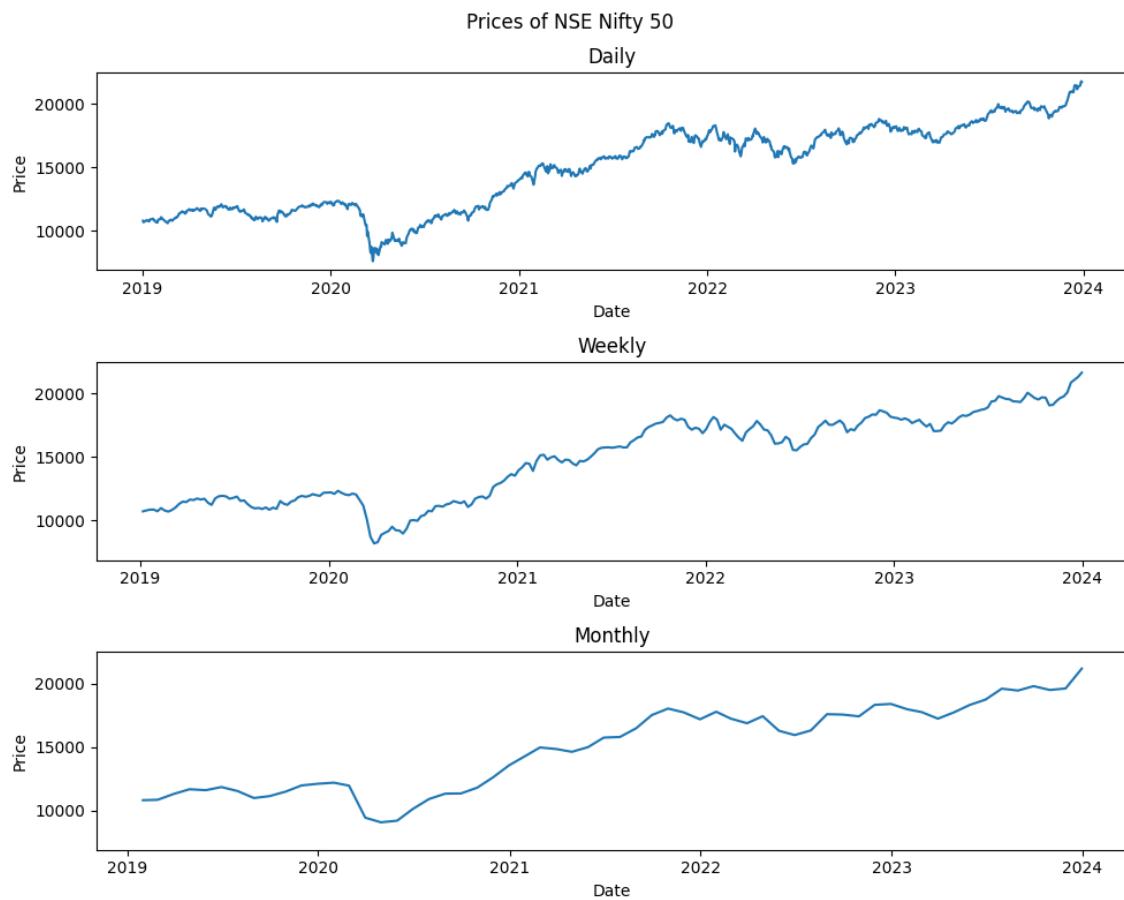
10 stocks not in NSE Nifty 50 with tickers in brackets: Piramal Enterprises (**PEL.NS**), Jubilant Foodworks (**JUBLFOOD.NS**), United Breweries (**UBL.NS**), MRF (**MRF.NS**), Berger Paints India (**BERGERPAINT.NS**), Siemens (**SIEMENS.NS**), Hindustan Petroleum Corporation (**HINDPETRO.NS**), Havells India (**HAVELLS.NS**), Interglobe Aviation (**INDIGO.NS**), Dabur India (**DABUR.NS**).

Q1 Indices

BSE SENSEX 30

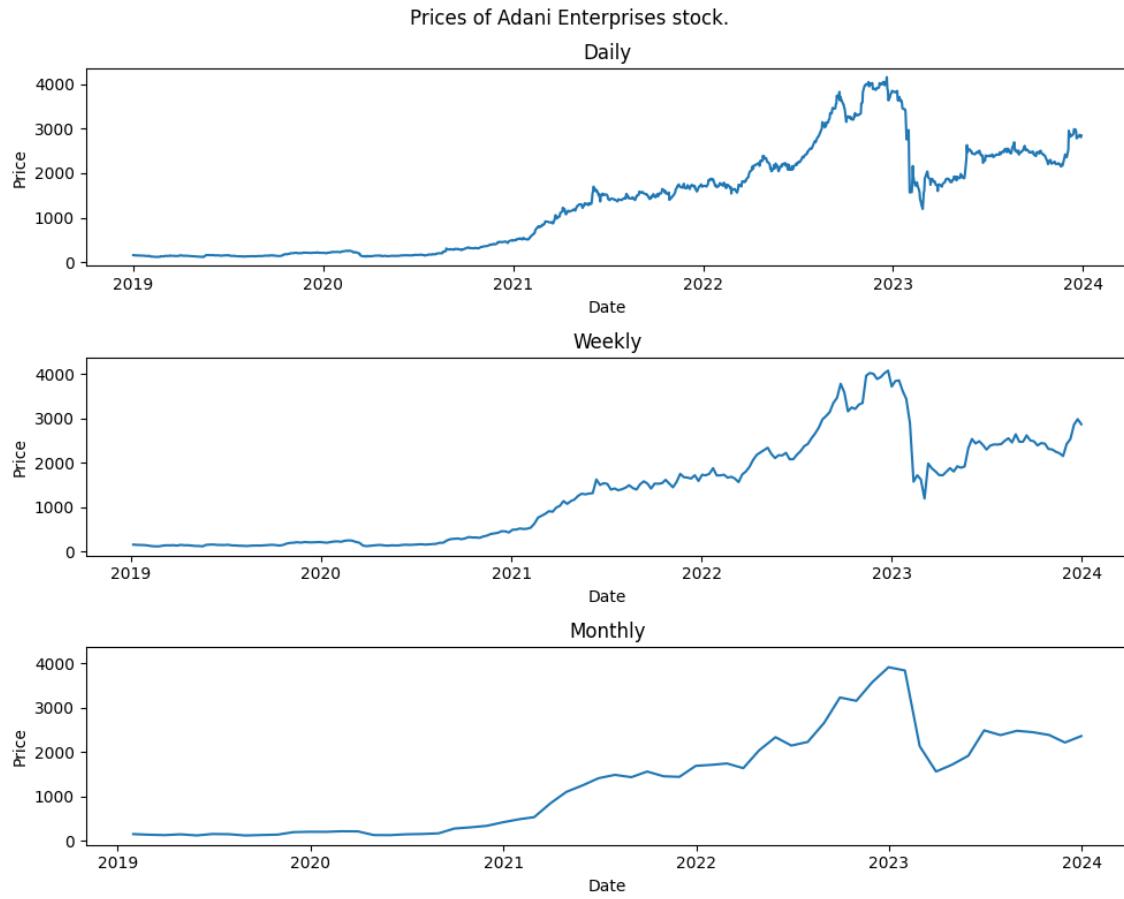


NSE NIFTY 50



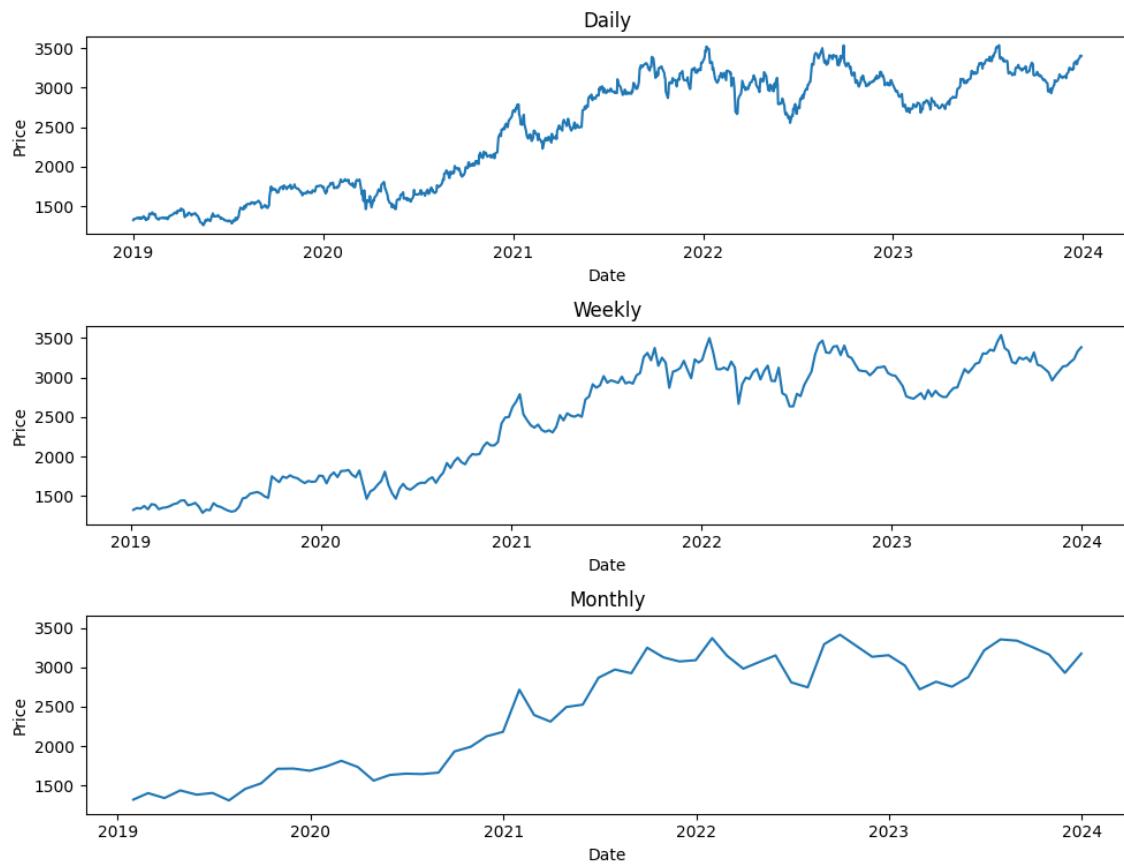
Q1 Stocks

ADANIENT NS

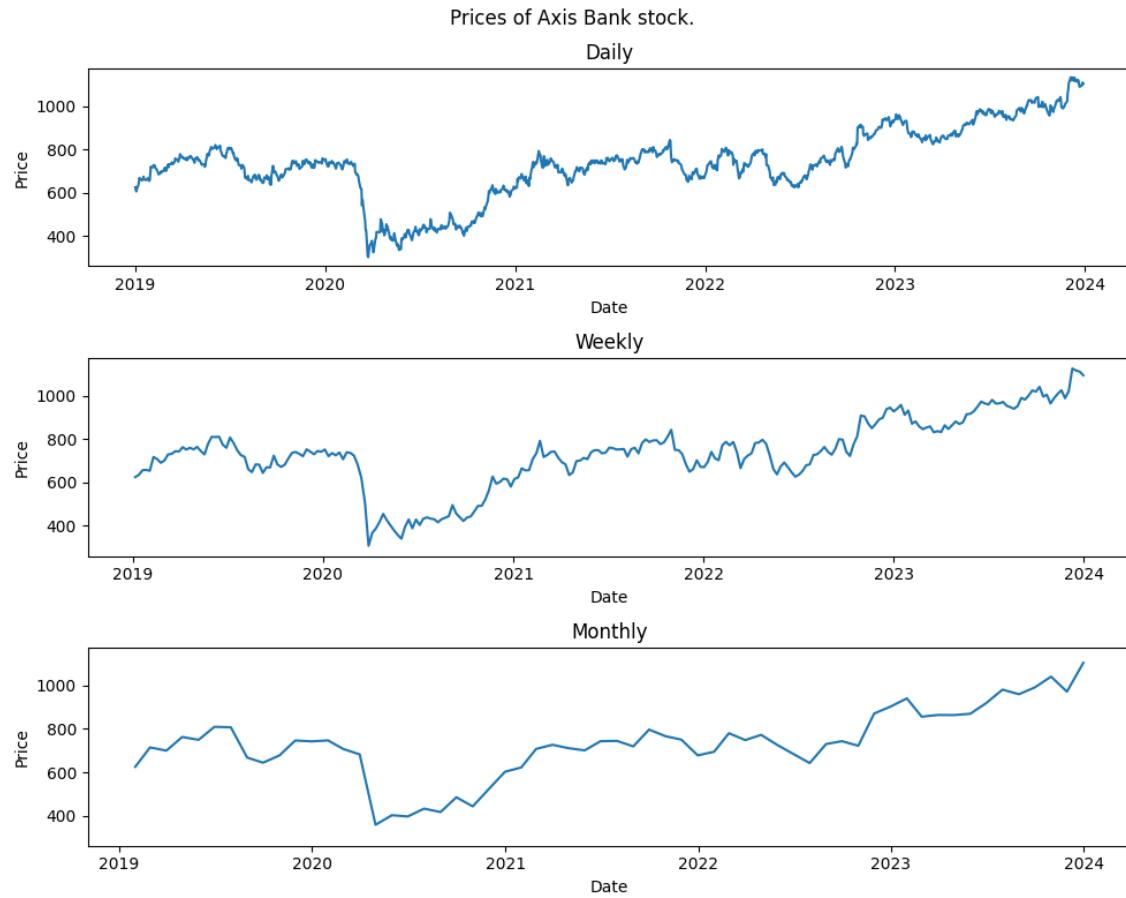


ASIANPAINT NS

Prices of Asian Paints stock.

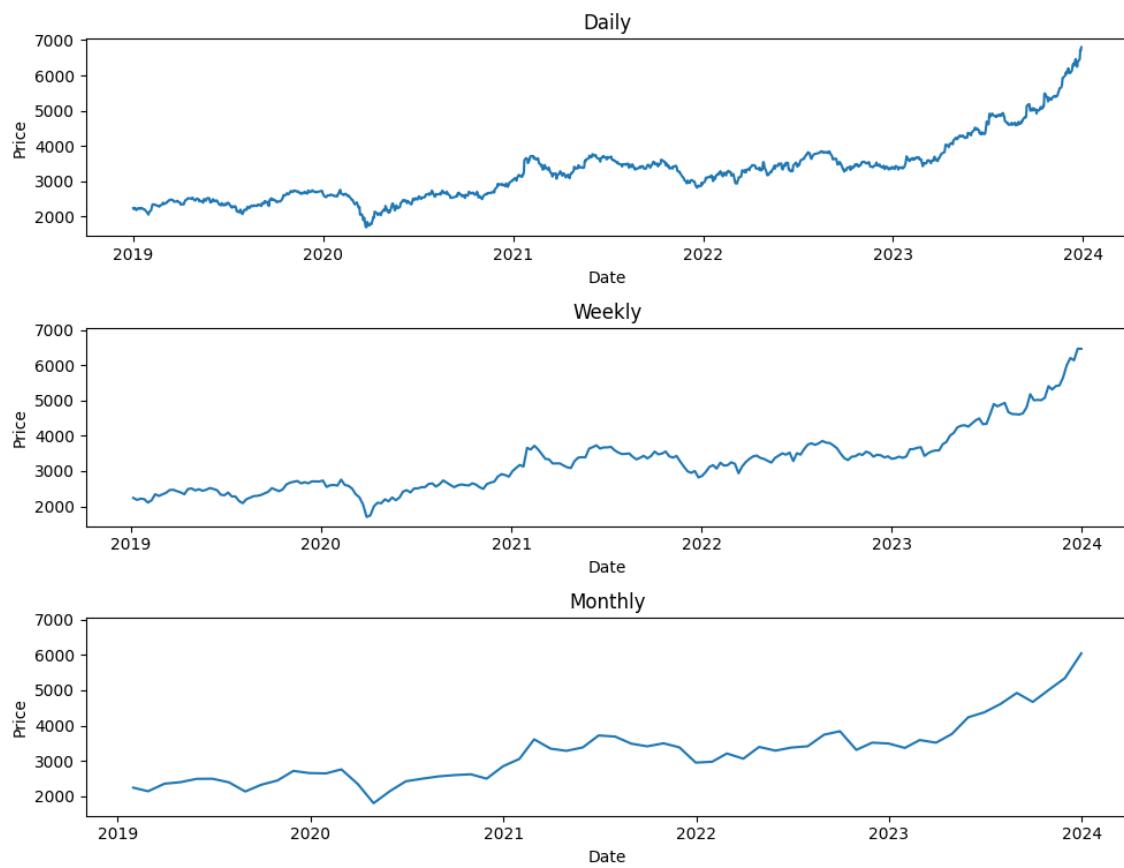


AXISBANK NS



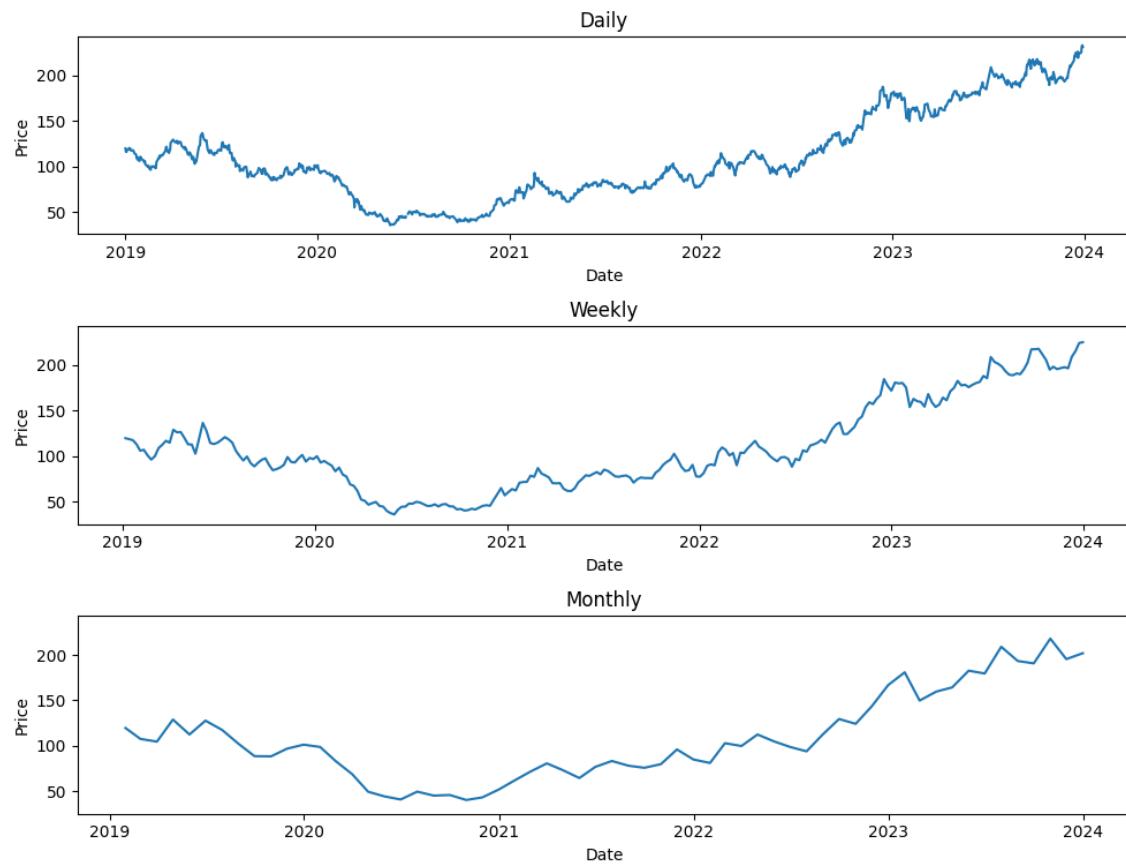
BAJAJ-AUTO NS

Prices of Bajaj Automobiles stock.



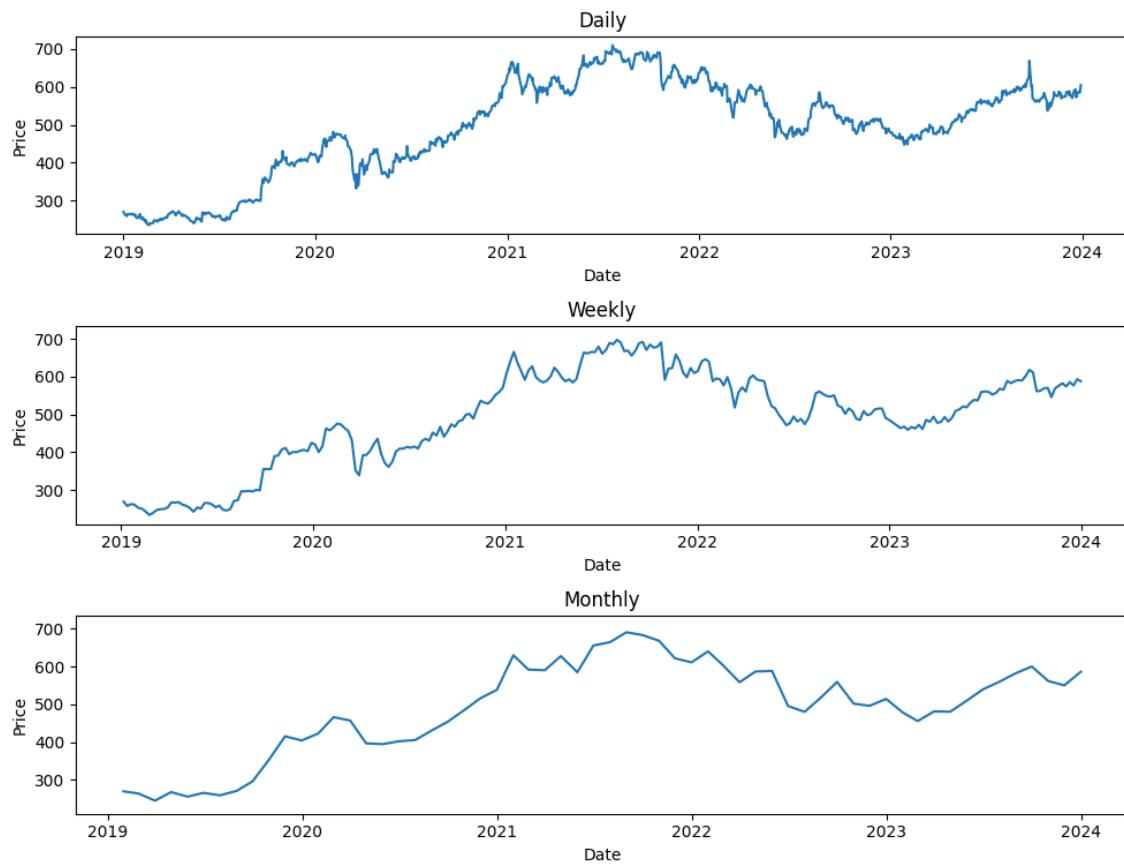
BANKBARODA BO

Prices of Bank of Baroda stock.

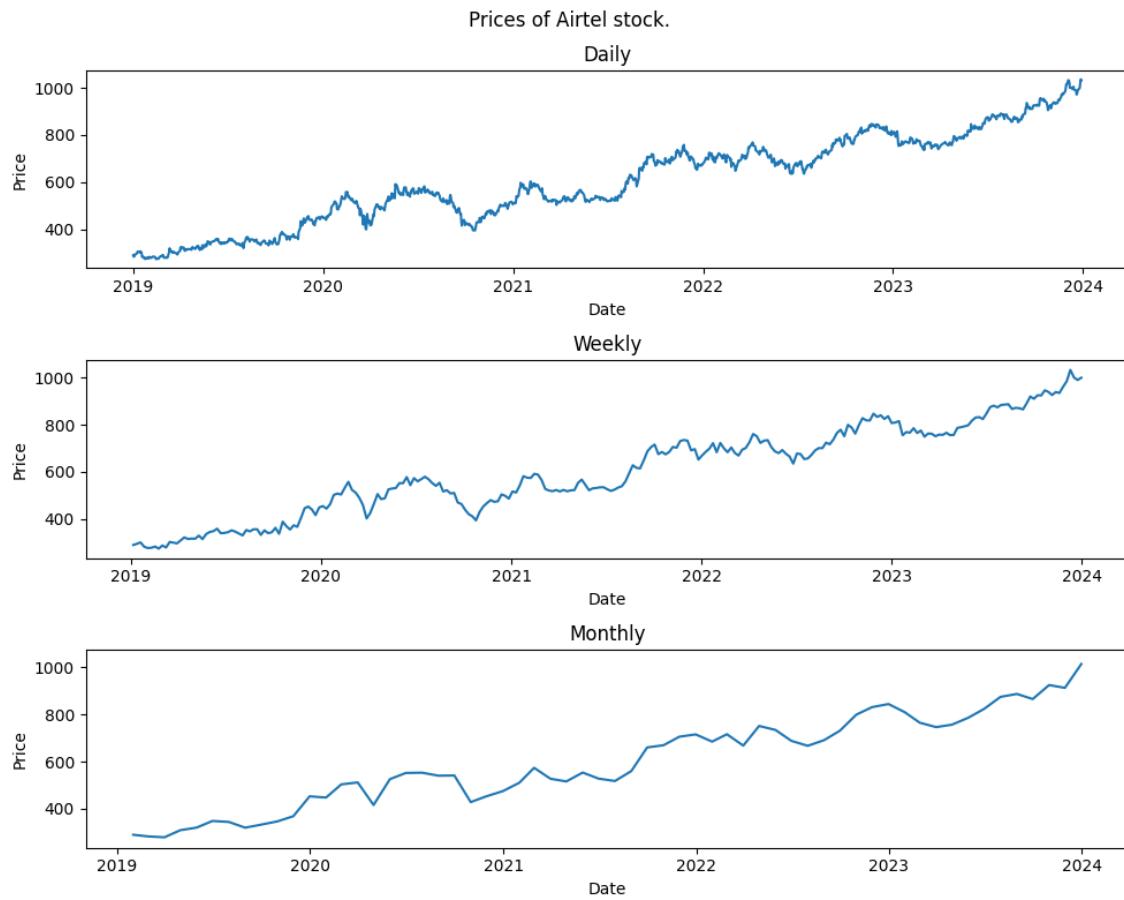


BERGEPAINT NS

Prices of Berger Paints stock.

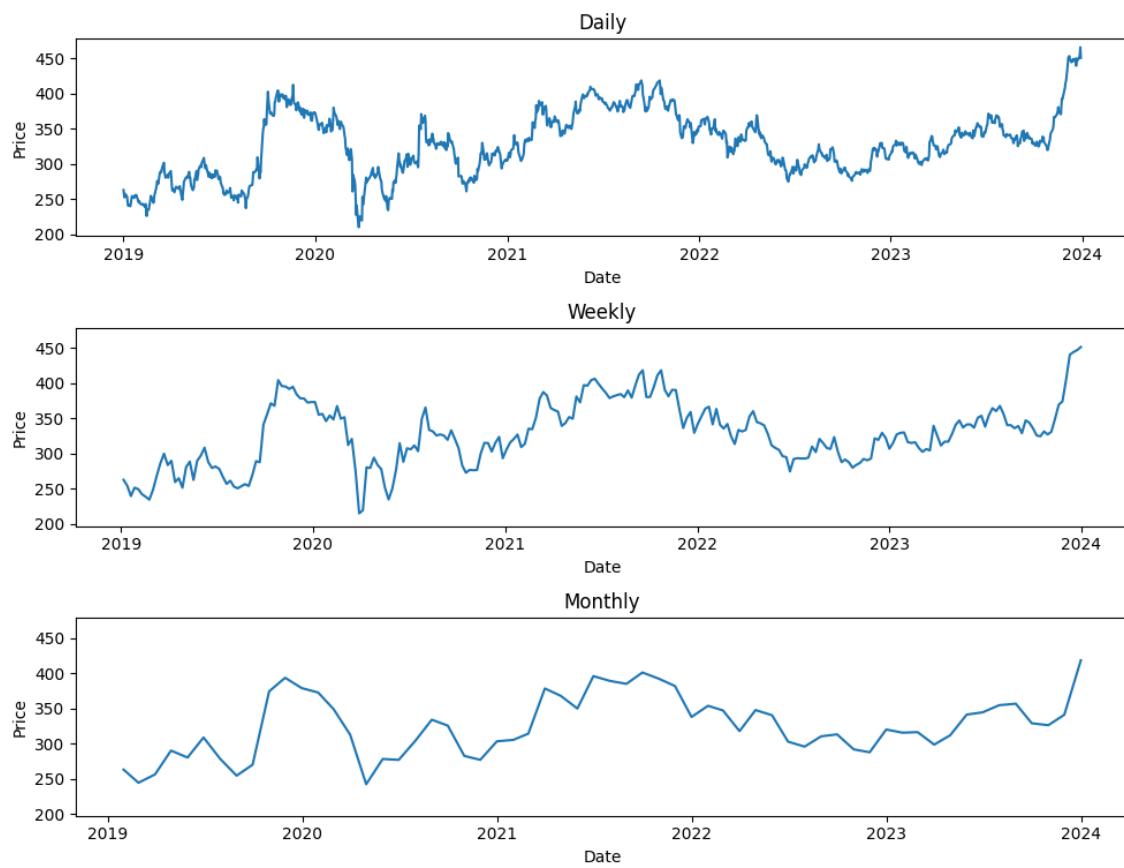


BHARTIARTL NS



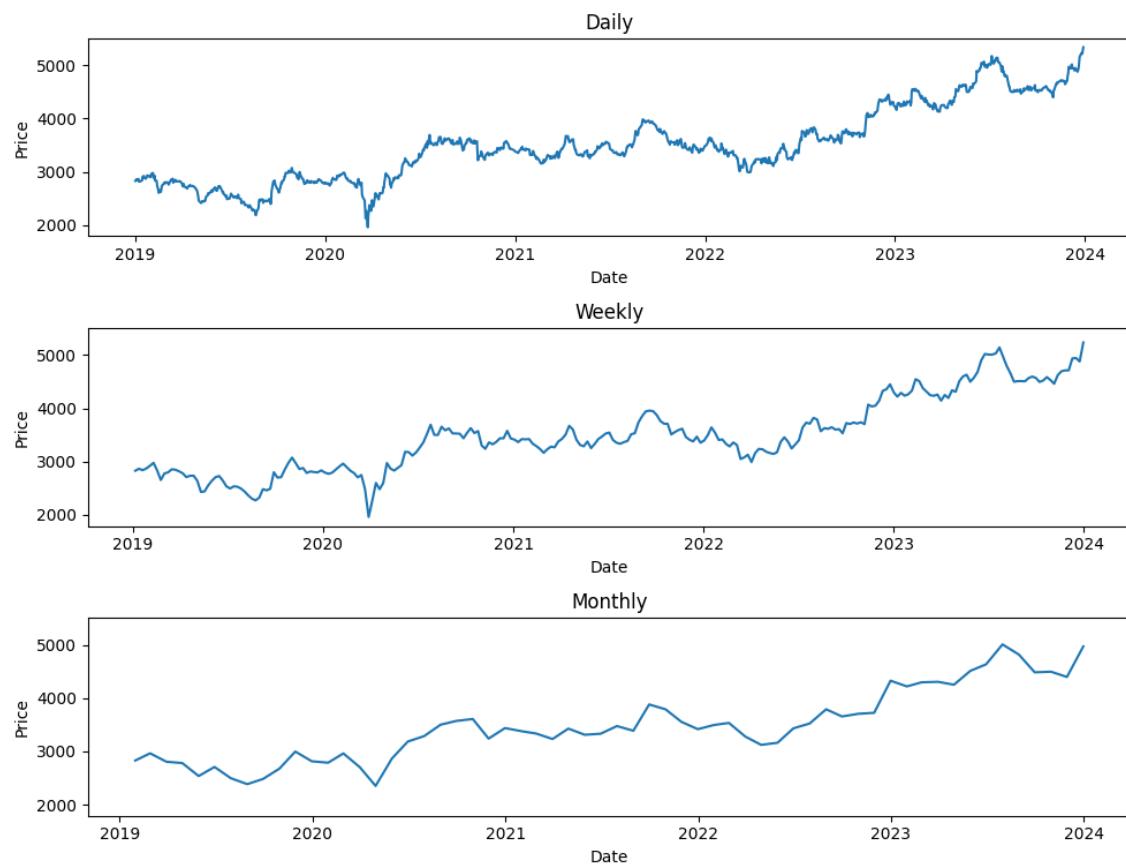
BPCL NS

Prices of Bharat Petroleum Corp. Ltd stock.

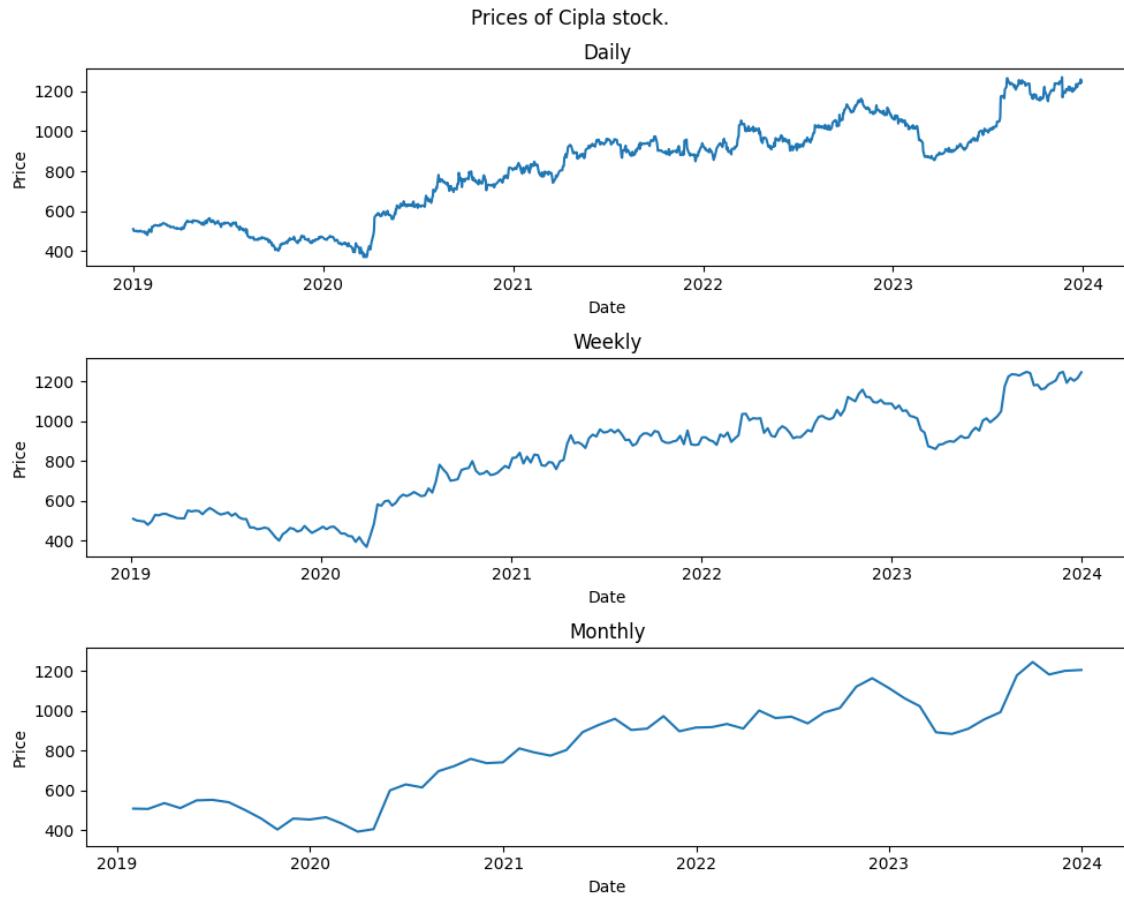


BRITANNIA NS

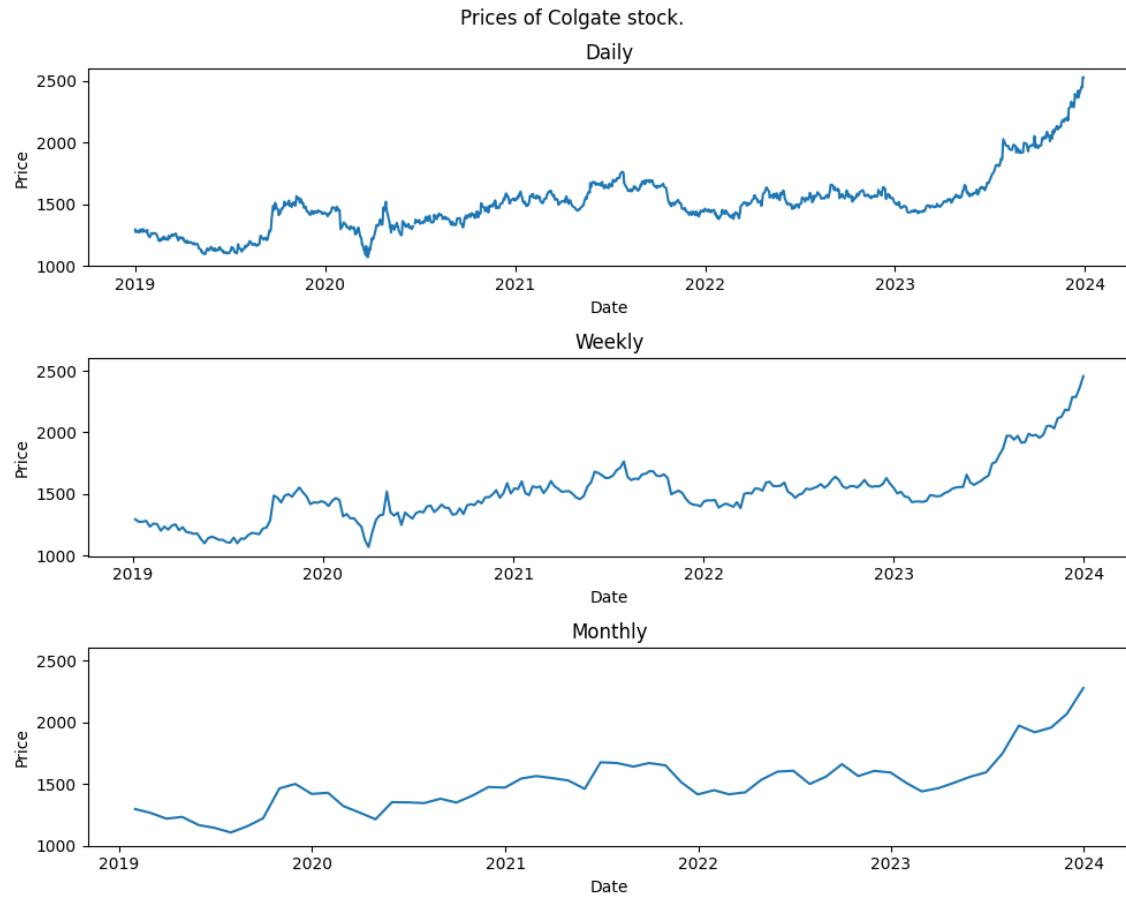
Prices of Britannia stock.



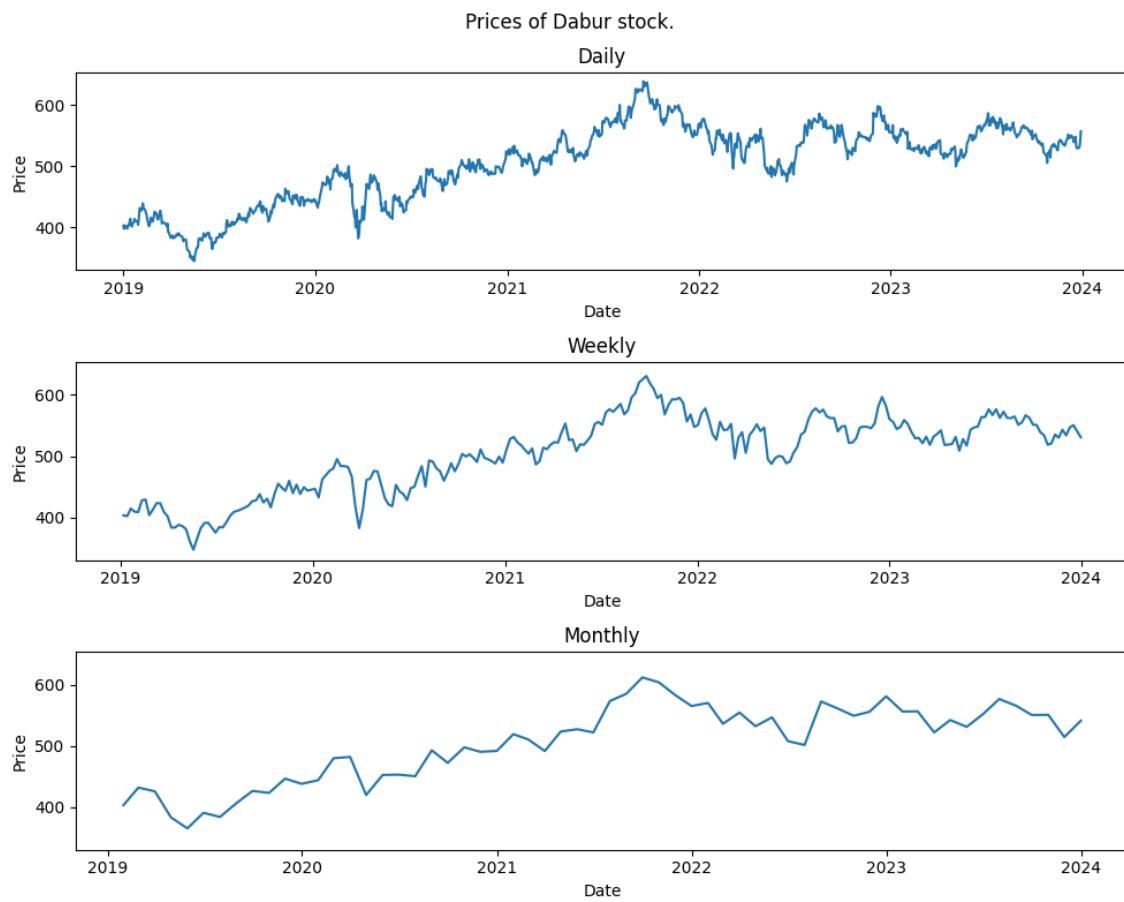
CIPLA NS



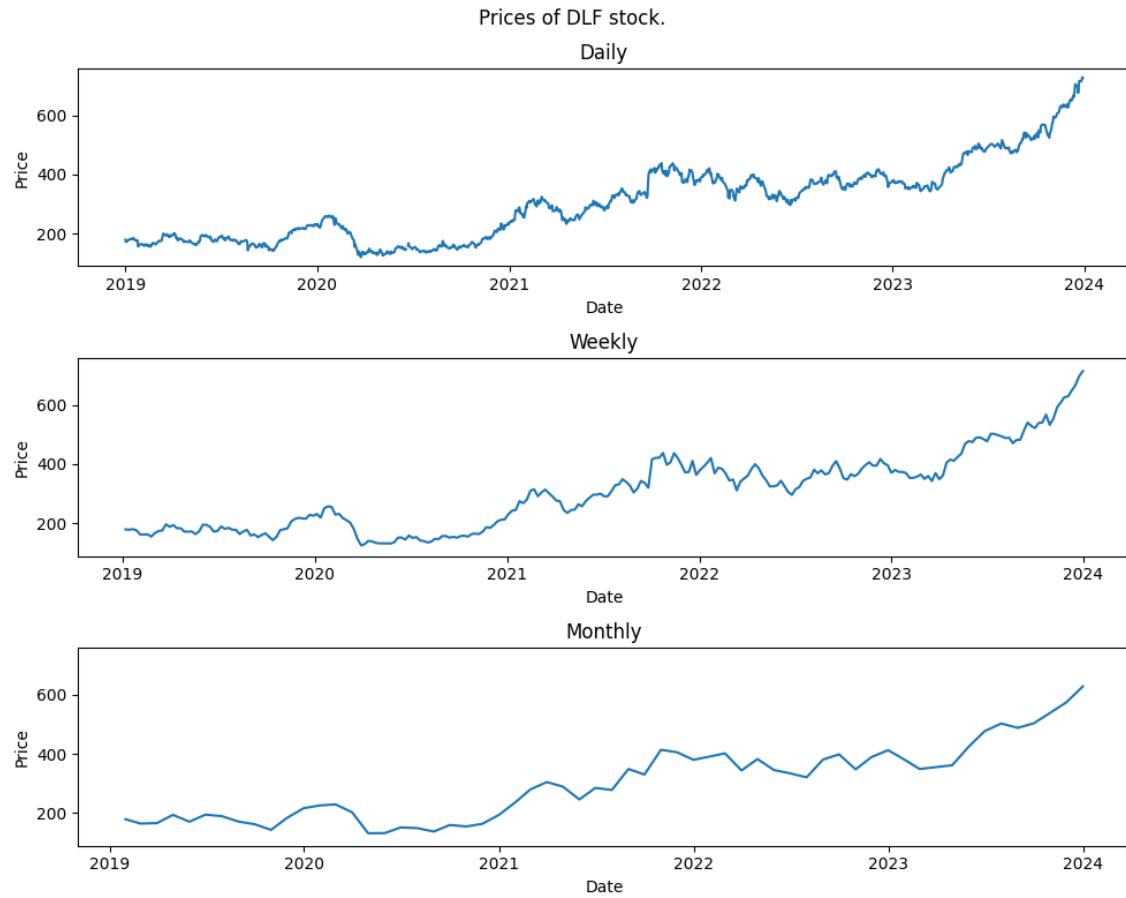
COLPAL BO



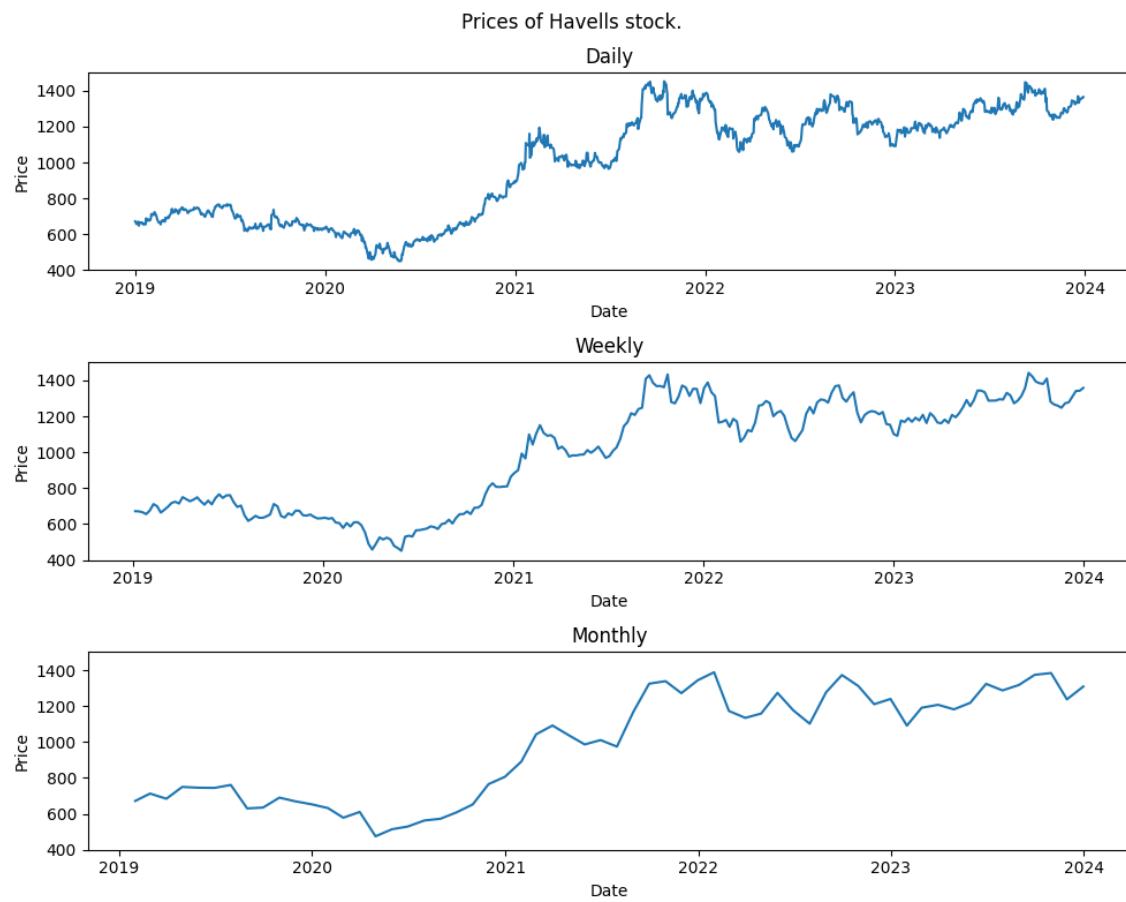
DABUR NS



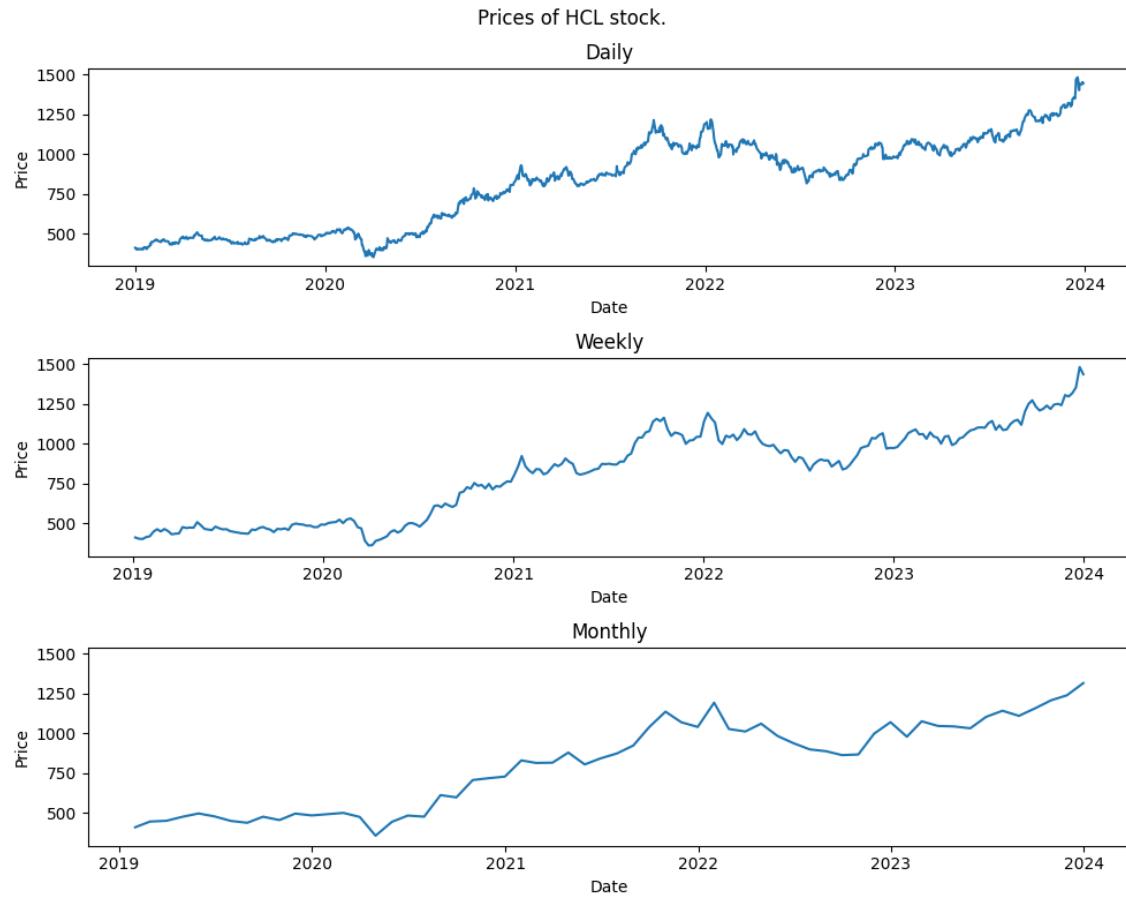
DLF BO



HAVELLS NS

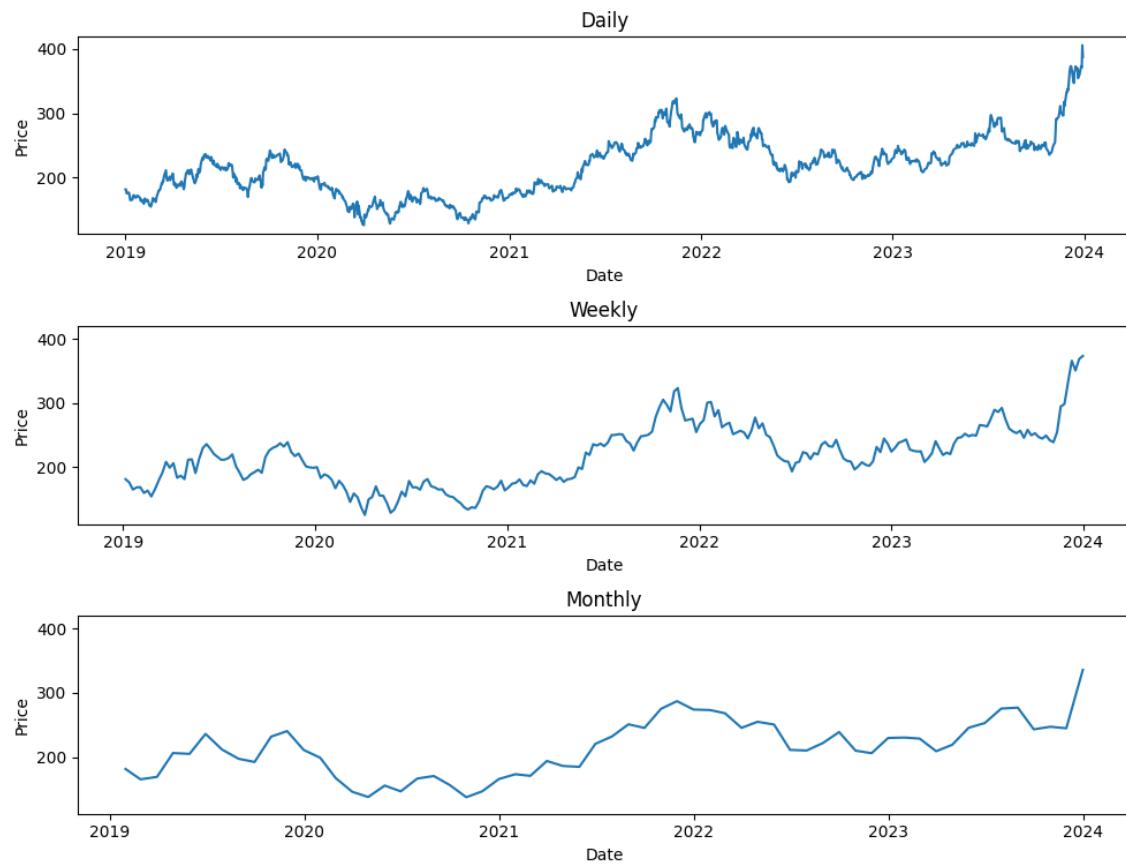


HCLTECH NS



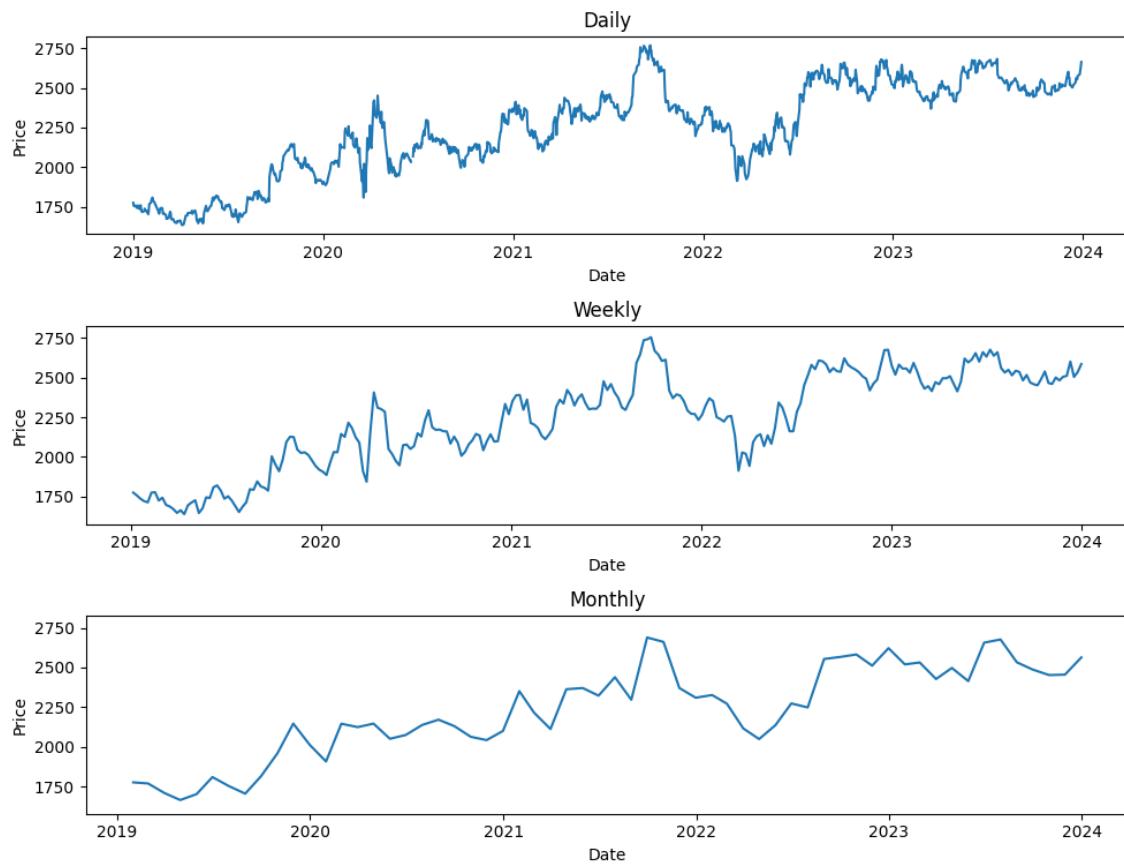
HINDPETRO NS

Prices of Hindustan Petroleum stock.

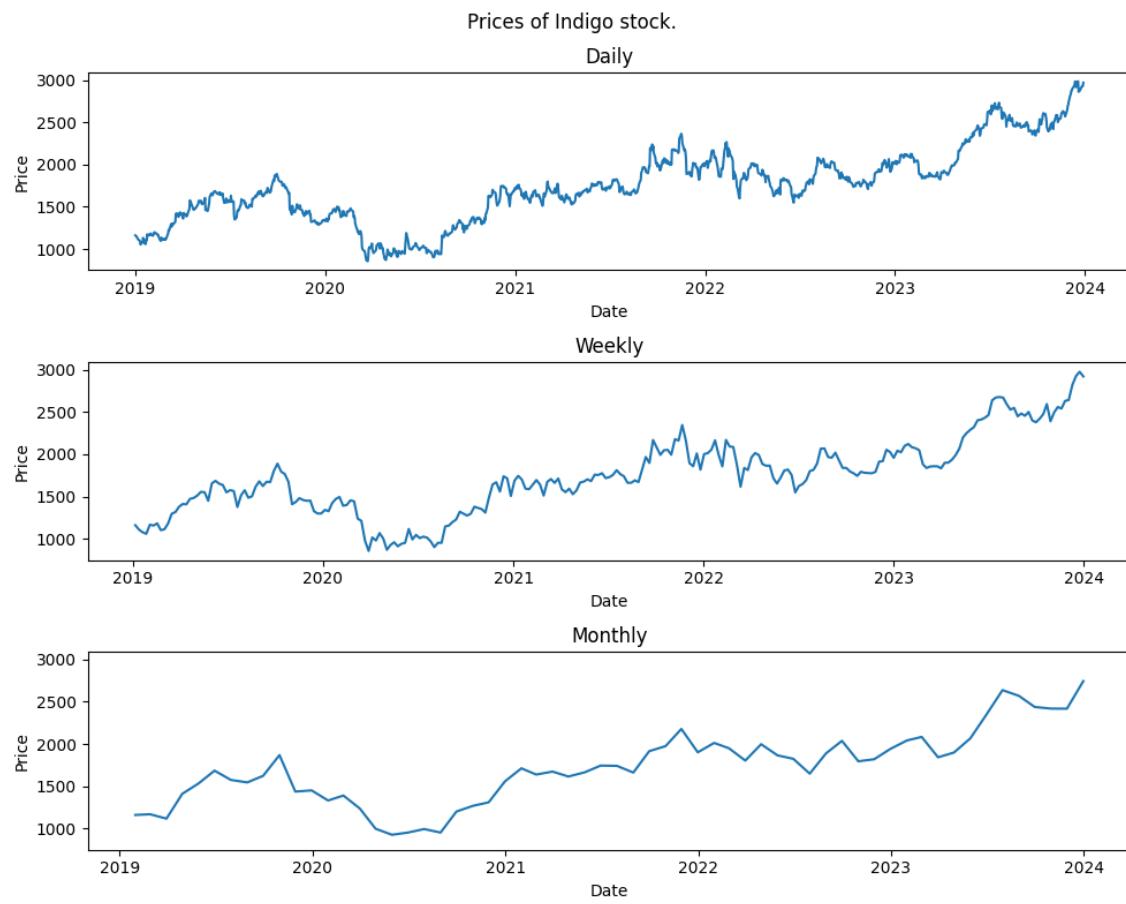


HINDUNILVR BO

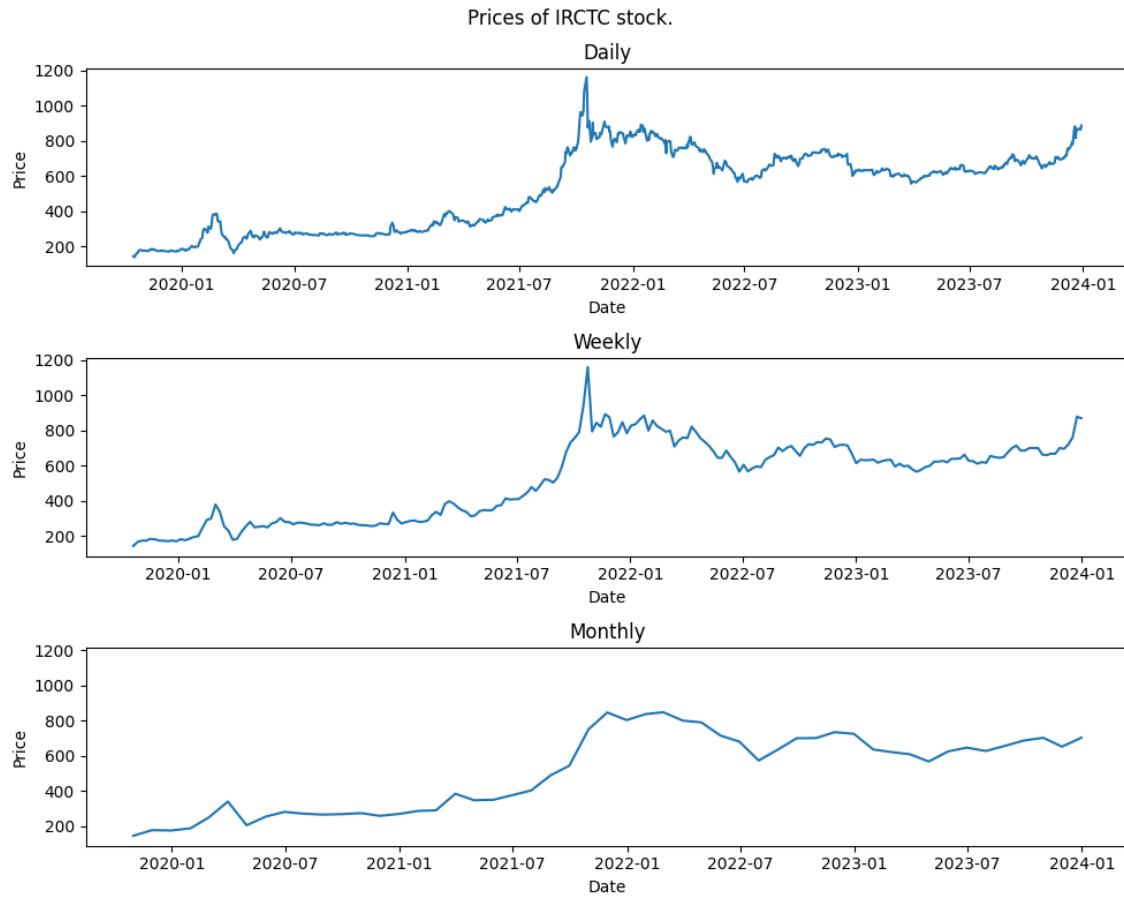
Prices of Hindustan Unilever Ltd stock.



INDIGO NS

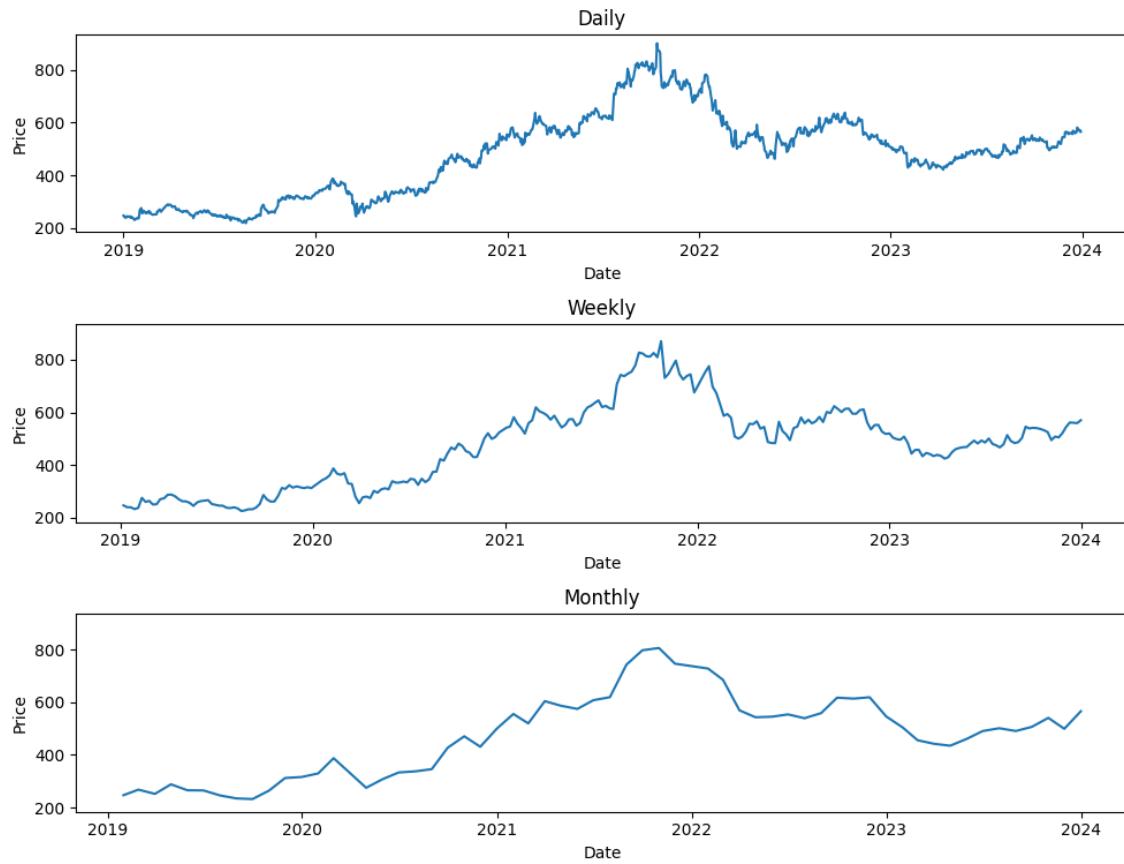


IRCTC BO

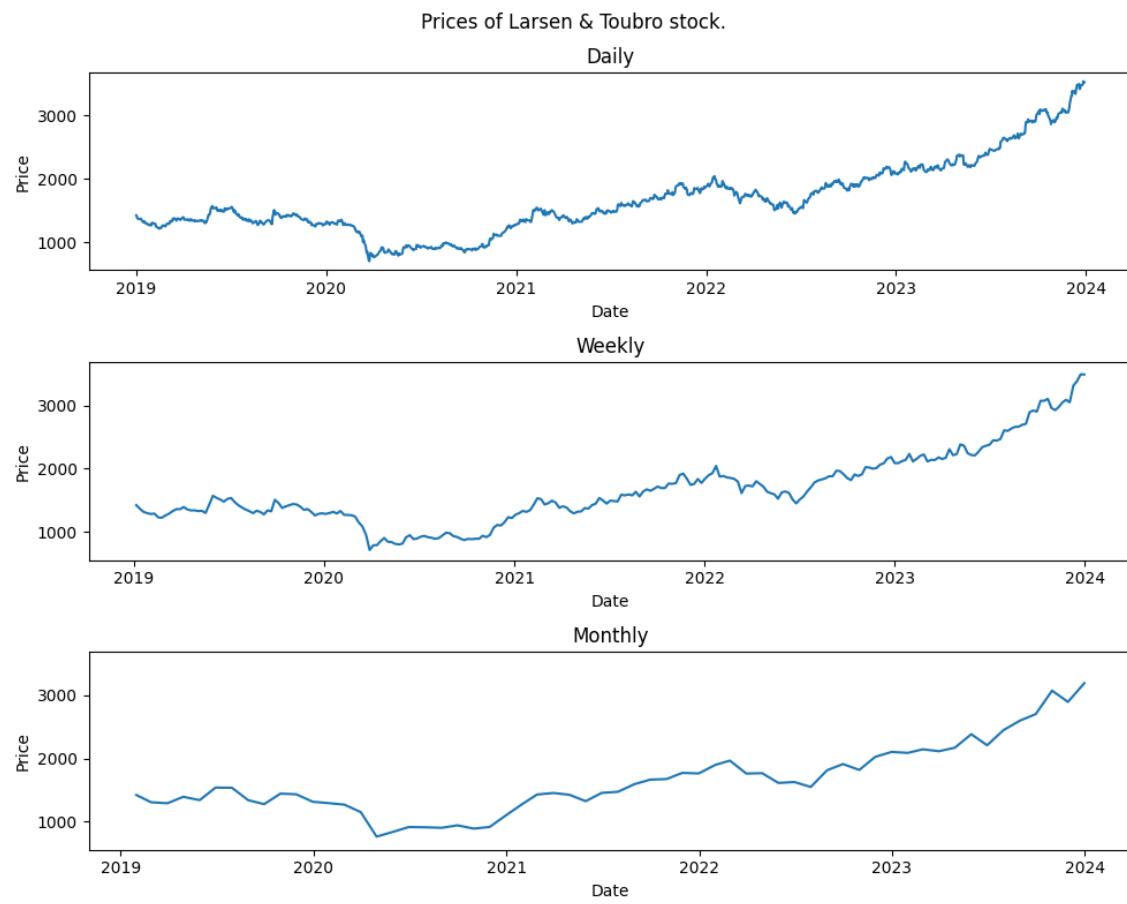


JUBLFOOD NS

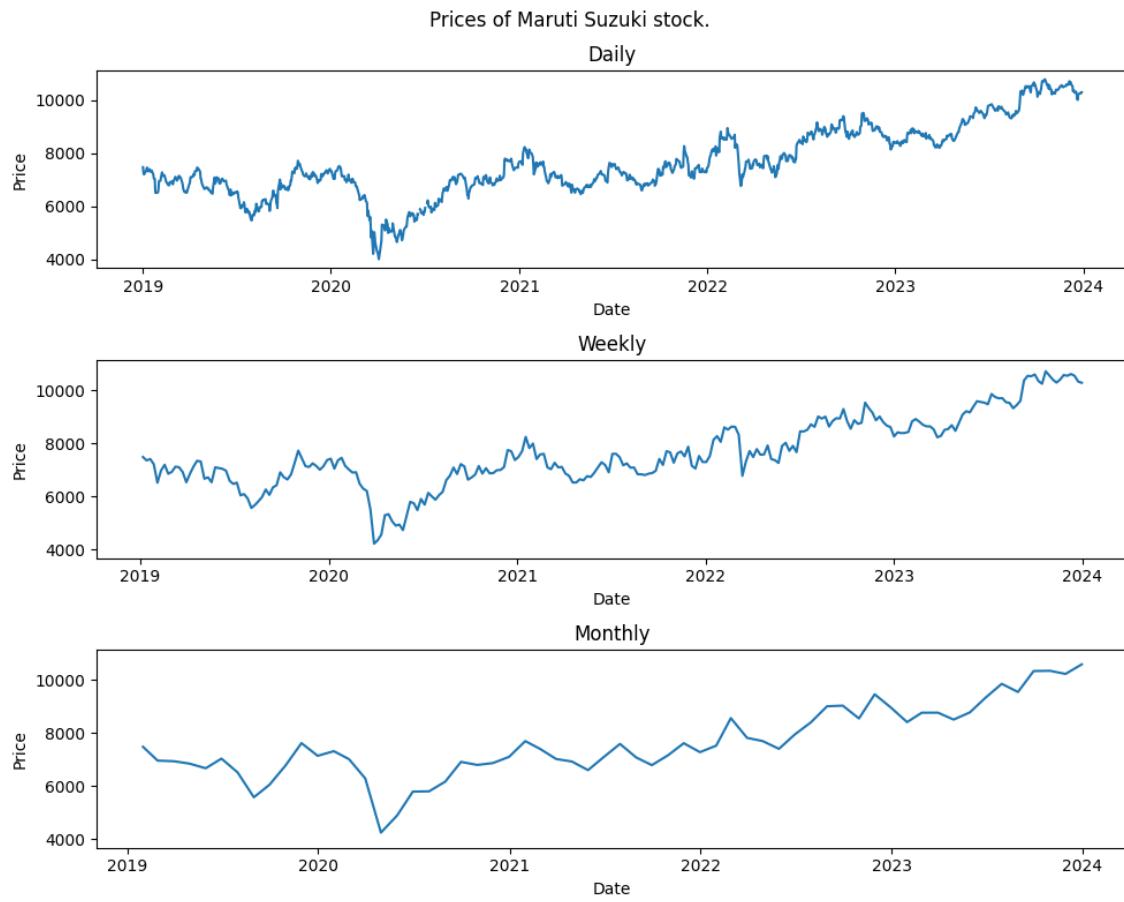
Prices of Jubilant Foods stock.



LT BO



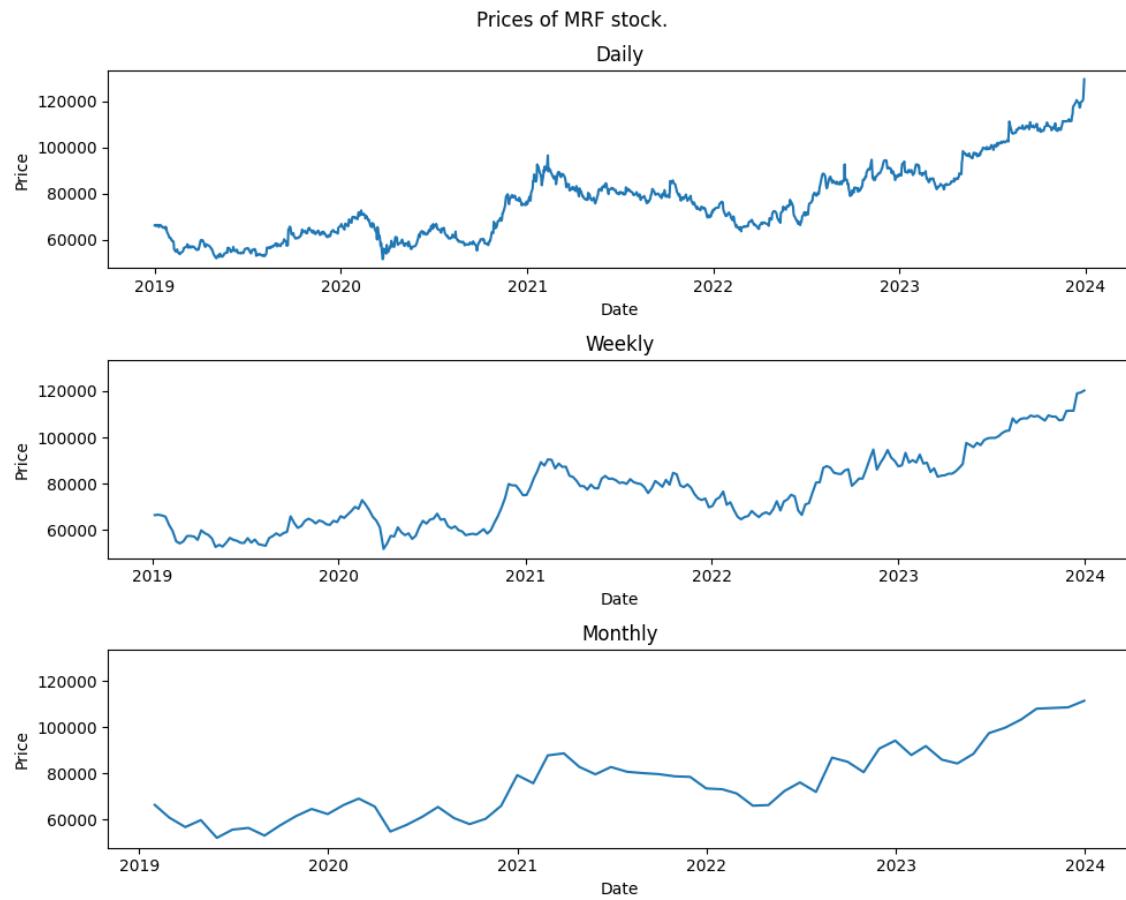
MARUTI BO



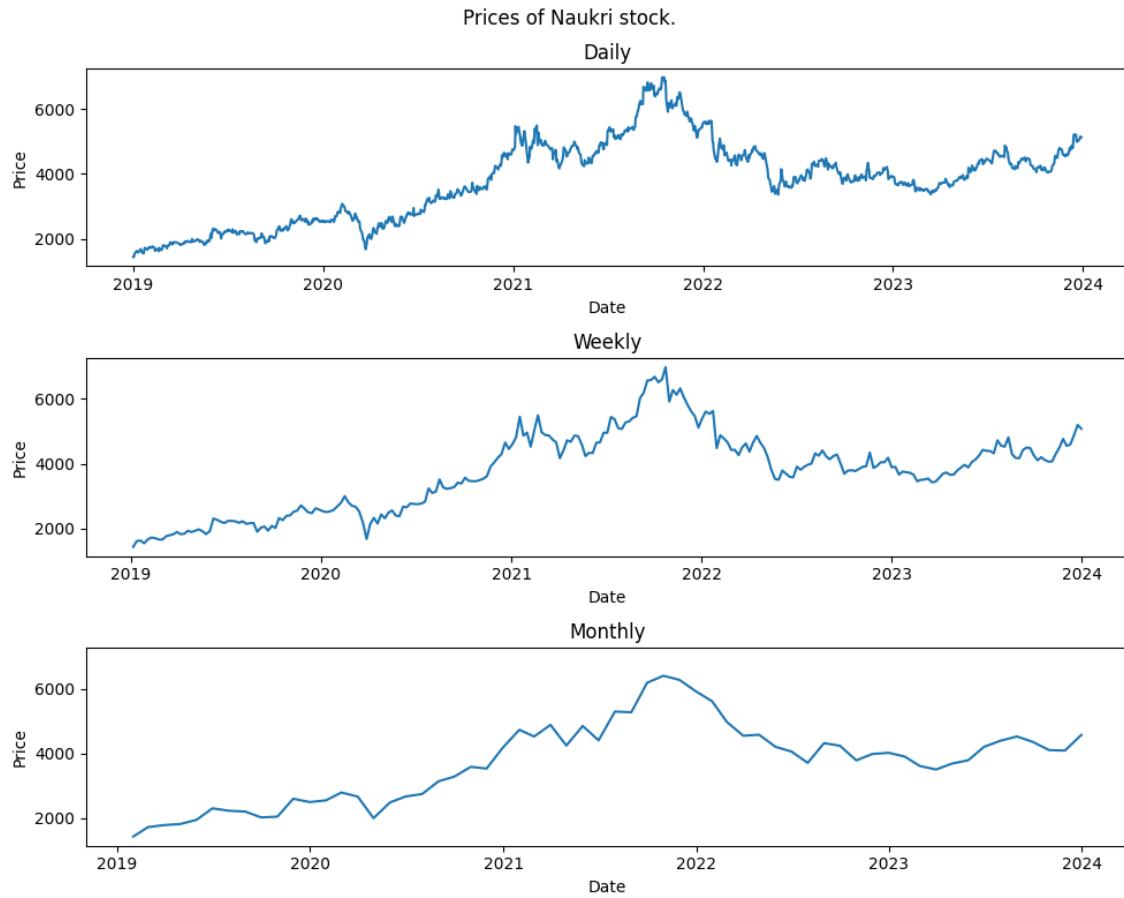
MFSL BO



MRF NS

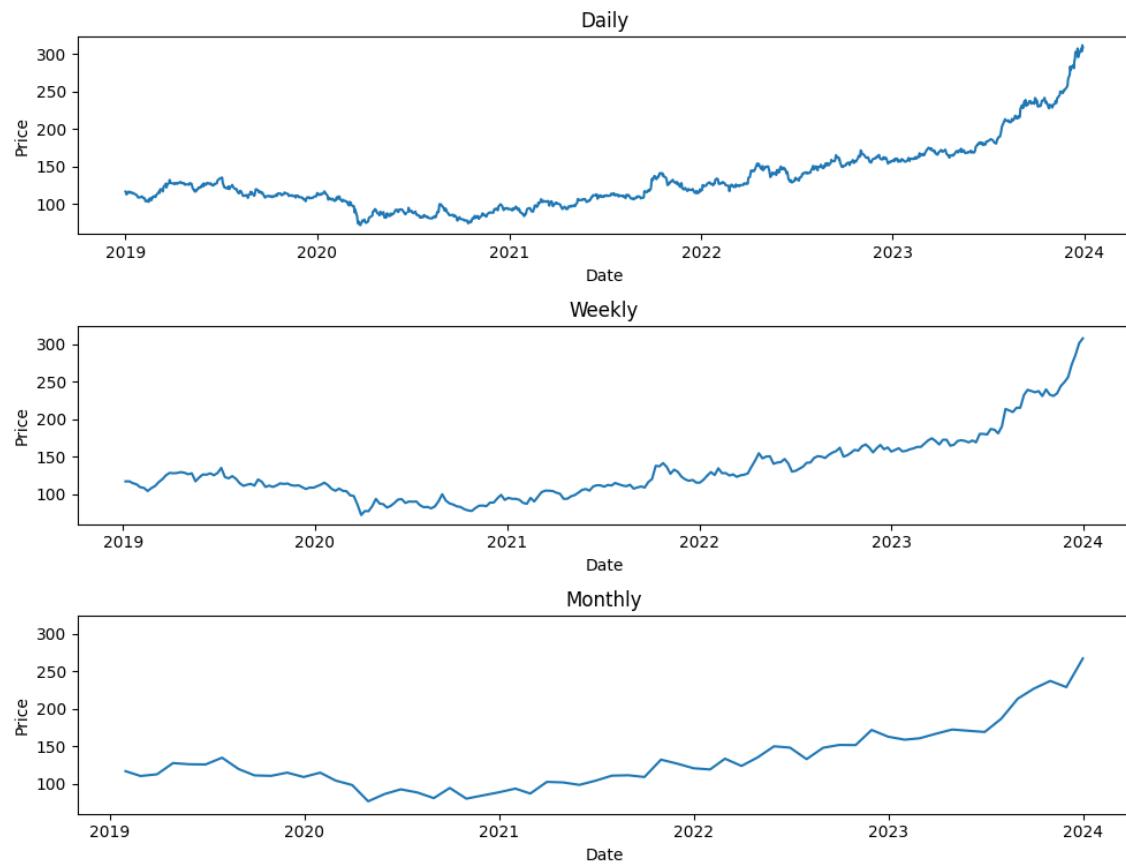


NAUKRI BO



NTPC BO

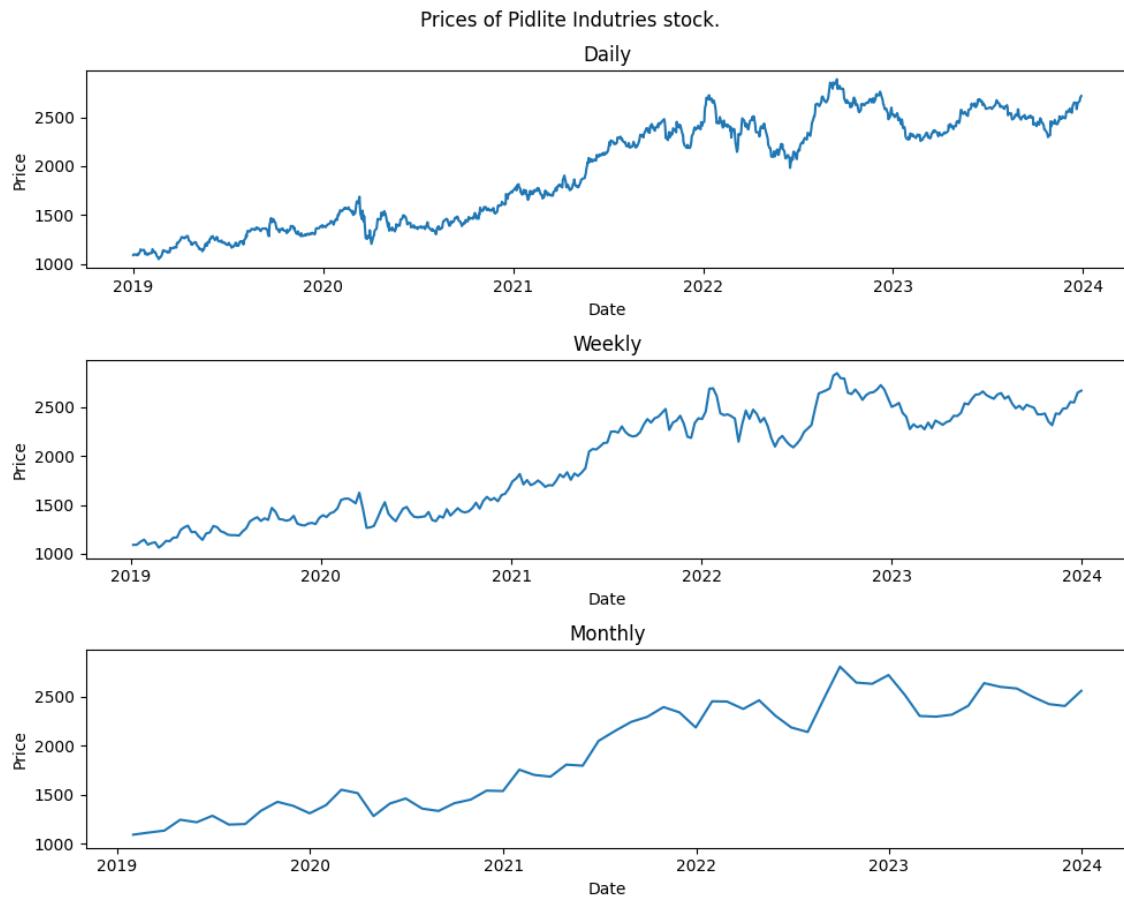
Prices of NTPC Corp. stock.



PEL NS

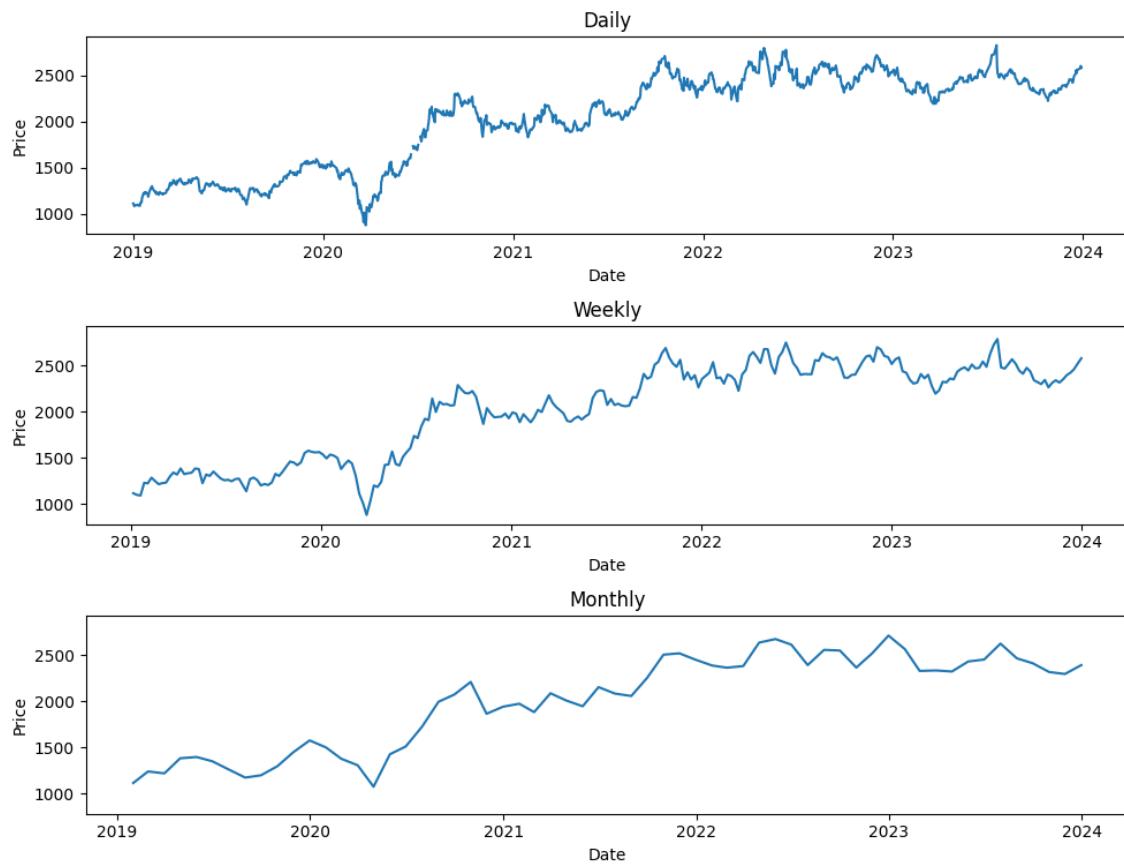


PIDILITIND BO



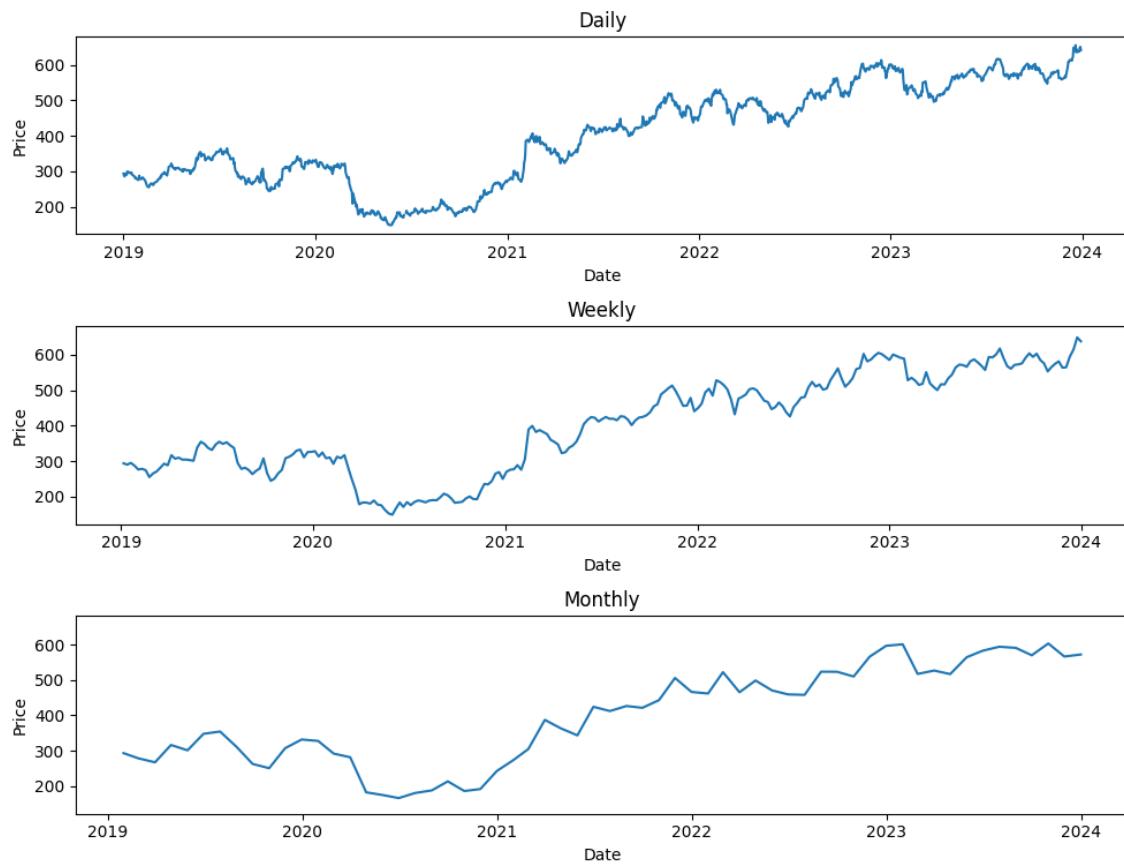
RELIANCE BO

Prices of Reliance Industries stock.



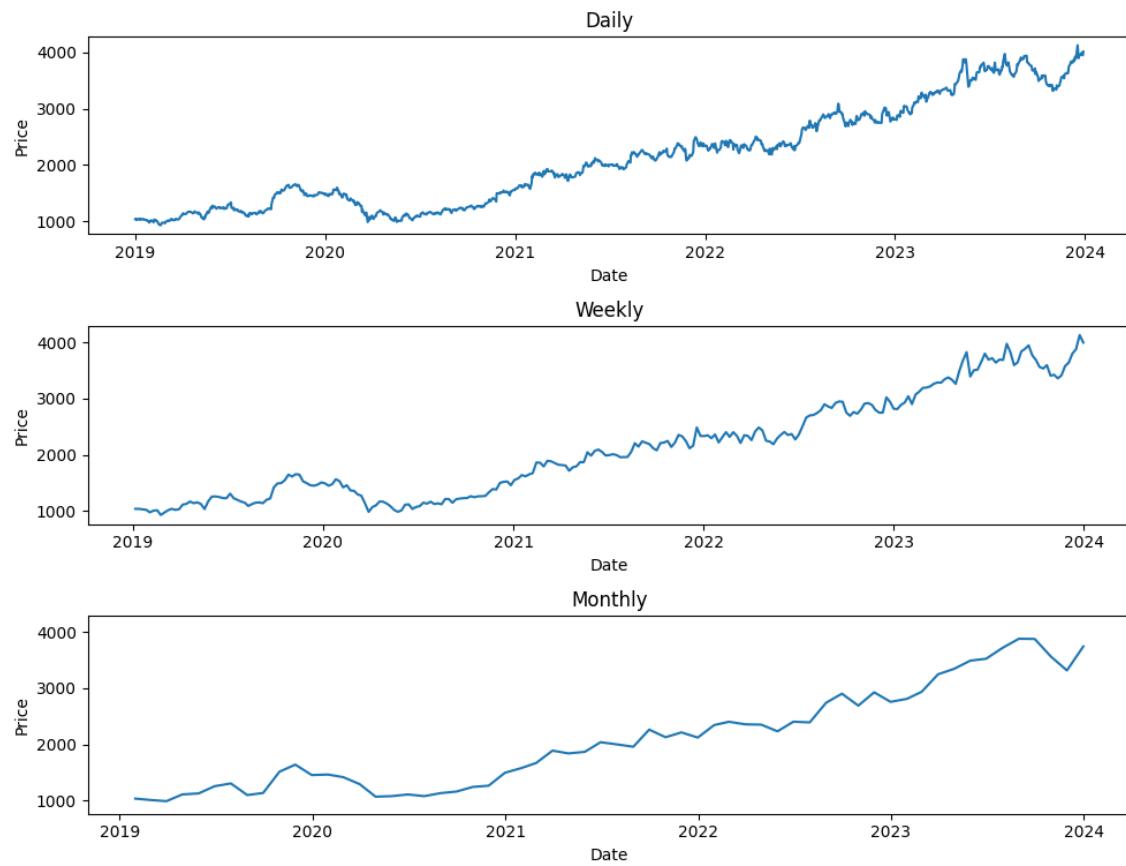
SBIN BO

Prices of State Bank of India stock.



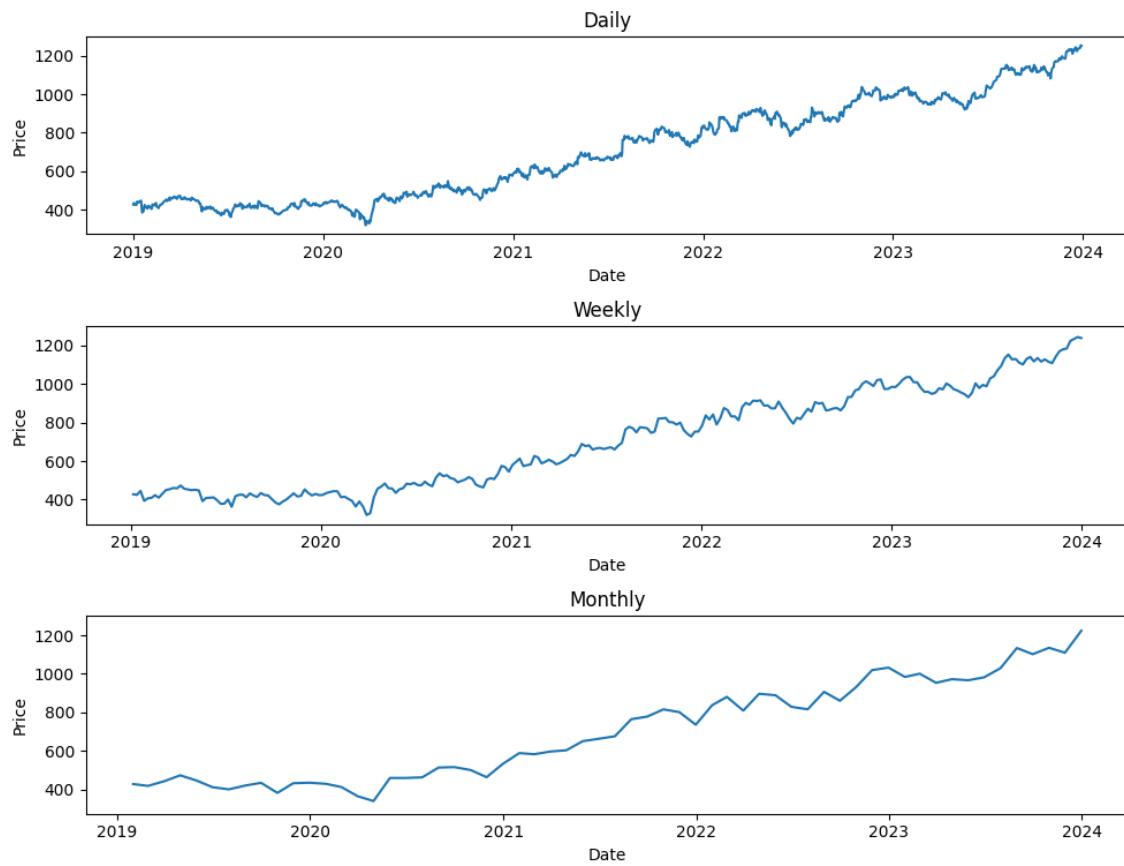
SIEMENS NS

Prices of Siemens stock.

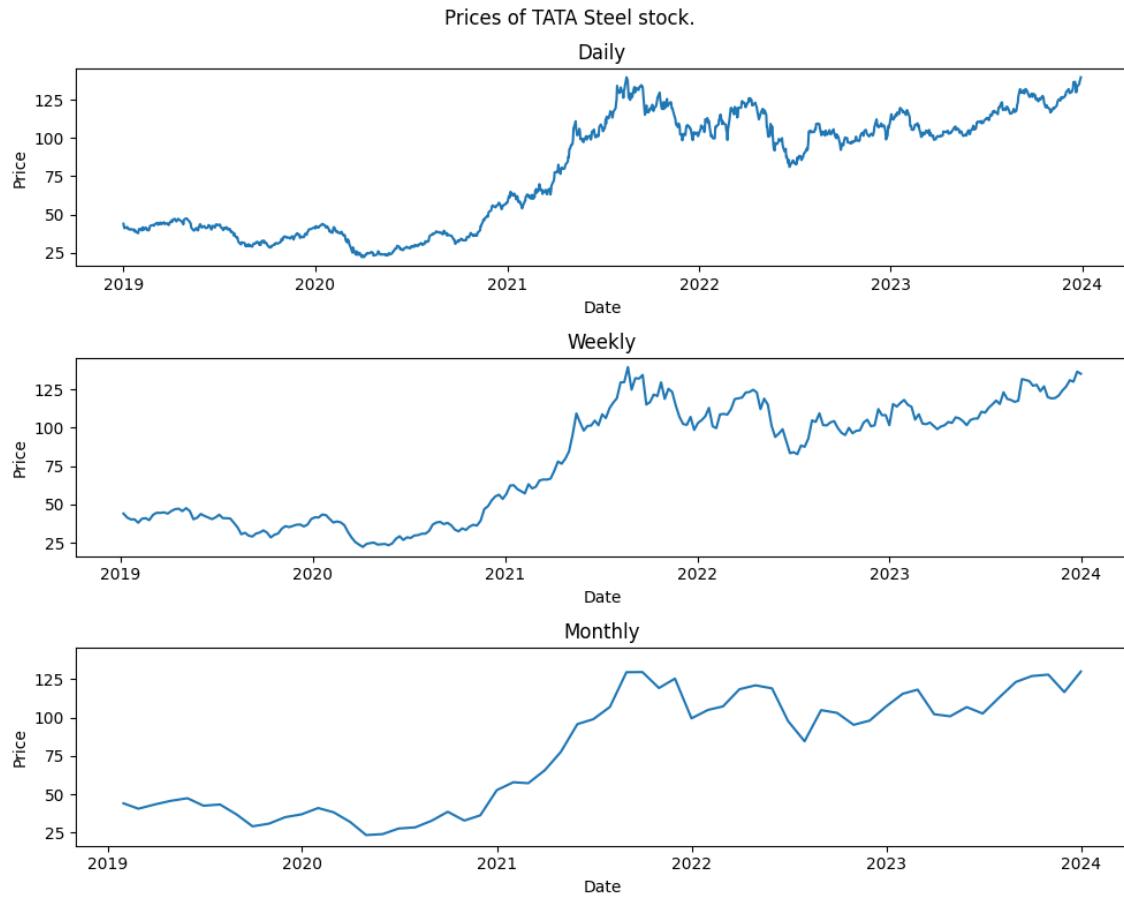


SUNPHARMA BO

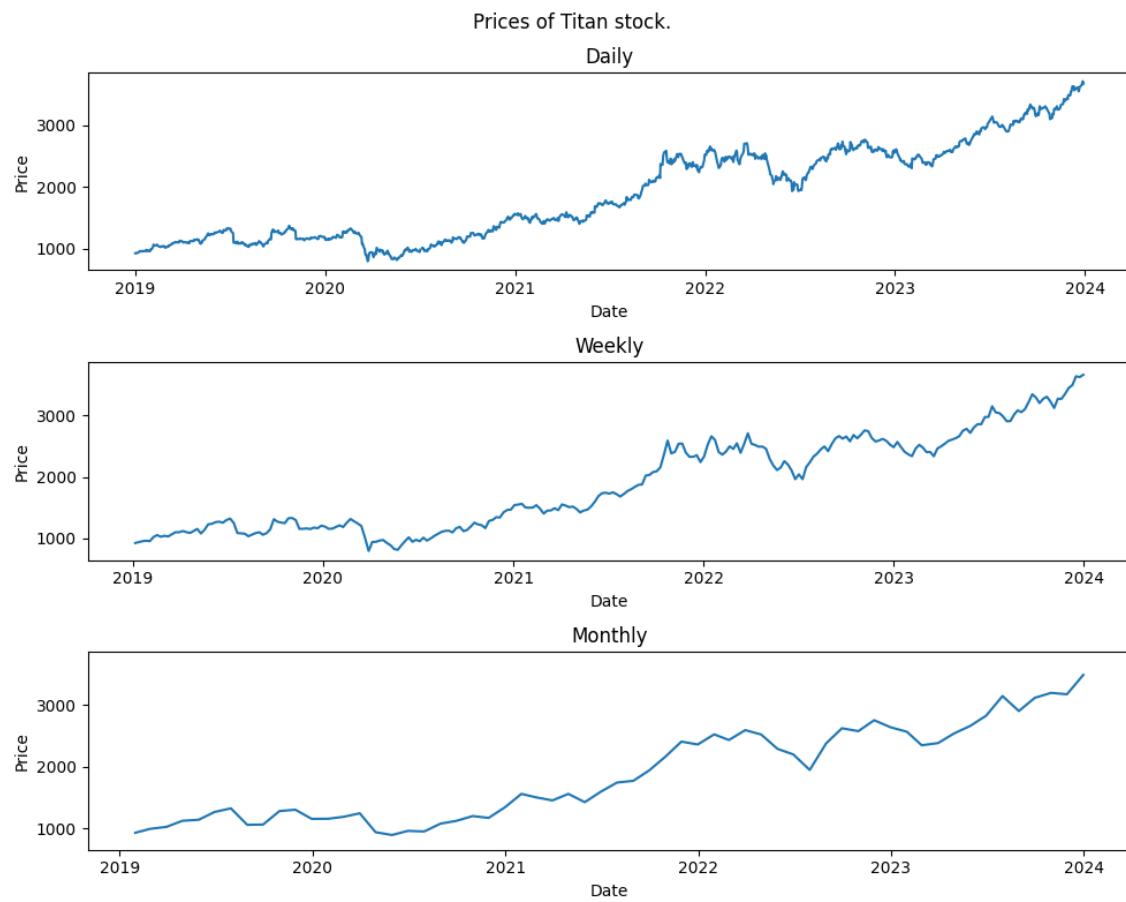
Prices of Sun Pharma stock.



TATASTEEL NS

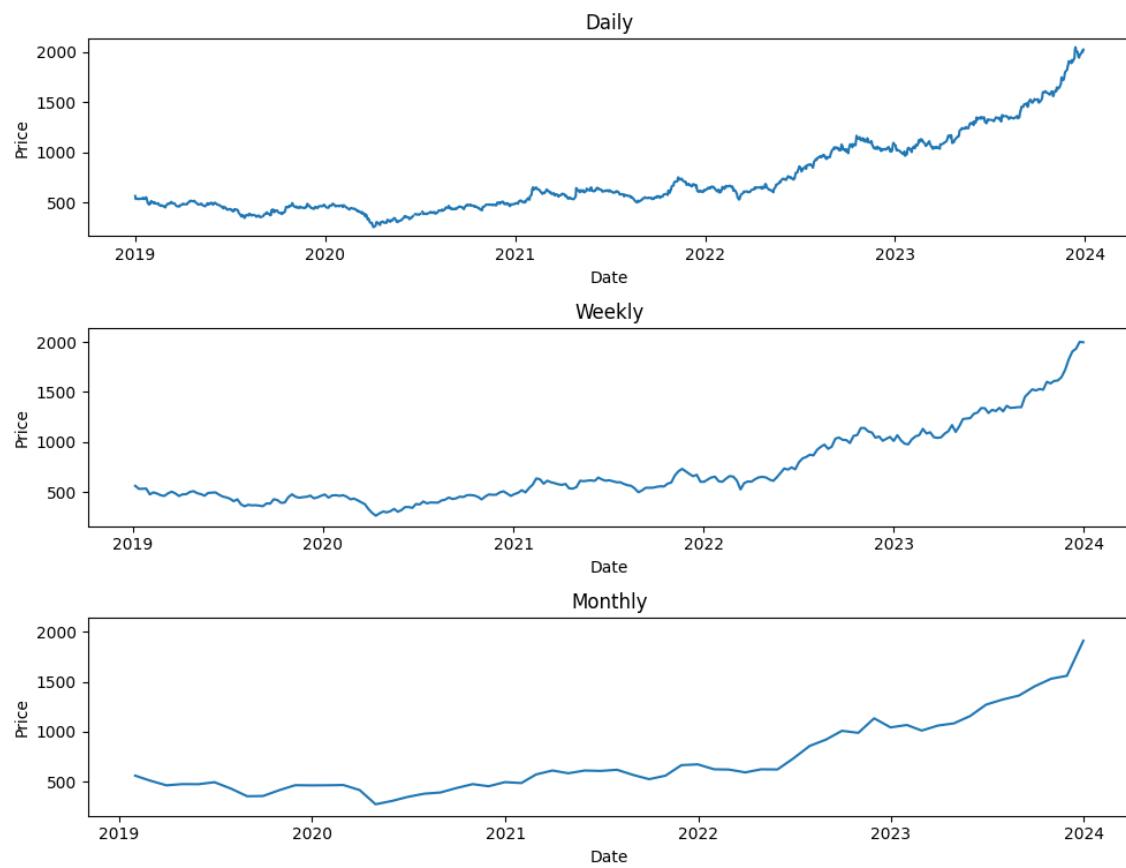


TITAN BO

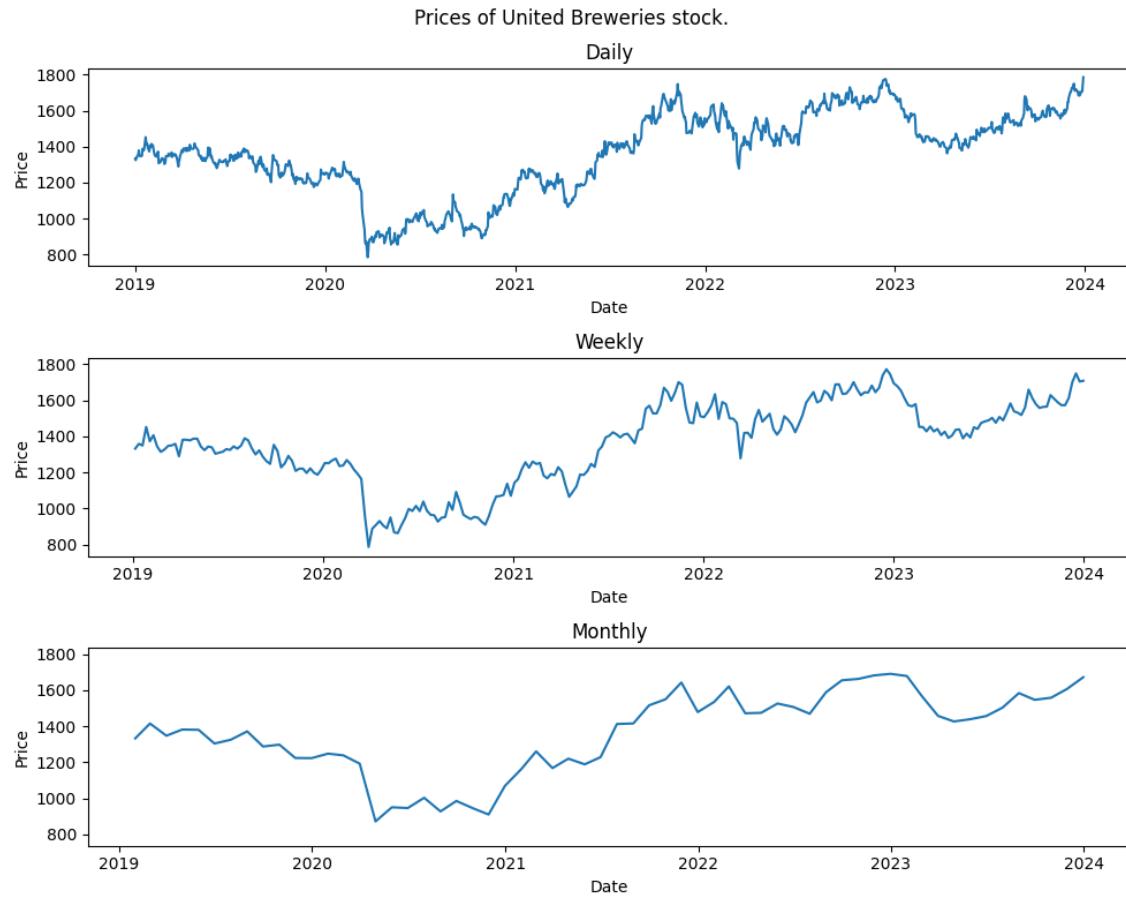


TVSMOTOR BO

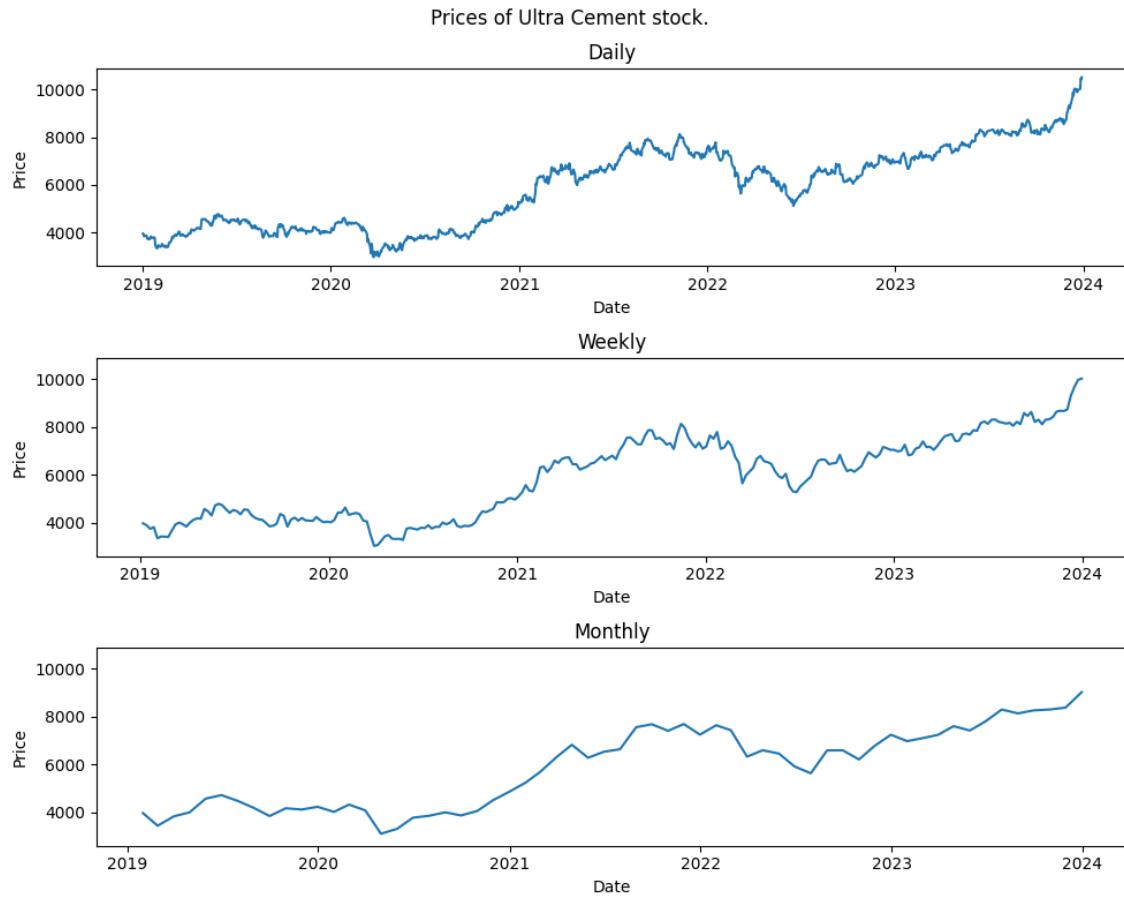
Prices of TVS Motors stock.



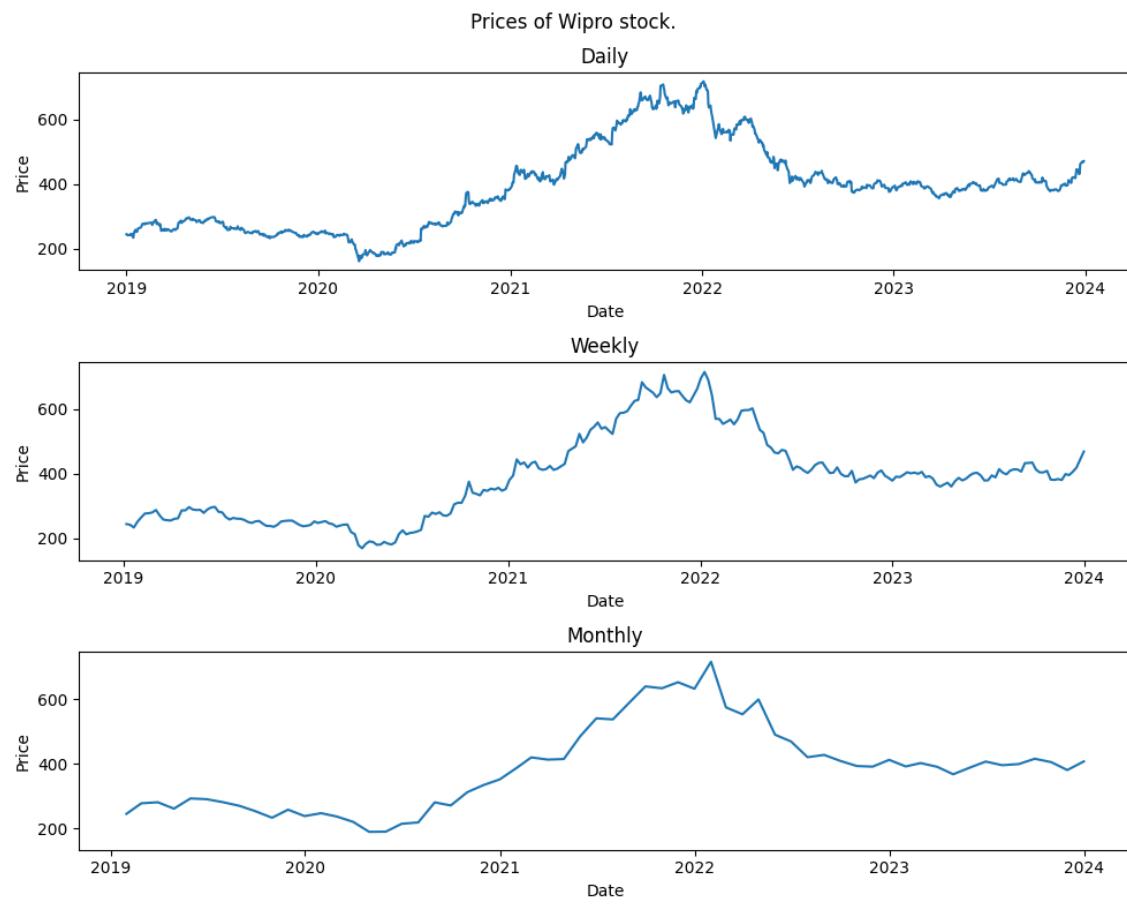
UBL NS



ULTRACEMCO BO

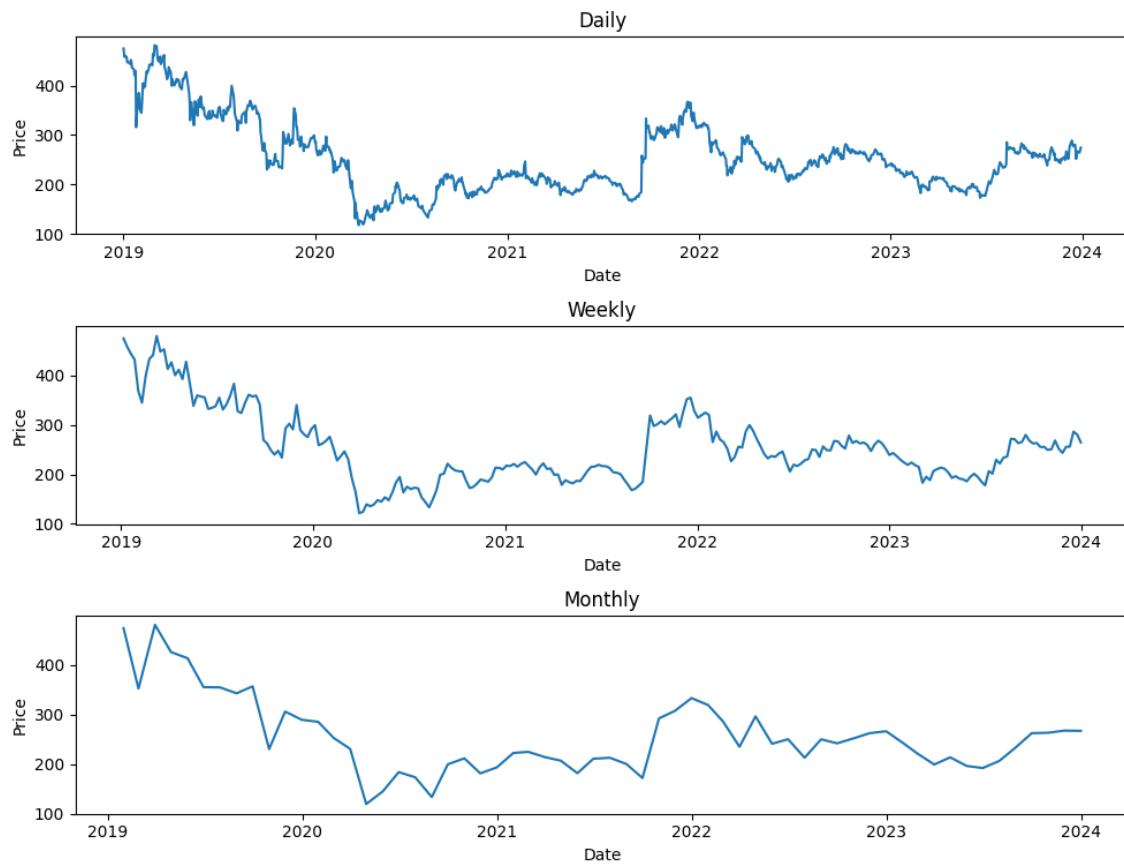


WIPRO BO



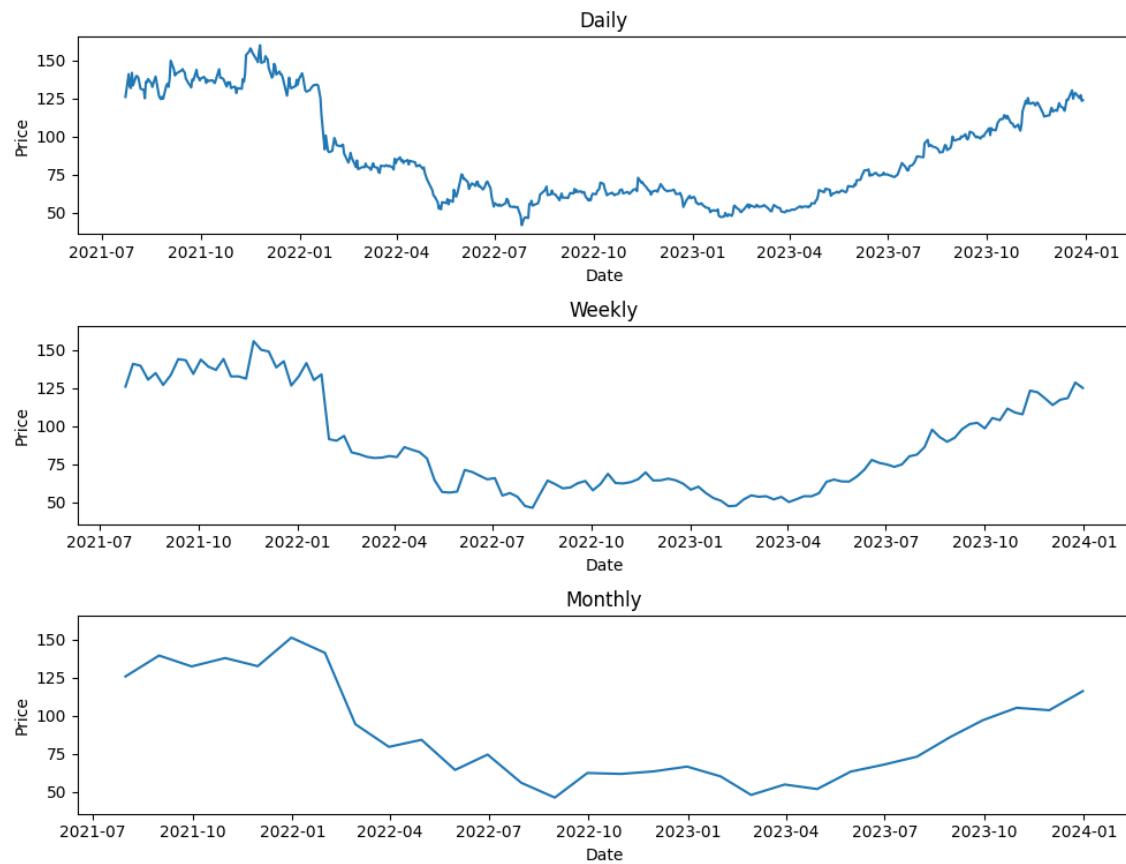
ZEEL BO

Prices of Zee Entertainment stock.



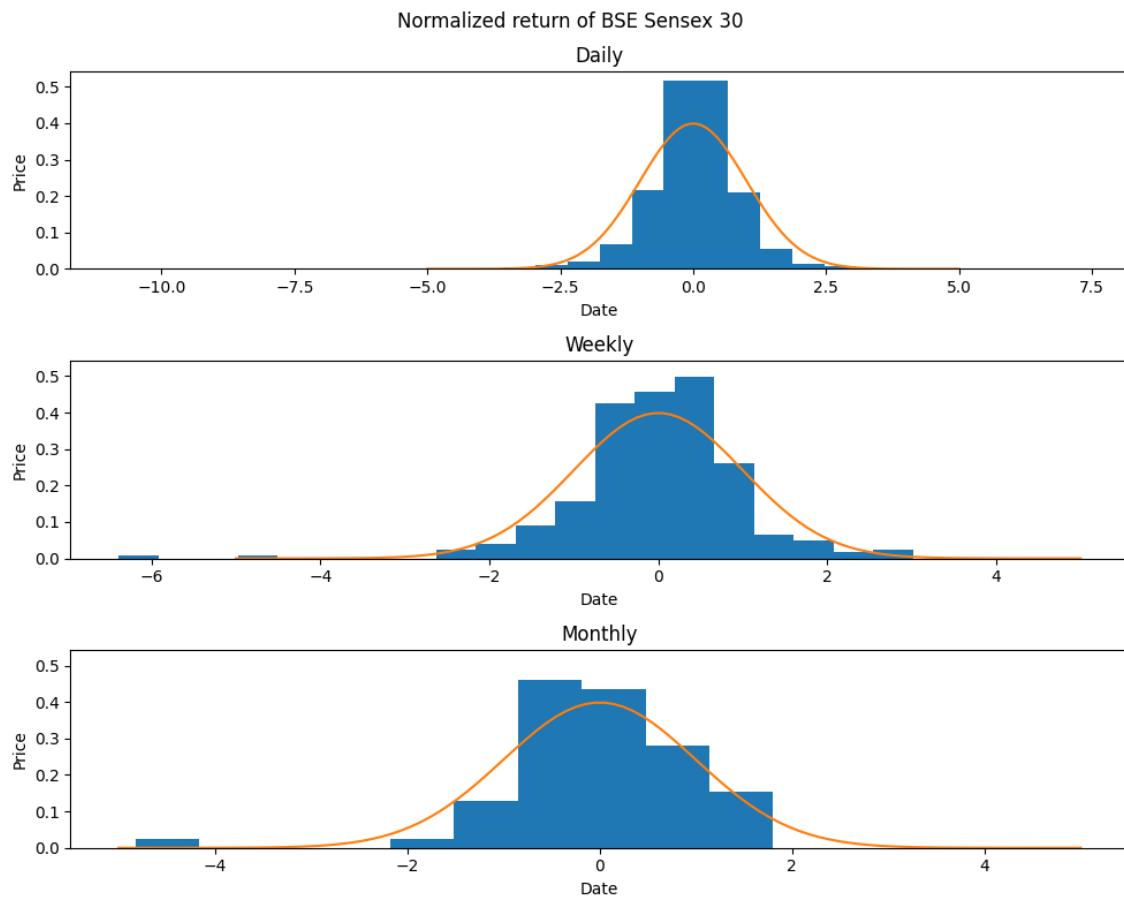
ZOMATO BO

Prices of Zomato stock.

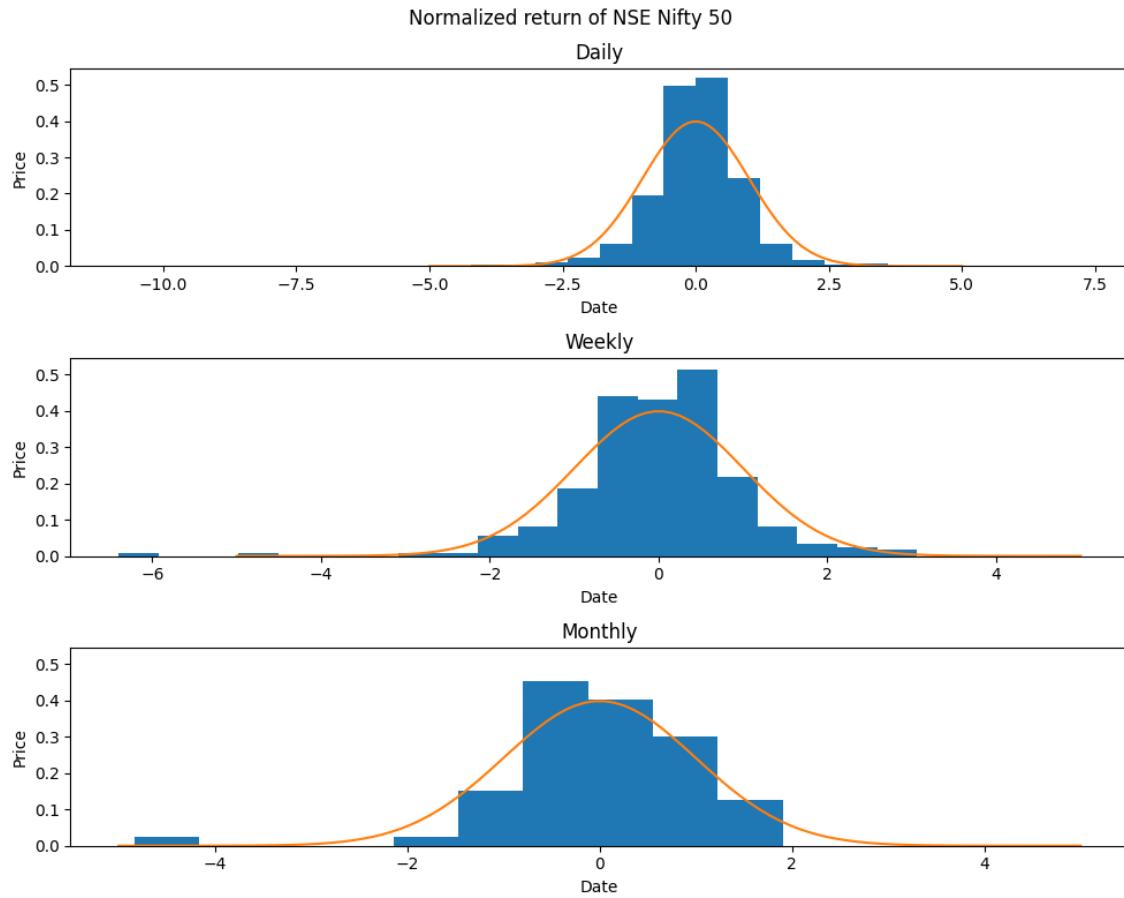


Q2 Indices

BSE SENSEX 30 RETURNS

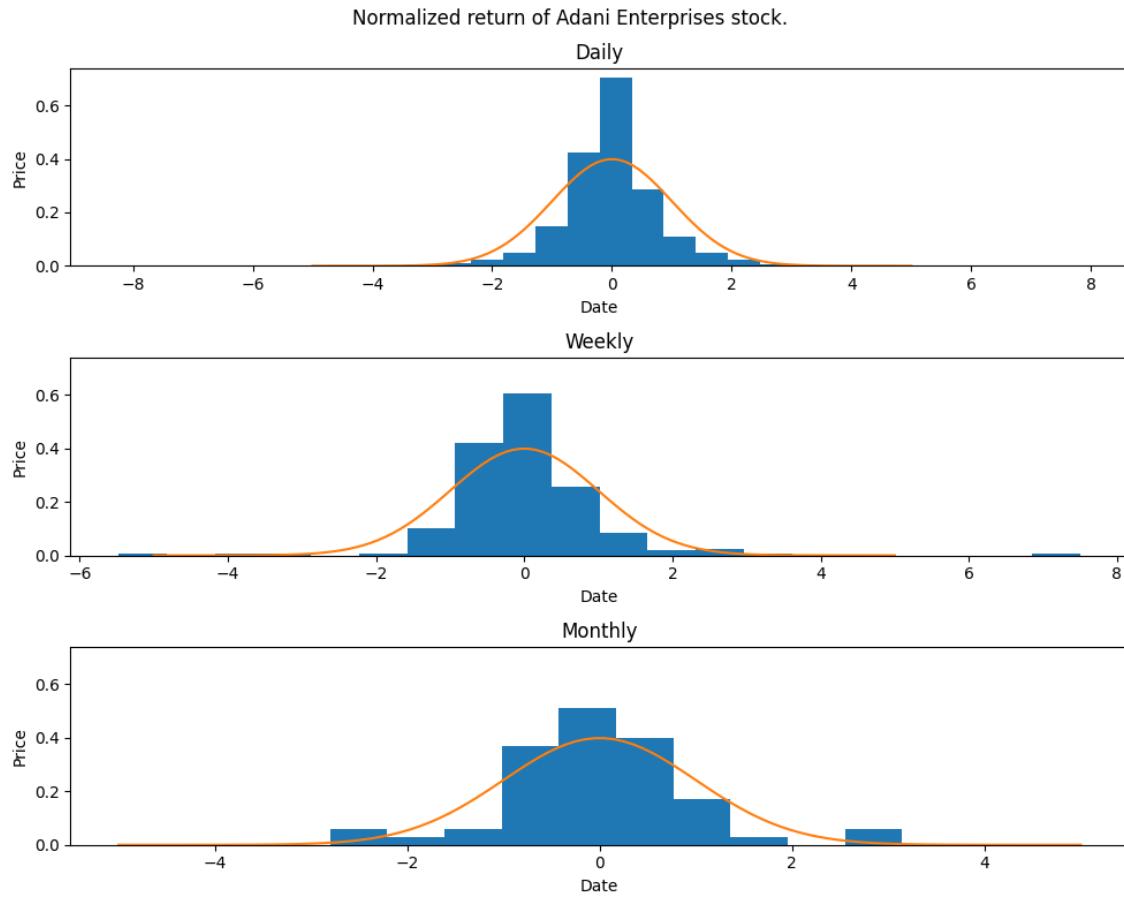


NSE NIFTY 50 RETURNS



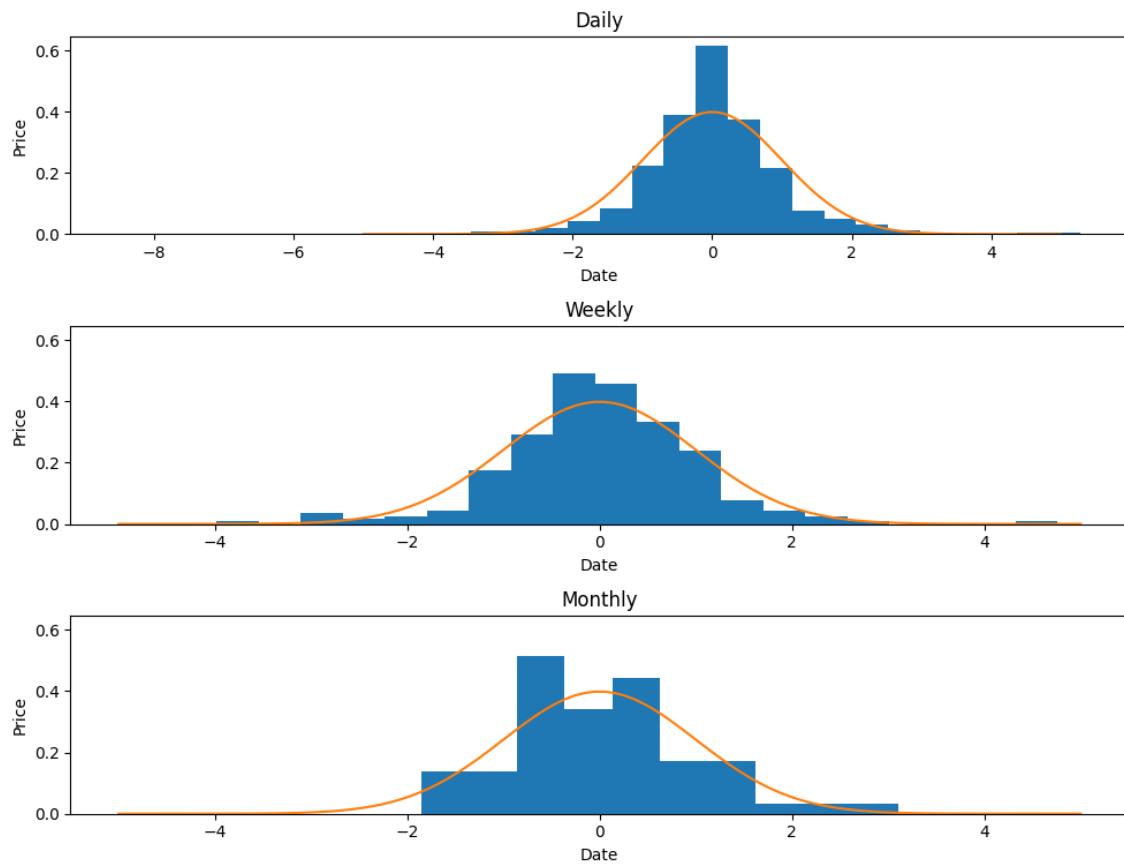
Q2 Stocks

ADANIENT NS RETURNS



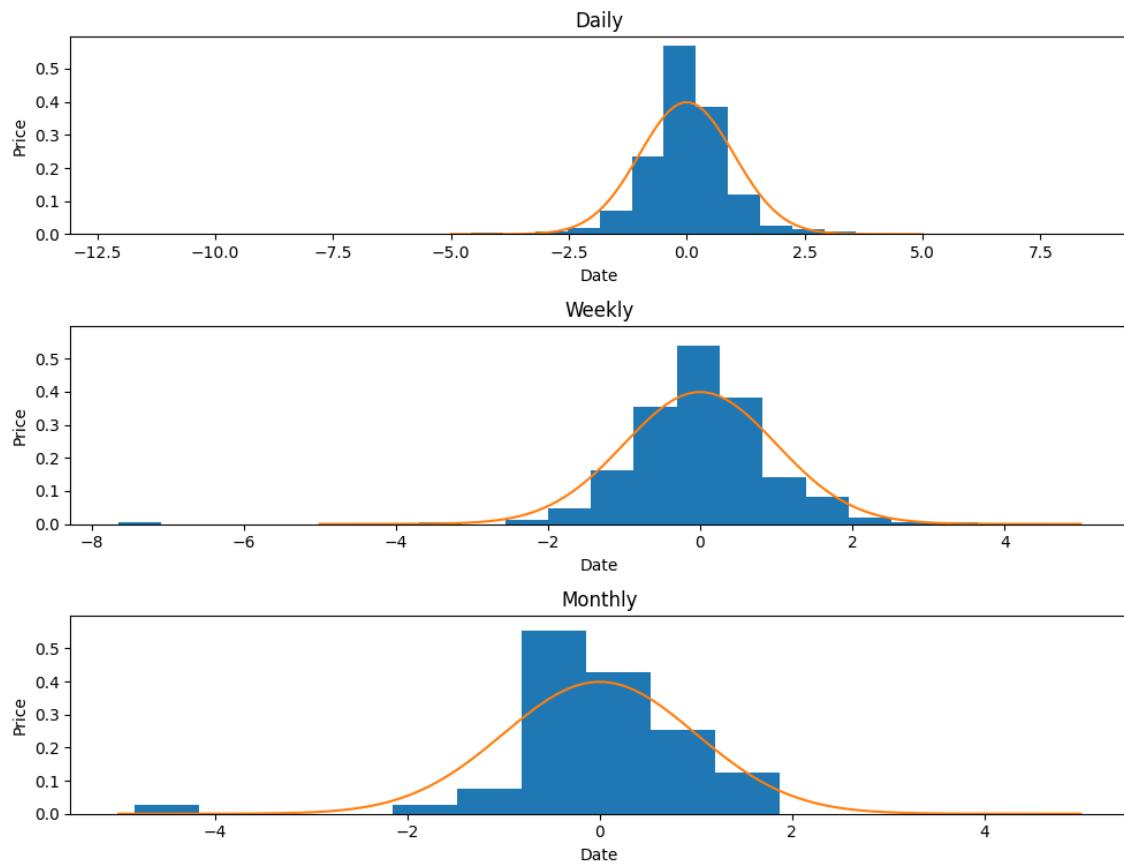
ASIANPAINT NS RETURNS

Normalized return of Asian Paints stock.



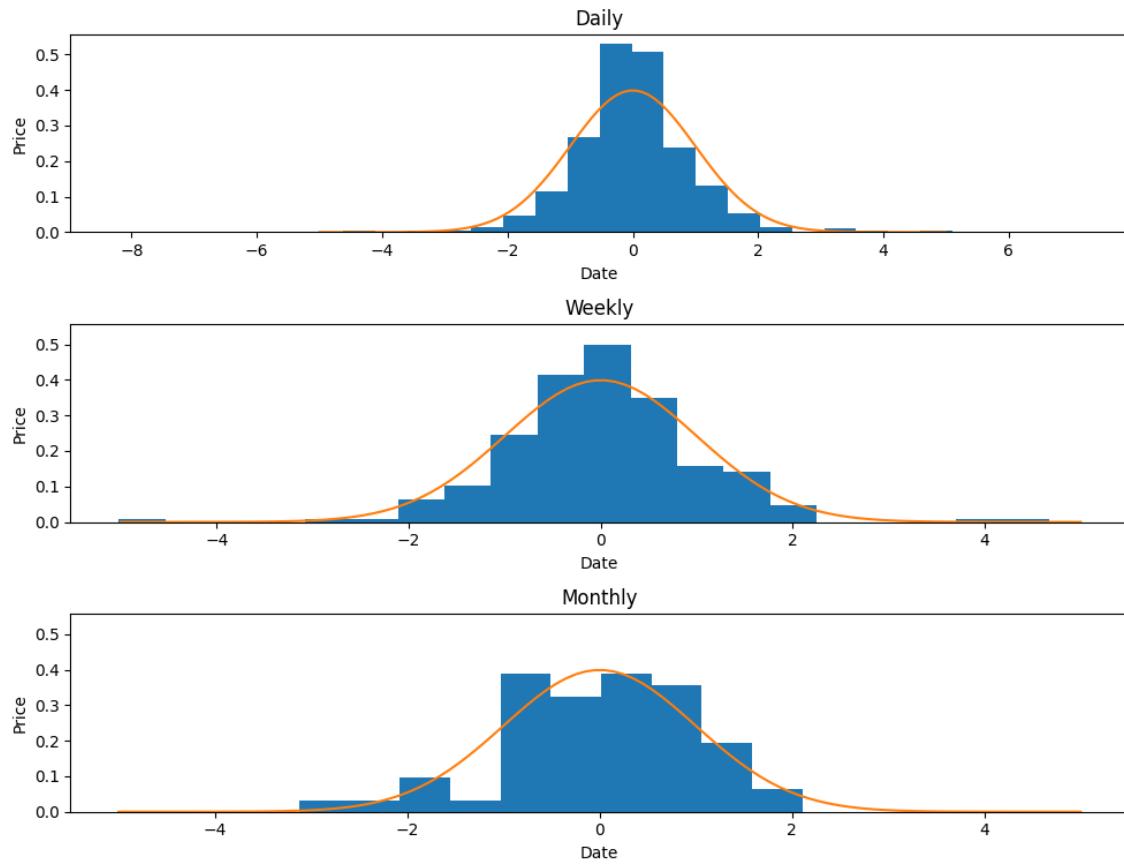
AXISBANK NS RETURNS

Normalized return of Axis Bank stock.



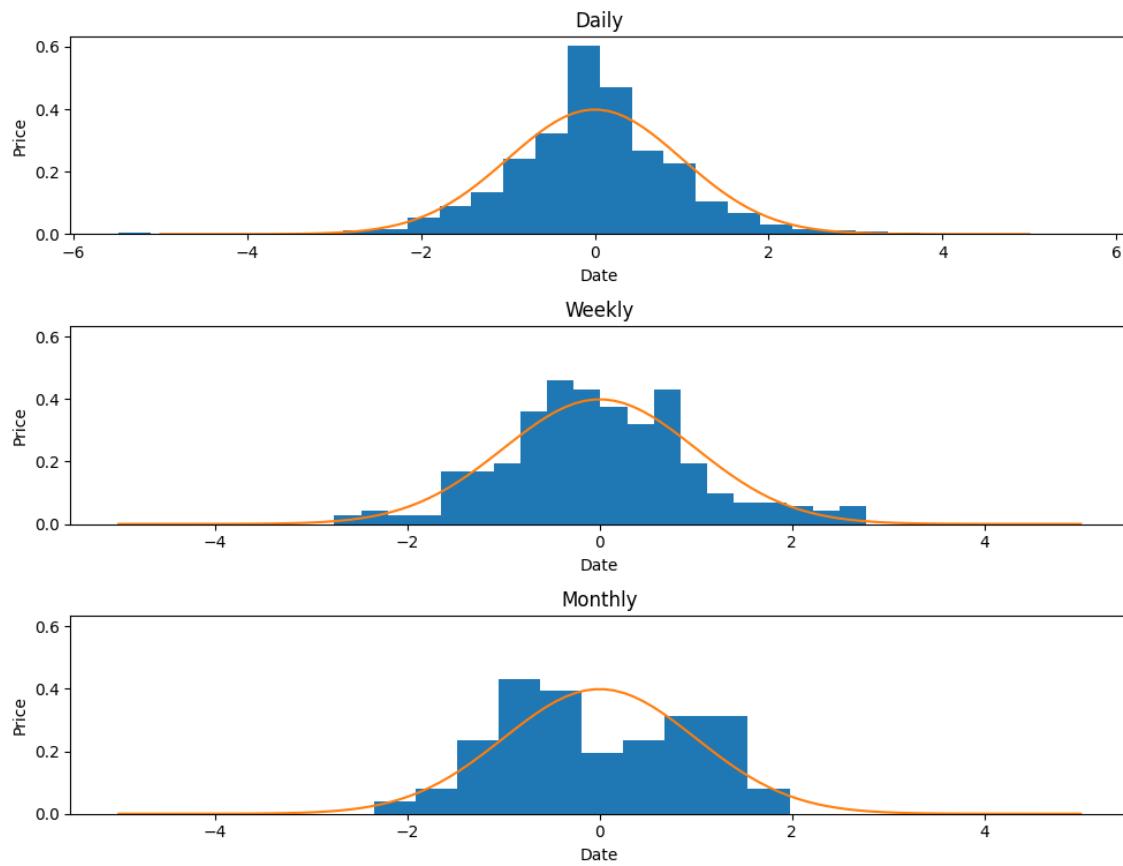
BAJAJ-AUTO NS RETURNS

Normalized return of Bajaj Automobiles stock.



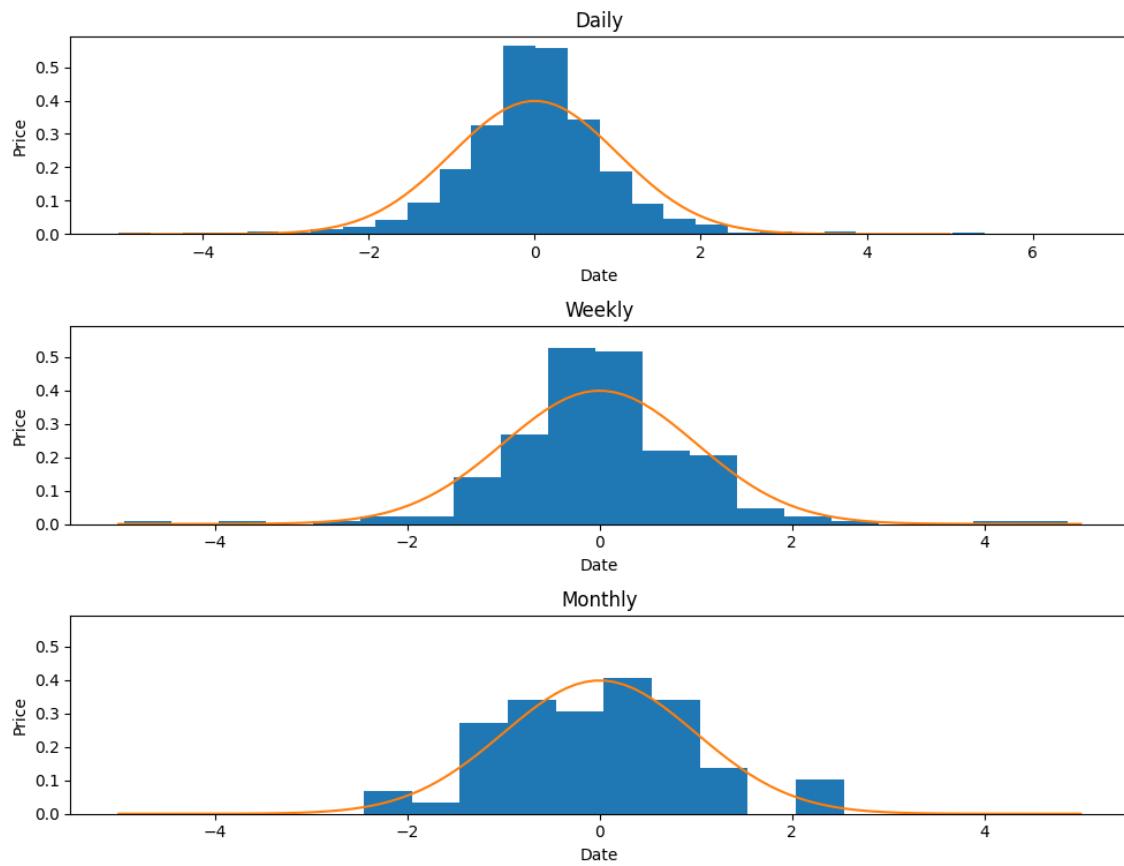
BANKBARODA BO RETURNS

Normalized return of Bank of Baroda stock.



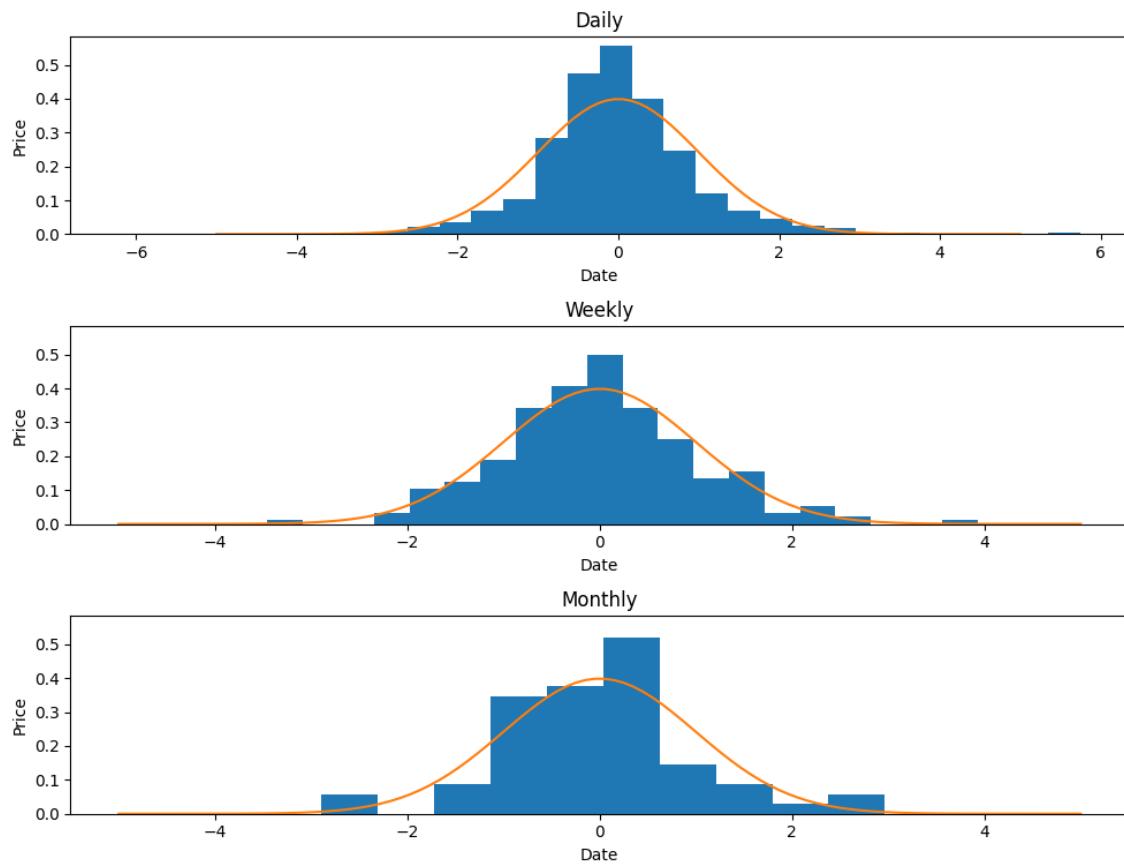
BERGEPAINT NS RETURNS

Normalized return of Berger Paints stock.



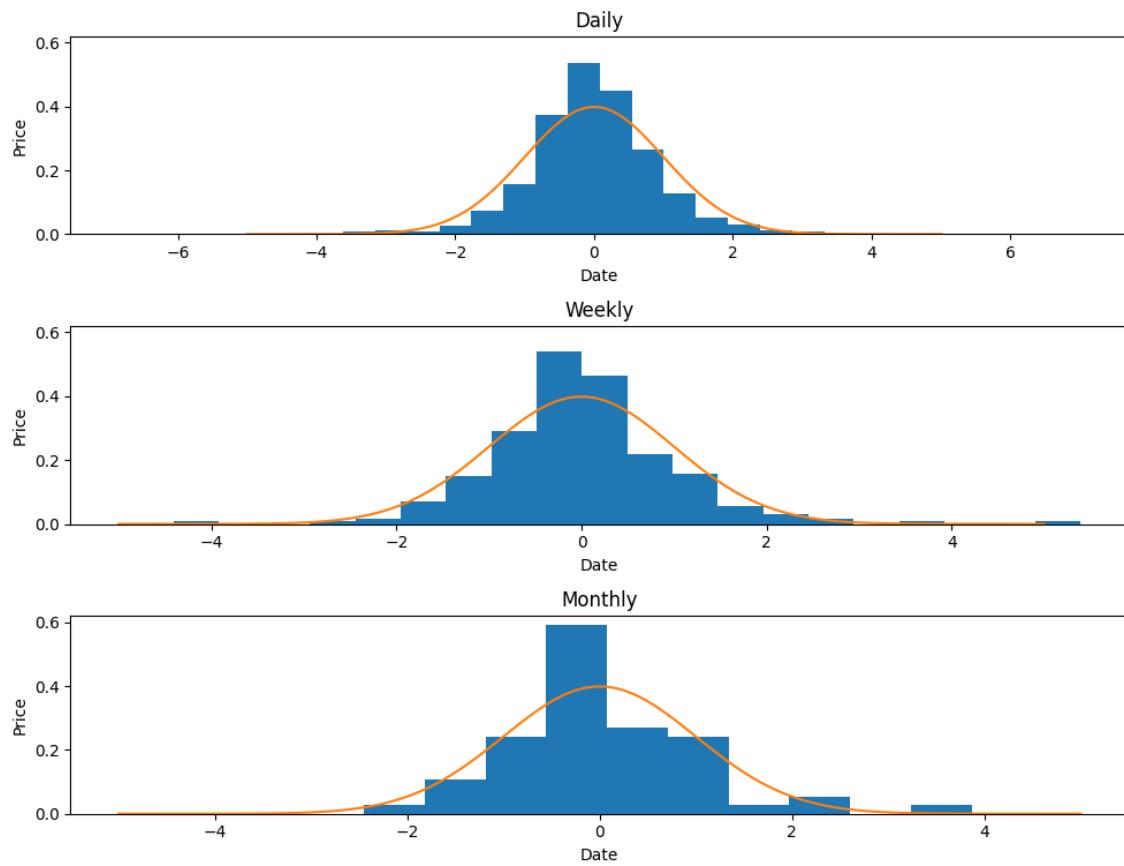
BHARTIARTL NS RETURNS

Normalized return of Airtel stock.



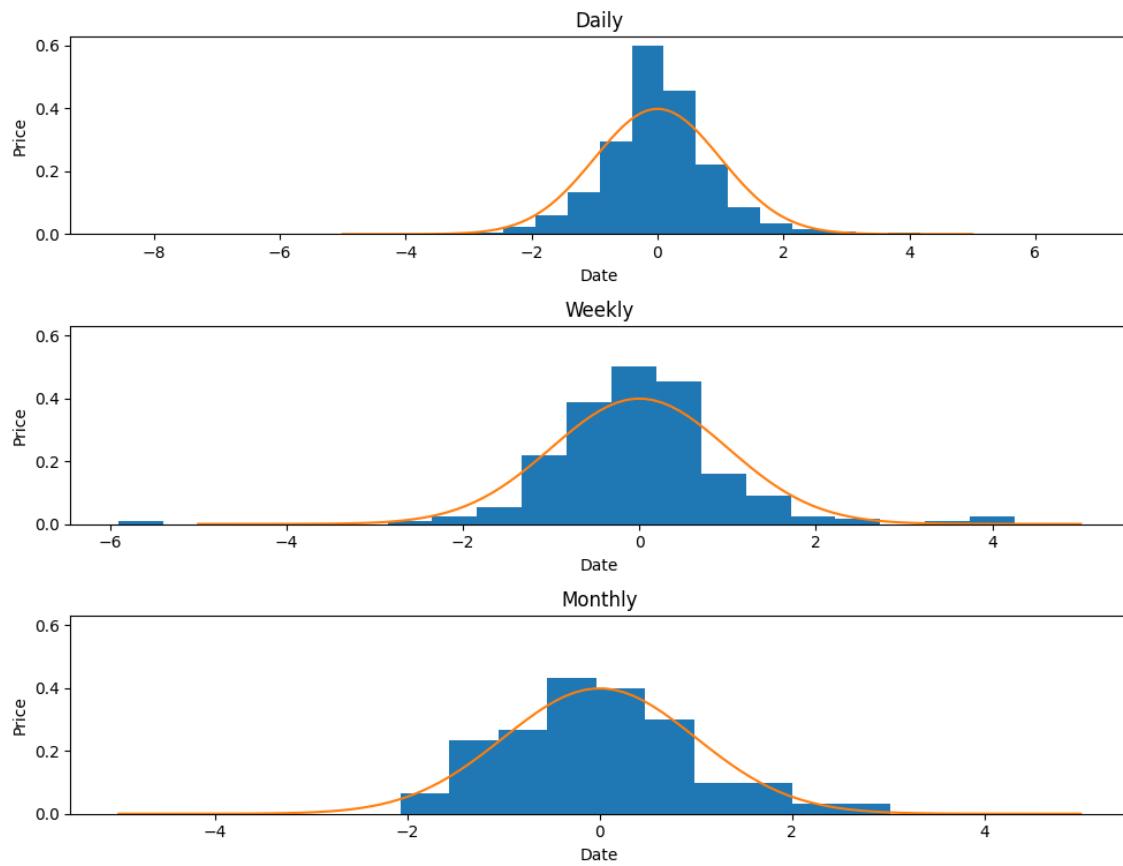
BPCL NS RETURNS

Normalized return of Bharat Petroleum Corp. Ltd stock.

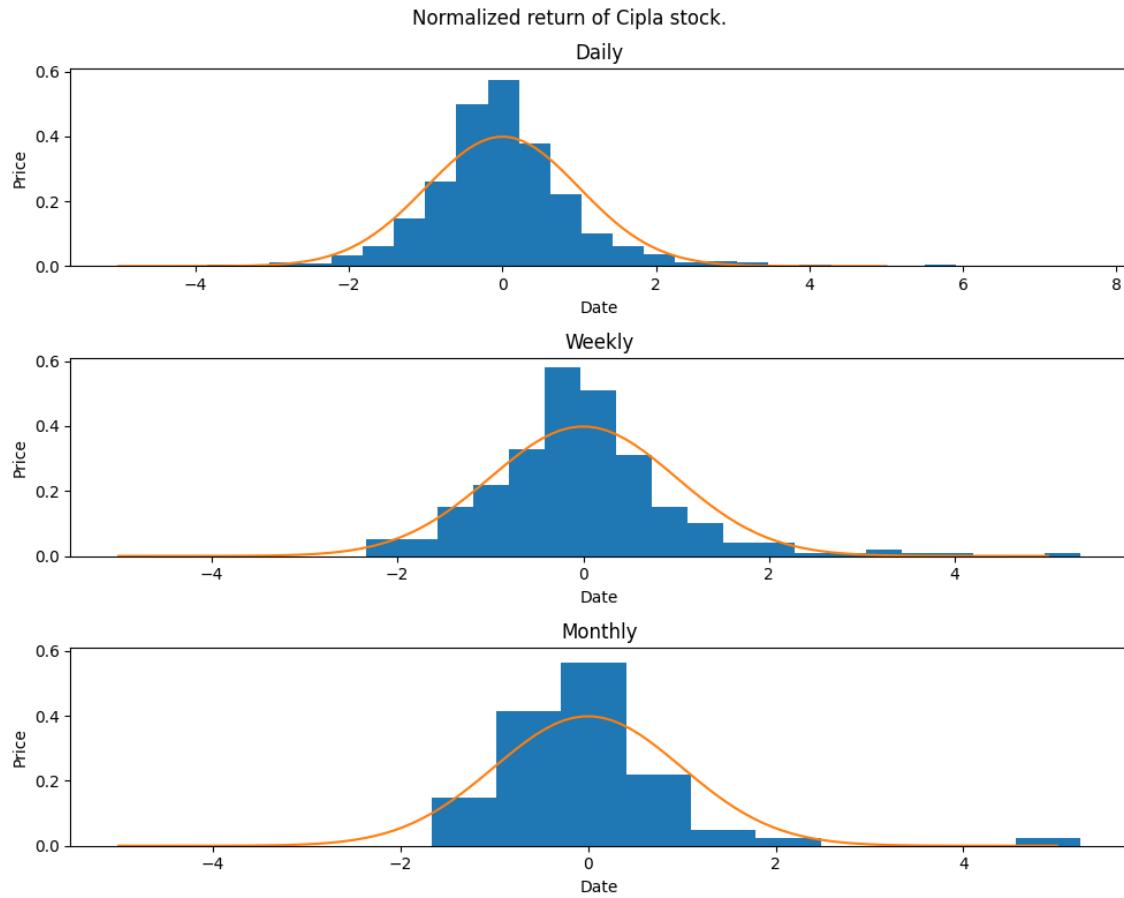


BRITANNIA NS RETURNS

Normalized return of Britannia stock.

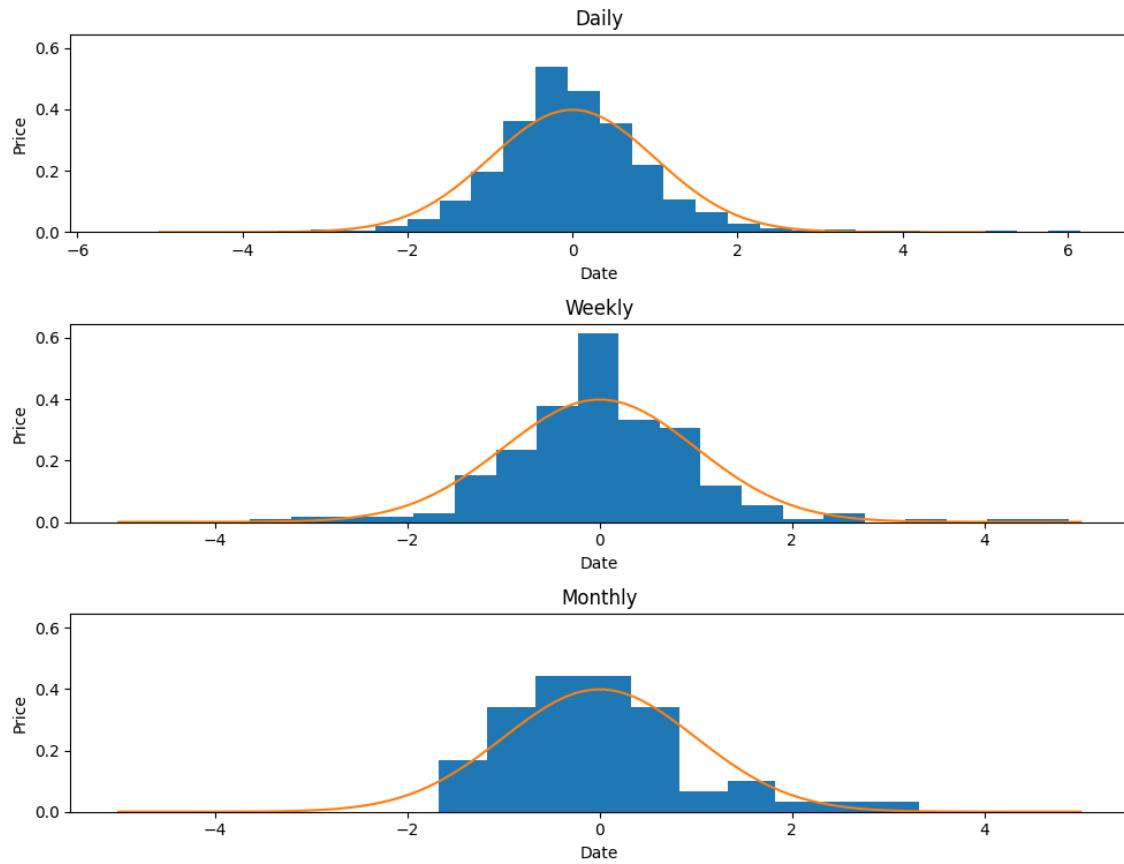


CIPLA NS RETURNS



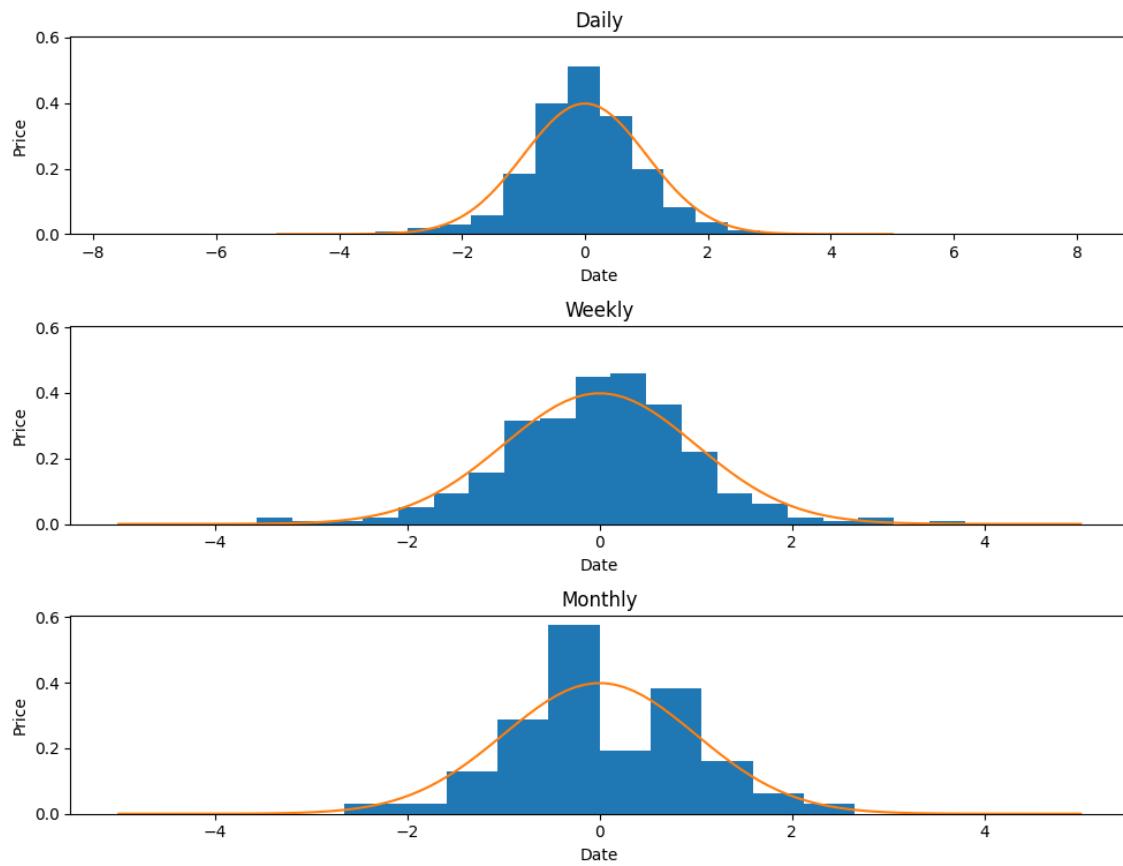
COLPAL BO RETURNS

Normalized return of Colgate stock.

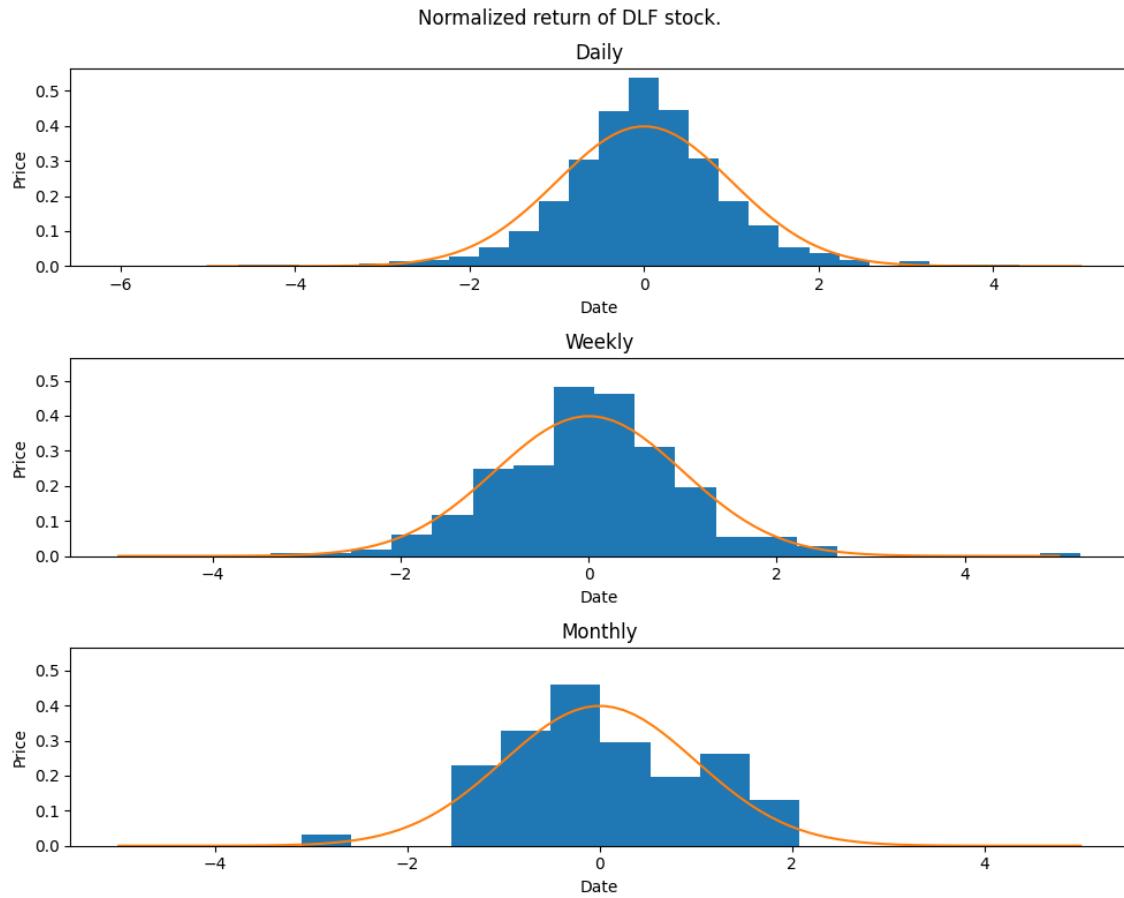


DABUR NS RETURNS

Normalized return of Dabur stock.

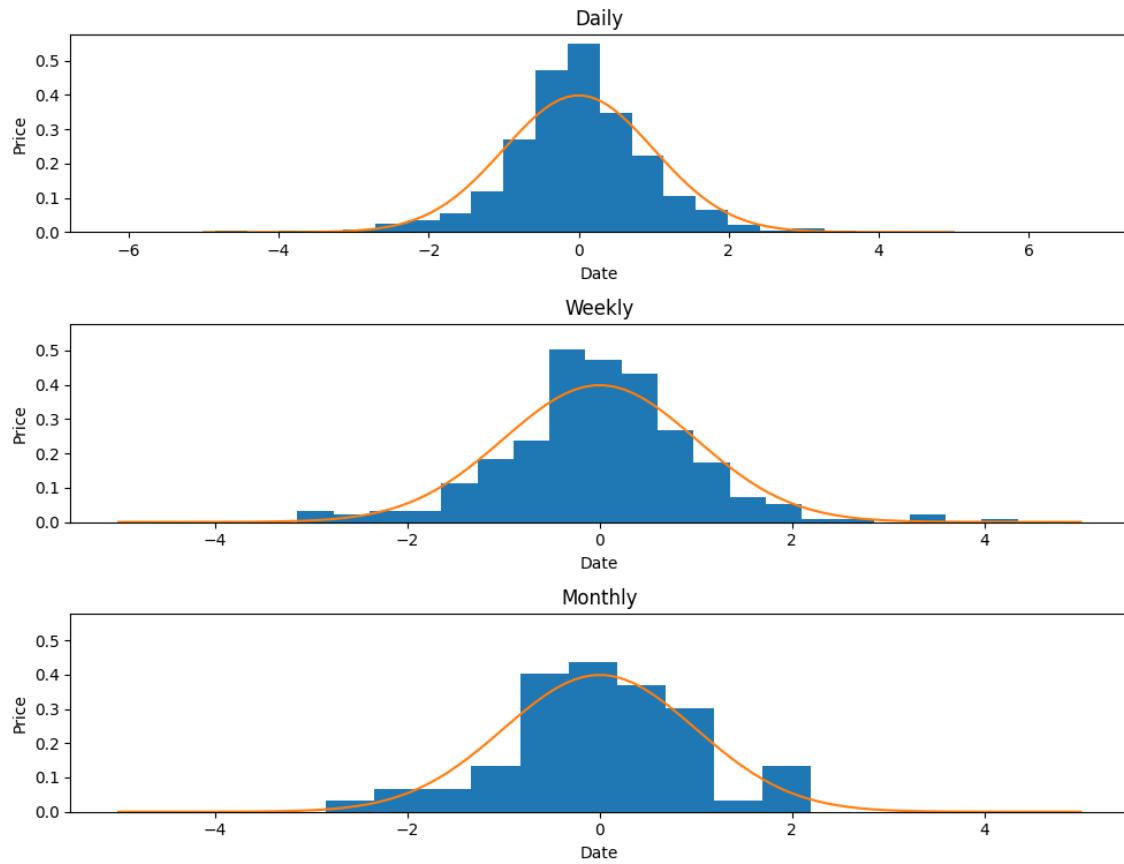


DLF BO RETURNS

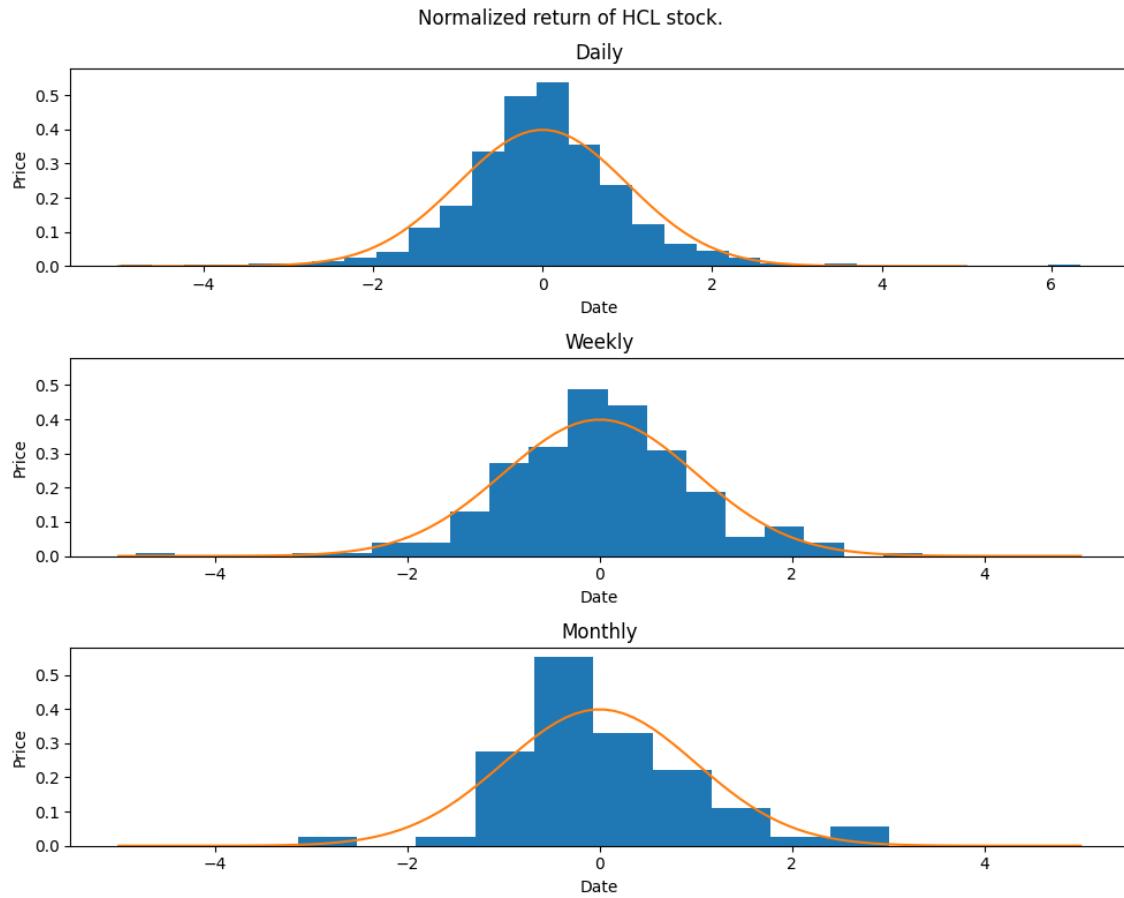


HAVELLS NS RETURNS

Normalized return of Havells stock.

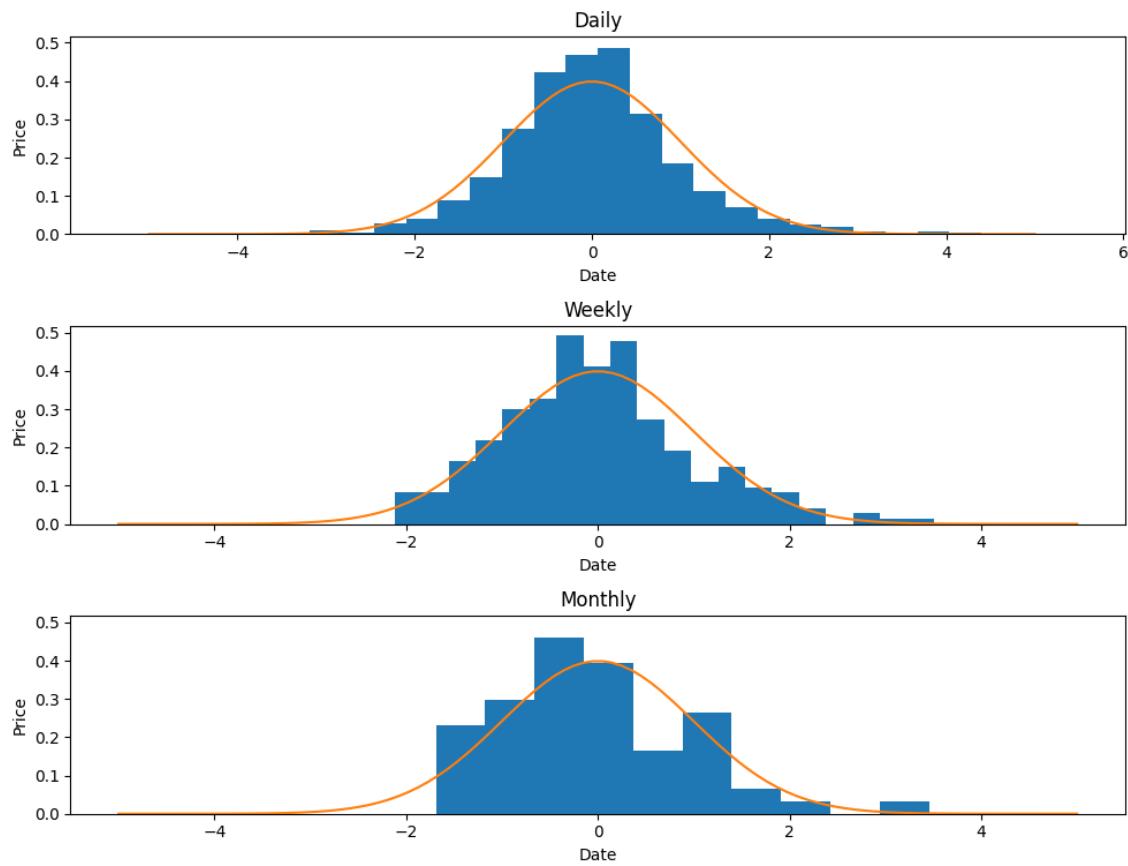


HCLTECH NS RETURNS



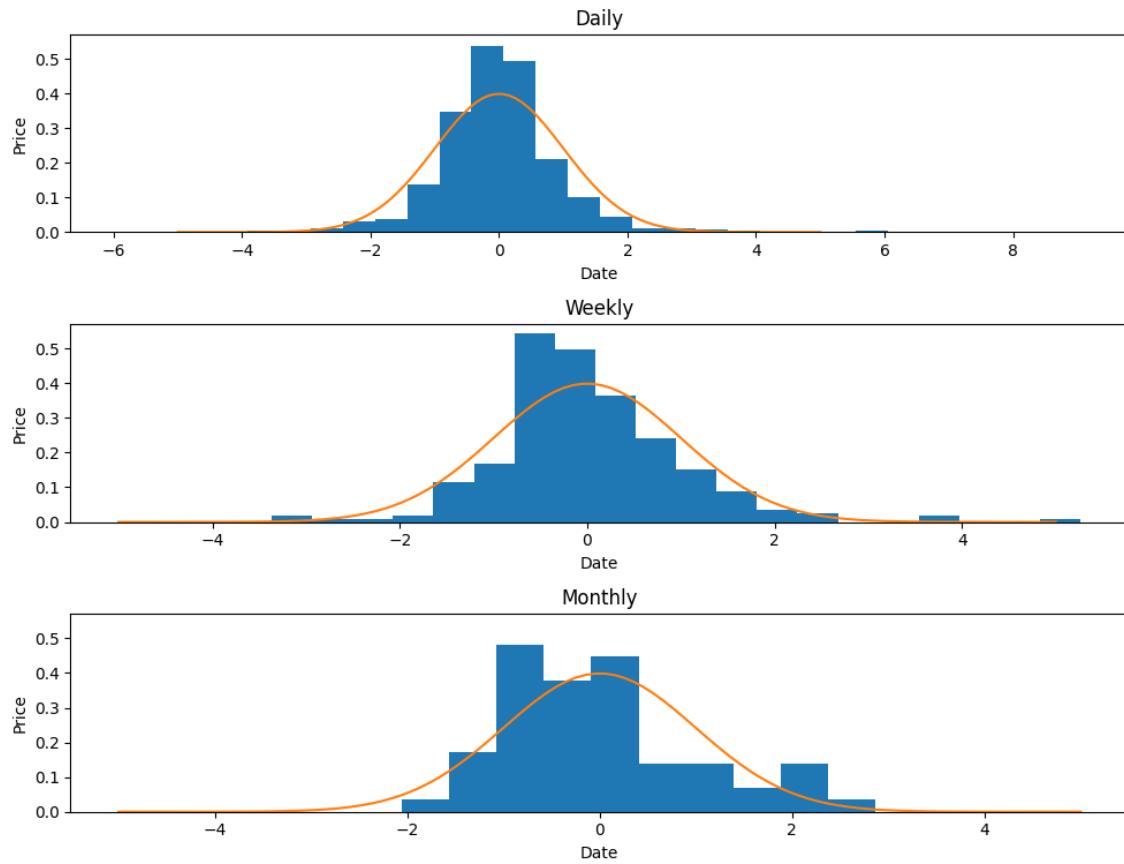
HINDPETRO NS RETURNS

Normalized return of Hindustan Petroleum stock.



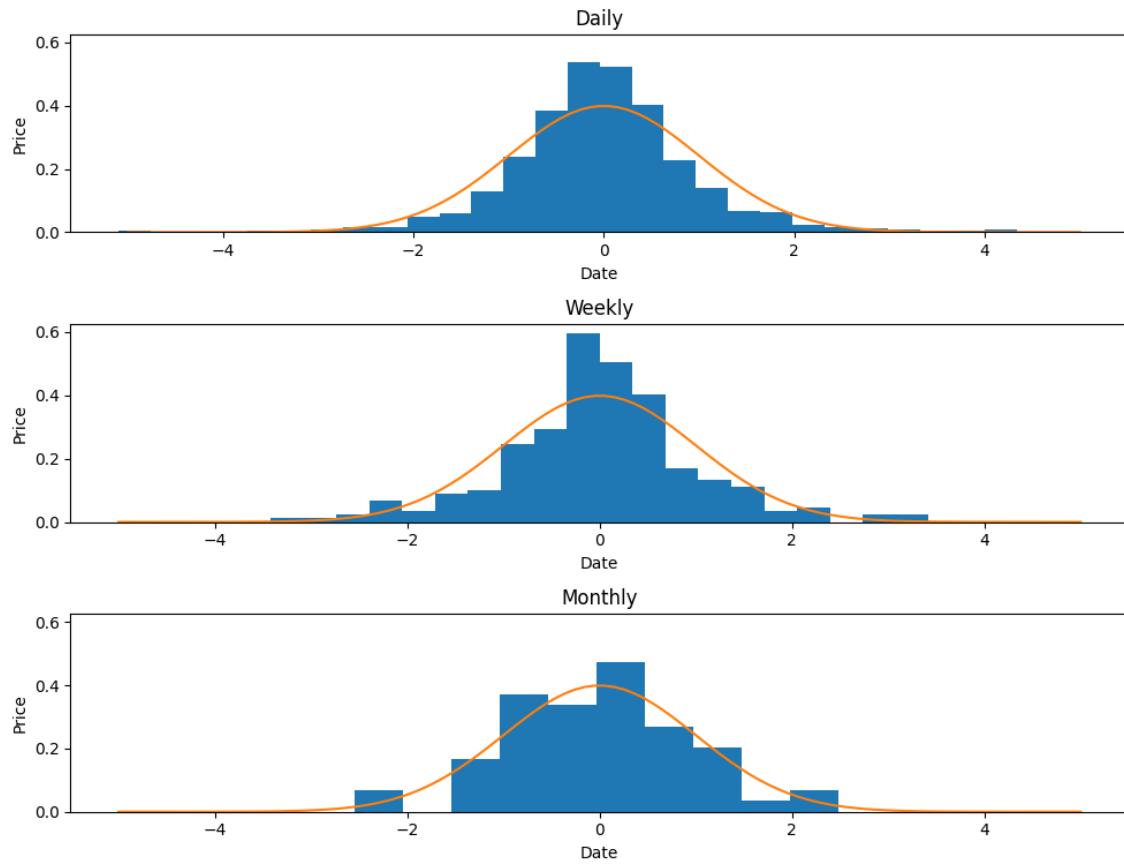
HINDUNILVR BO RETURNS

Normalized return of Hindustan Unilever Ltd stock.



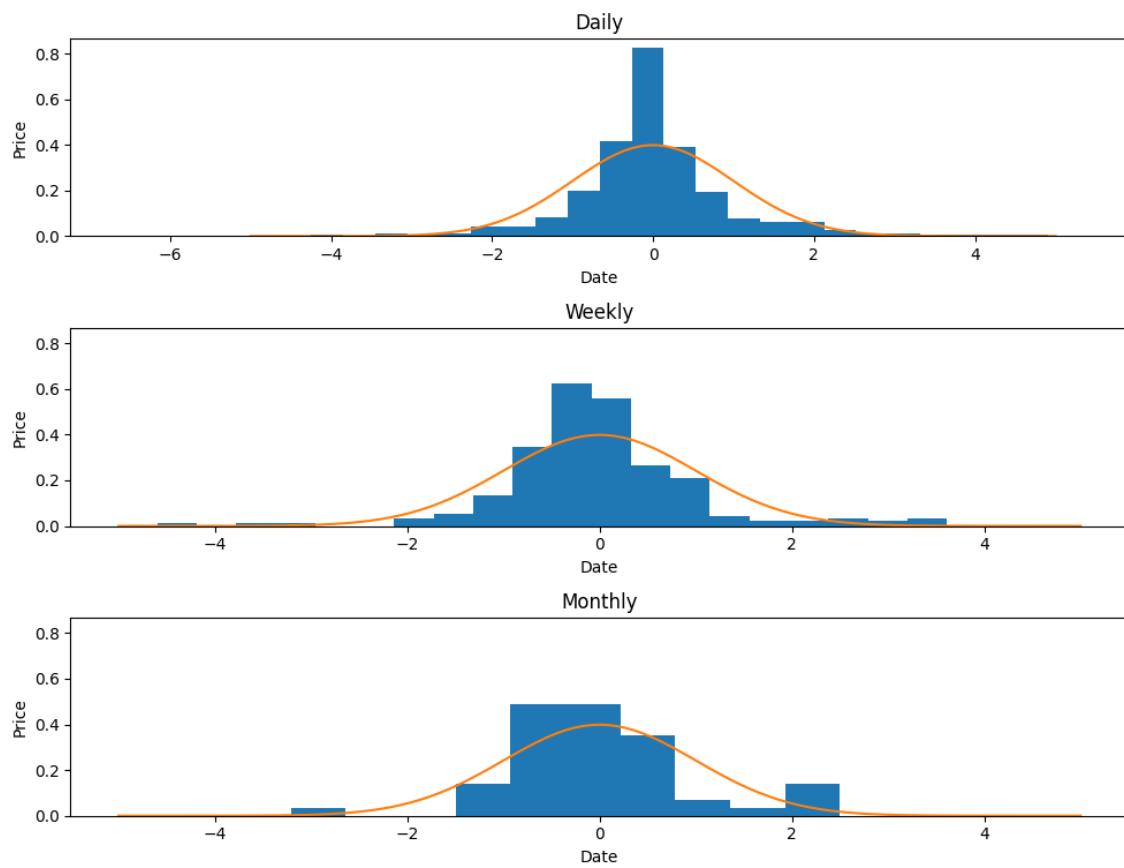
INDIGO NS RETURNS

Normalized return of Indigo stock.



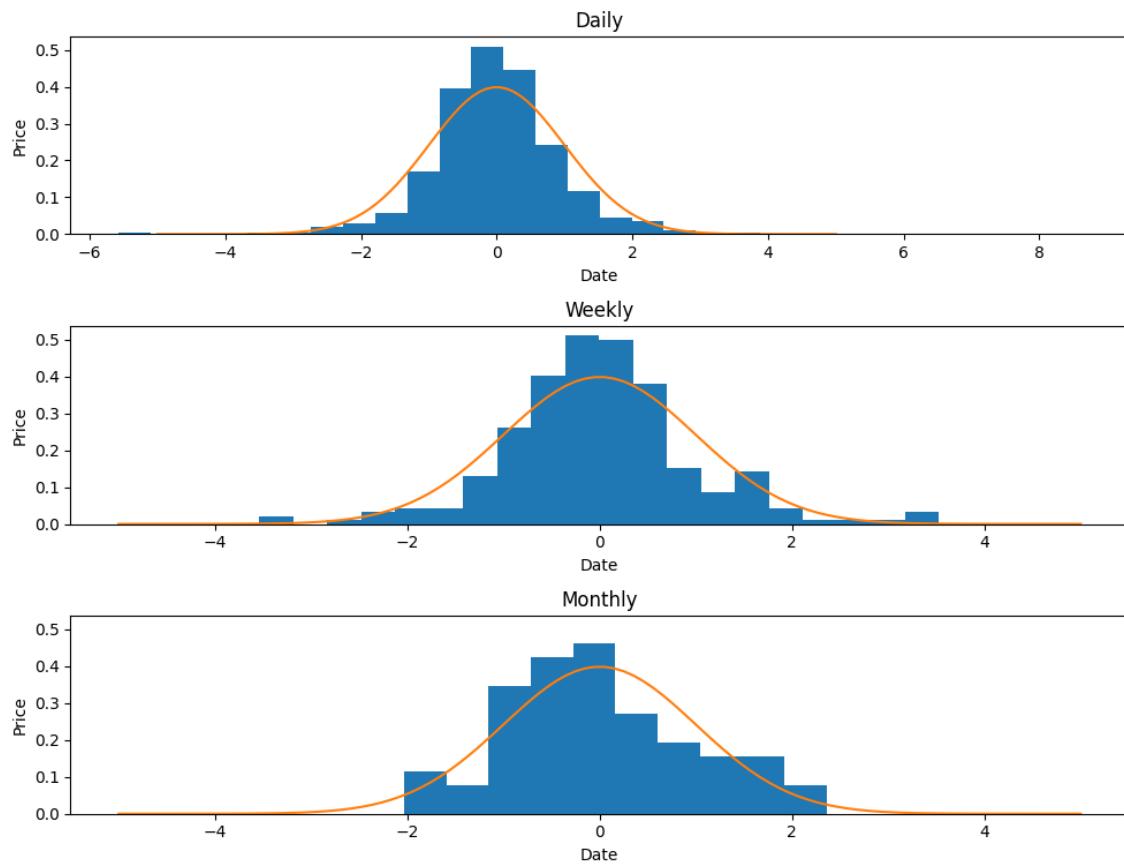
IRCTC BO RETURNS

Normalized return of IRCTC stock.



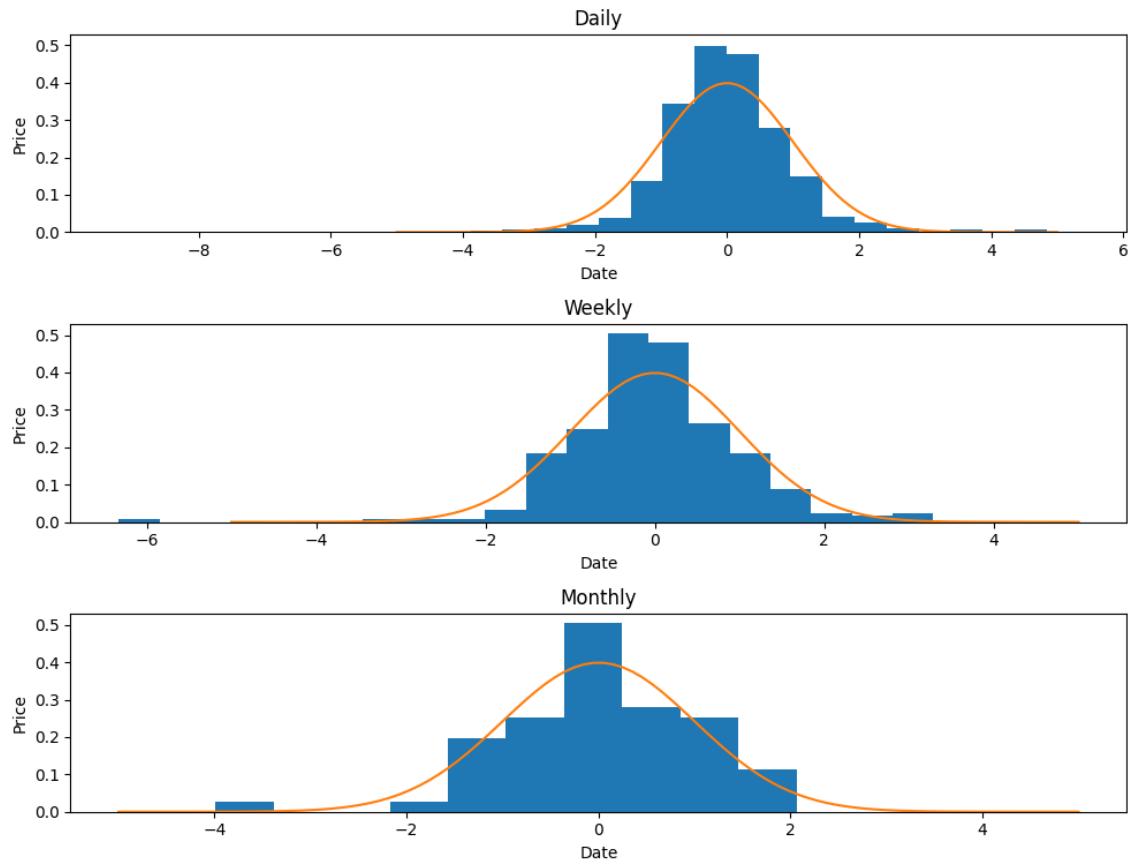
JUBLFOOD NS RETURNS

Normalized return of Jubilant Foods stock.



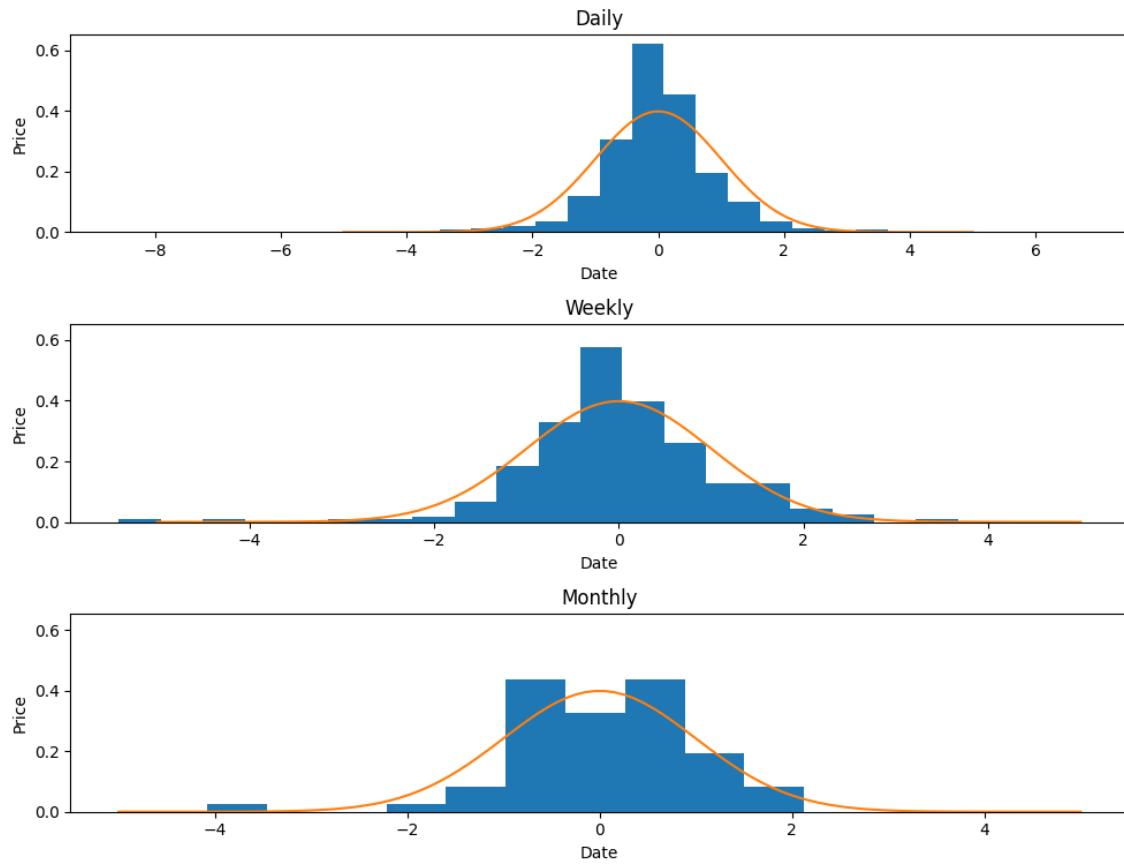
LT BO RETURNS

Normalized return of Larsen & Toubro stock.



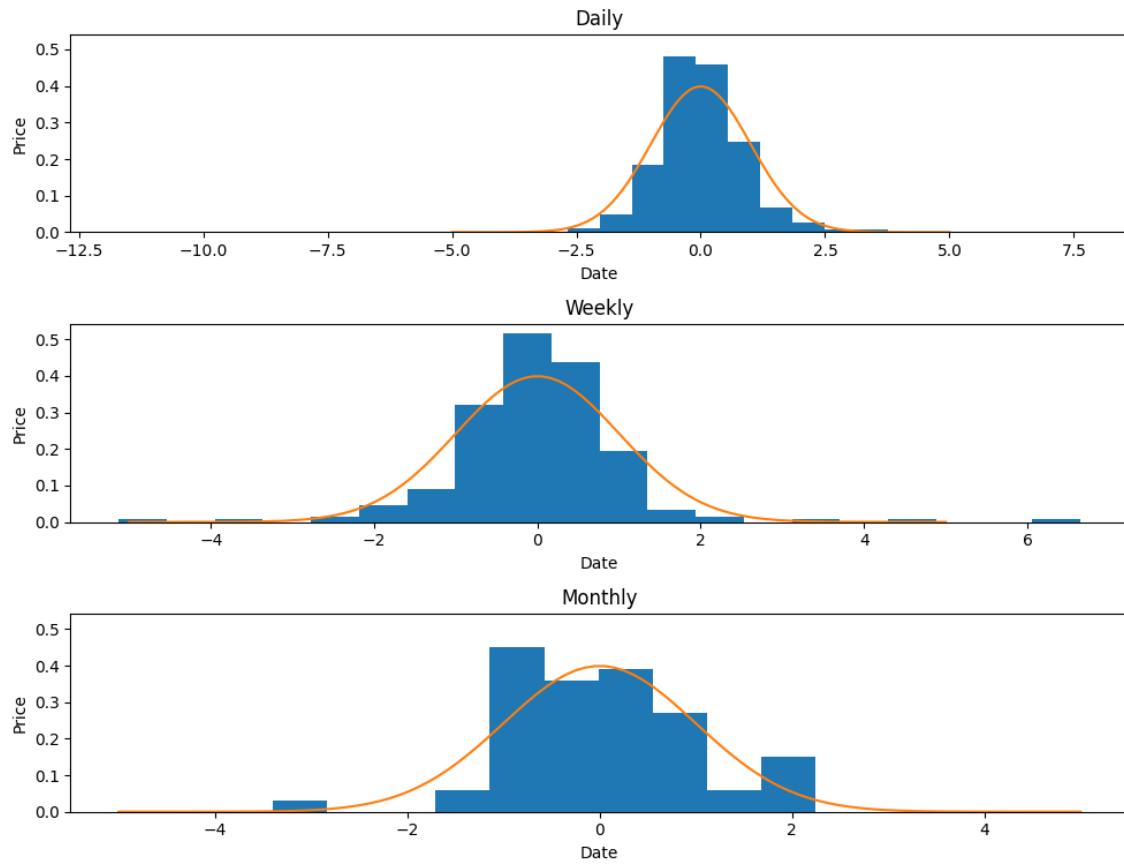
MARUTI BO RETURNS

Normalized return of Maruti Suzuki stock.

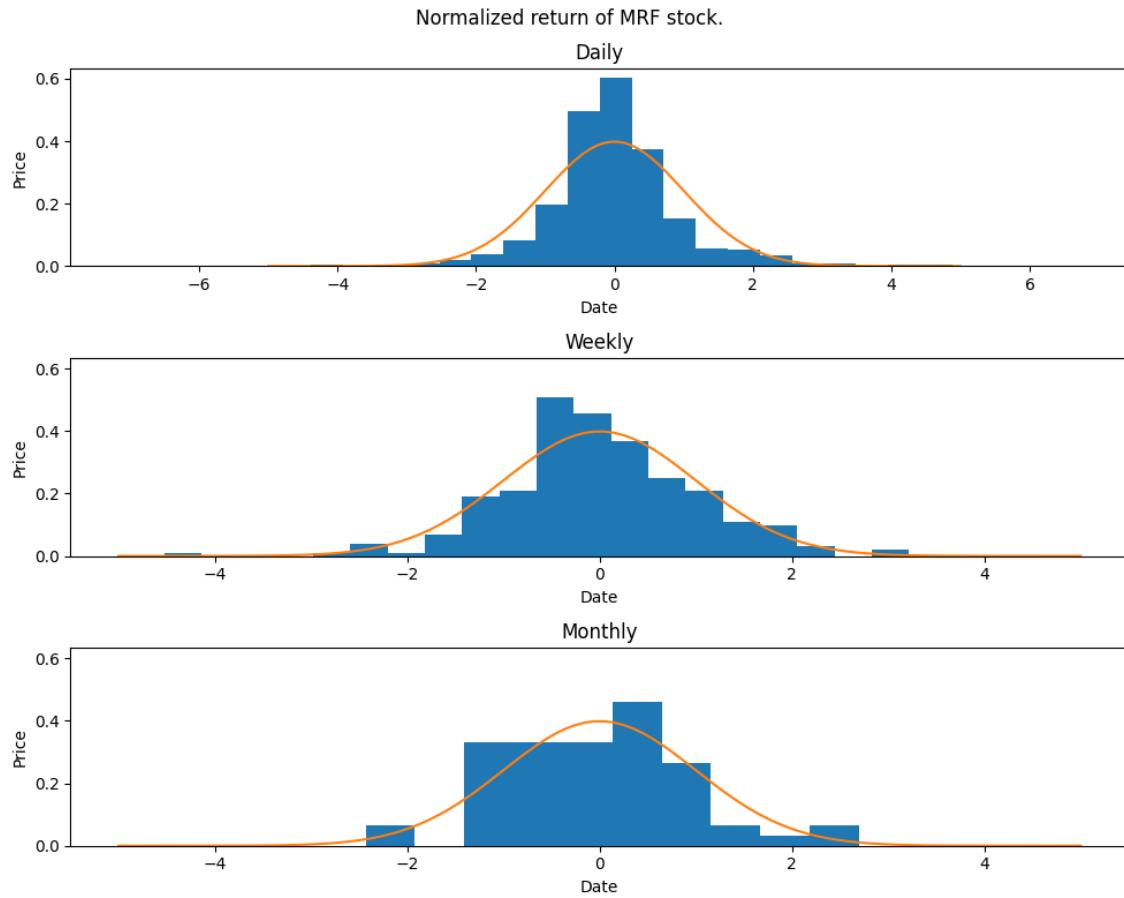


MFSL BO RETURNS

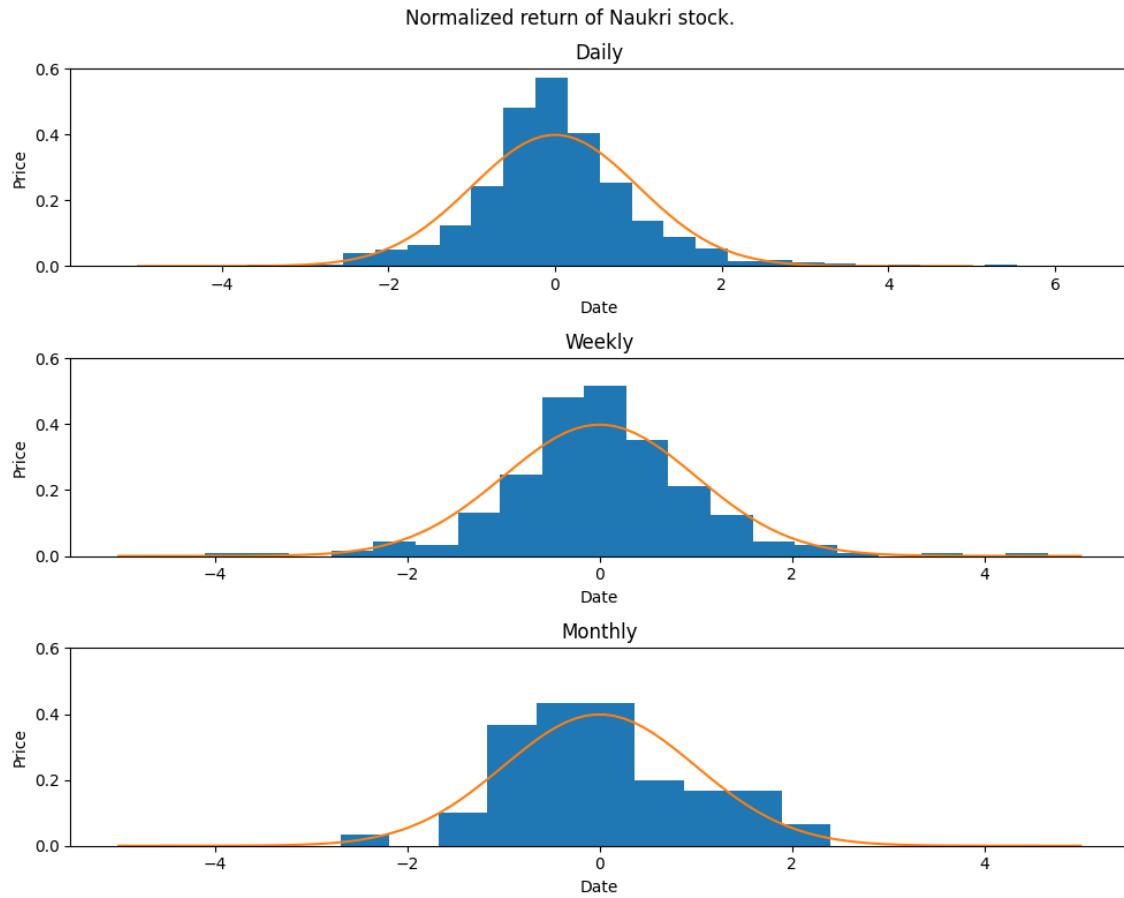
Normalized return of Max Fin. Services stock.



MRF NS RETURNS

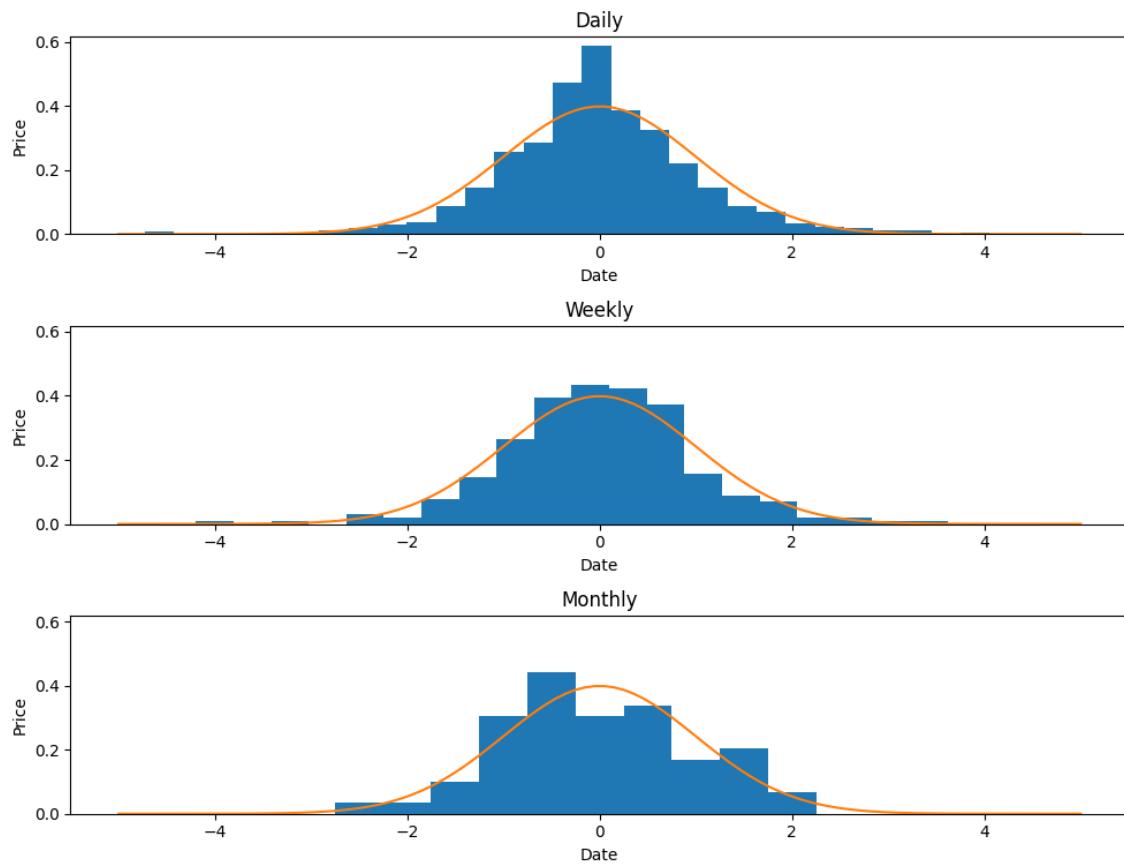


NAUKRI BO RETURNS



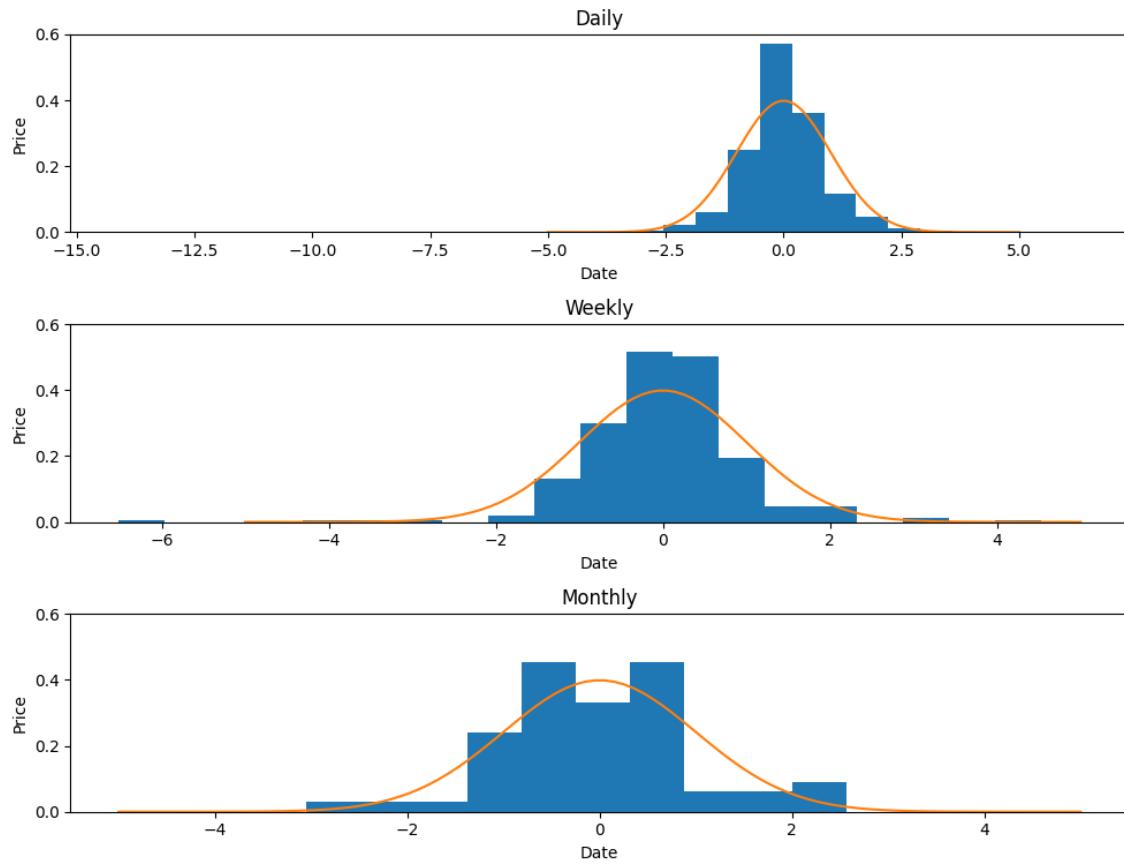
NTPC BO RETURNS

Normalized return of NTPC Corp. stock.



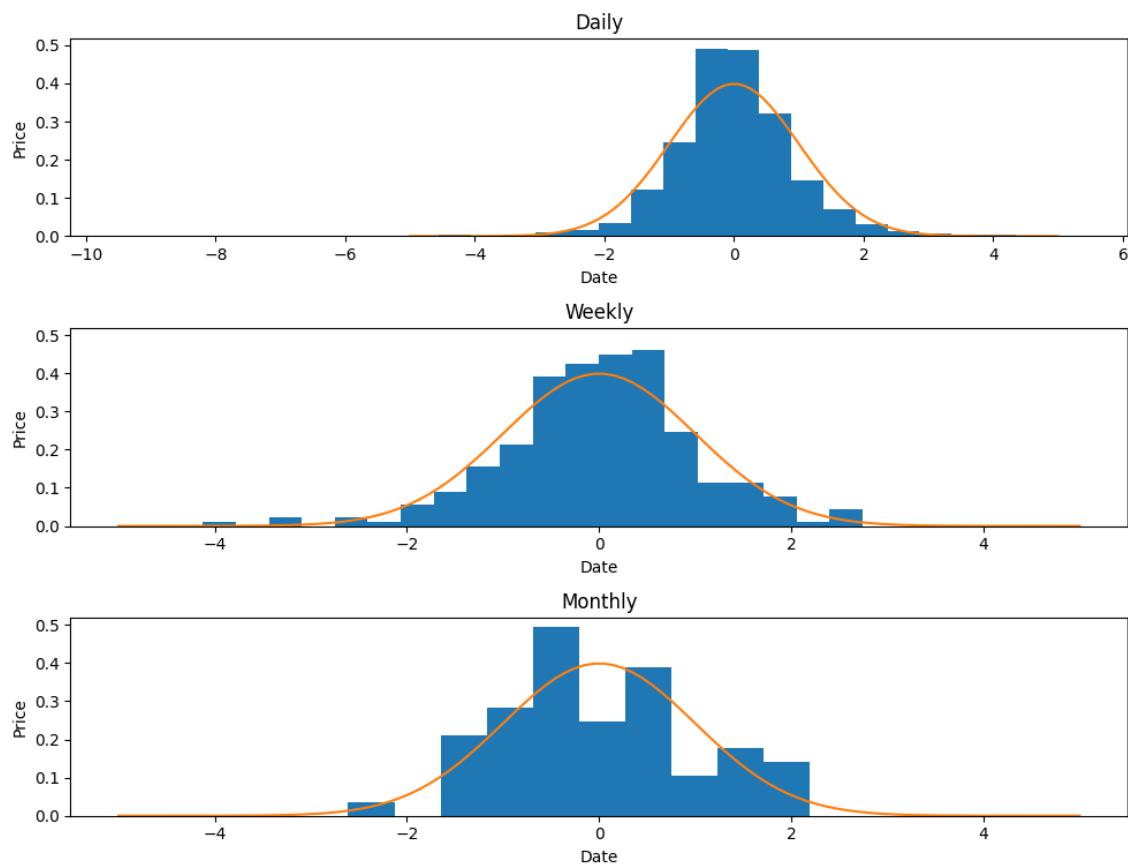
PEL NS RETURNS

Normalized return of Piramal Enterprises stock.



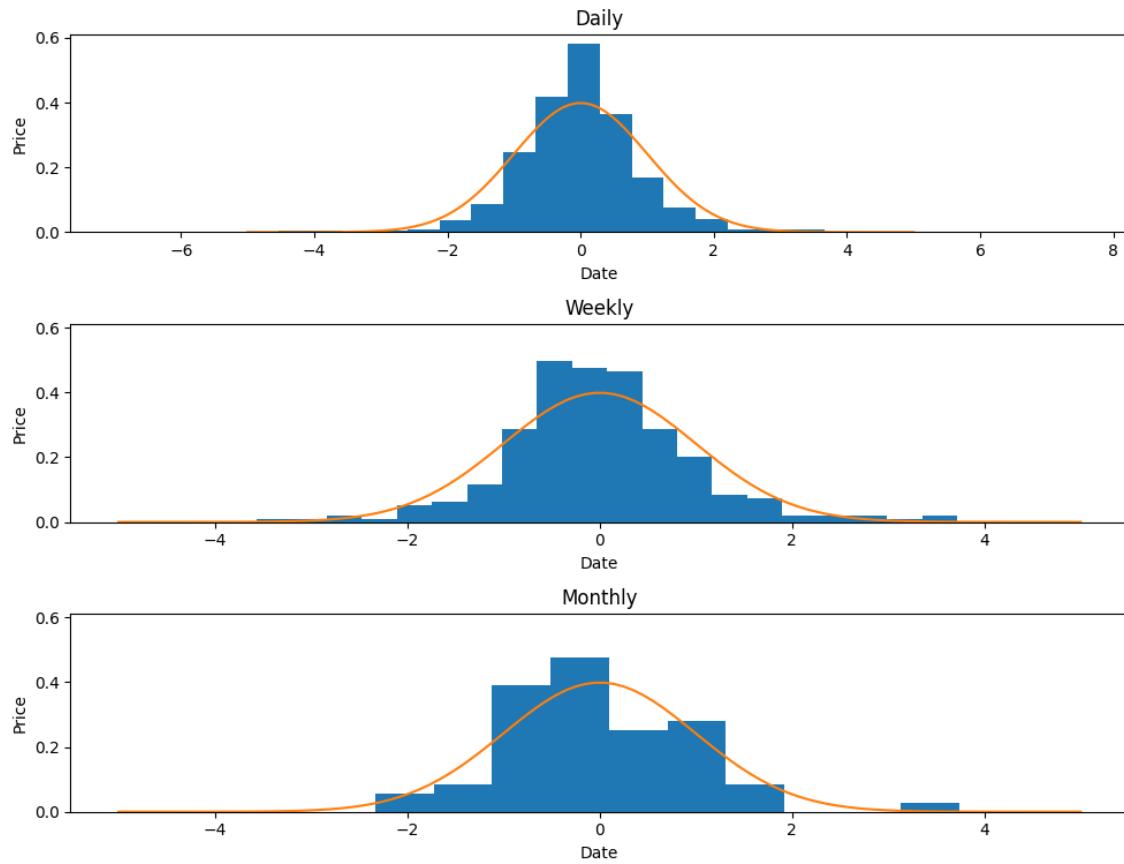
PIDILITIND BO RETURNS

Normalized return of Pidlite Industries stock.



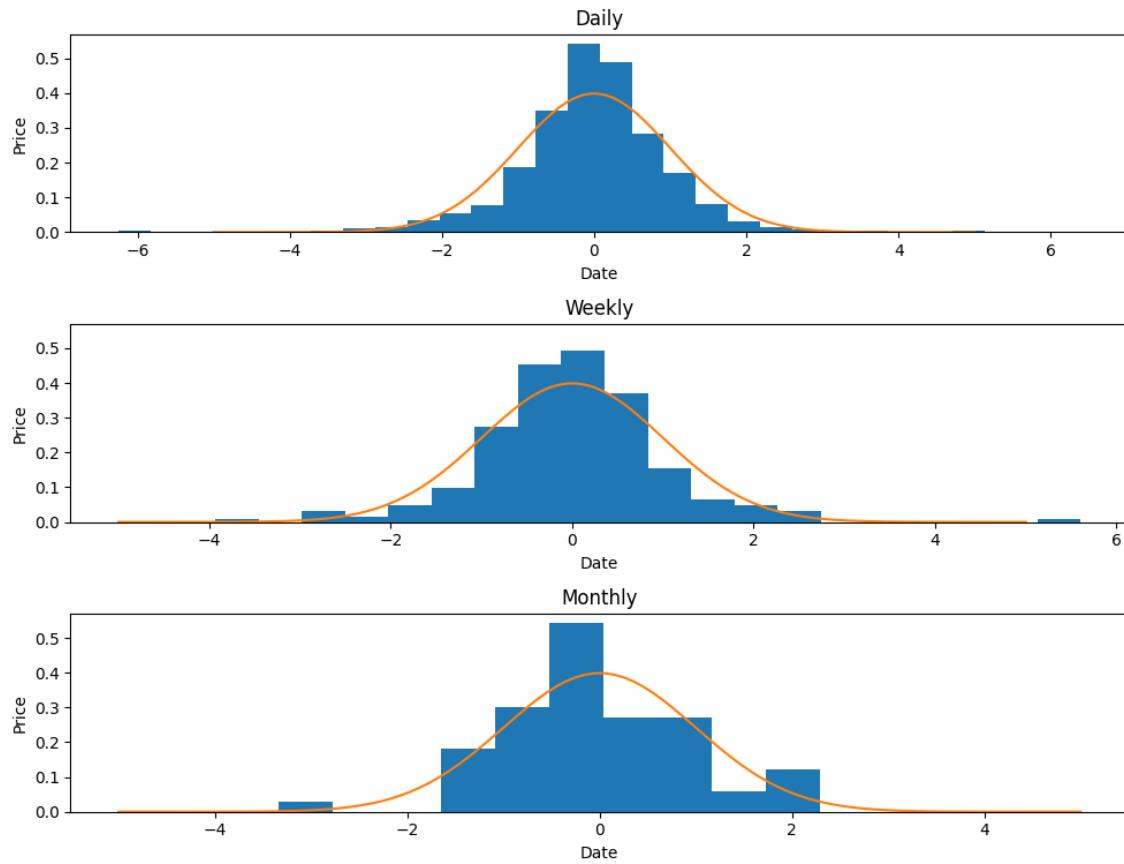
RELIANCE BO RETURNS

Normalized return of Reliance Industries stock.



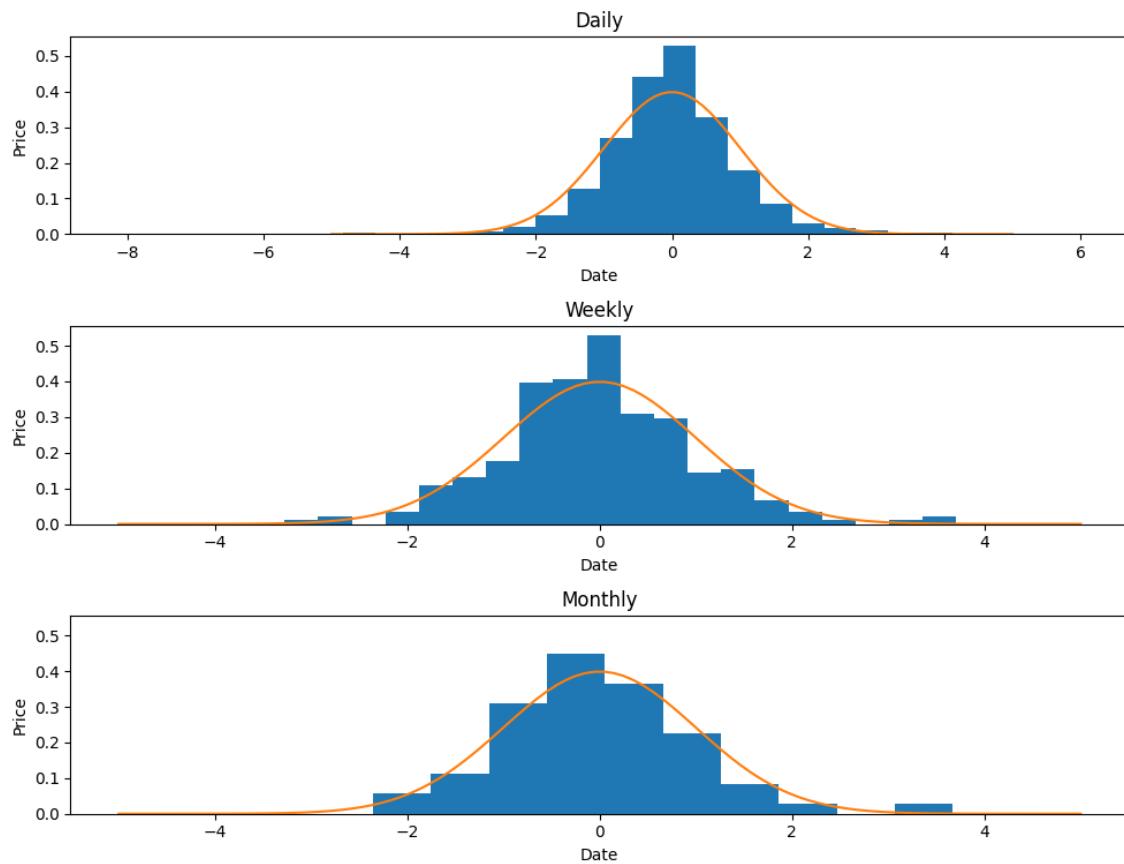
SBIN BO RETURNS

Normalized return of State Bank of India stock.



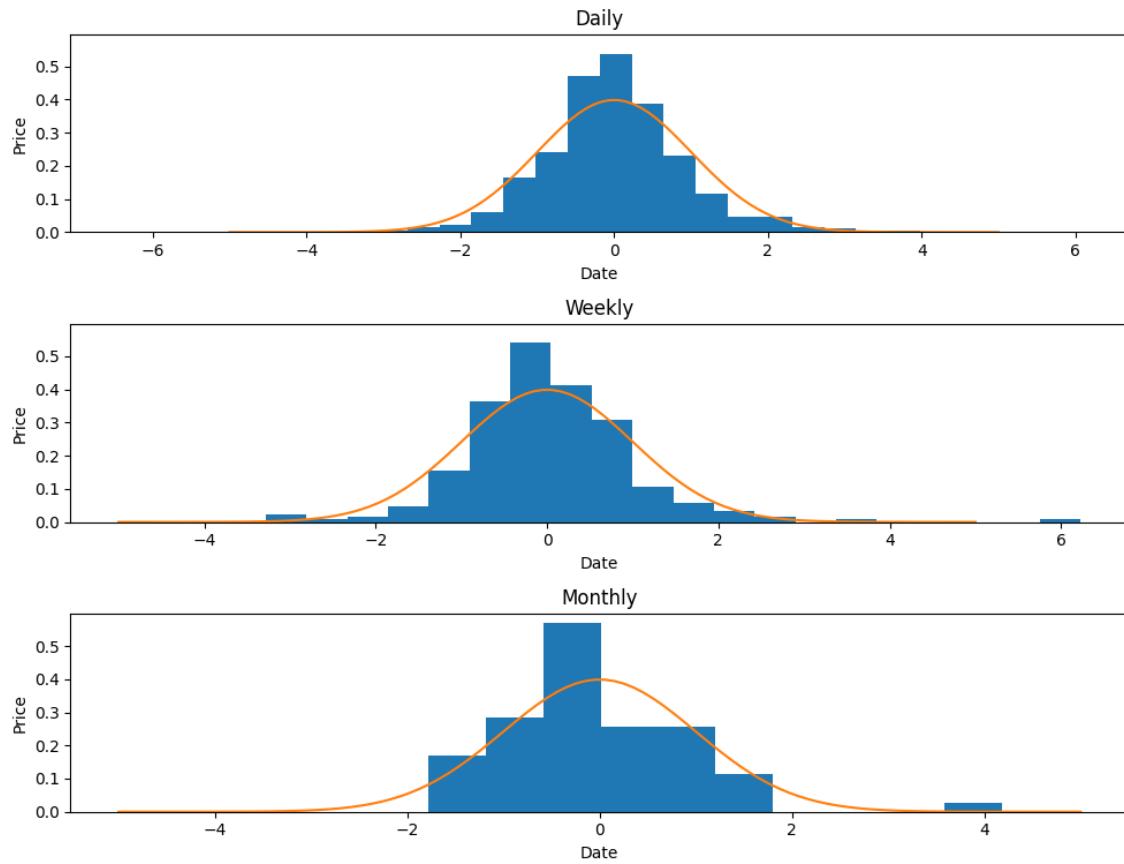
SIEMENS NS RETURNS

Normalized return of Siemens stock.



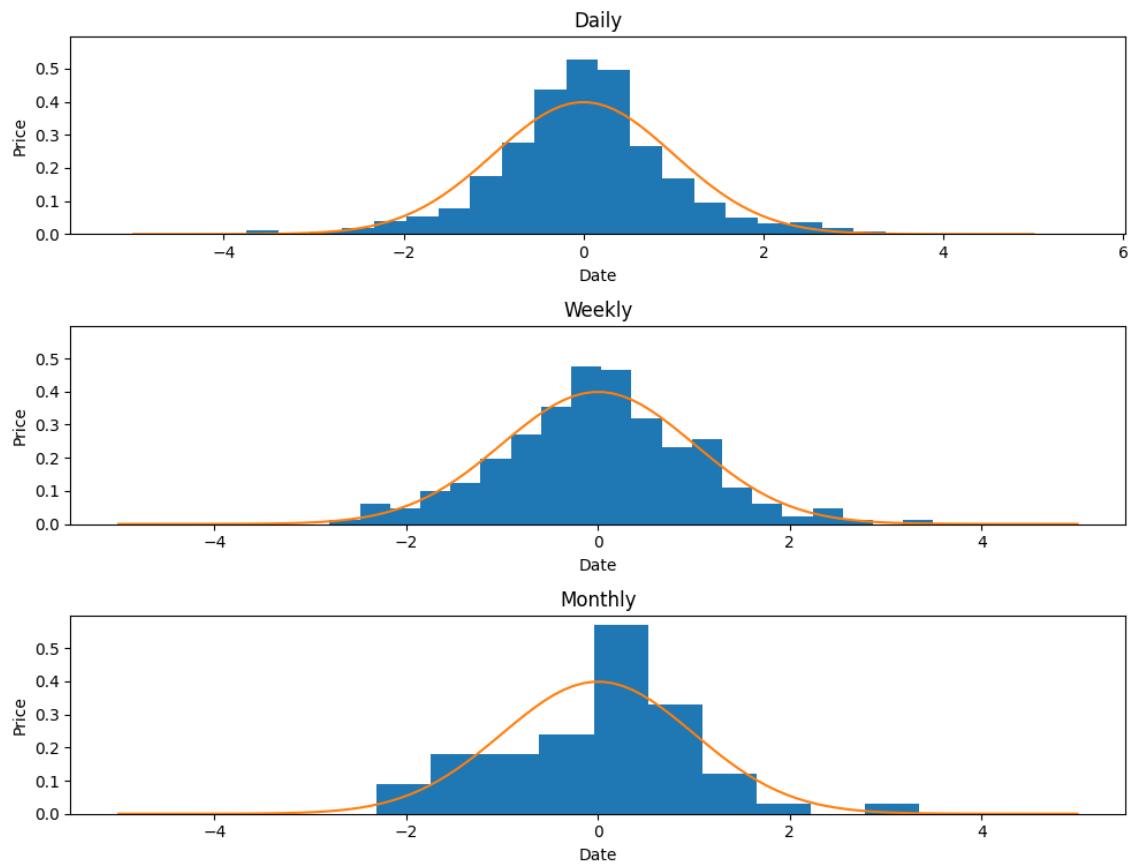
SUNPHARMA BO RETURNS

Normalized return of Sun Pharma stock.



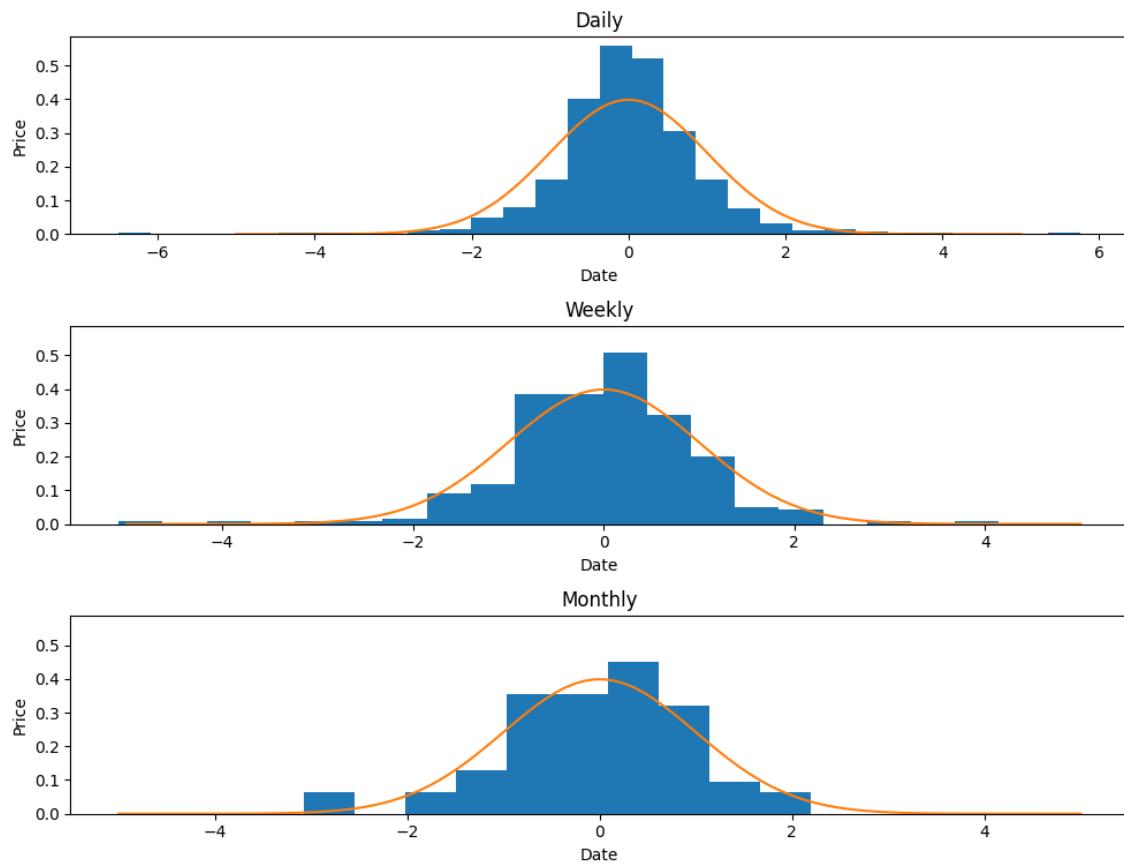
TATASTEEL NS RETURNS

Normalized return of TATA Steel stock.



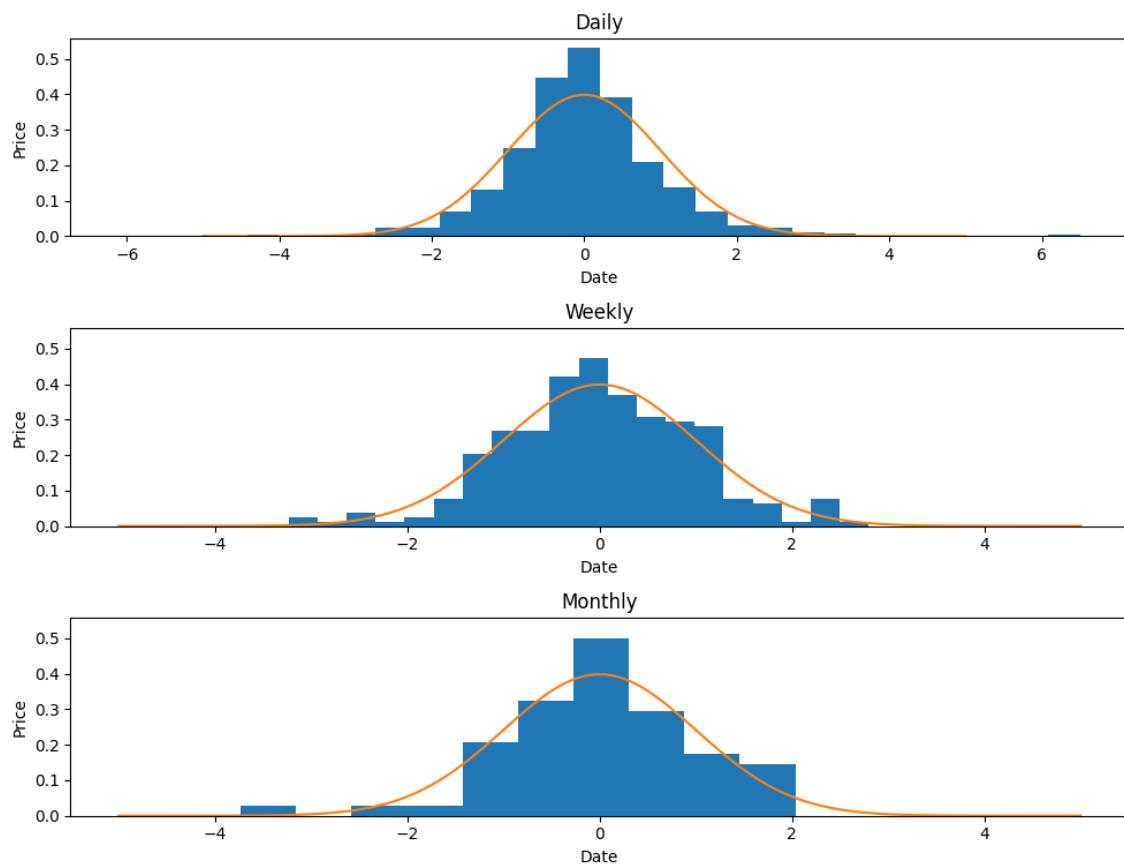
TITAN BO RETURNS

Normalized return of Titan stock.



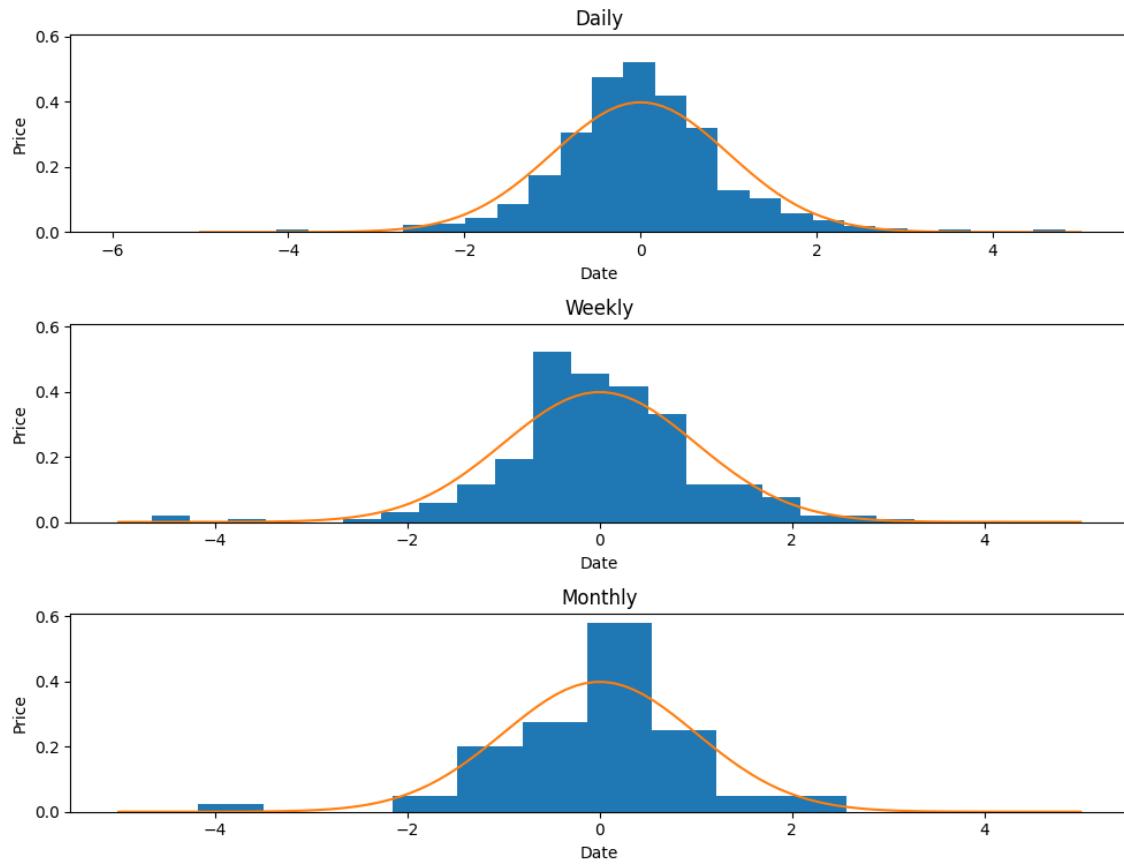
TVSMOTOR BO RETURNS

Normalized return of TVS Motors stock.



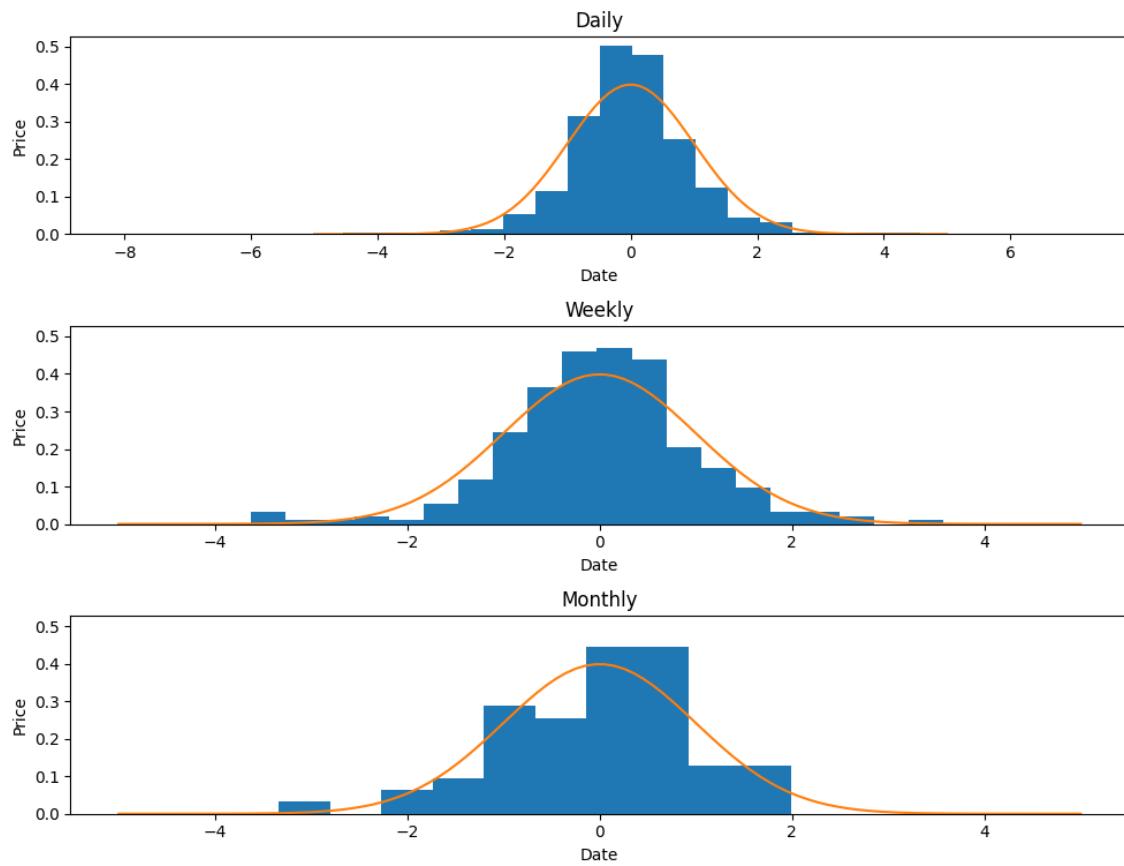
UBL NS RETURNS

Normalized return of United Breweries stock.

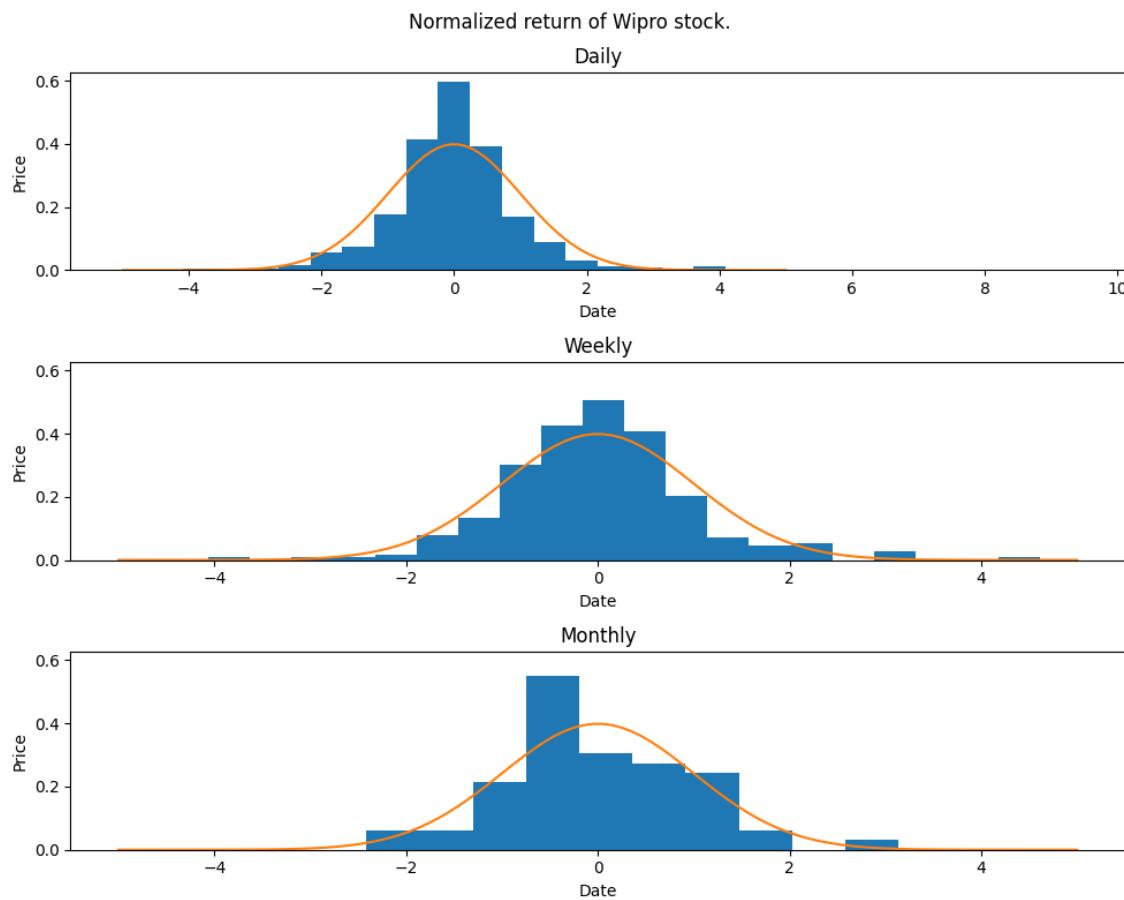


ULTRACEMCO BO RETURNS

Normalized return of Ultra Cement stock.

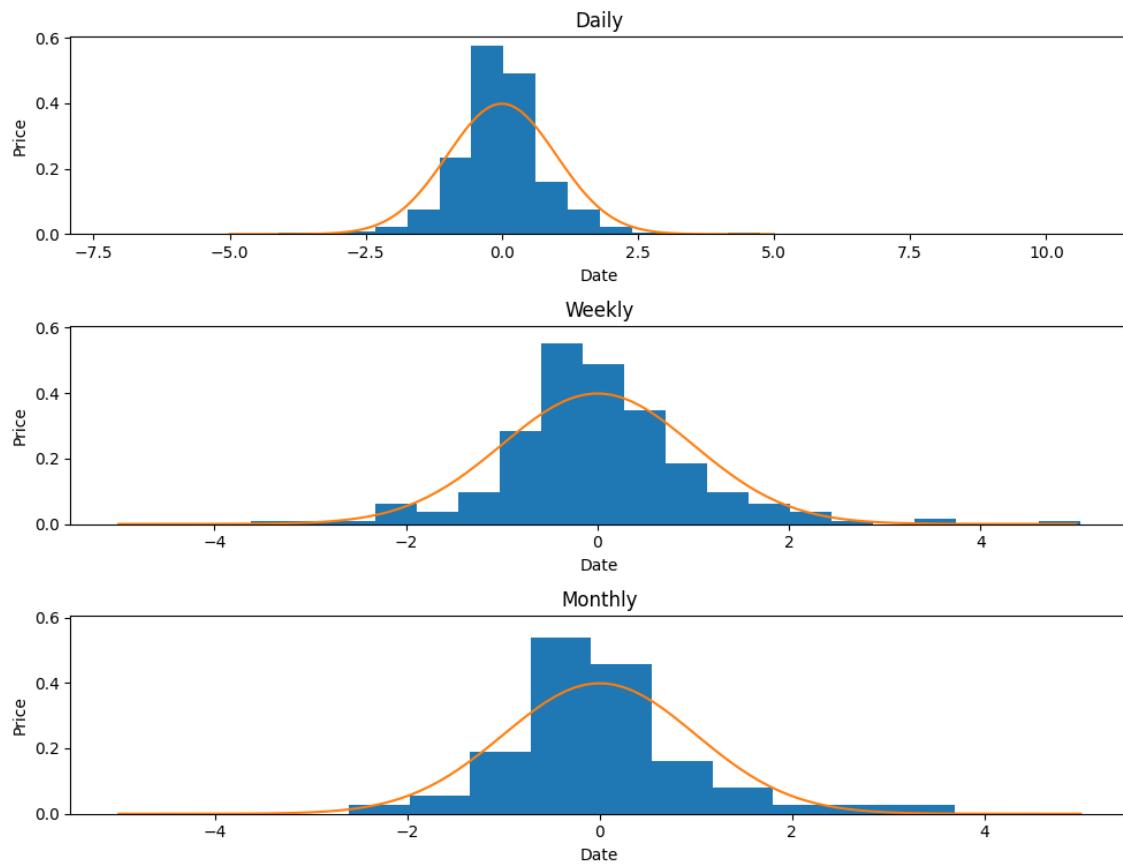


WIPRO BO RETURNS

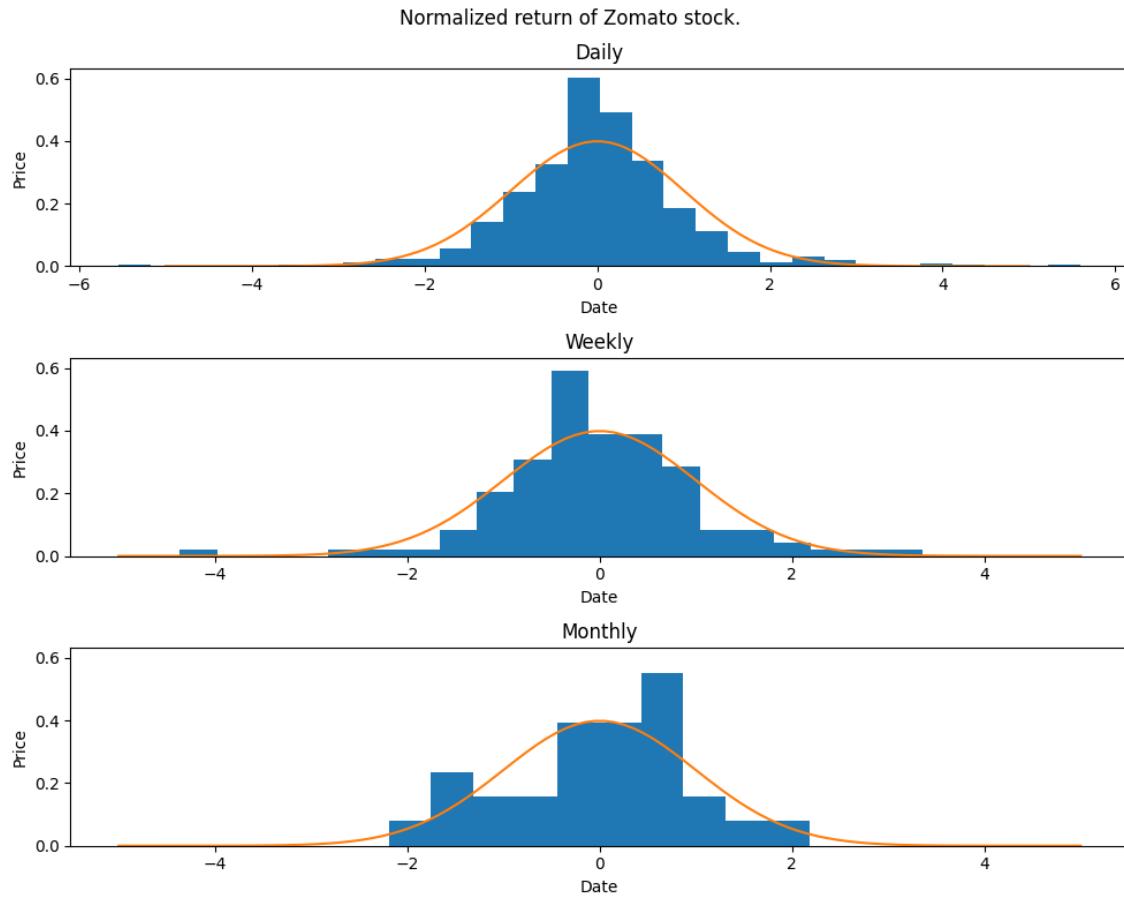


ZEEL BO RETURNS

Normalized return of Zee Entertainment stock.



ZOMATO BO RETURNS

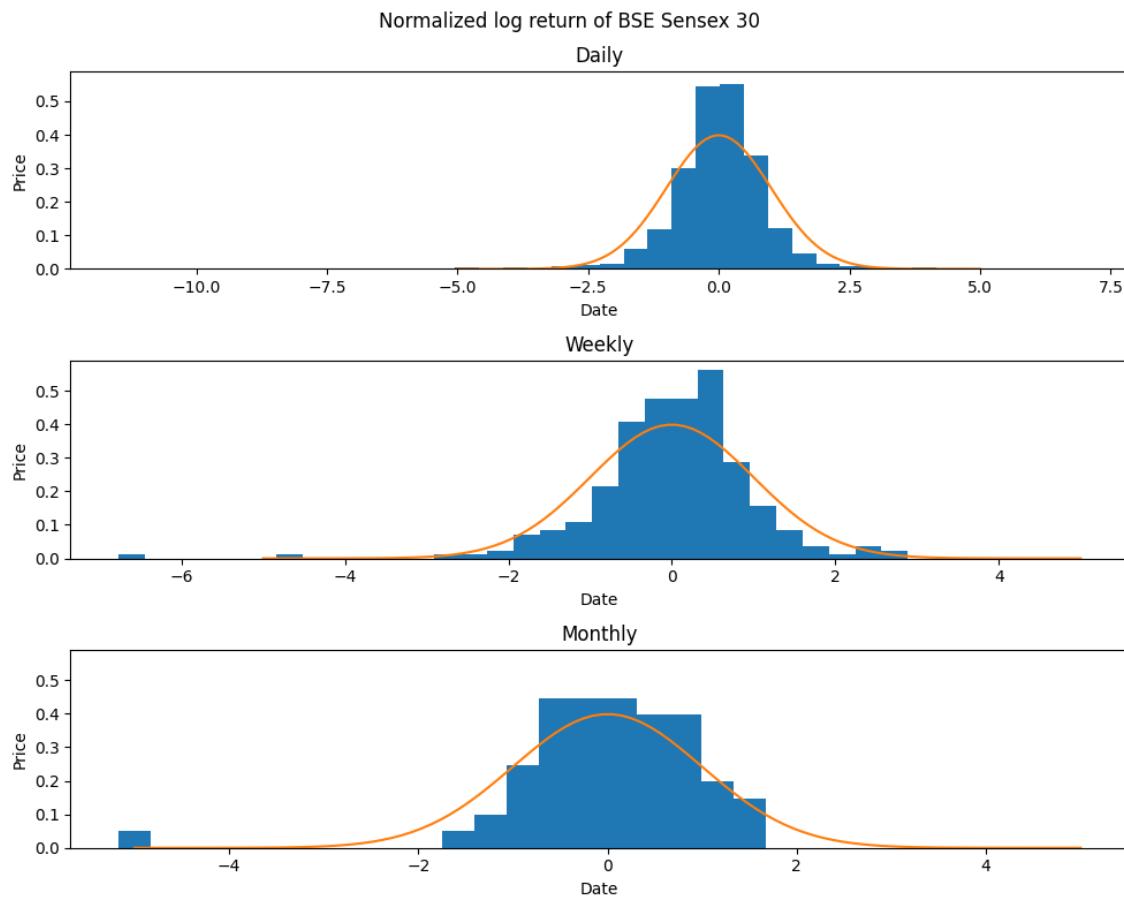


Observations:

The normalized returns mostly agree with the density function of $N(0, 1)$ except for some noise which is prevalent in the real world scenarios. Zooming into the tails of these distributions reveals that the normalized returns exhibit heavy tail behaviour.

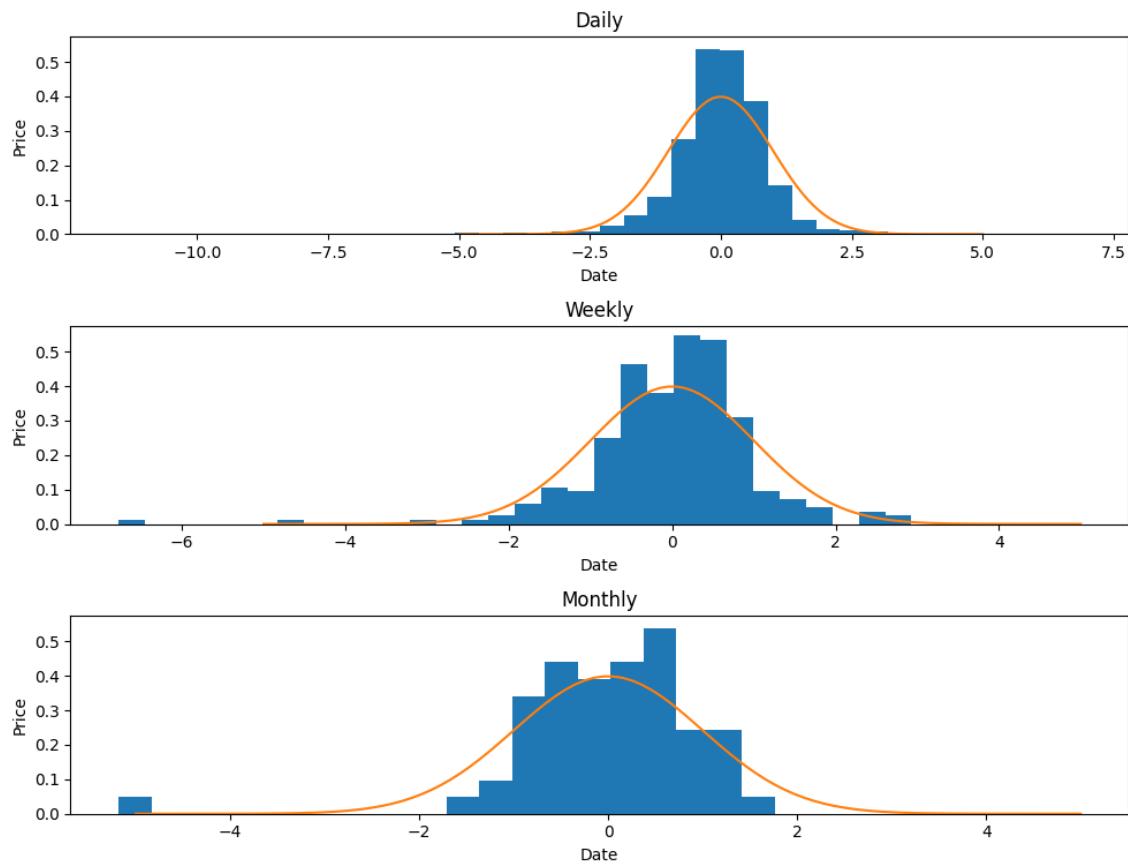
Q3 Indices

BSE SENSEX 30 LOGRETURNS



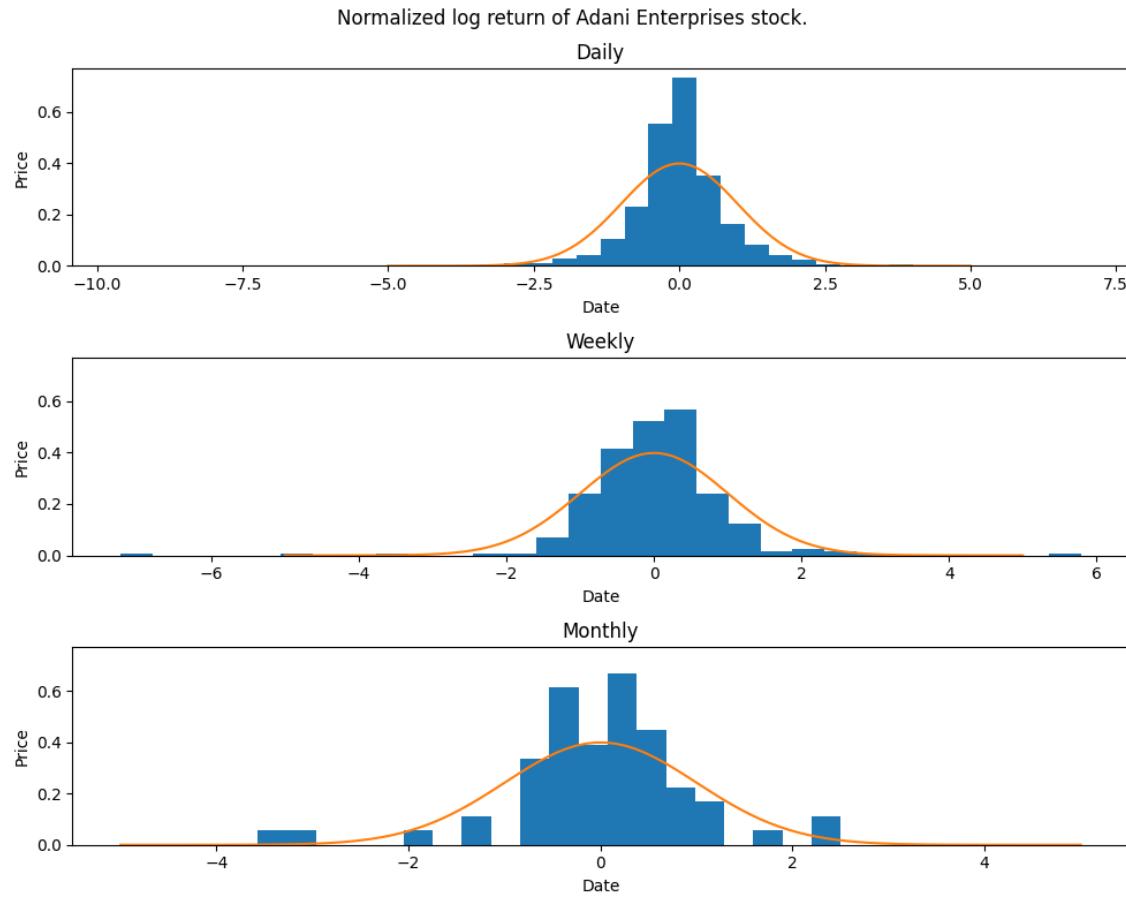
NSE NIFTY 50 LOGRETURNS

Normalized log return of NSE Nifty 50



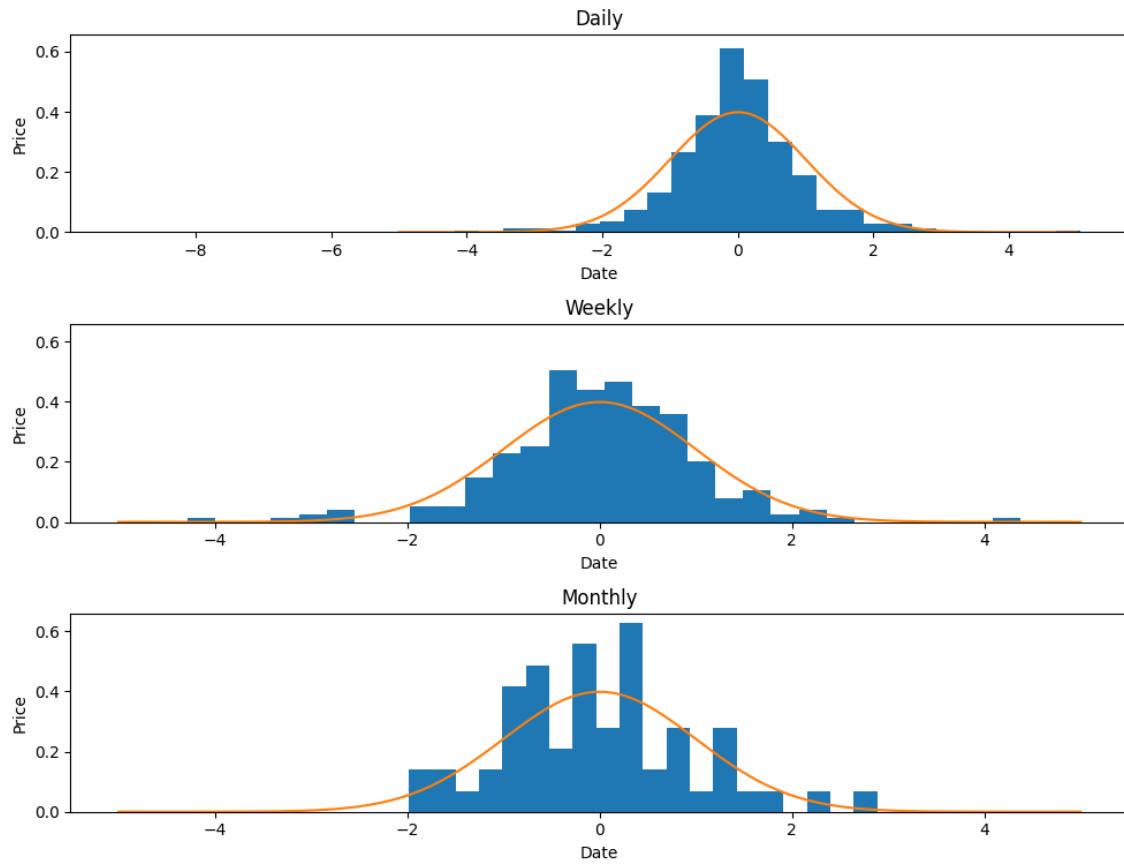
Q3 Stocks

ADANIENT NS LOGRETURNS



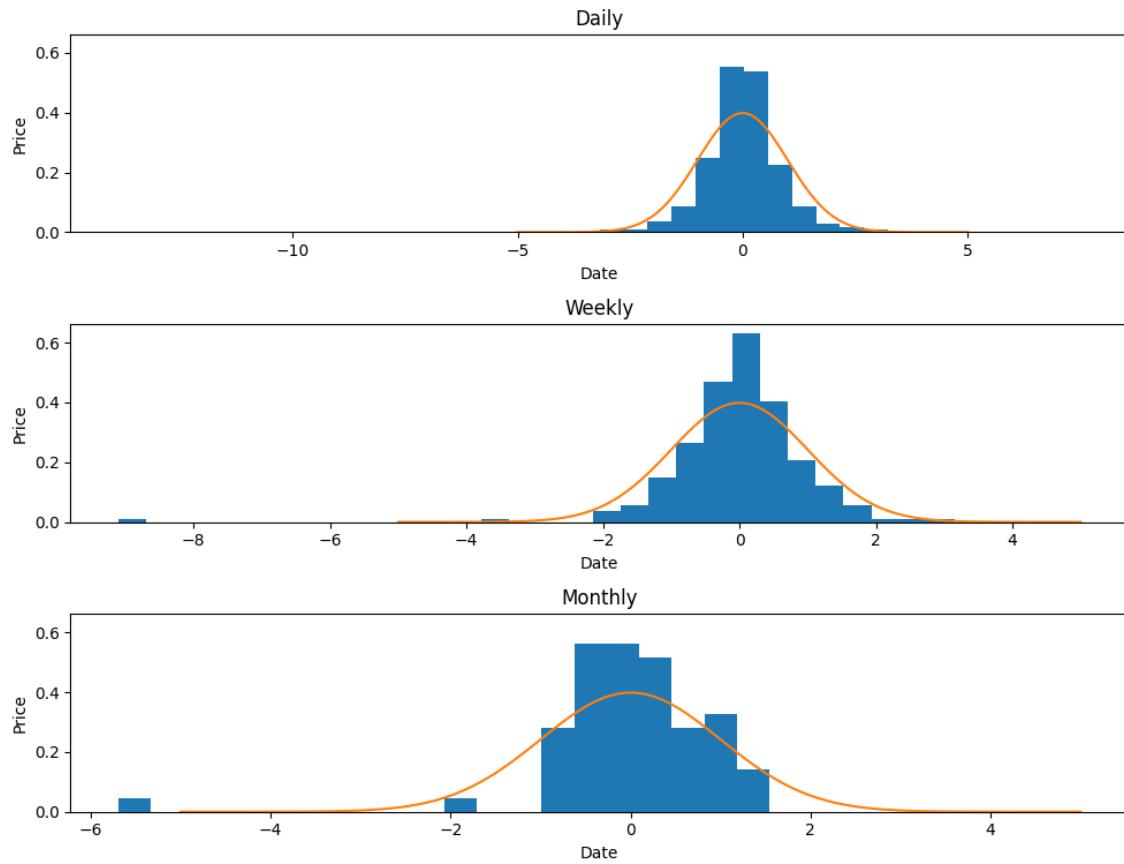
ASIANPAINT NS LOGRETURNS

Normalized log return of Asian Paints stock.



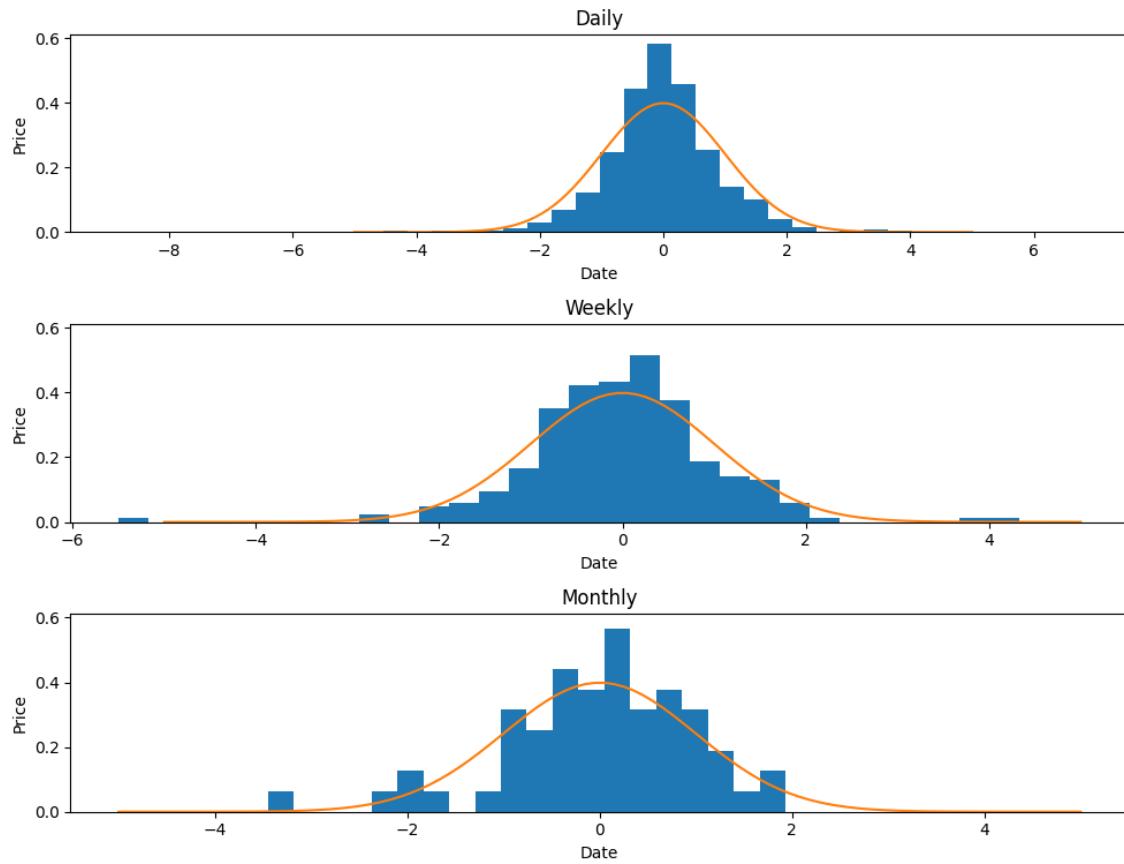
AXISBANK NS LOGRETURNS

Normalized log return of Axis Bank stock.



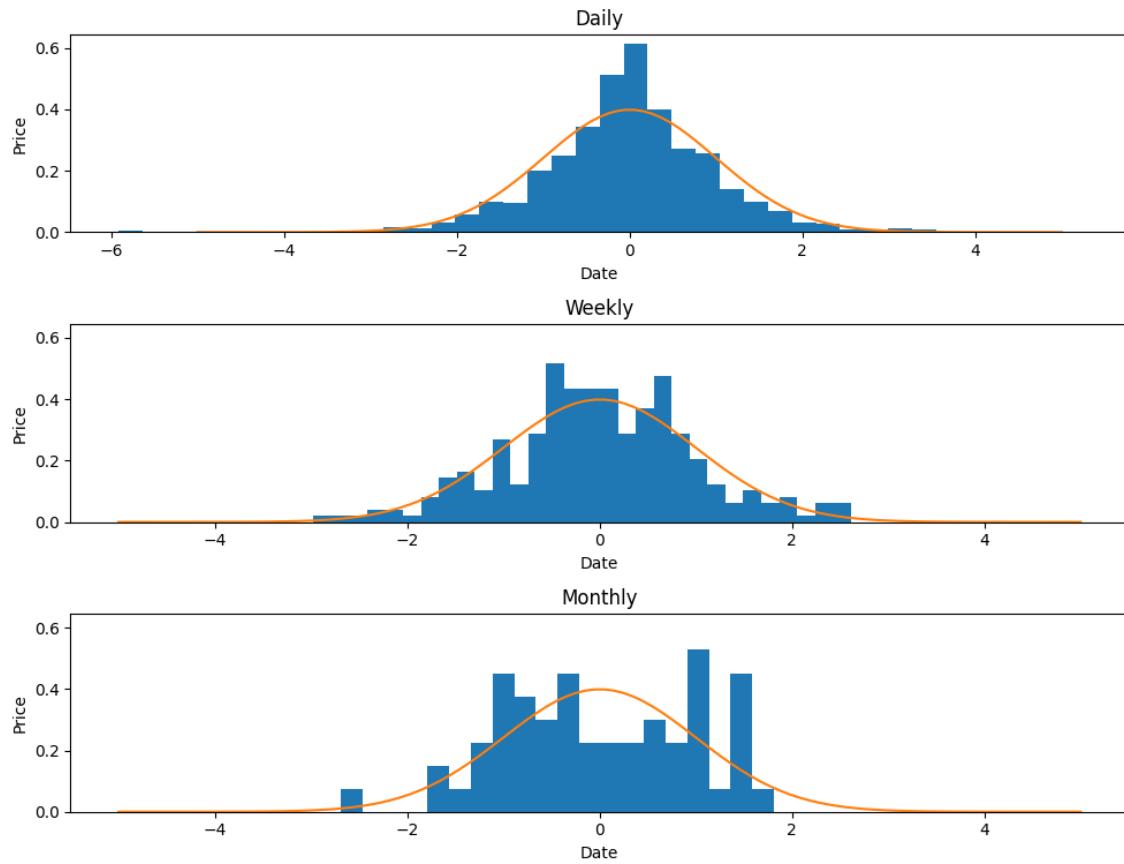
BAJAJ-AUTO NS LOGRETURNS

Normalized log return of Bajaj Automobiles stock.



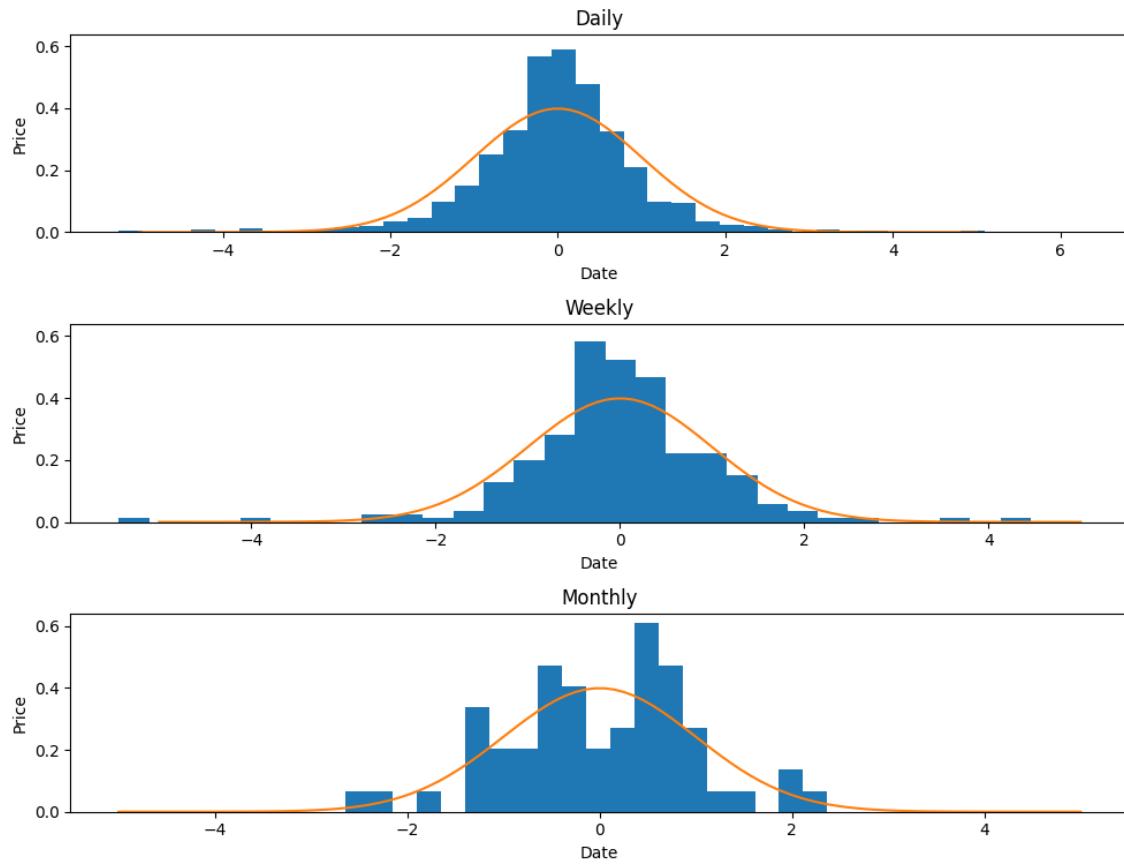
BANKBARODA BO LOGRETURNS

Normalized log return of Bank of Baroda stock.



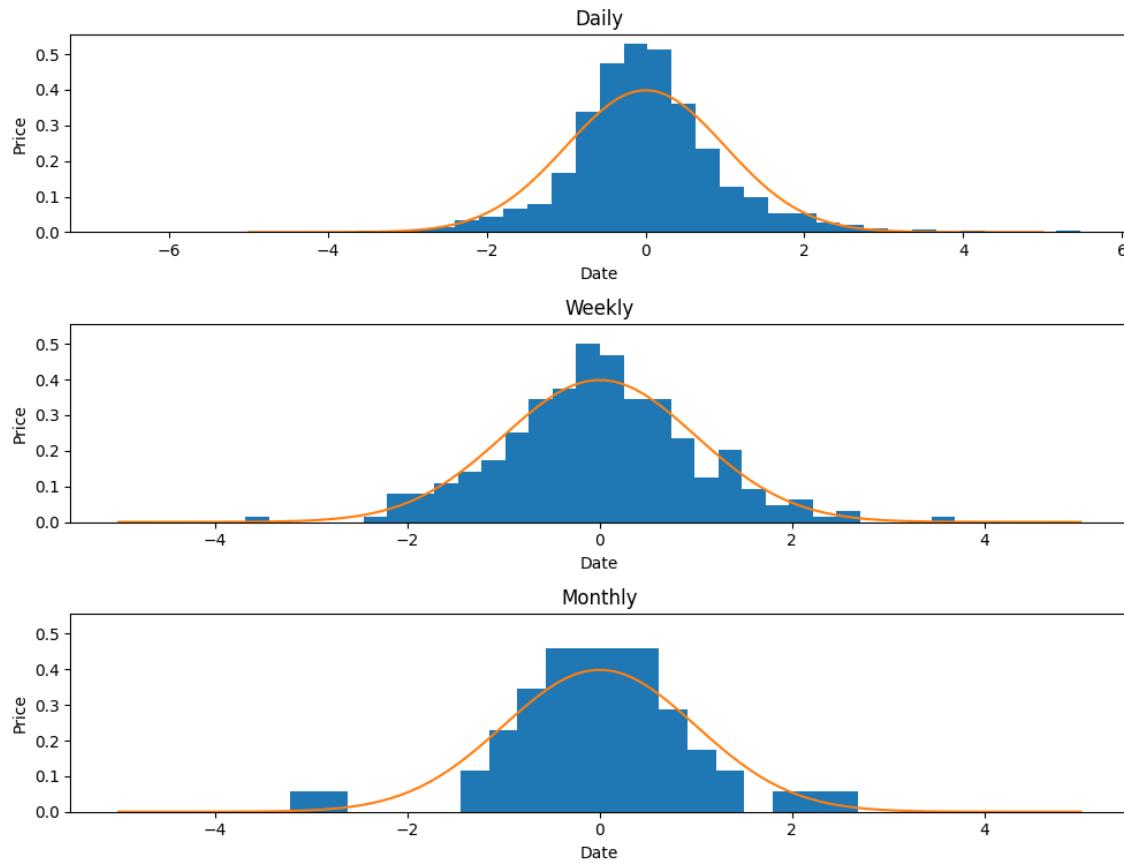
BERGEPAINT NS LOGRETURNS

Normalized log return of Berger Paints stock.



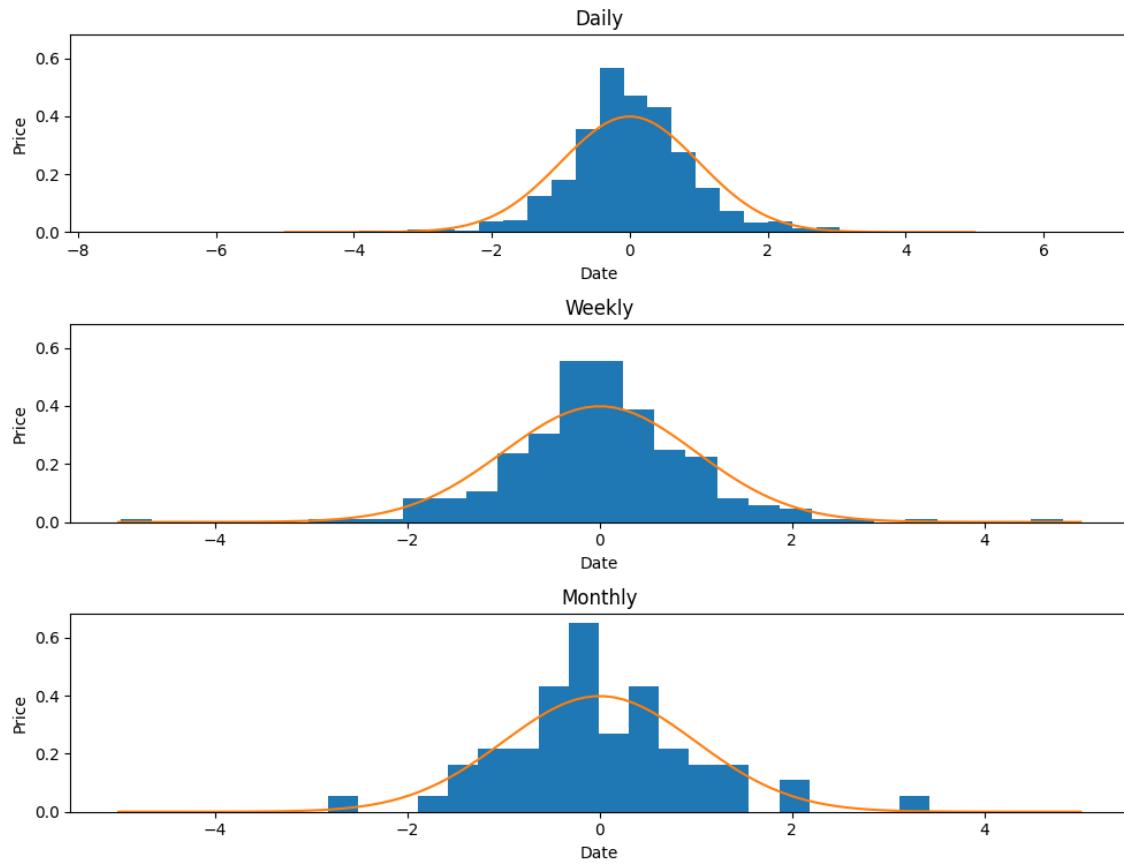
BHARTIARTL NS LOGRETURNS

Normalized log return of Airtel stock.



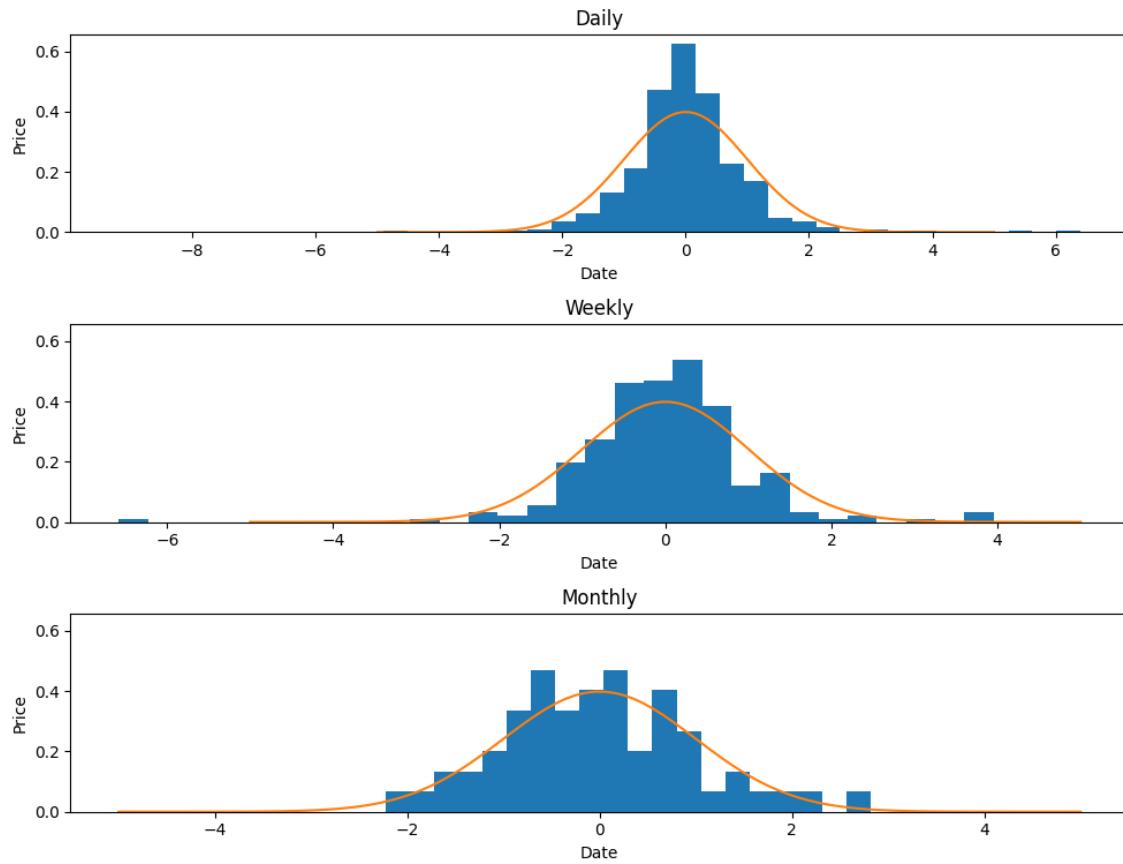
BPCL NS LOGRETURNS

Normalized log return of Bharat Petroleum Corp. Ltd stock.



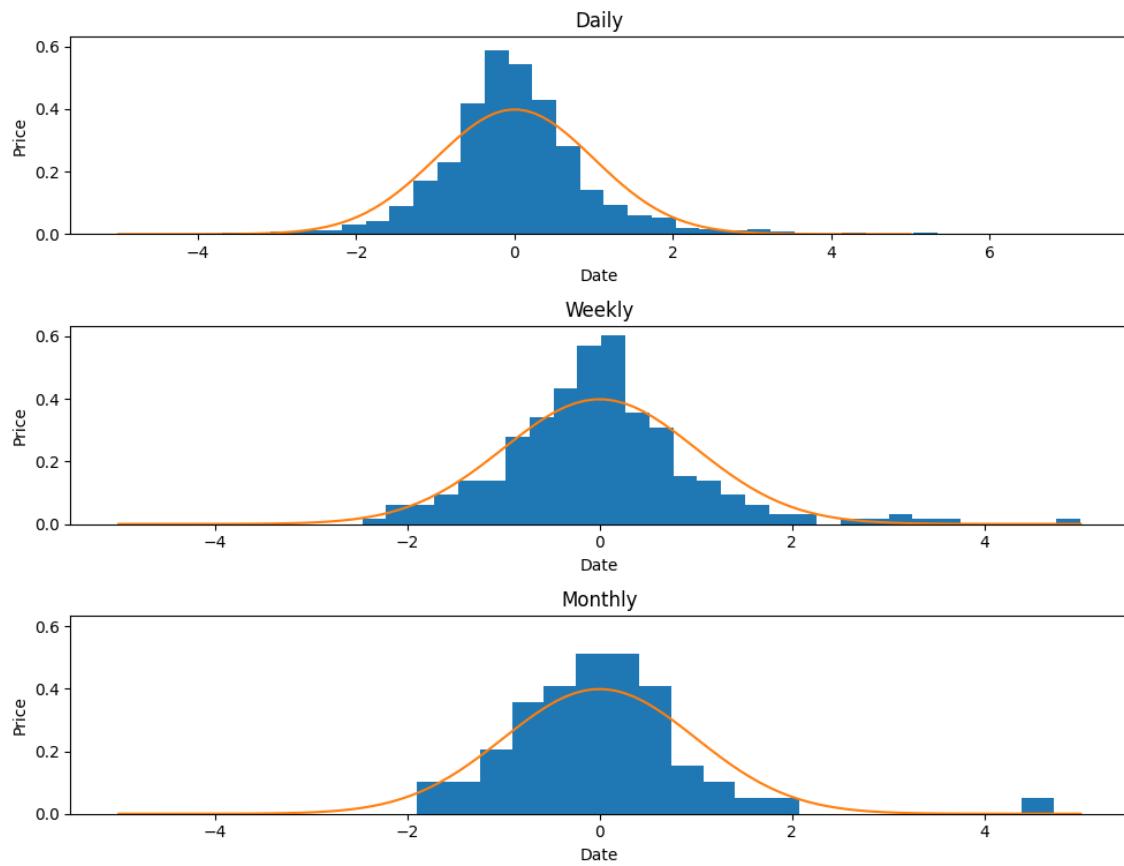
BRITANNIA NS LOGRETURNS

Normalized log return of Britannia stock.



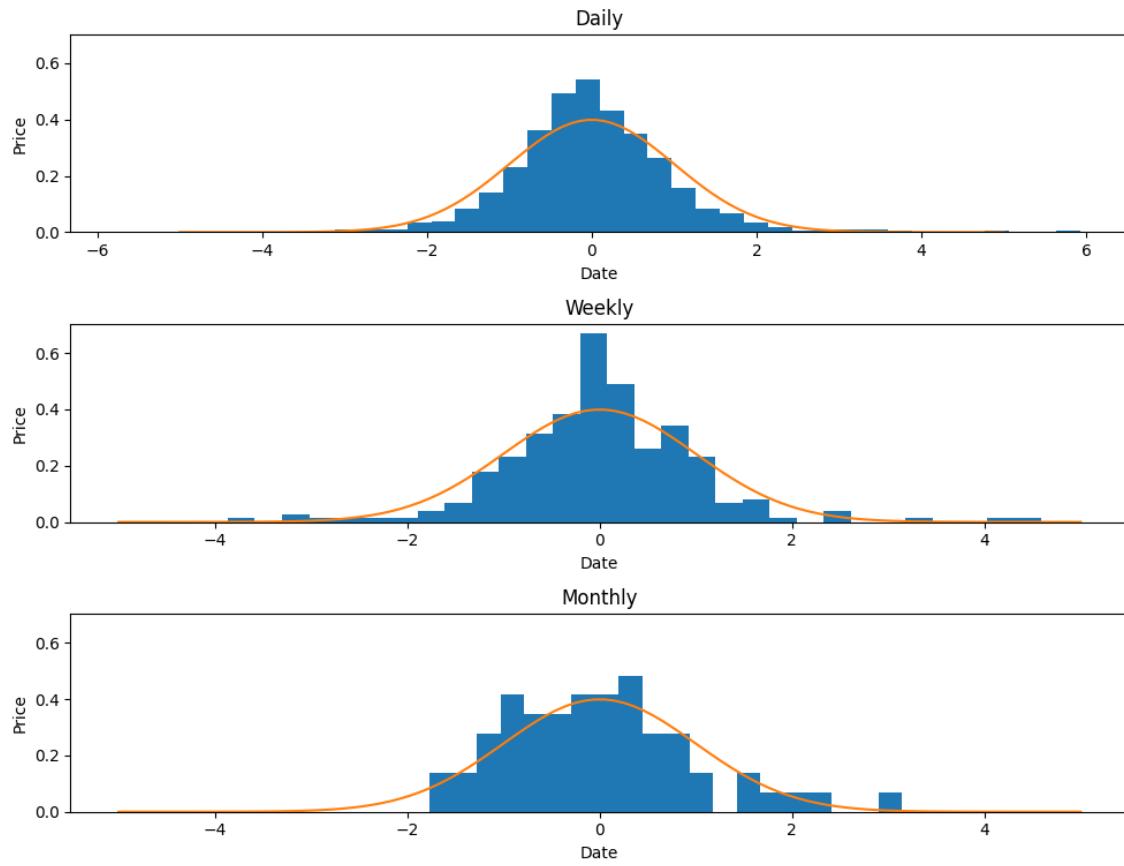
CIPLA NS LOGRETURNS

Normalized log return of Cipla stock.



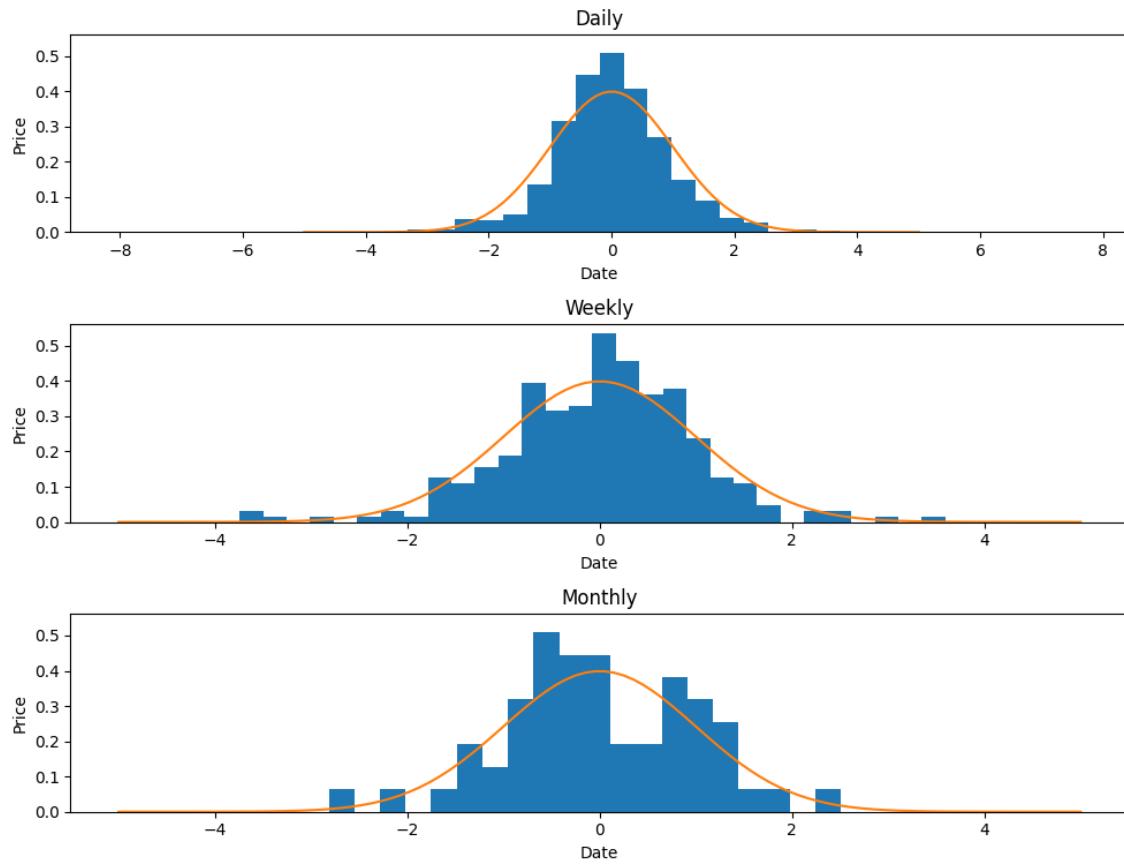
COLPAL BO LOGRETURNS

Normalized log return of Colgate stock.



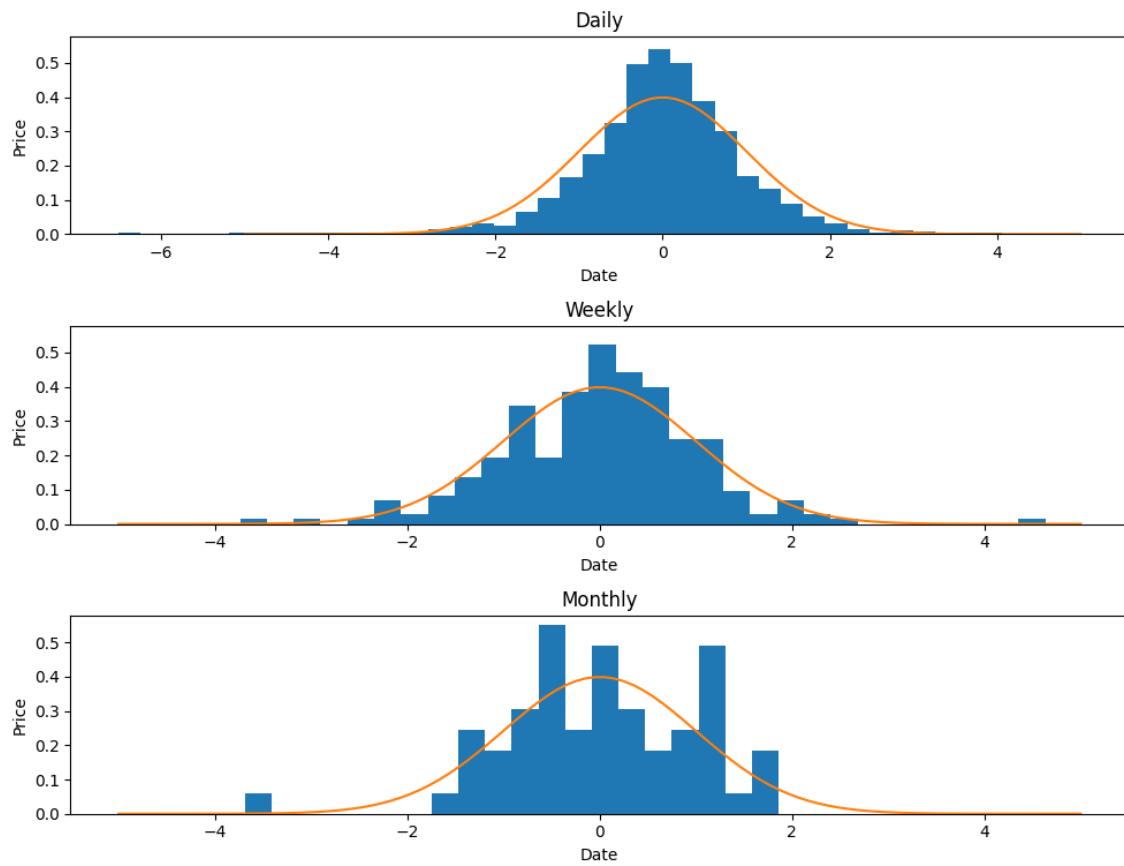
DABUR NS LOGRETURNS

Normalized log return of Dabur stock.



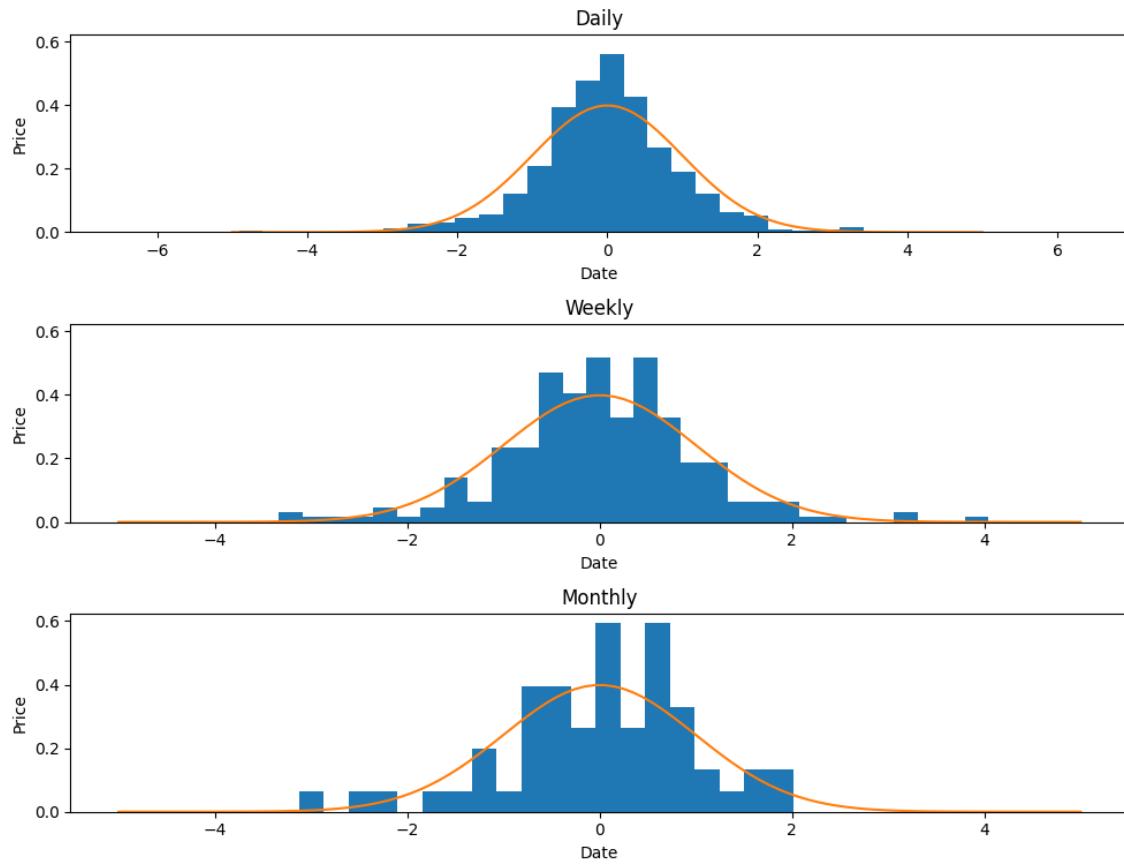
DLF BO LOGRETURNS

Normalized log return of DLF stock.



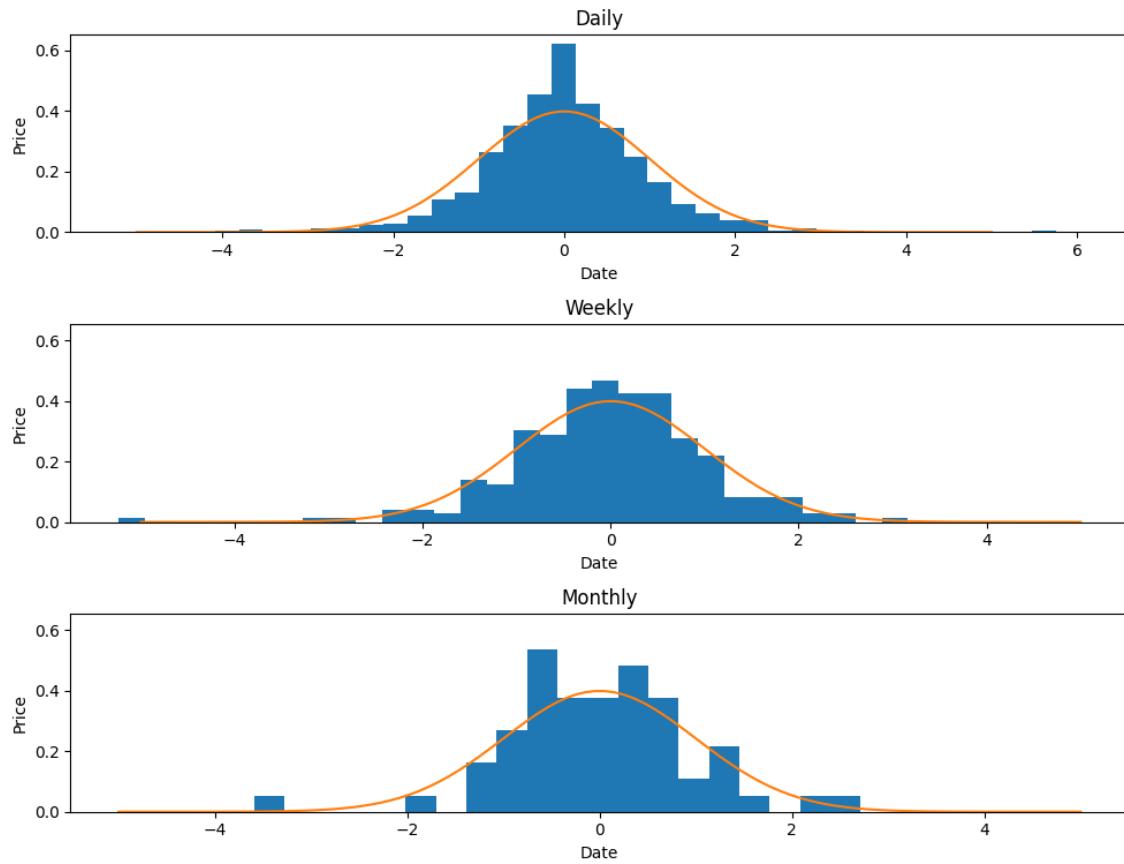
HAVELLS NS LOGRETURNS

Normalized log return of Havells stock.



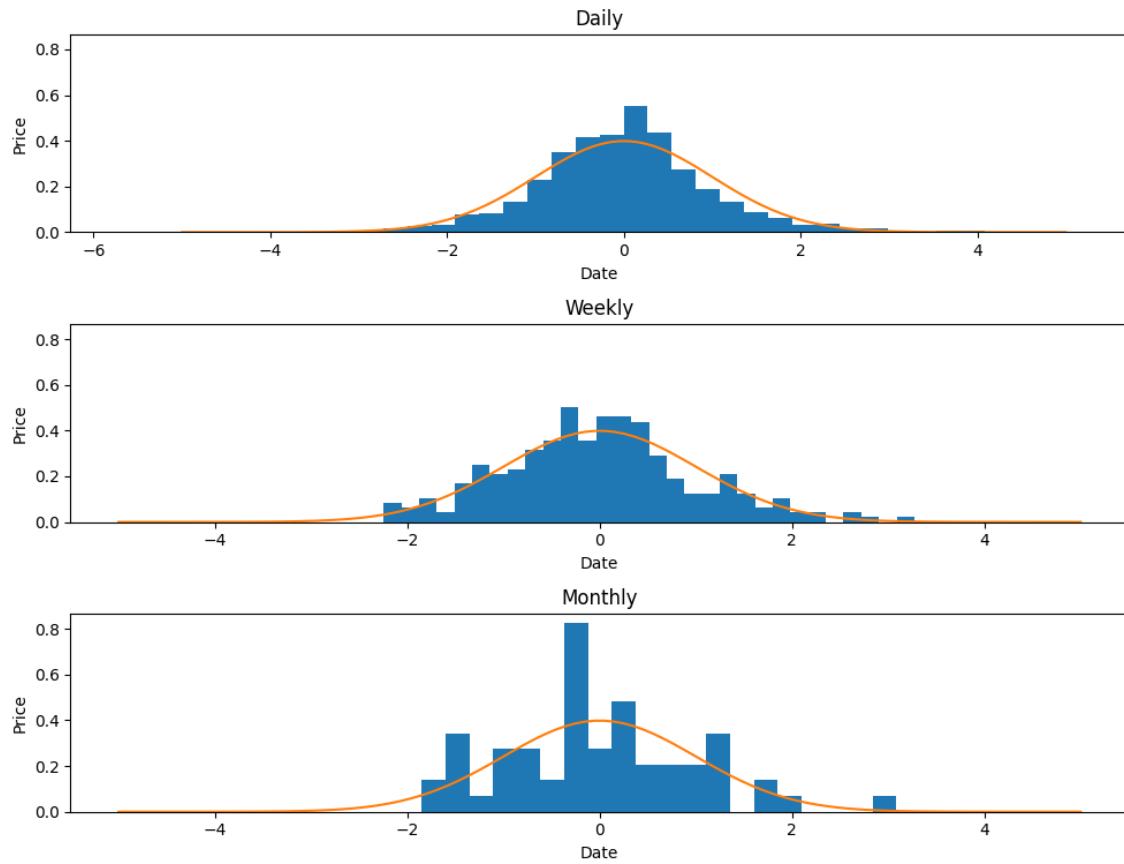
HCLTECH NS LOGRETURNS

Normalized log return of HCL stock.



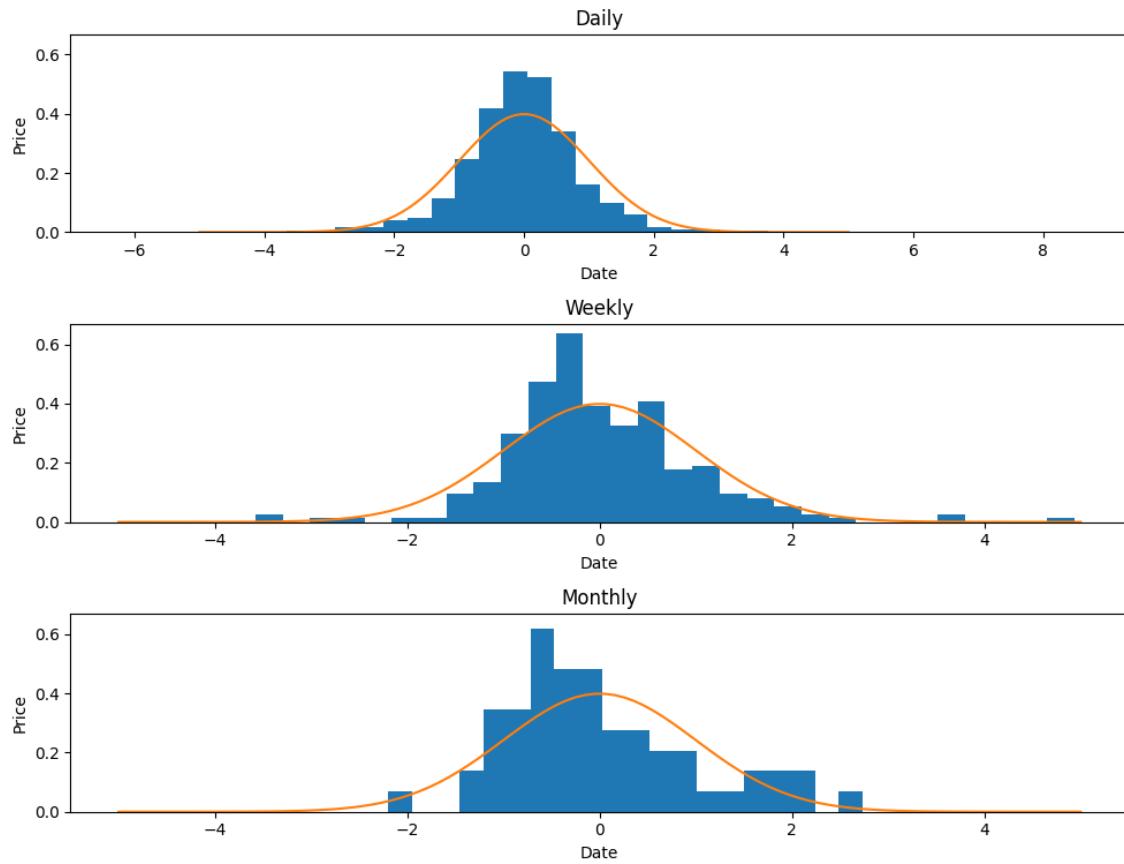
HINDPETRO NS LOGRETURNS

Normalized log return of Hindustan Petroleum stock.



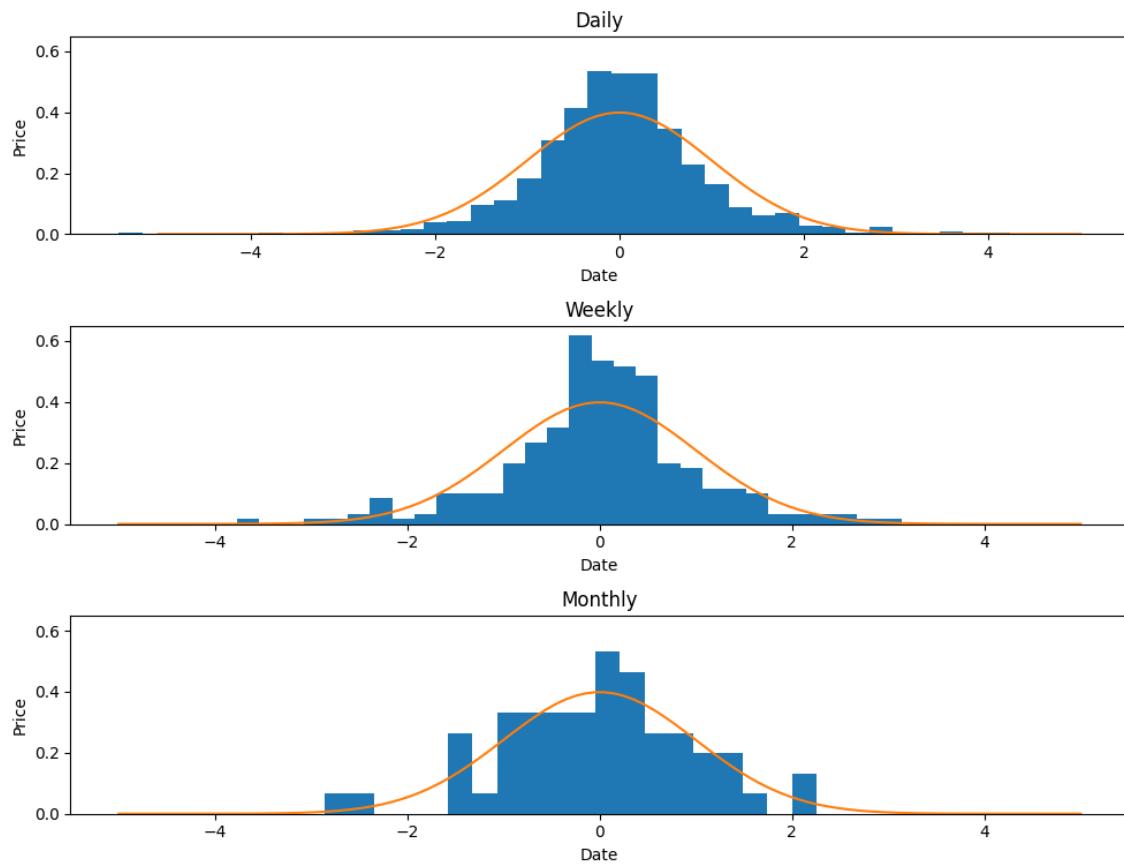
HINDUNILVR BO LOGRETURNS

Normalized log return of Hindustan Unilever Ltd stock.



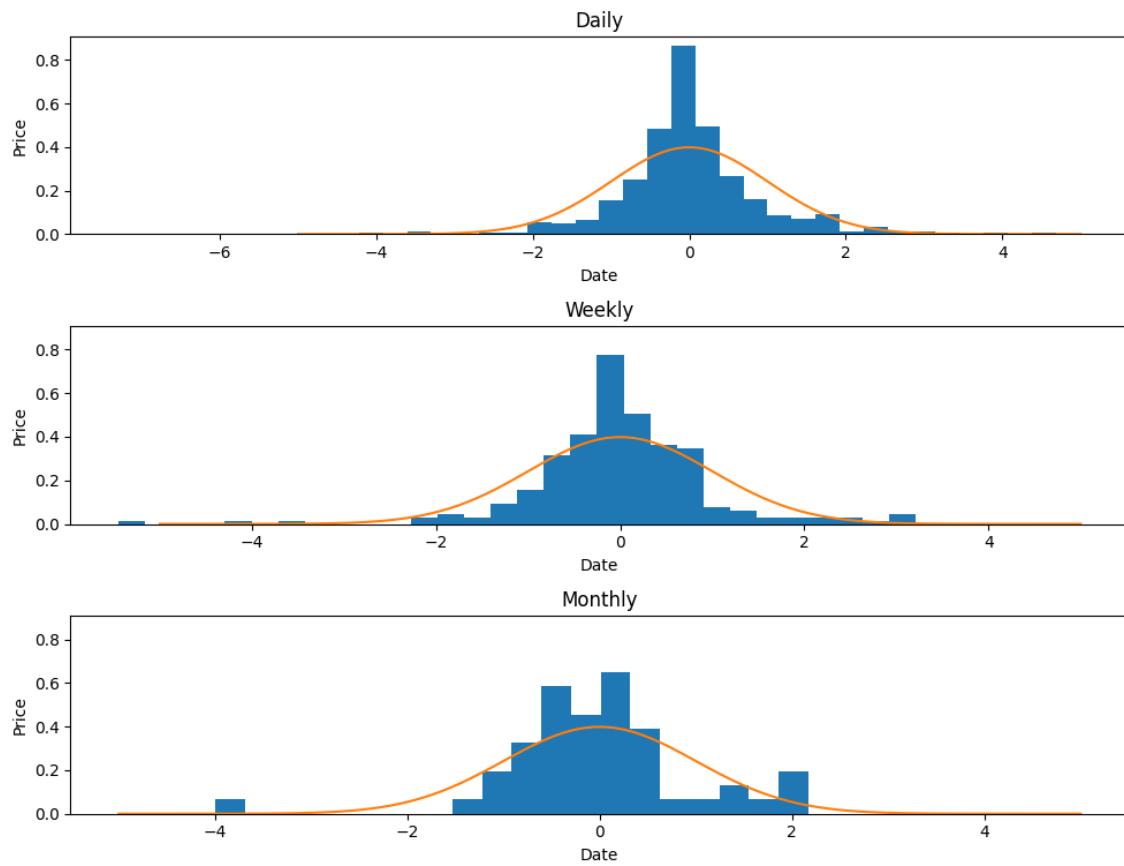
INDIGO NS LOGRETURNS

Normalized log return of Indigo stock.



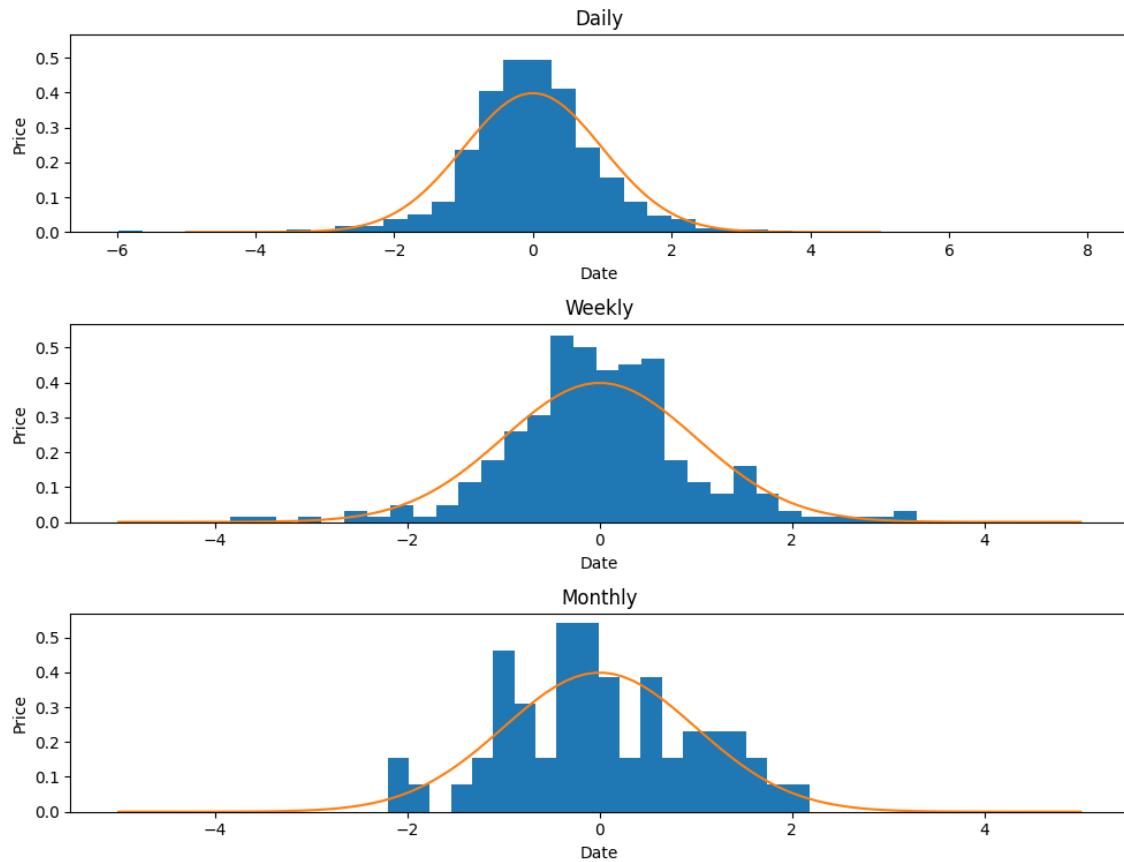
IRCTC BO LOGRETURNS

Normalized log return of IRCTC stock.



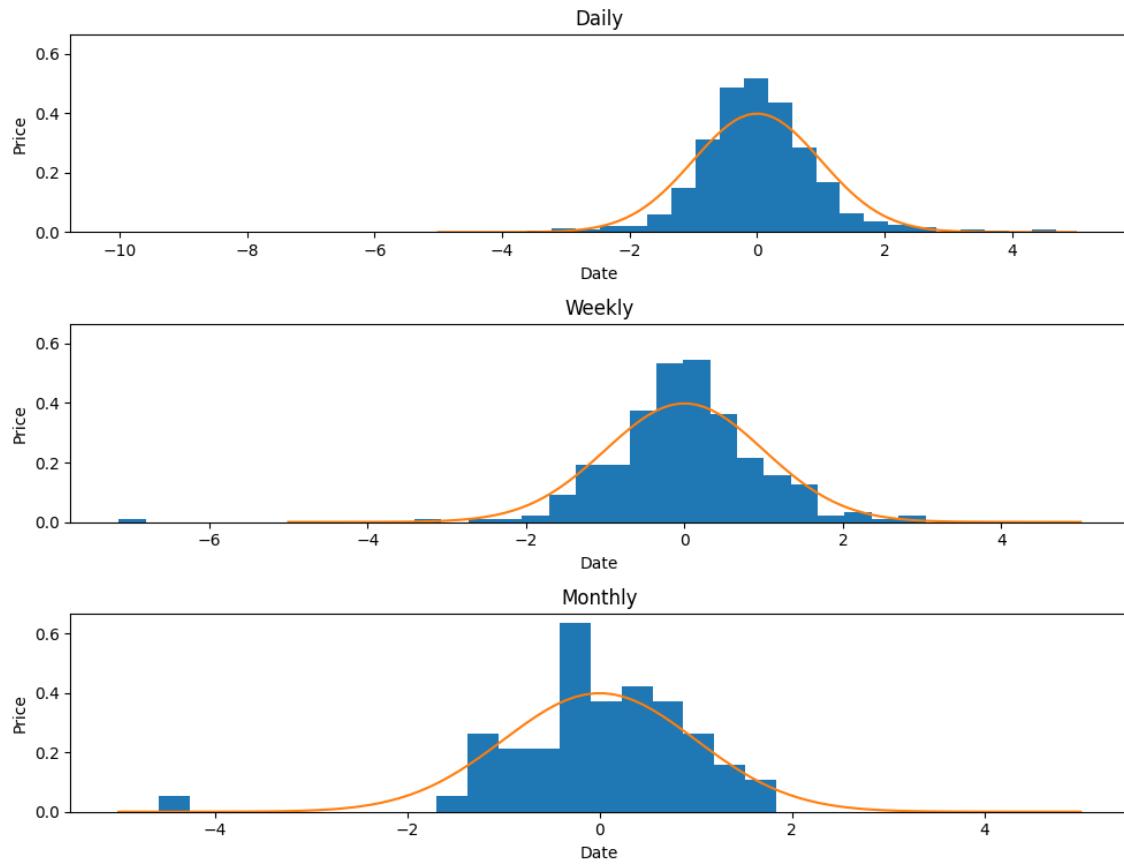
JUBLFOOD NS LOGRETURNS

Normalized log return of Jubilant Foods stock.



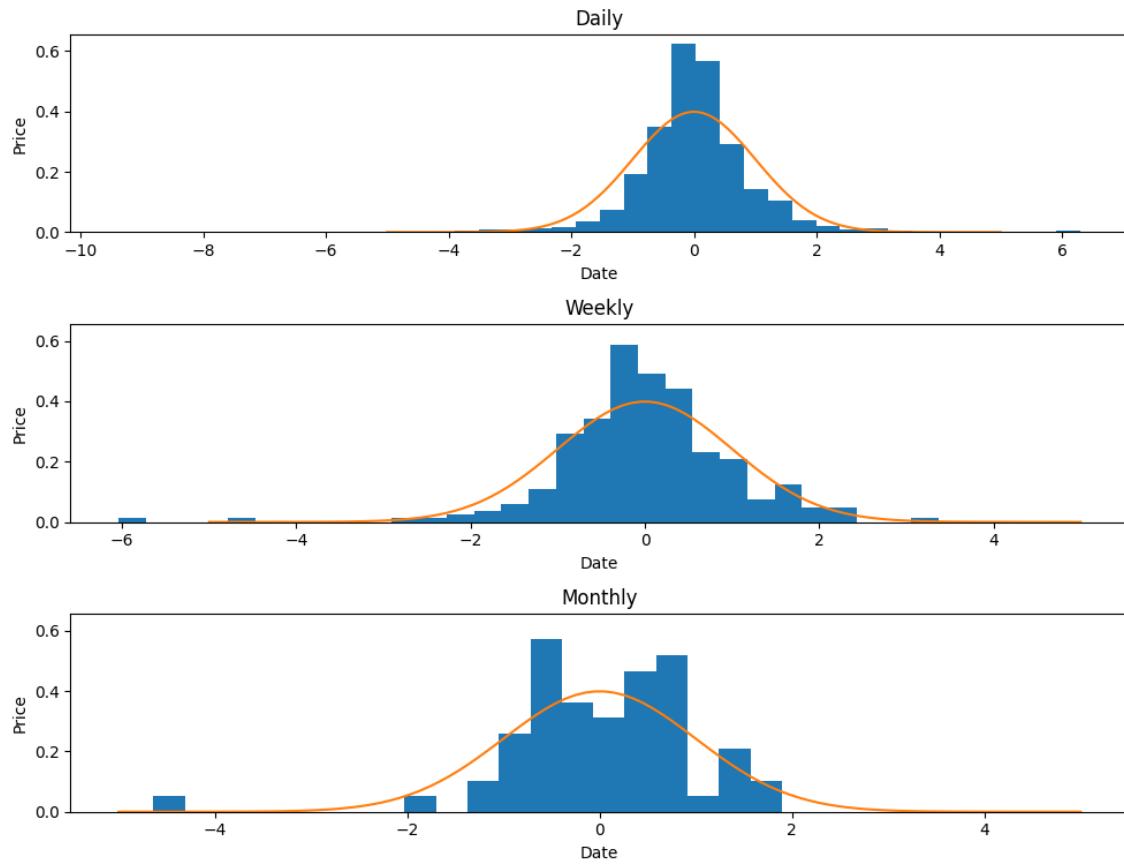
LT BO LOGRETURNS

Normalized log return of Larsen & Toubro stock.



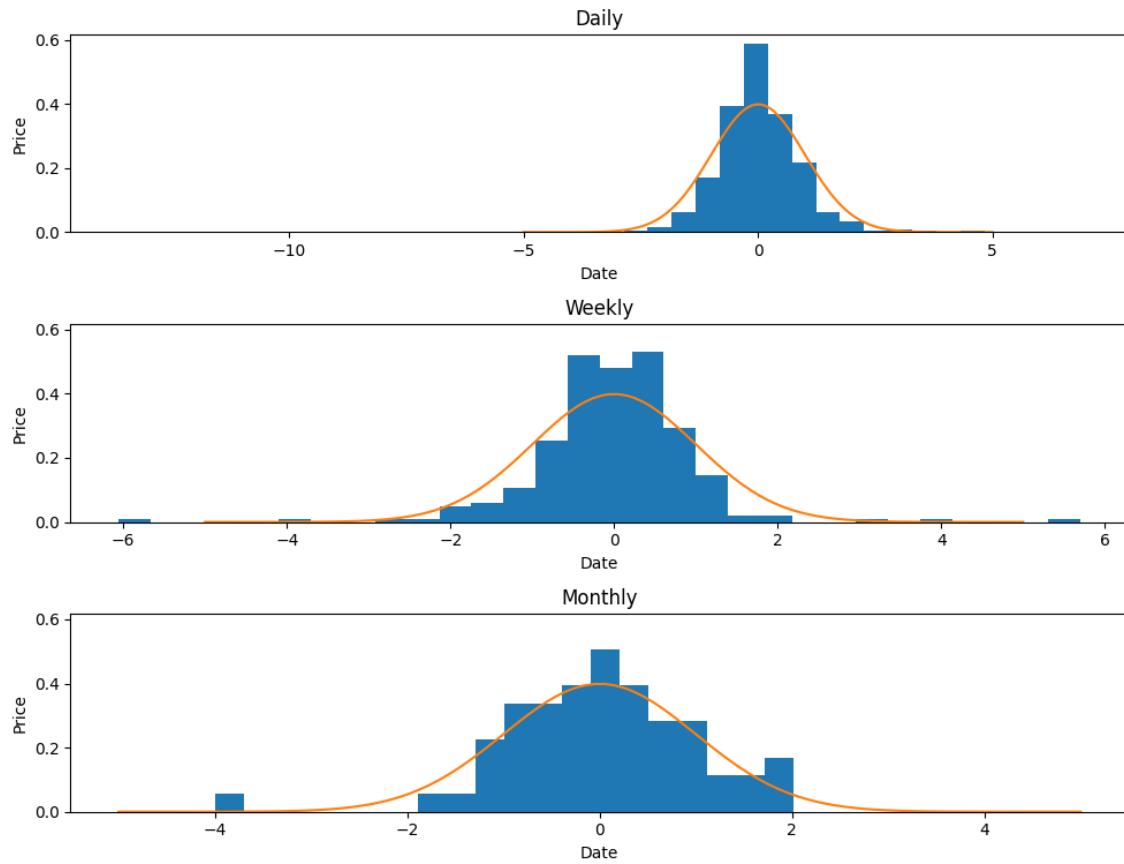
MARUTI BO LOGRETURNS

Normalized log return of Maruti Suzuki stock.



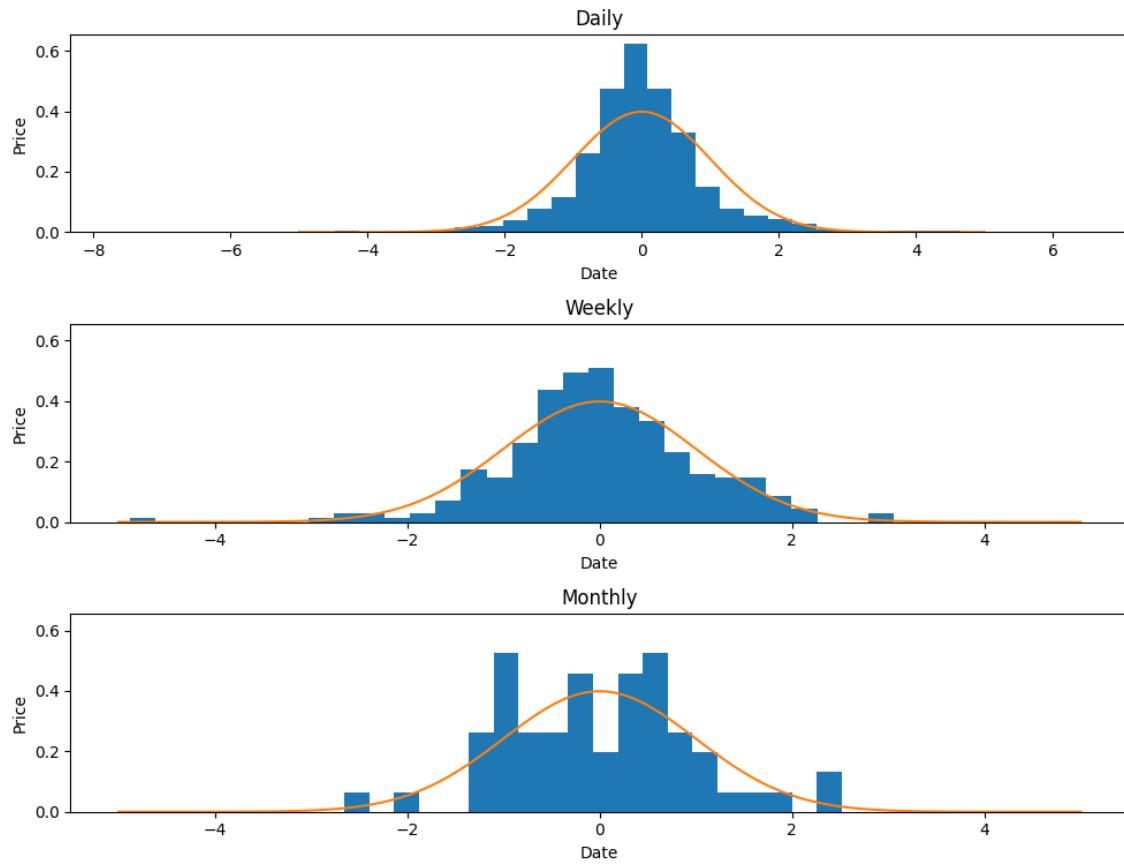
MFSL BO LOGRETURNS

Normalized log return of Max Fin. Services stock.



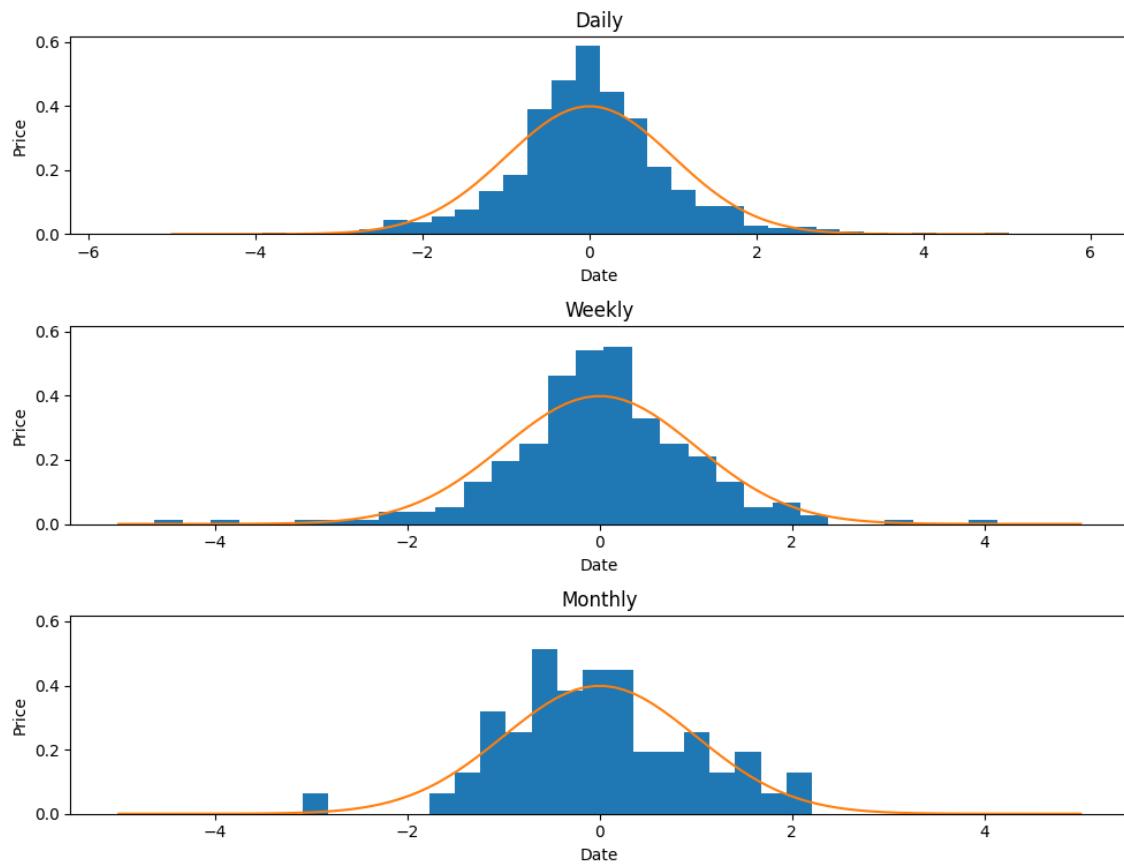
MRF NS LOGRETURNS

Normalized log return of MRF stock.



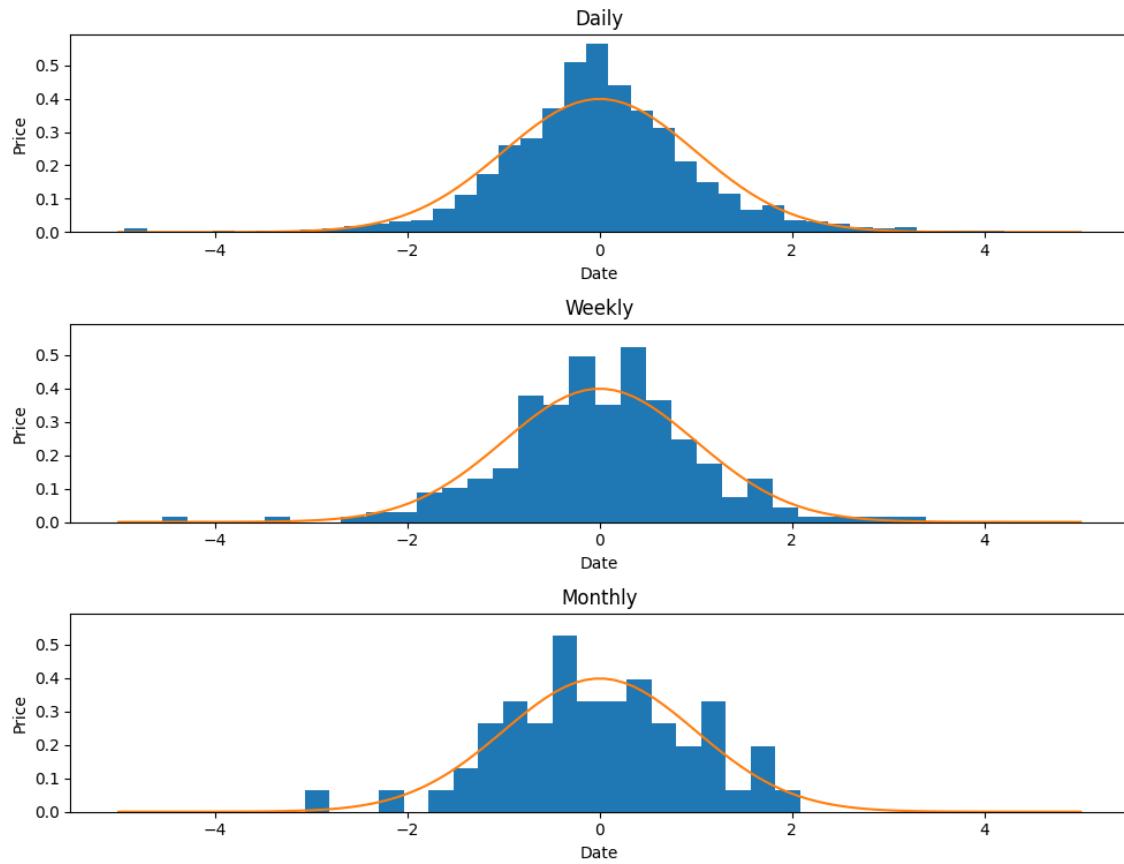
NAUKRI BO LOGRETURNS

Normalized log return of Naukri stock.



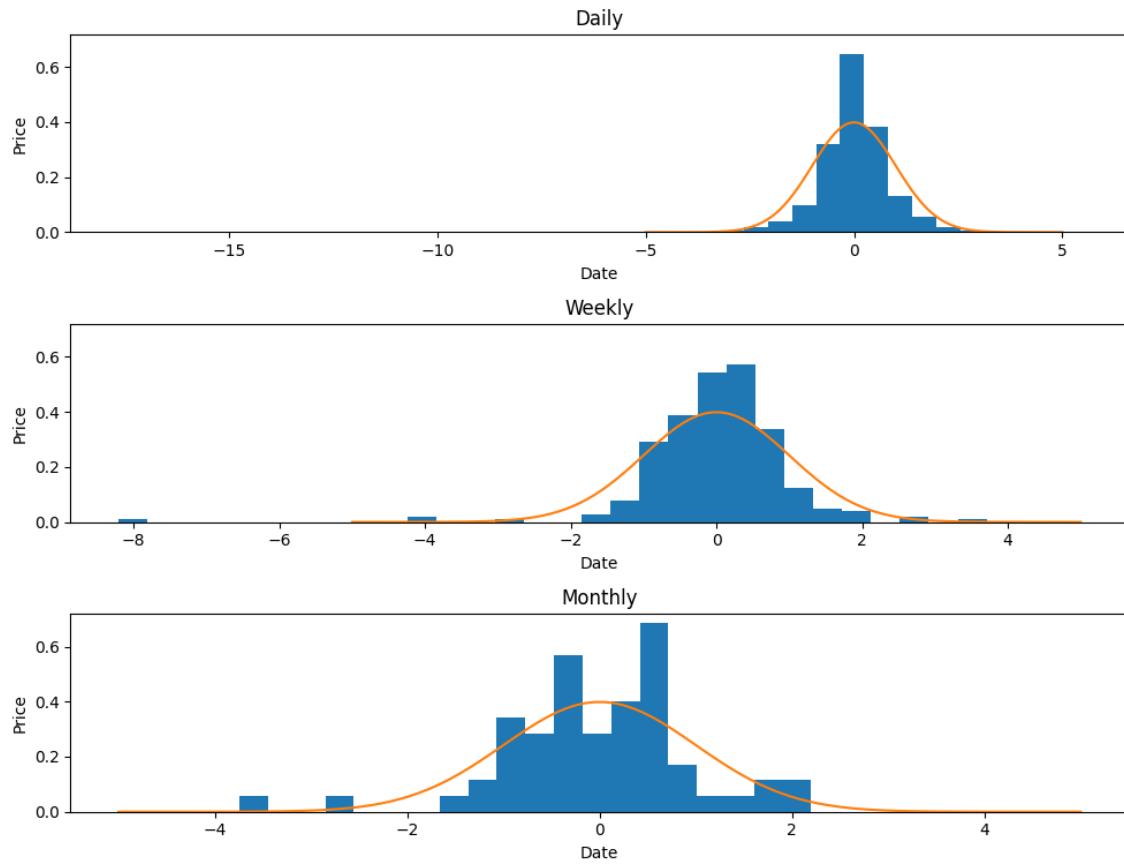
NTPC BO LOGRETURNS

Normalized log return of NTPC Corp. stock.



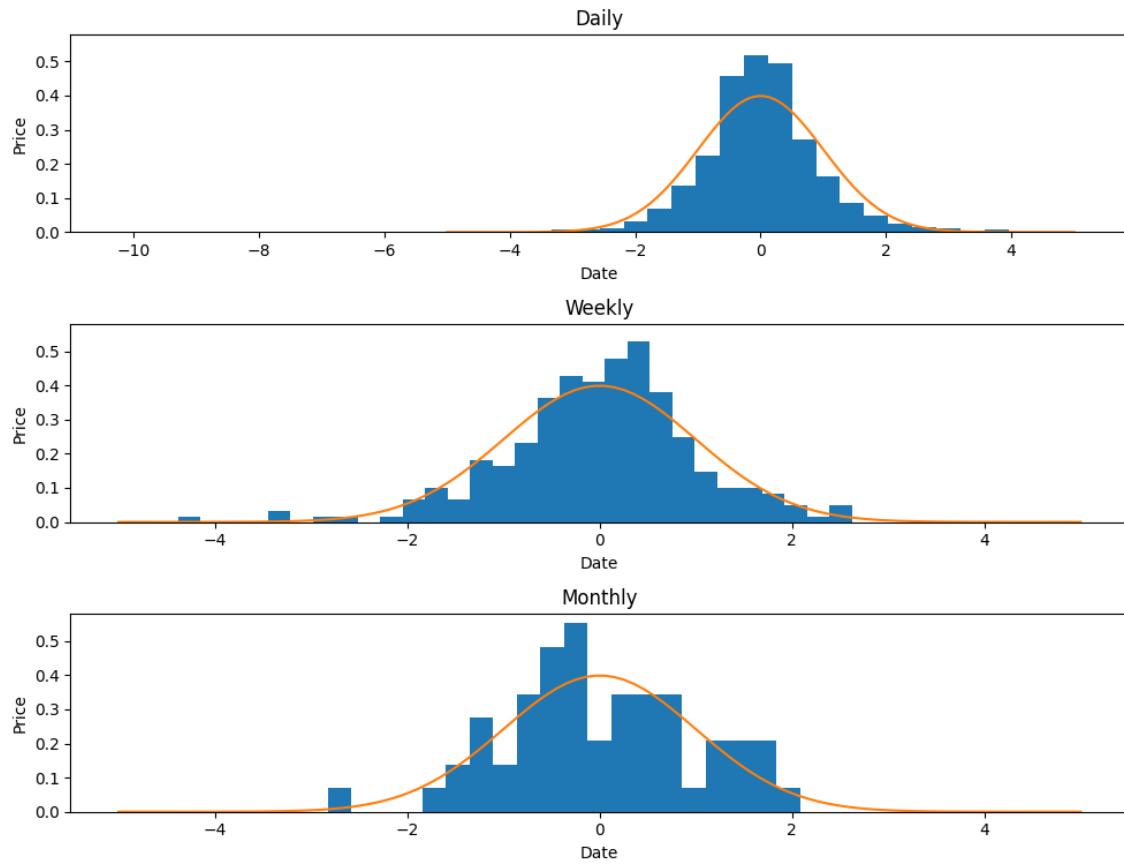
PEL NS LOGRETURNS

Normalized log return of Piramal Enterprises stock.



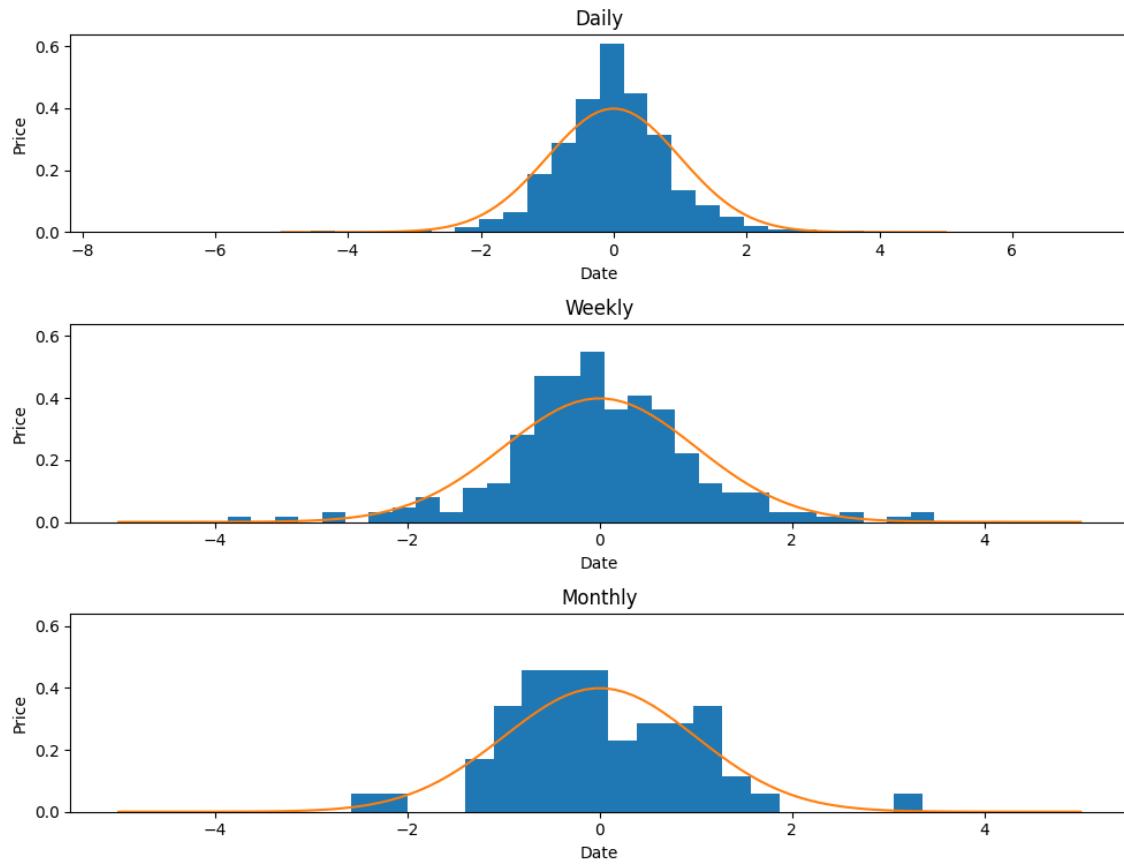
PIDILITIND BO LOGRETURNS

Normalized log return of Pidlite Industries stock.



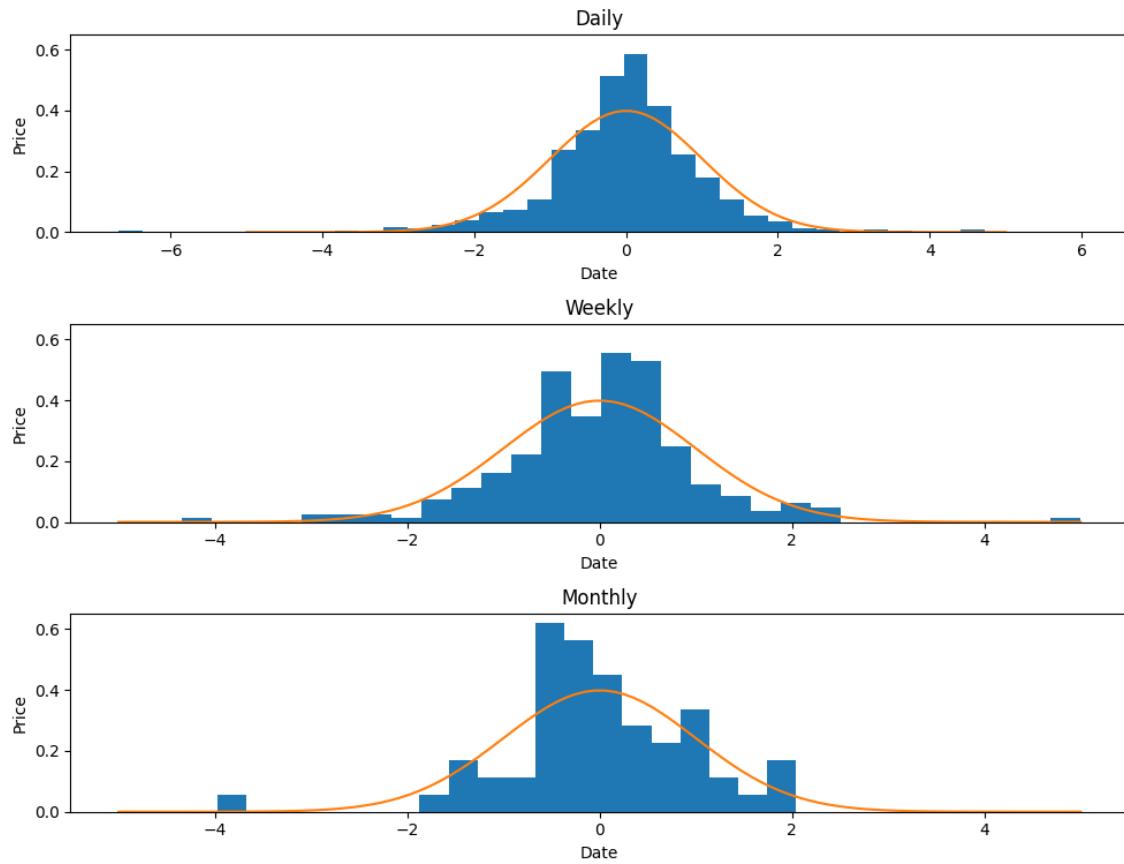
RELIANCE BO LOGRETURNS

Normalized log return of Reliance Industries stock.



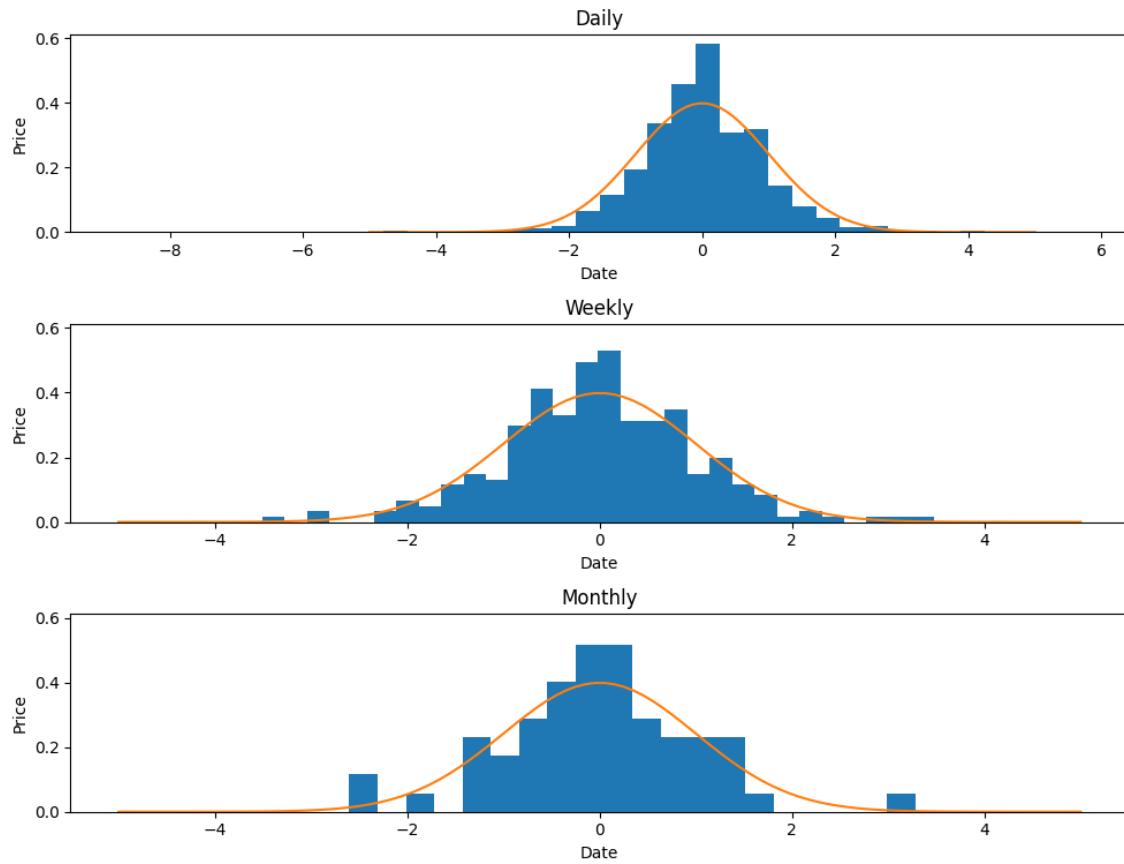
SBIN BO LOGRETURNS

Normalized log return of State Bank of India stock.



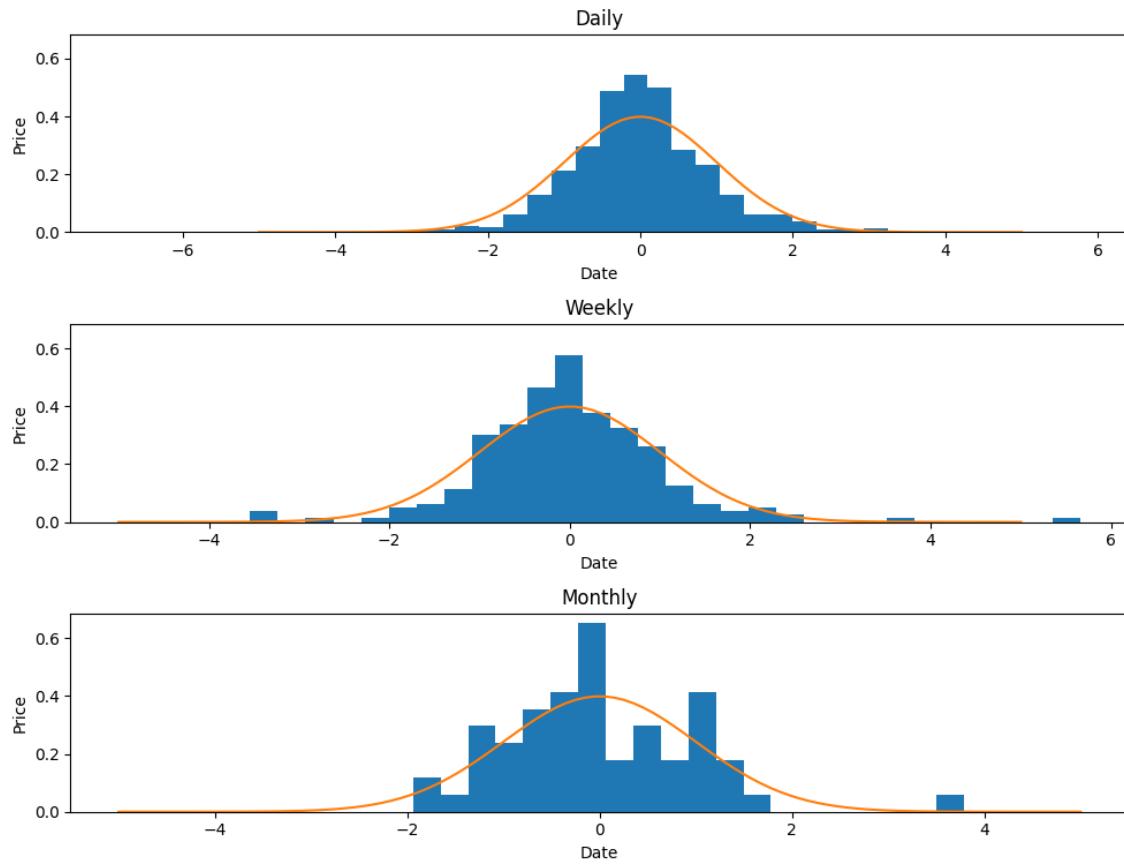
SIEMENS NS LOGRETURNS

Normalized log return of Siemens stock.



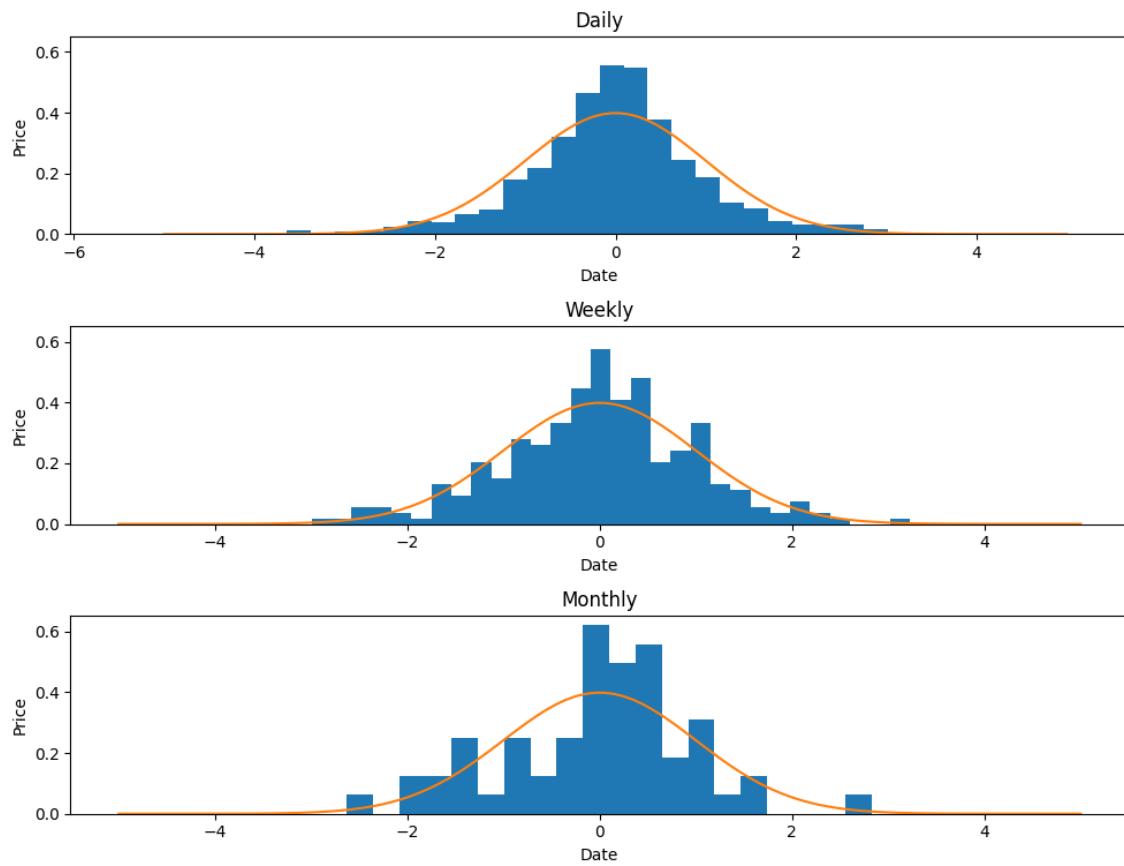
SUNPHARMA BO LOGRETURNS

Normalized log return of Sun Pharma stock.



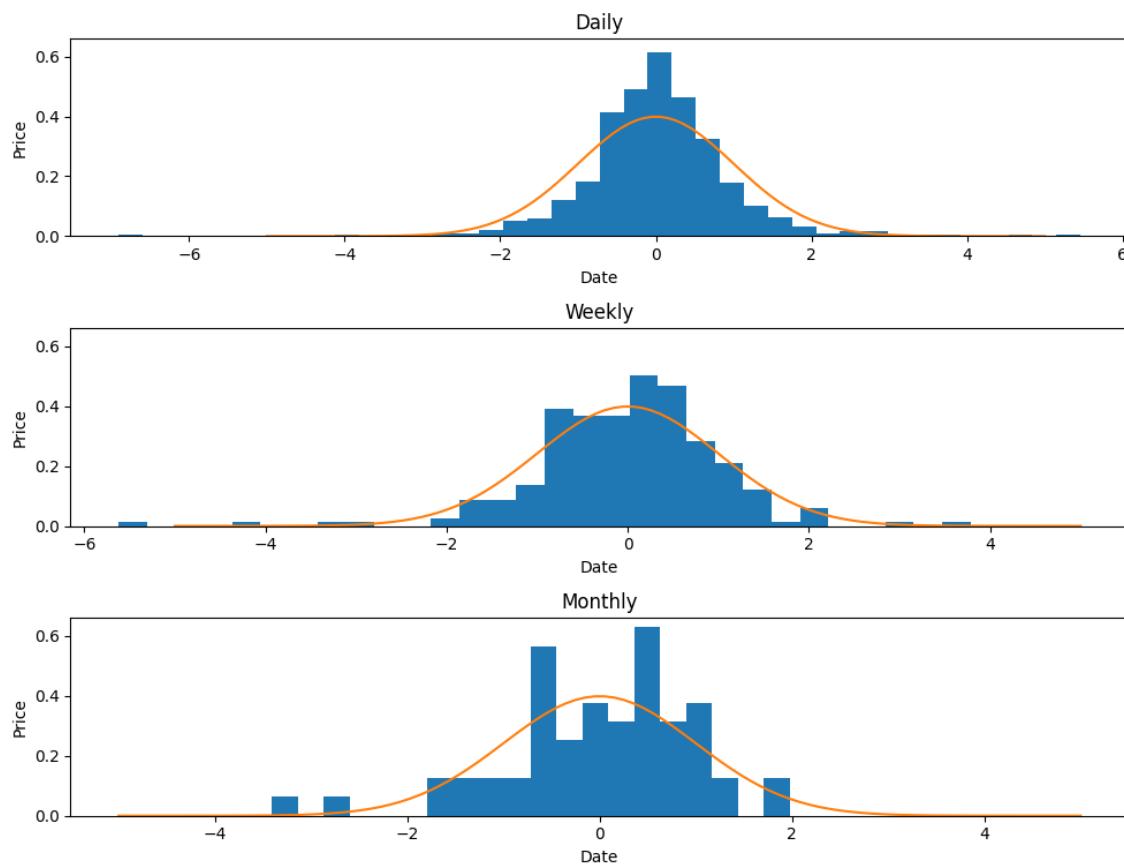
TATASTEEL NS LOGRETURNS

Normalized log return of TATA Steel stock.



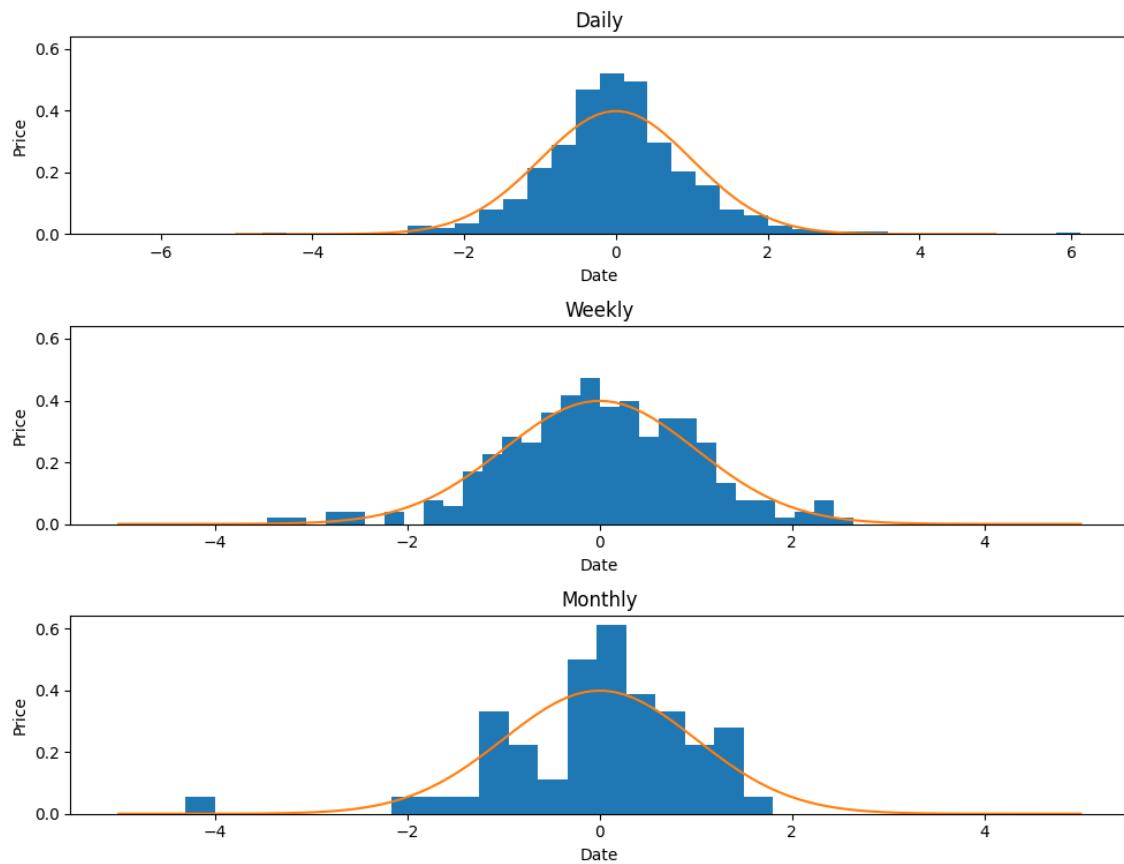
TITAN BO LOGRETURNS

Normalized log return of Titan stock.



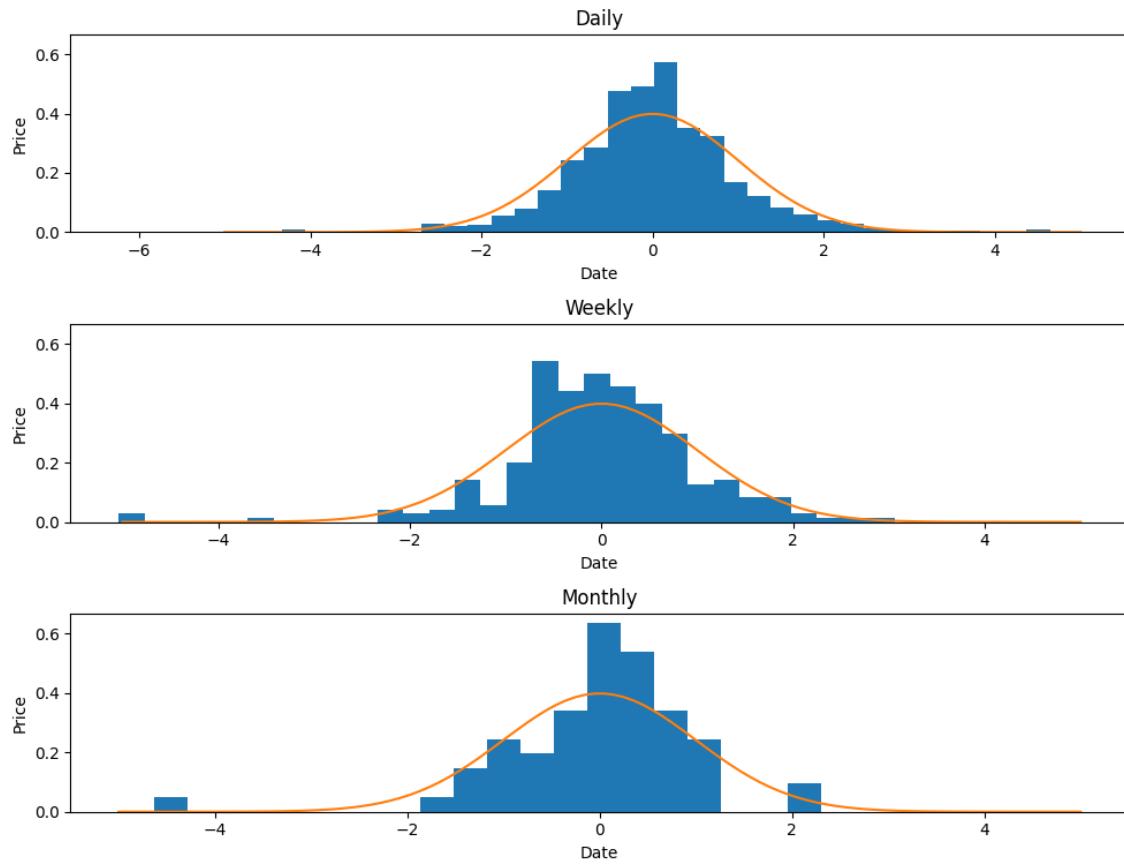
TVSMOTOR BO LOGRETURNS

Normalized log return of TVS Motors stock.



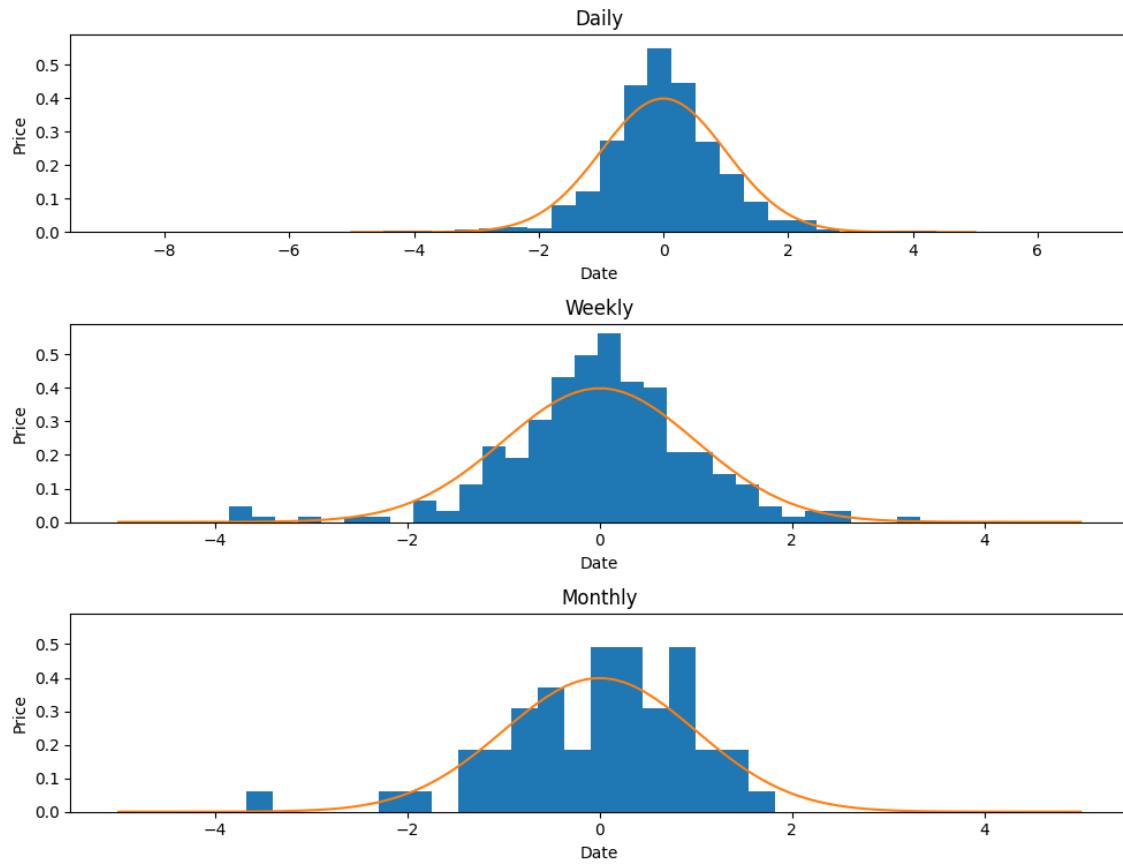
UBL NS LOGRETURNS

Normalized log return of United Breweries stock.



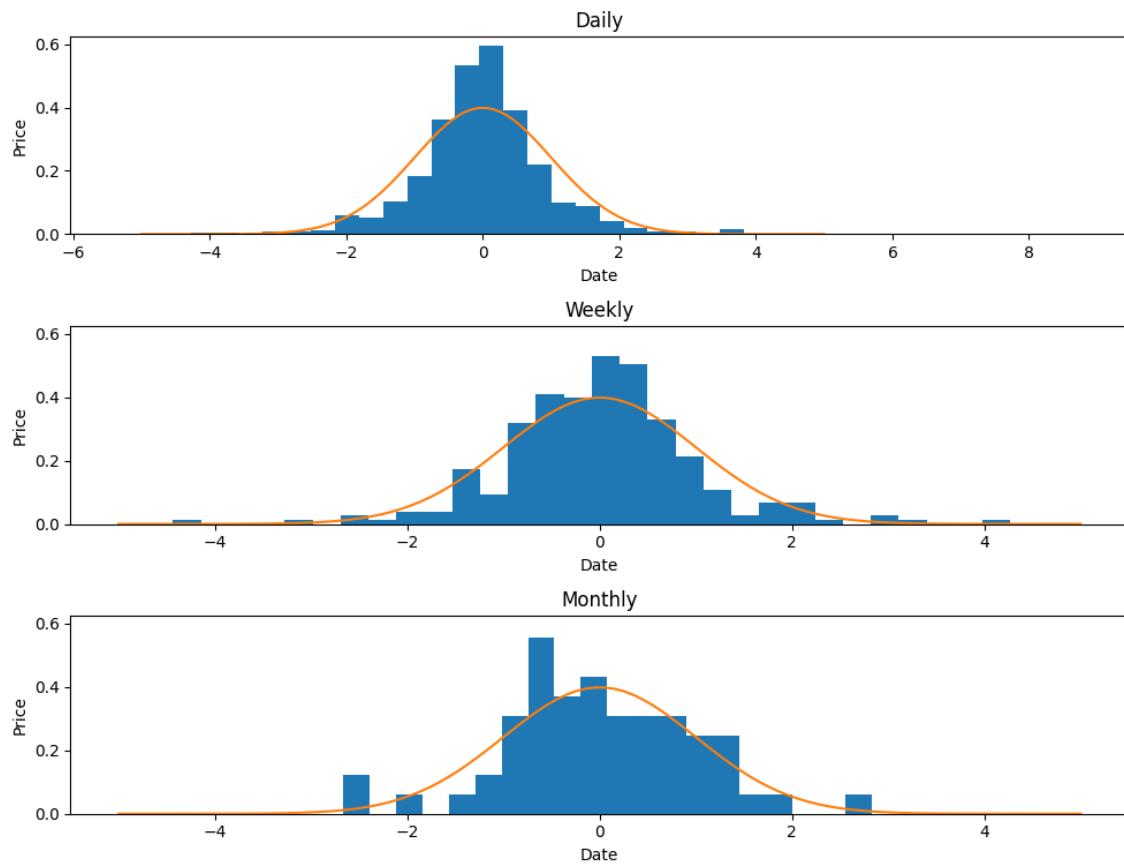
ULTRACEMCO BO LOGRETURNS

Normalized log return of Ultra Cement stock.



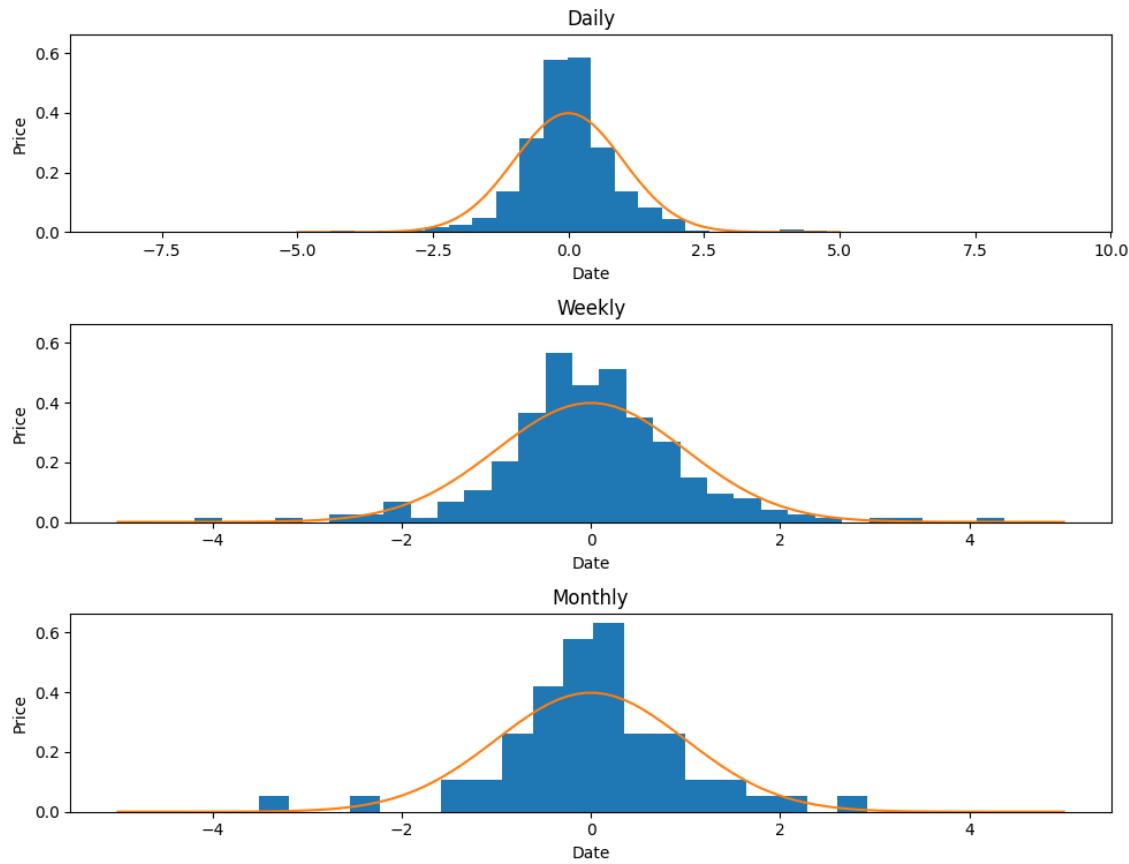
WIPRO BO LOGRETURNS

Normalized log return of Wipro stock.



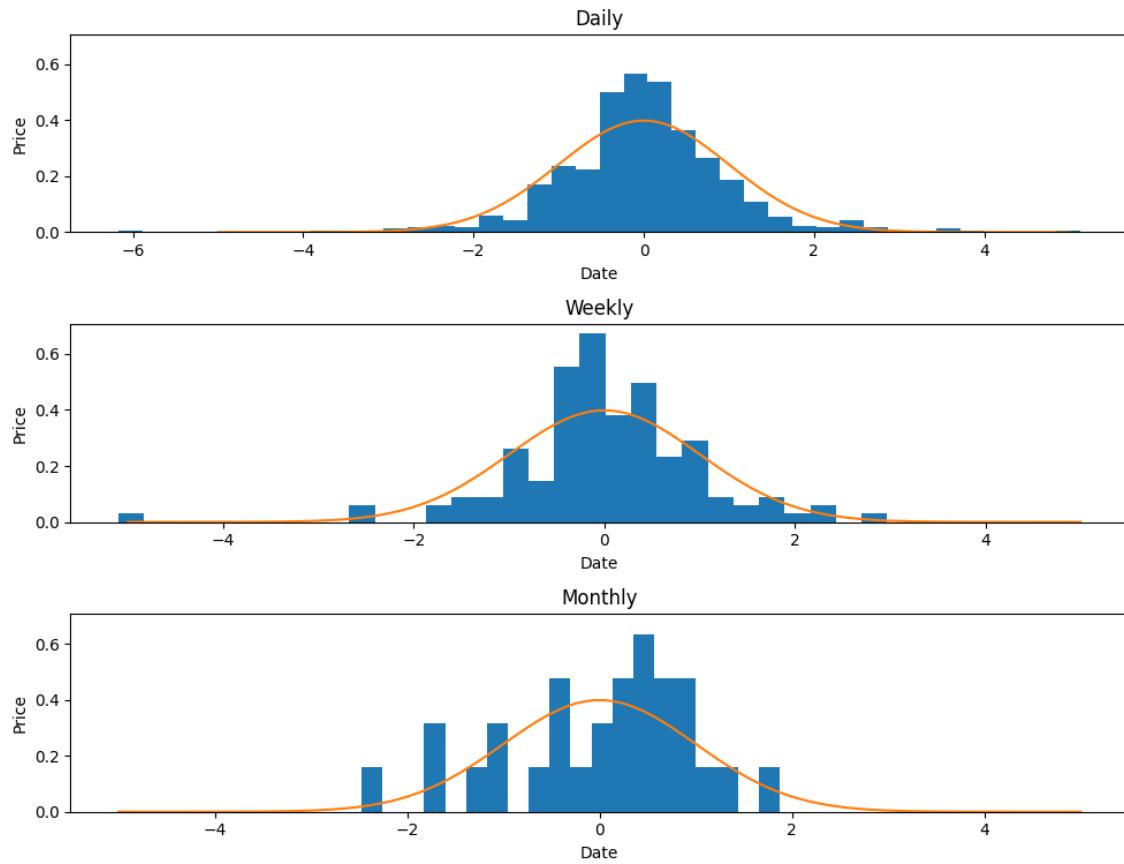
ZEEL BO LOGRETURNS

Normalized log return of Zee Entertainment stock.



ZOMATO BO LOGRETURNS

Normalized log return of Zomato stock.

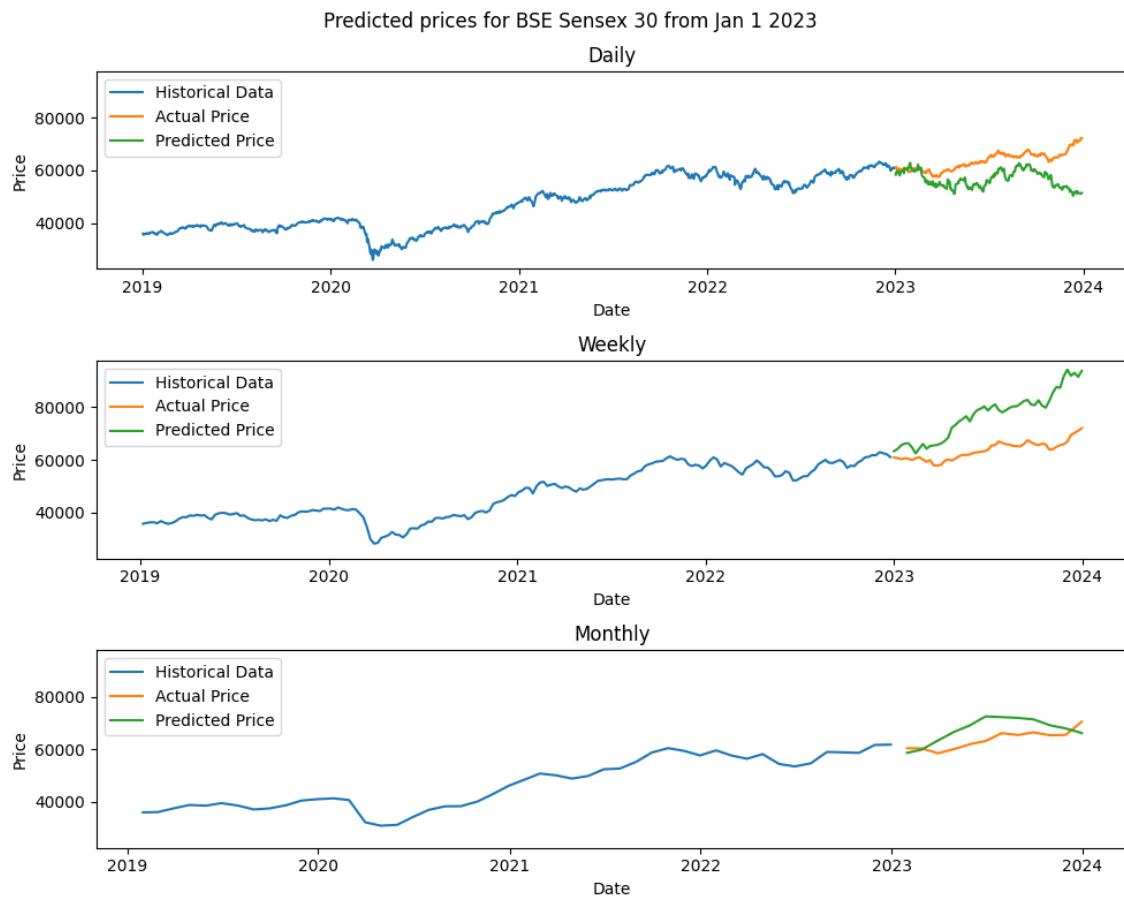


Observations:

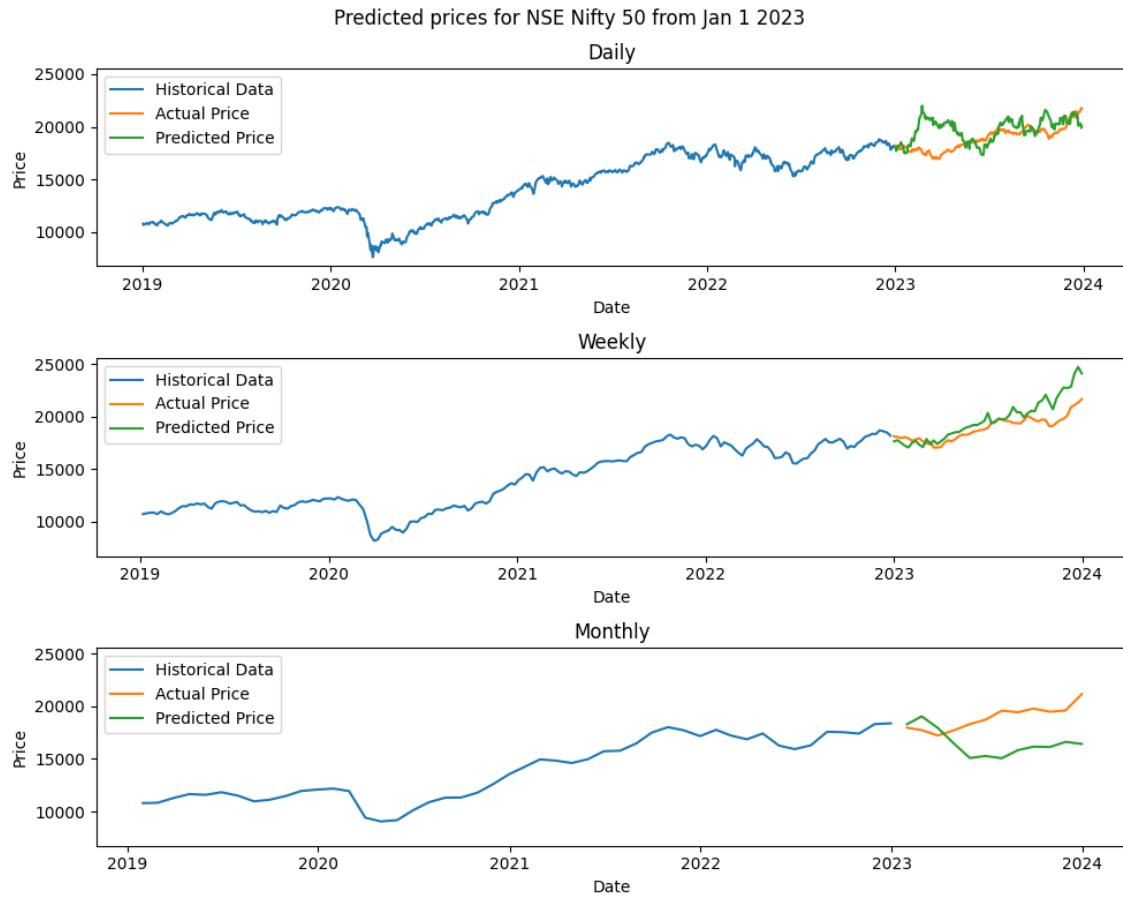
The log normalized returns agree with the density function of $N(0, 1)$ remarkably better than normalized returns. The tails agree with $N(0, 1)$ for all securities when returns are considered on a daily basis and majority of them on a weekly basis.

Q4 Indices

BSE SENSEX 30 PREDICTIONS

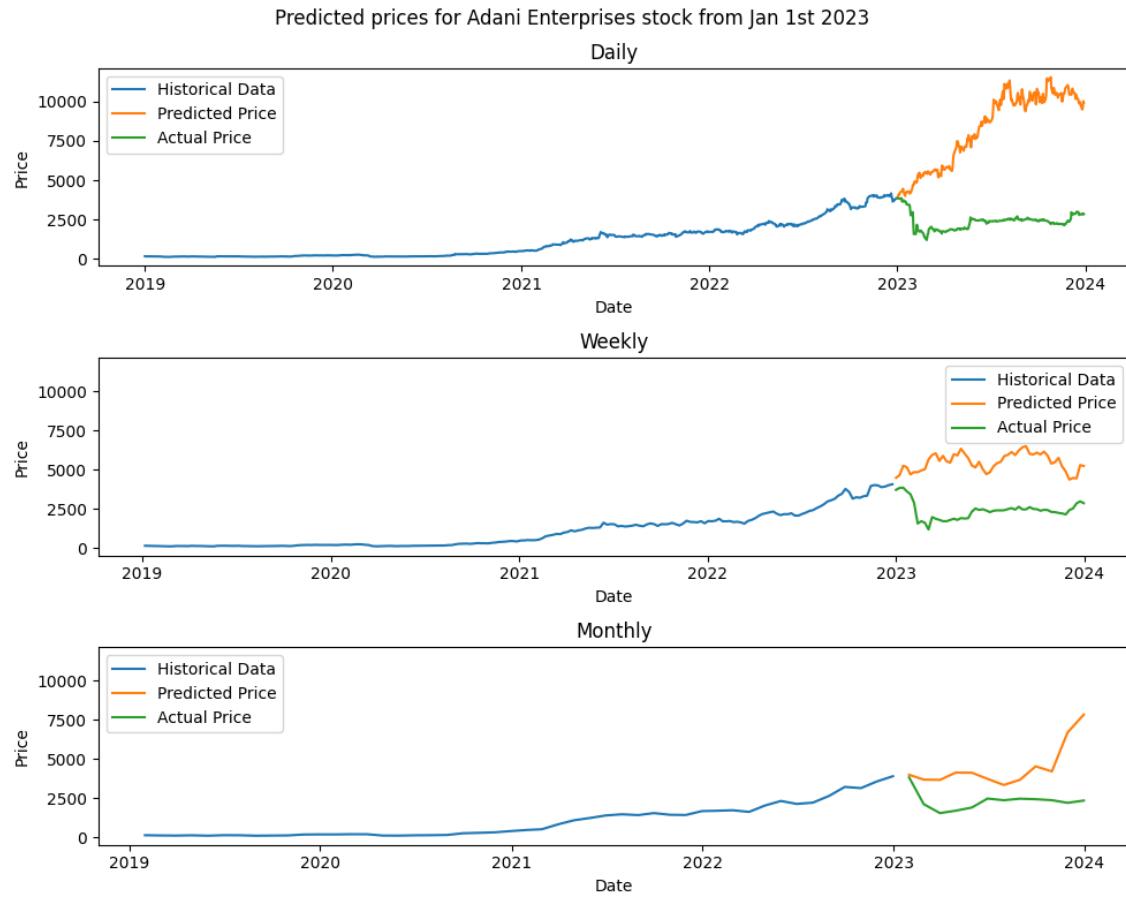


NSE NIFTY 50 PREDICTIONS

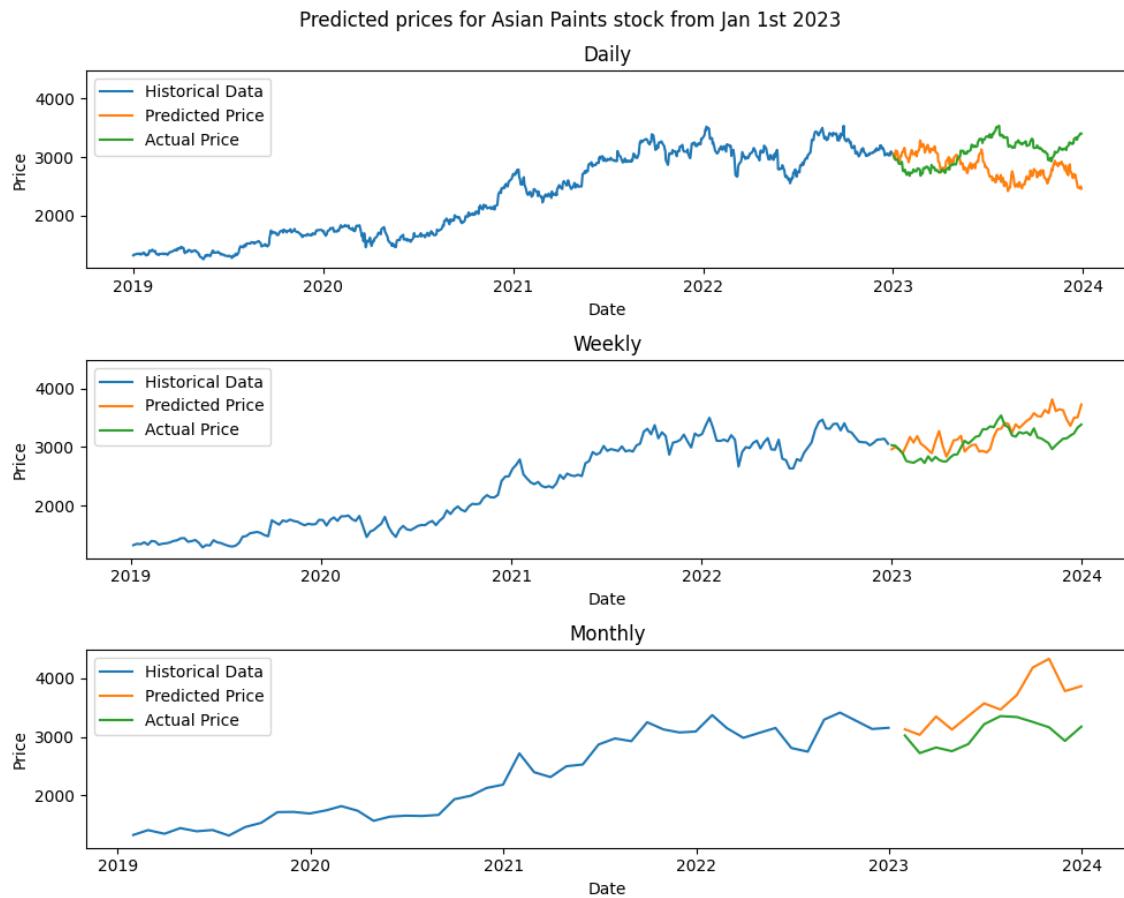


Q4 Stocks

ADANIENT NS PREDICTIONS

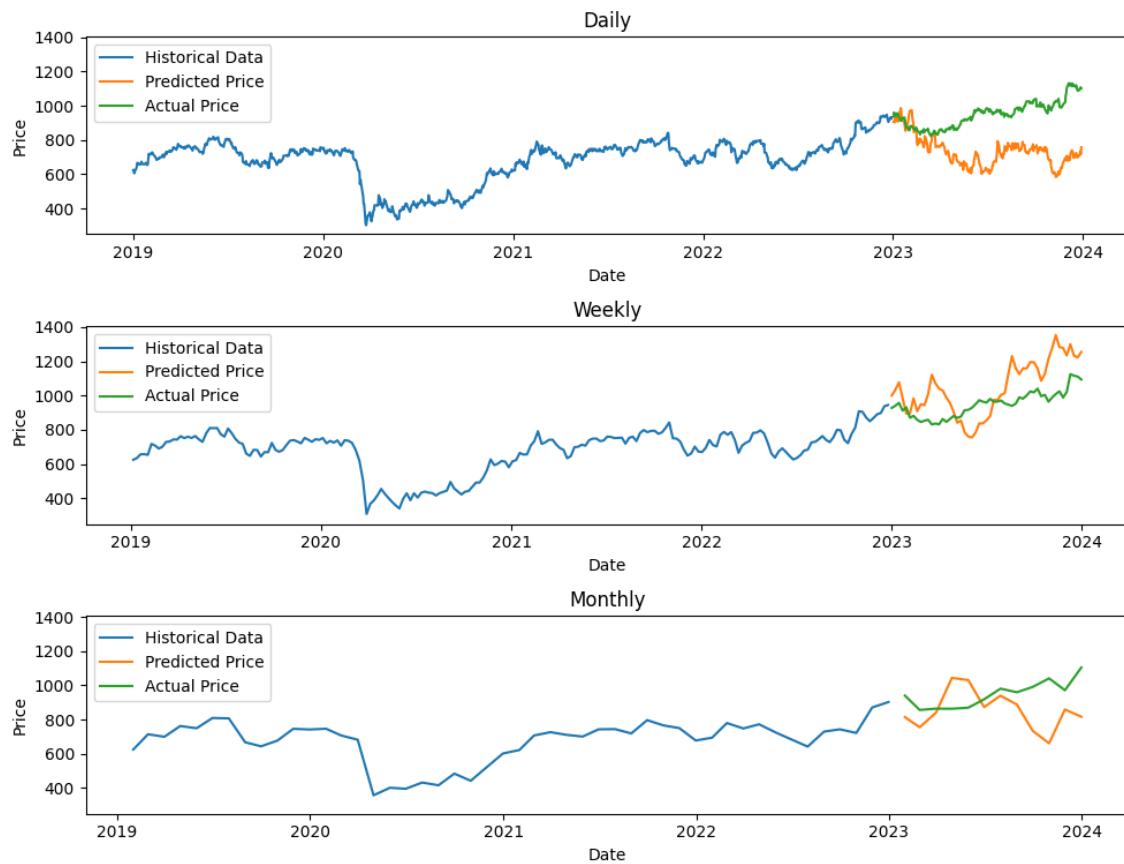


ASIANPAINT NS PREDICTIONS



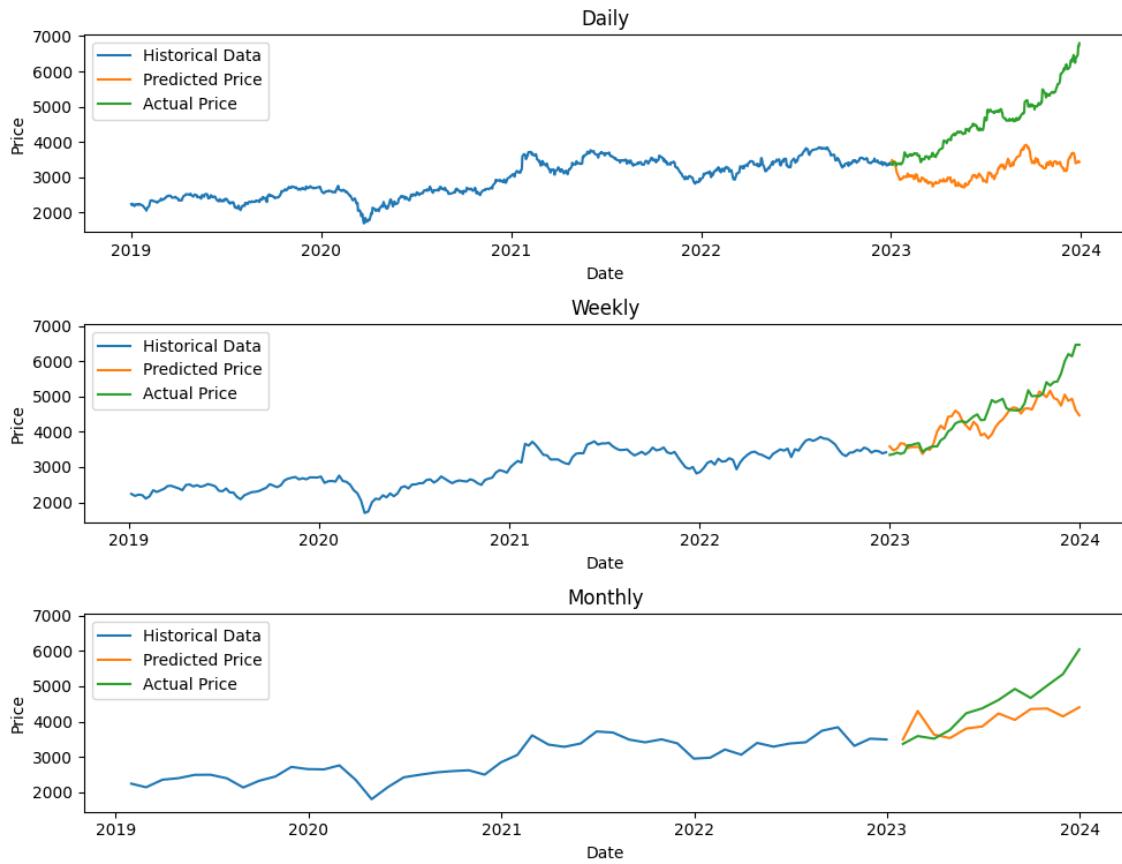
AXISBANK NS PREDICTIONS

Predicted prices for Axis Bank stock from Jan 1st 2023



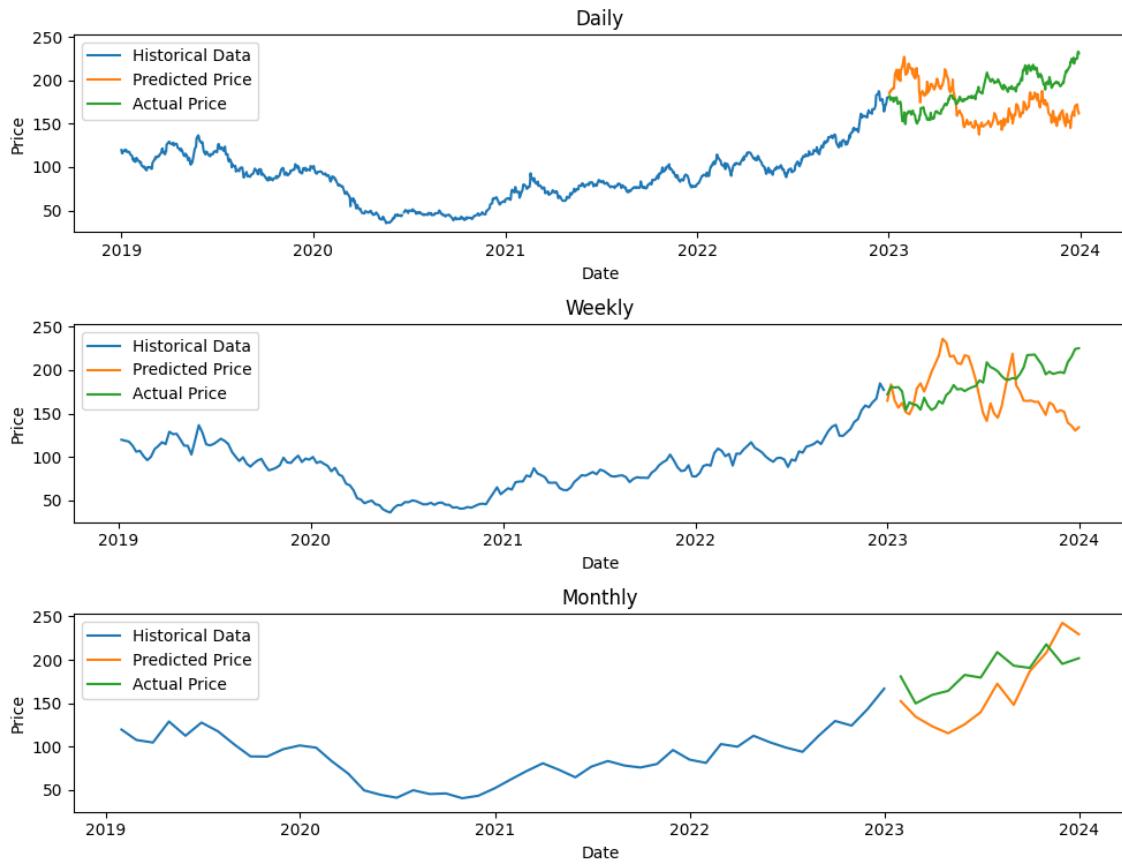
BAJAJ-AUTO NS PREDICTIONS

Predicted prices for Bajaj Automobiles stock from Jan 1st 2023

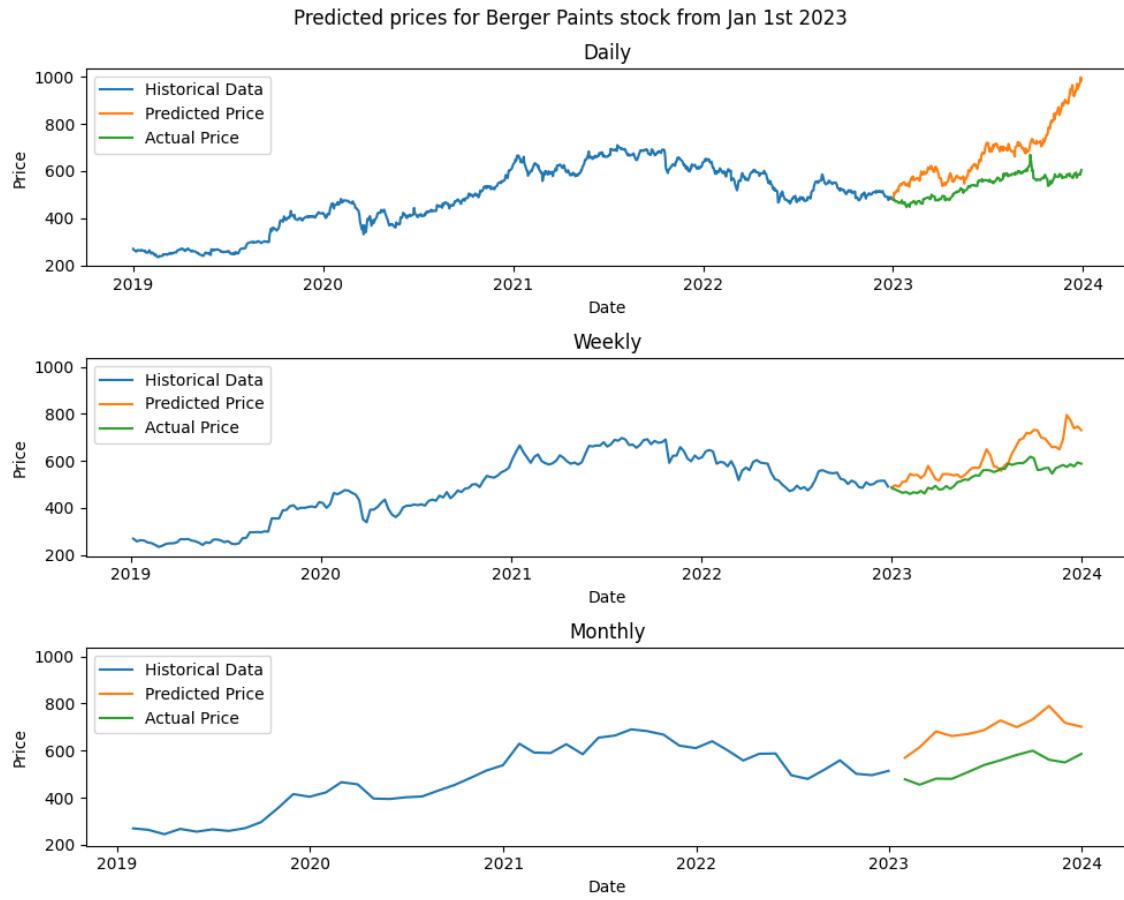


BANKBARODA BO PREDICTIONS

Predicted prices for Bank of Baroda stock from Jan 1st 2023

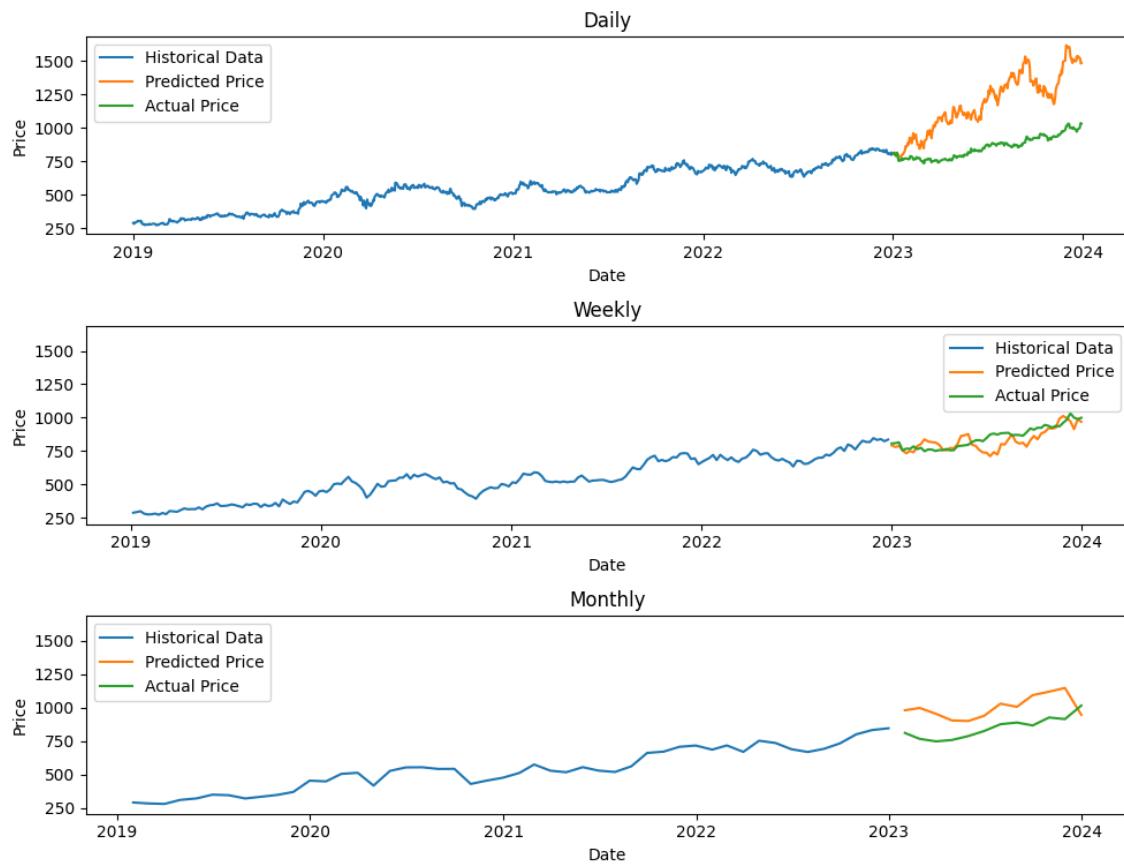


BERGEPAINT NS PREDICTIONS



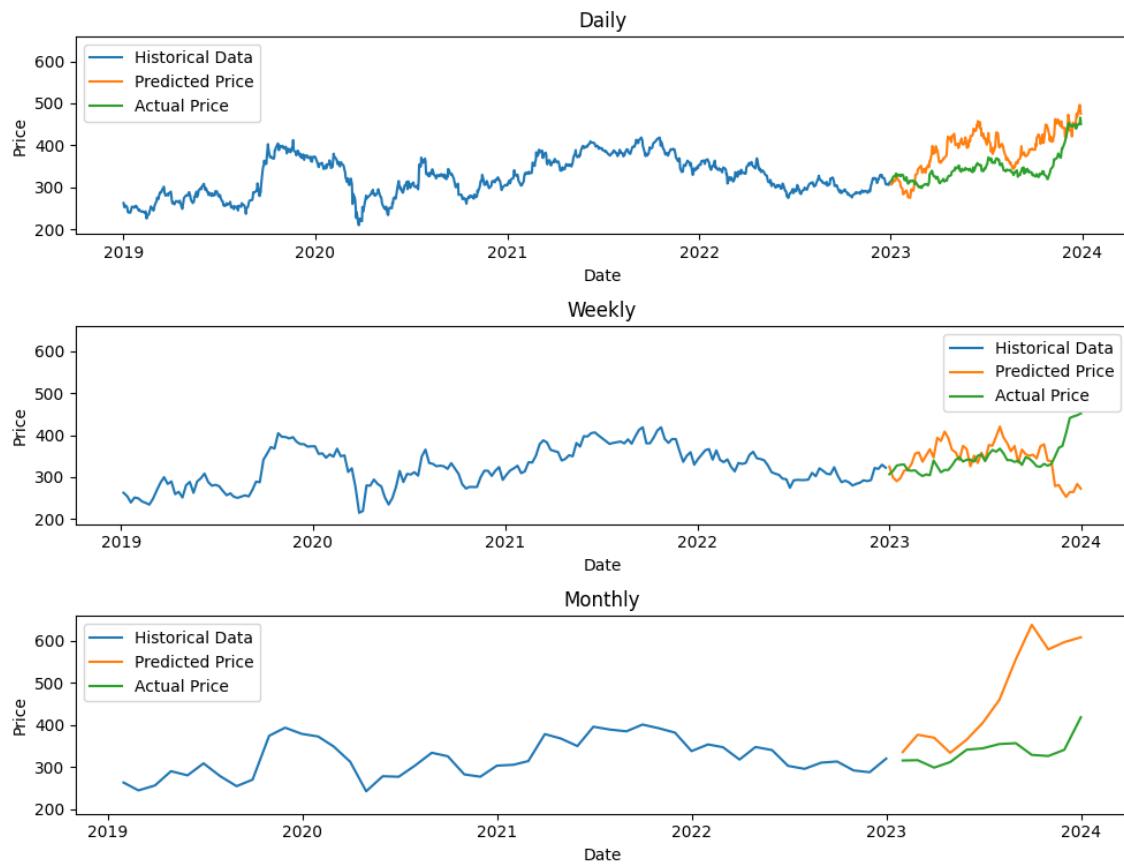
BHARTIARTL NS PREDICTIONS

Predicted prices for Airtel stock from Jan 1st 2023



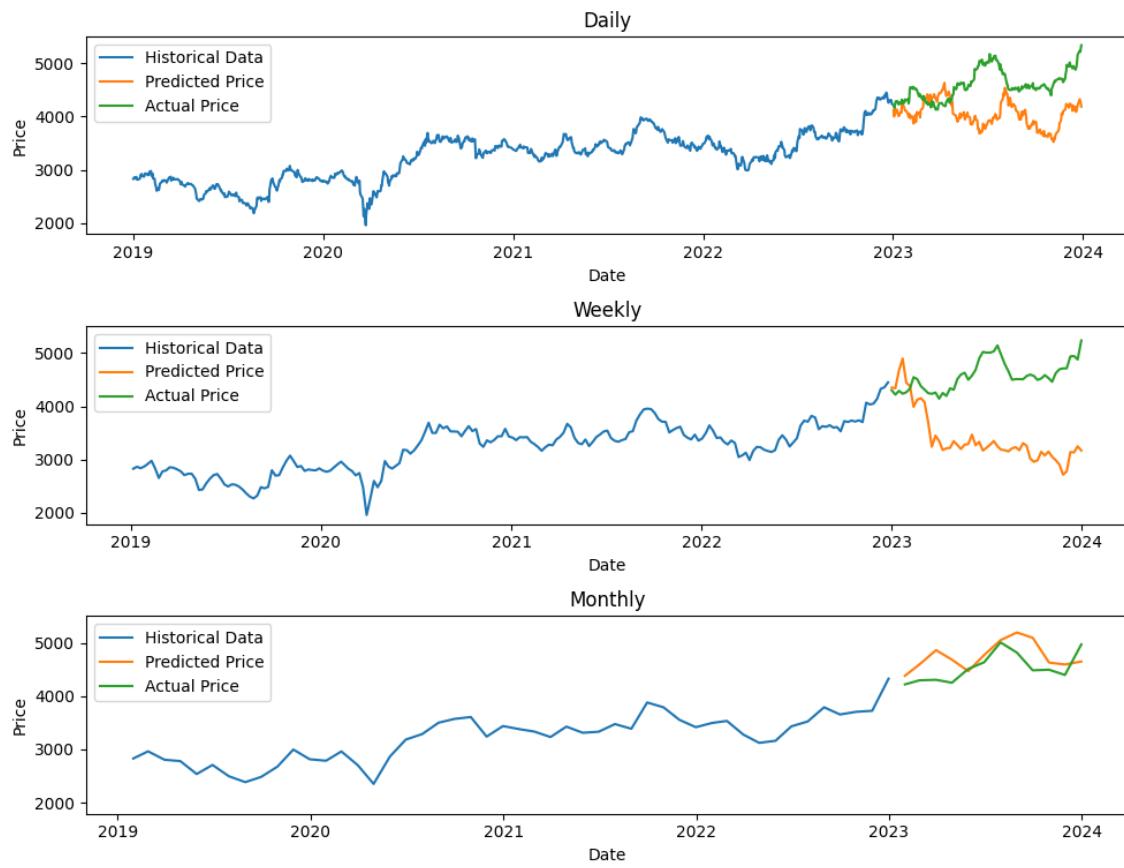
BPCL NS PREDICTIONS

Predicted prices for Bharat Petroleum Corp. Ltd stock from Jan 1st 2023



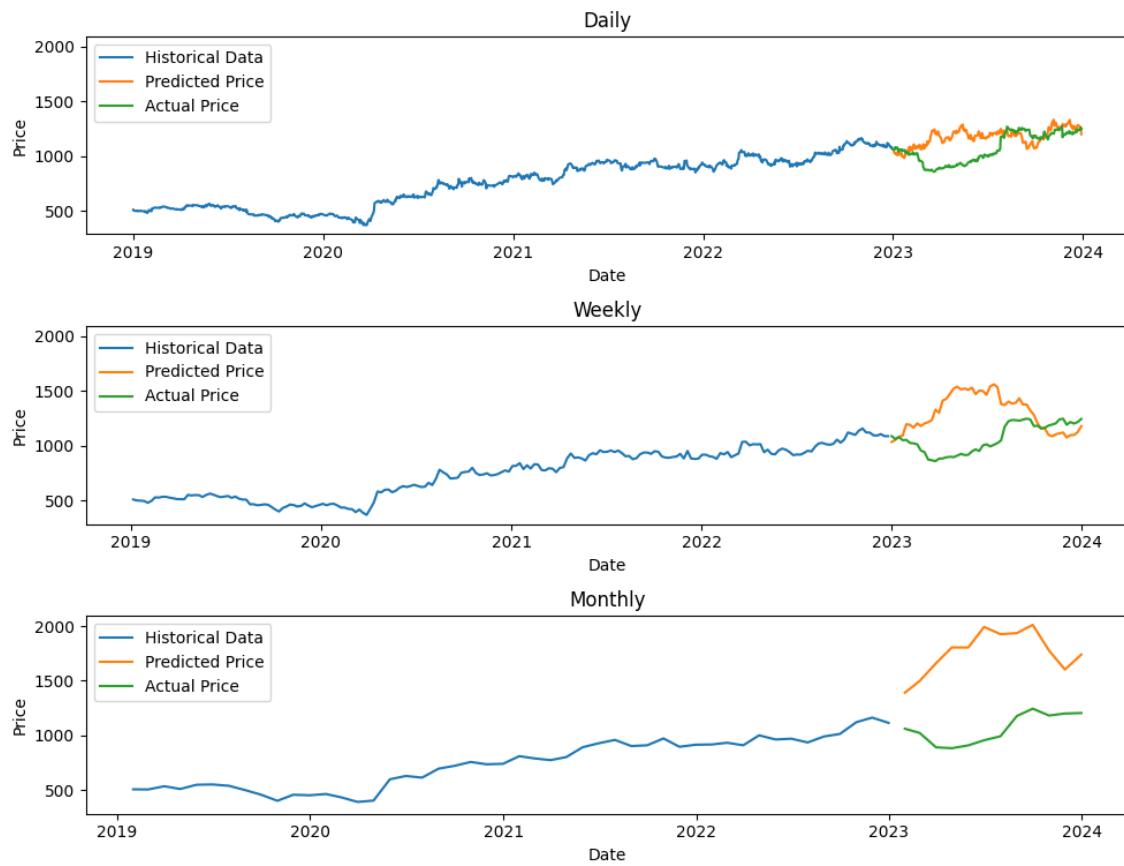
BRITANNIA NS PREDICTIONS

Predicted prices for Britannia stock from Jan 1st 2023

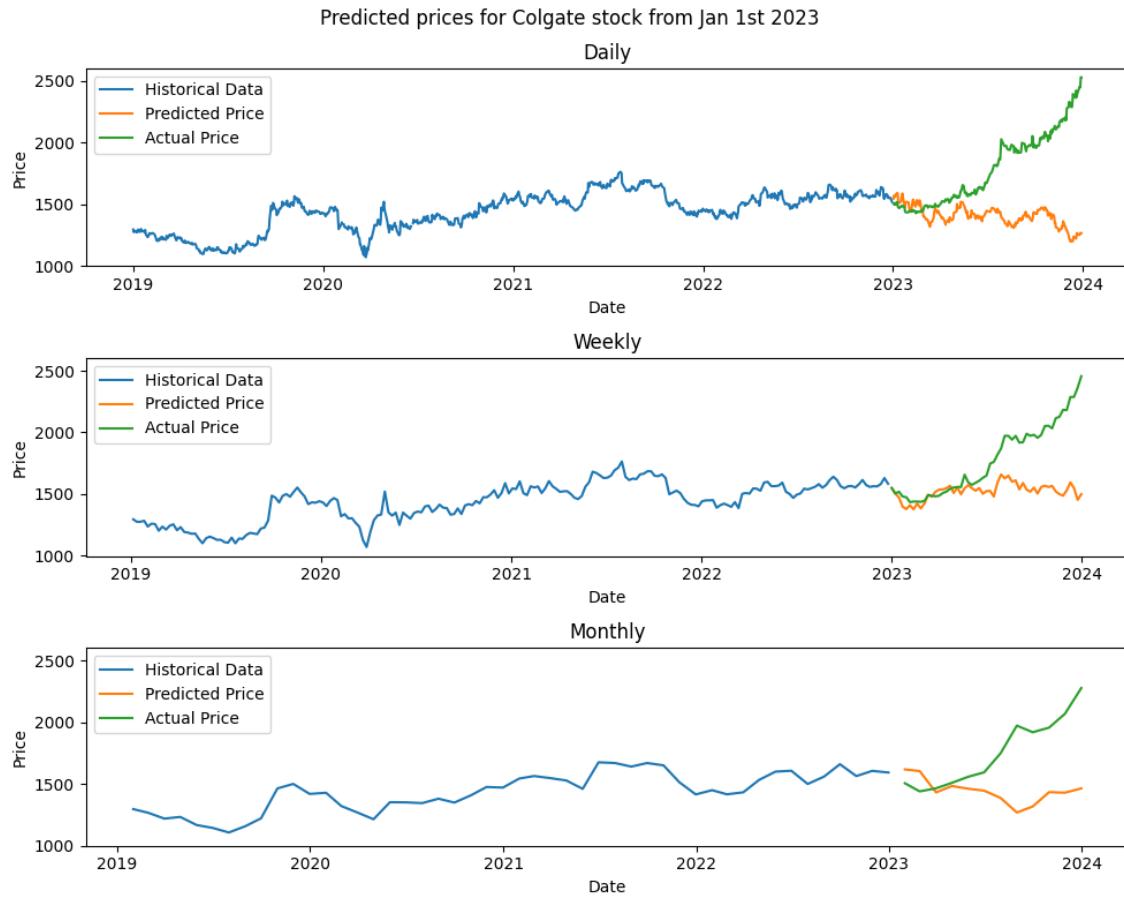


CIPLA NS PREDICTIONS

Predicted prices for Cipla stock from Jan 1st 2023

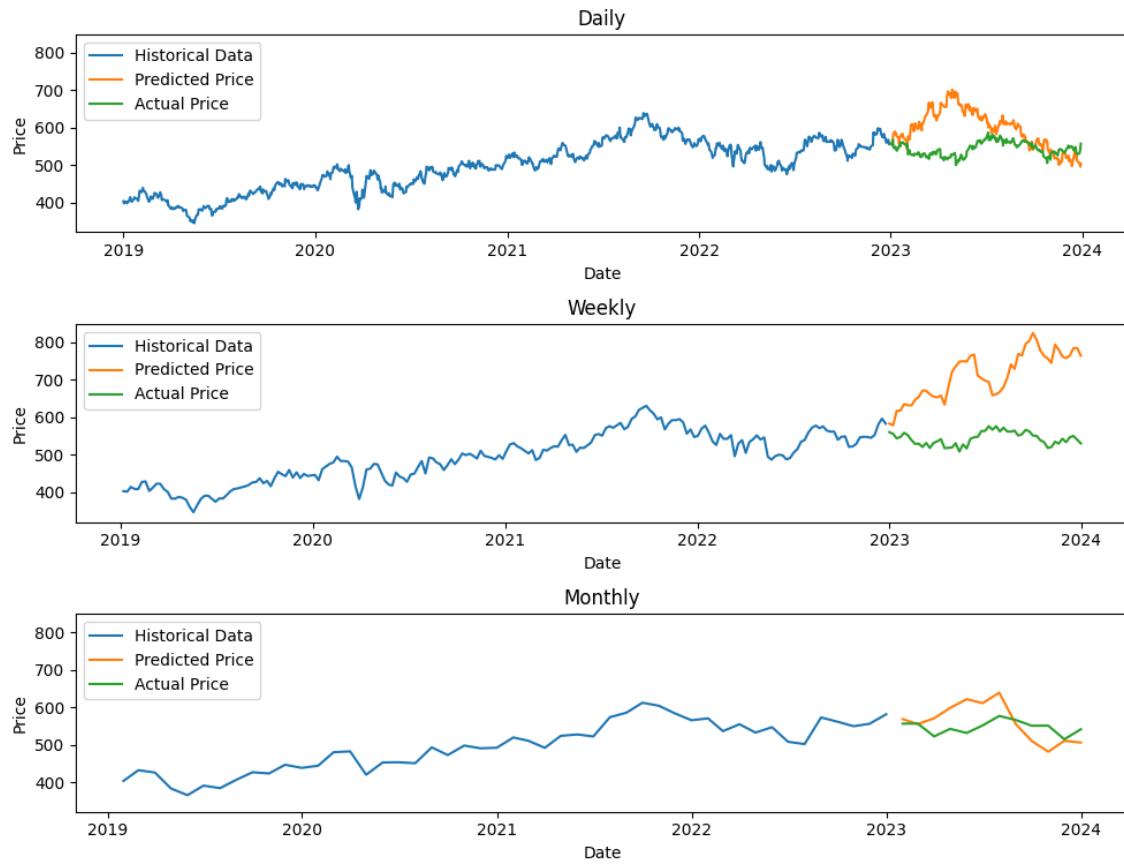


COLPAL BO PREDICTIONS



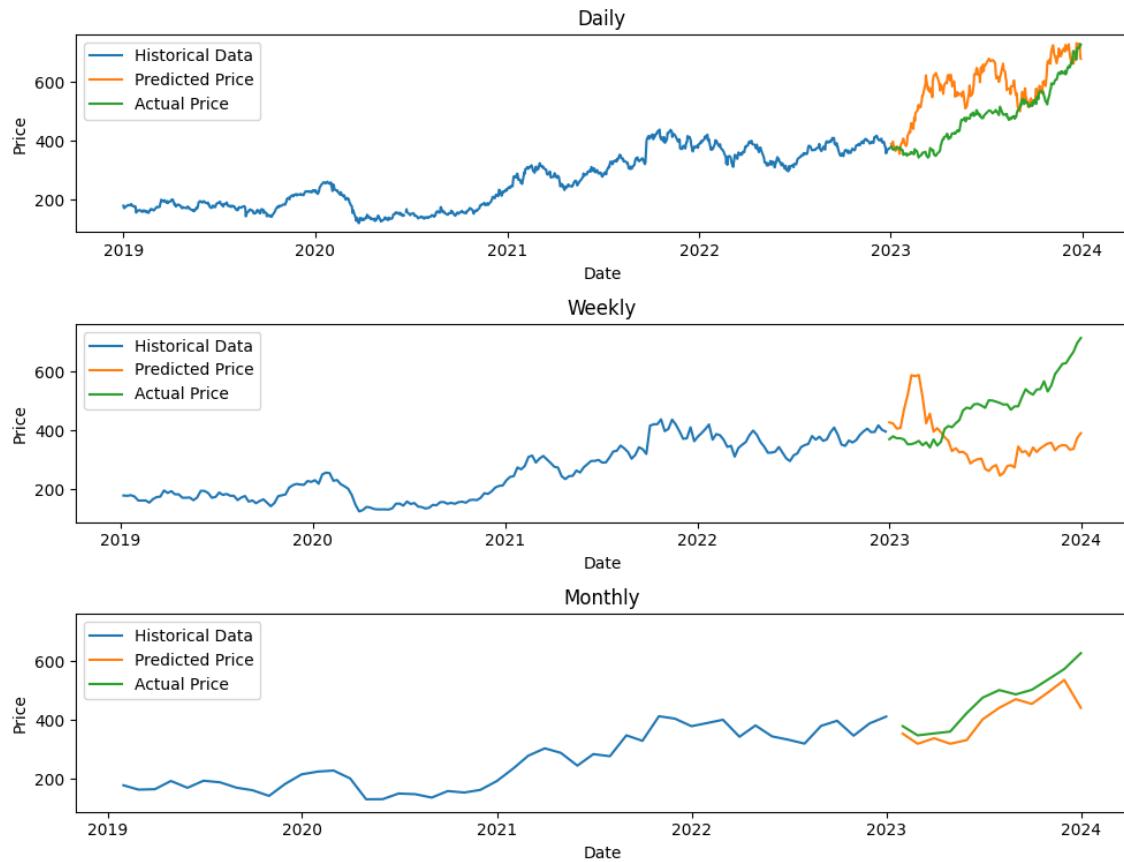
DABUR NS PREDICTIONS

Predicted prices for Dabur stock from Jan 1st 2023



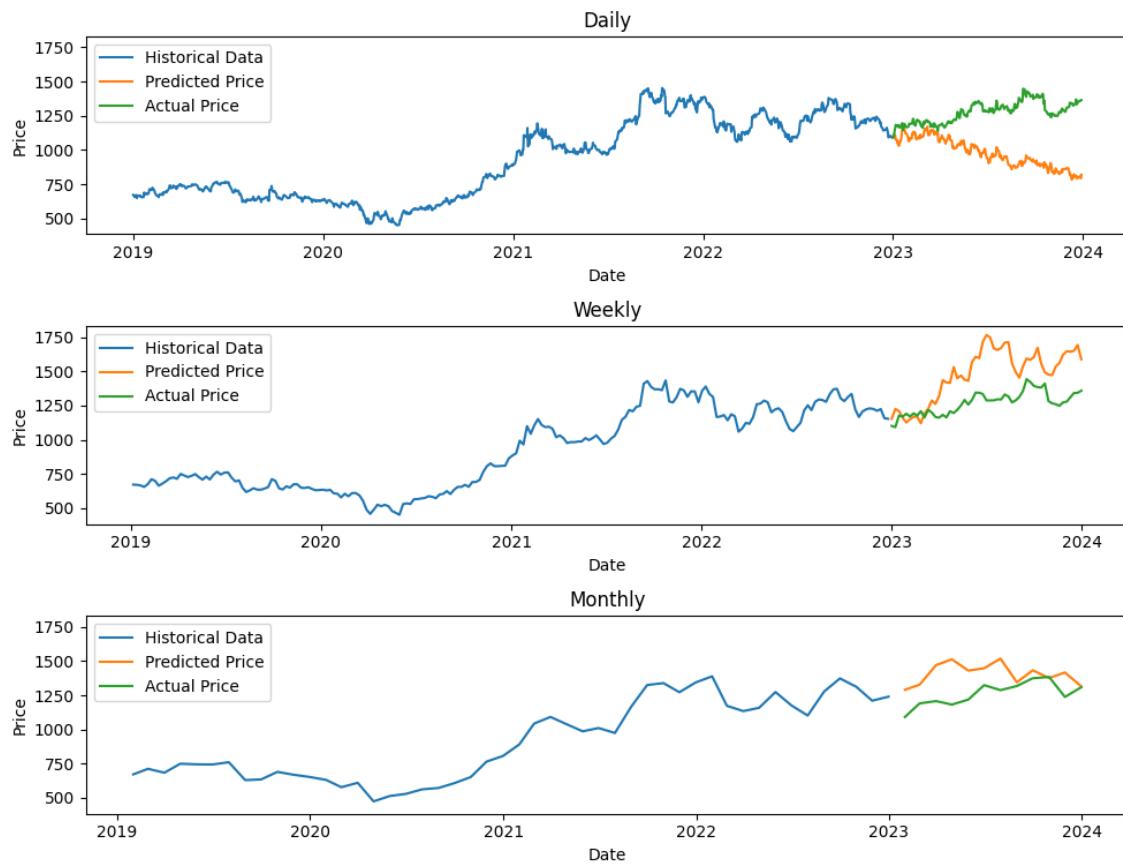
DLF BO PREDICTIONS

Predicted prices for DLF stock from Jan 1st 2023



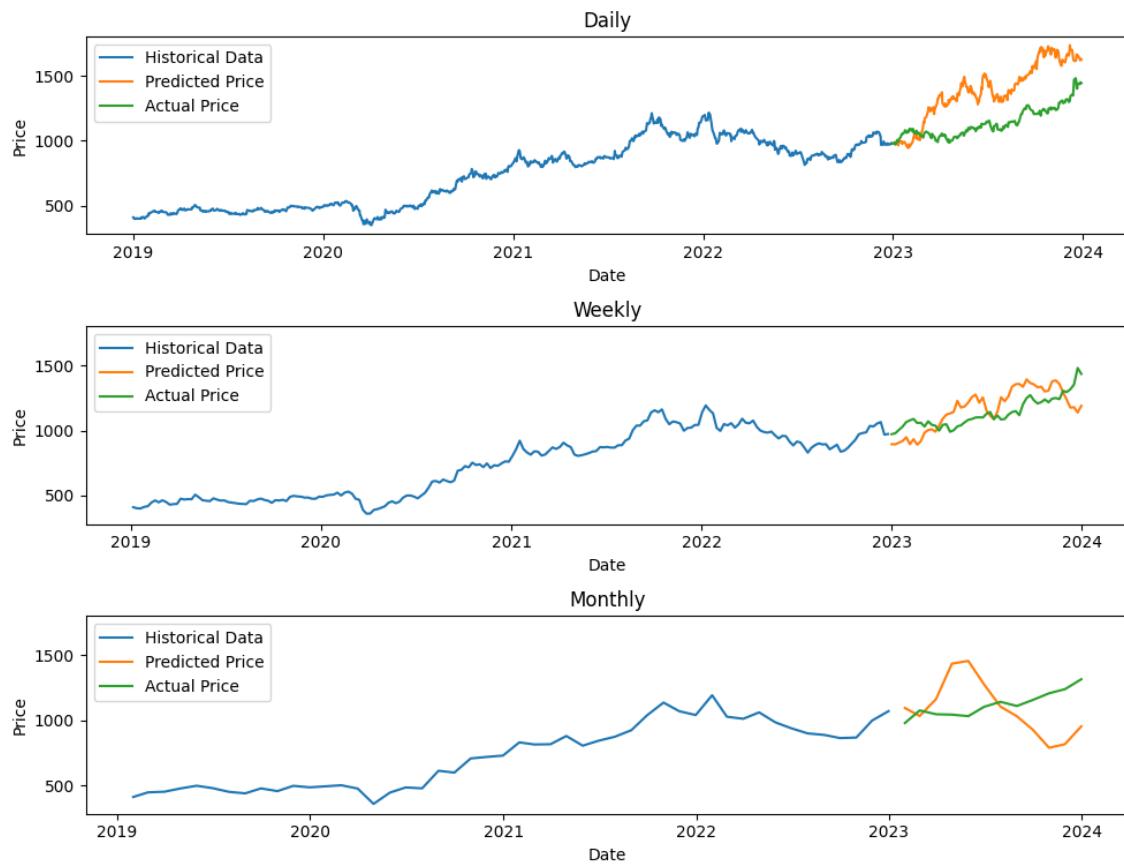
HAVELLS NS PREDICTIONS

Predicted prices for Havells stock from Jan 1st 2023

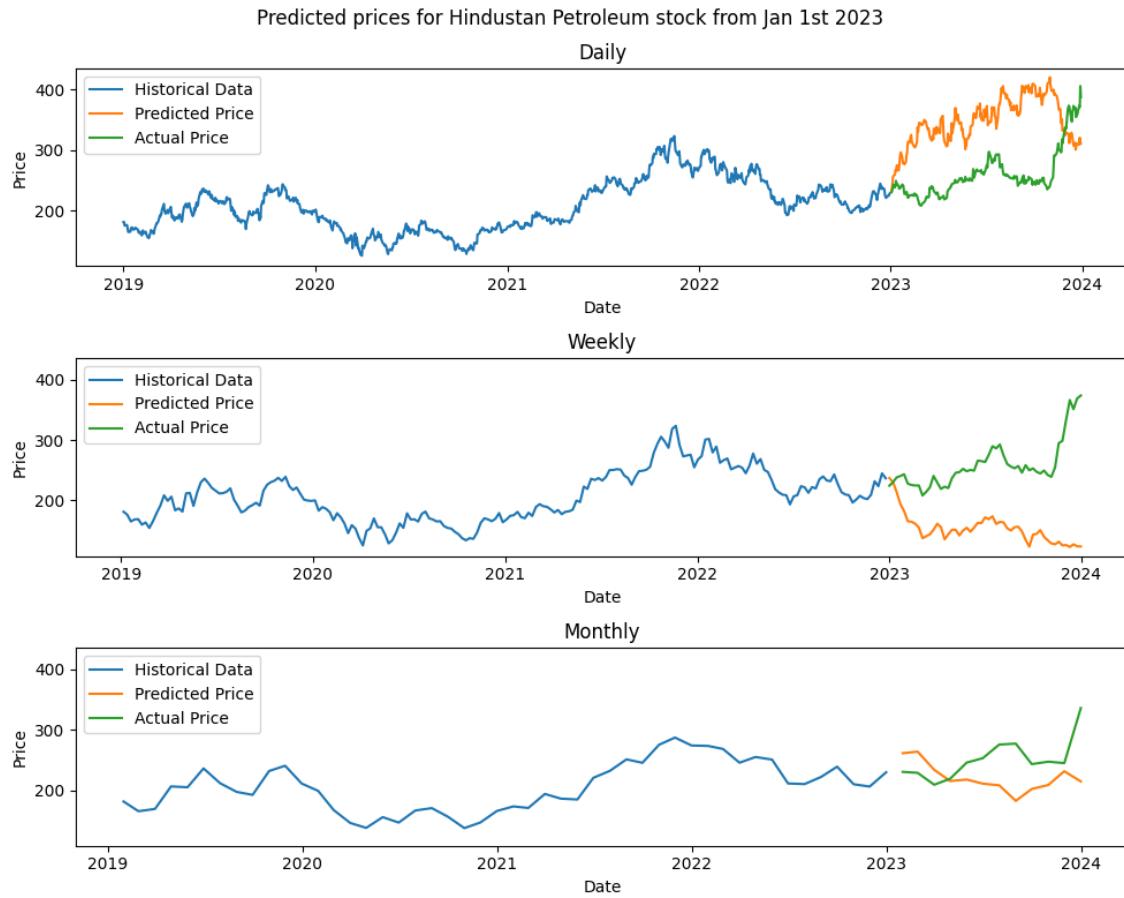


HCLTECH NS PREDICTIONS

Predicted prices for HCL stock from Jan 1st 2023

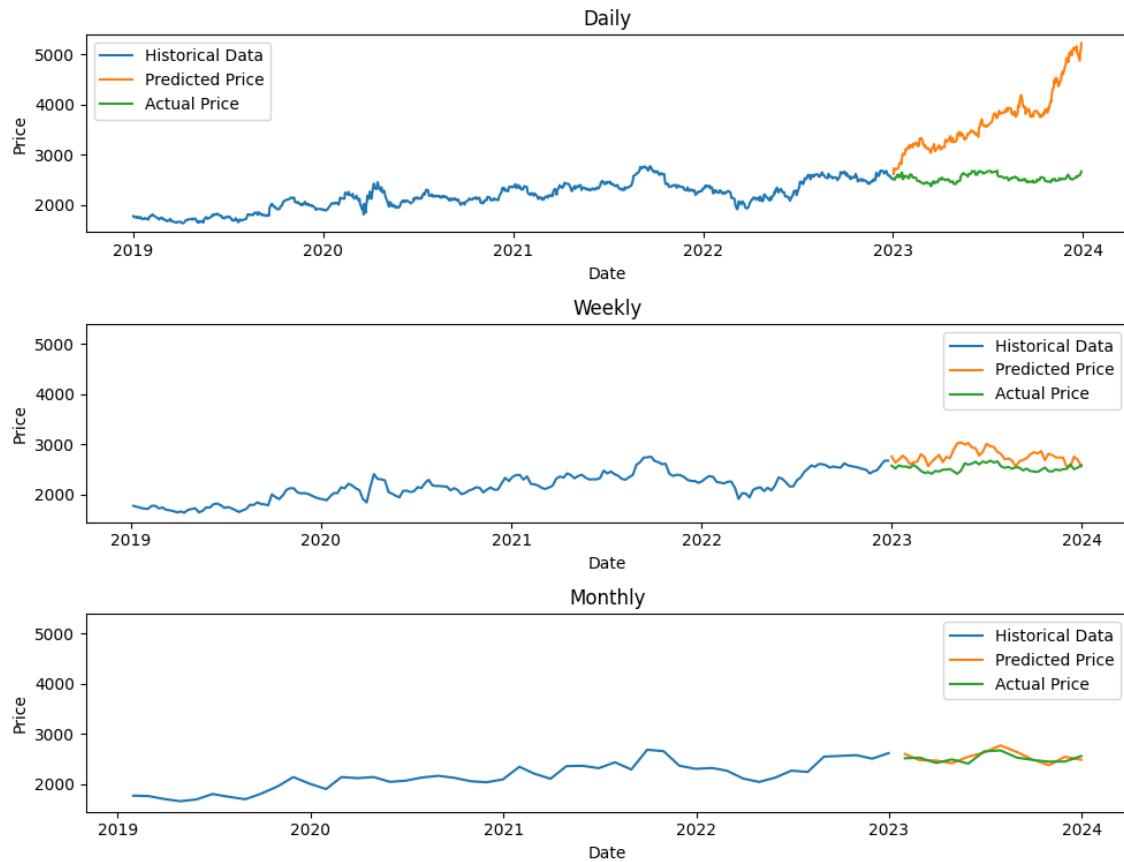


HINDPETRO NS PREDICTIONS



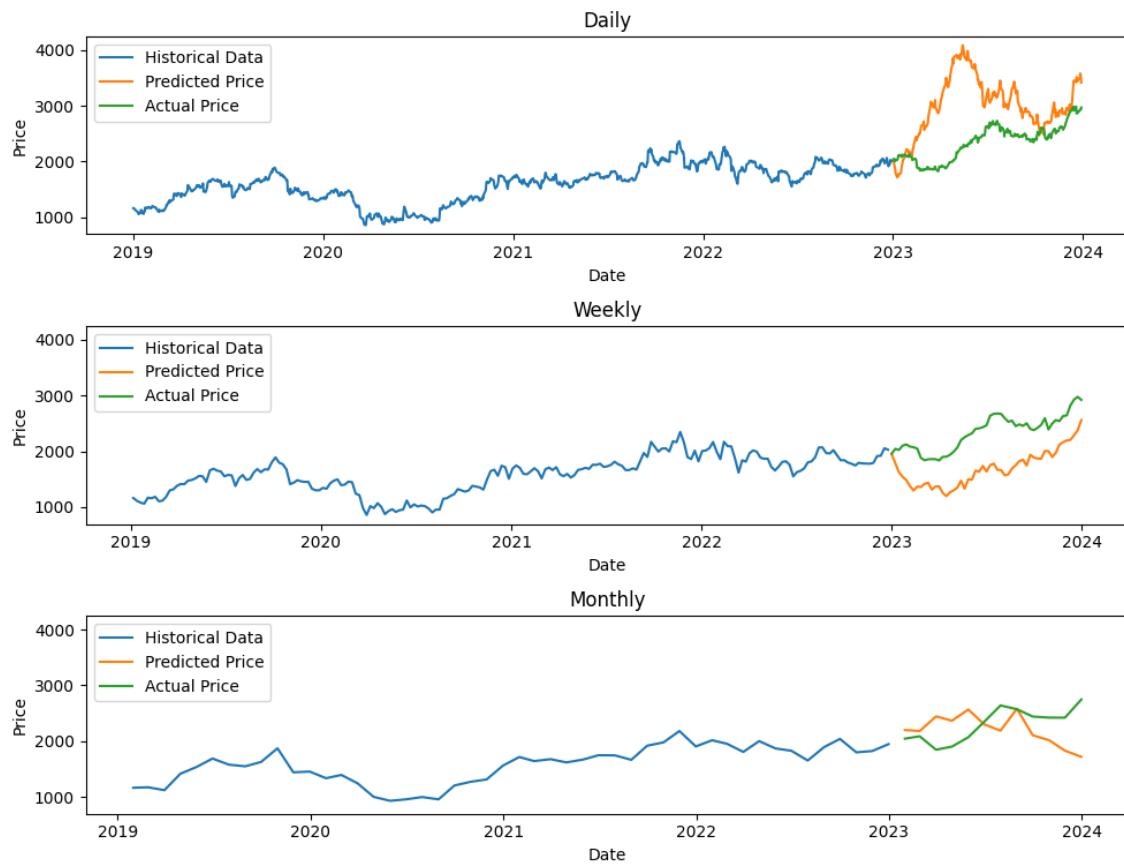
HINDUNILVR BO PREDICTIONS

Predicted prices for Hindustan Unilever Ltd stock from Jan 1st 2023



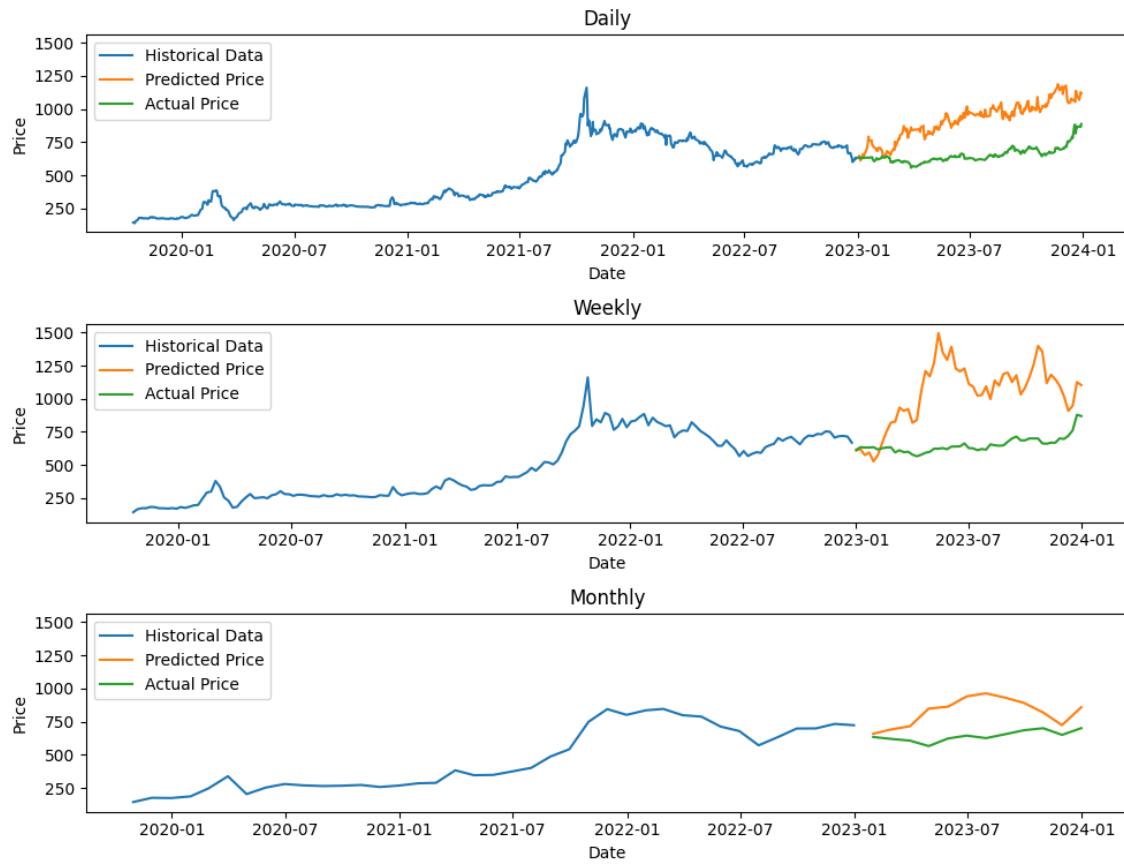
INDIGO NS PREDICTIONS

Predicted prices for Indigo stock from Jan 1st 2023

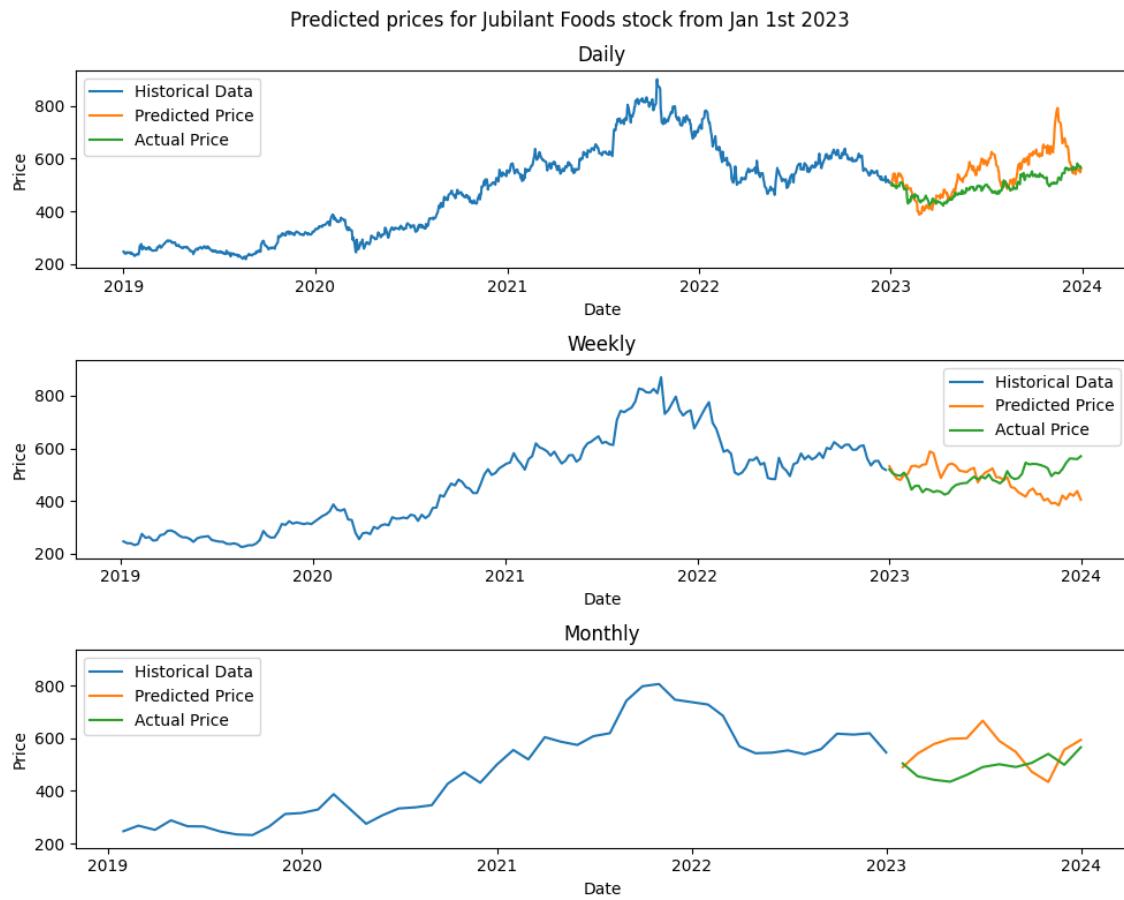


IRCTC BO PREDICTIONS

Predicted prices for IRCTC stock from Jan 1st 2023

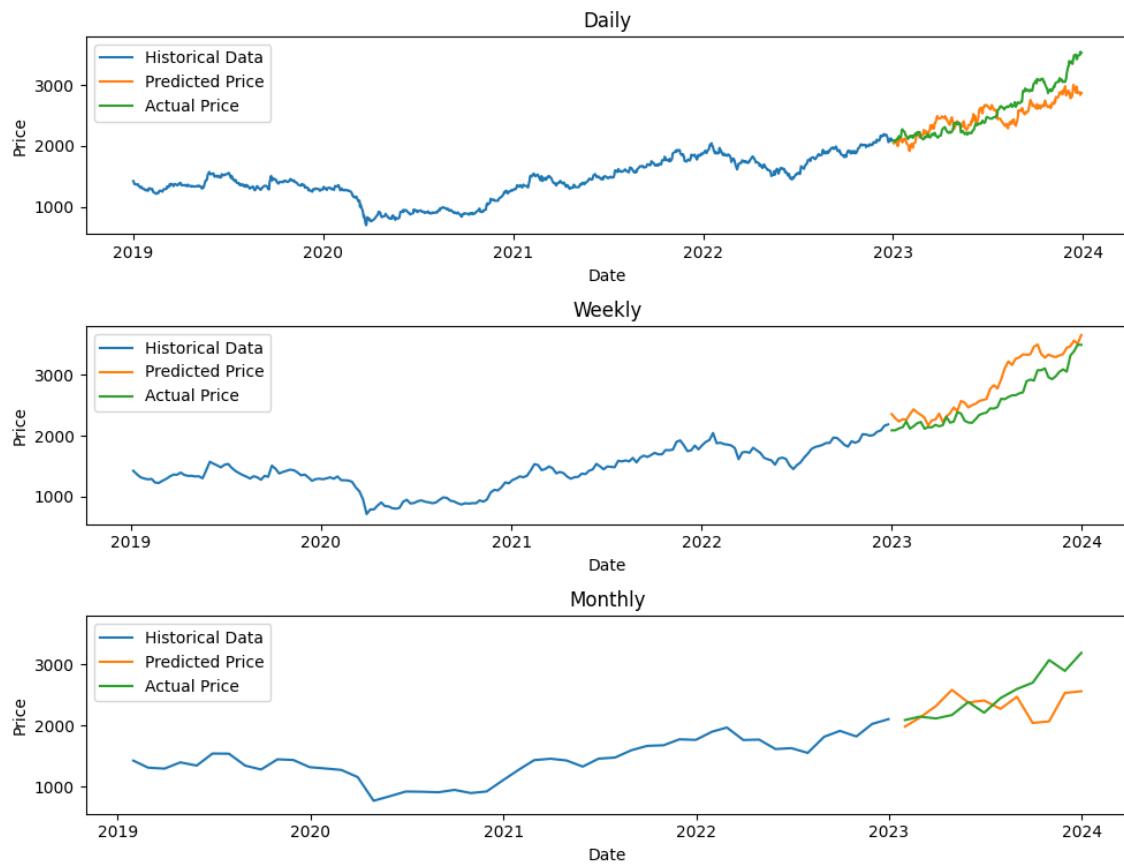


JUBLFOOD NS PREDICTIONS

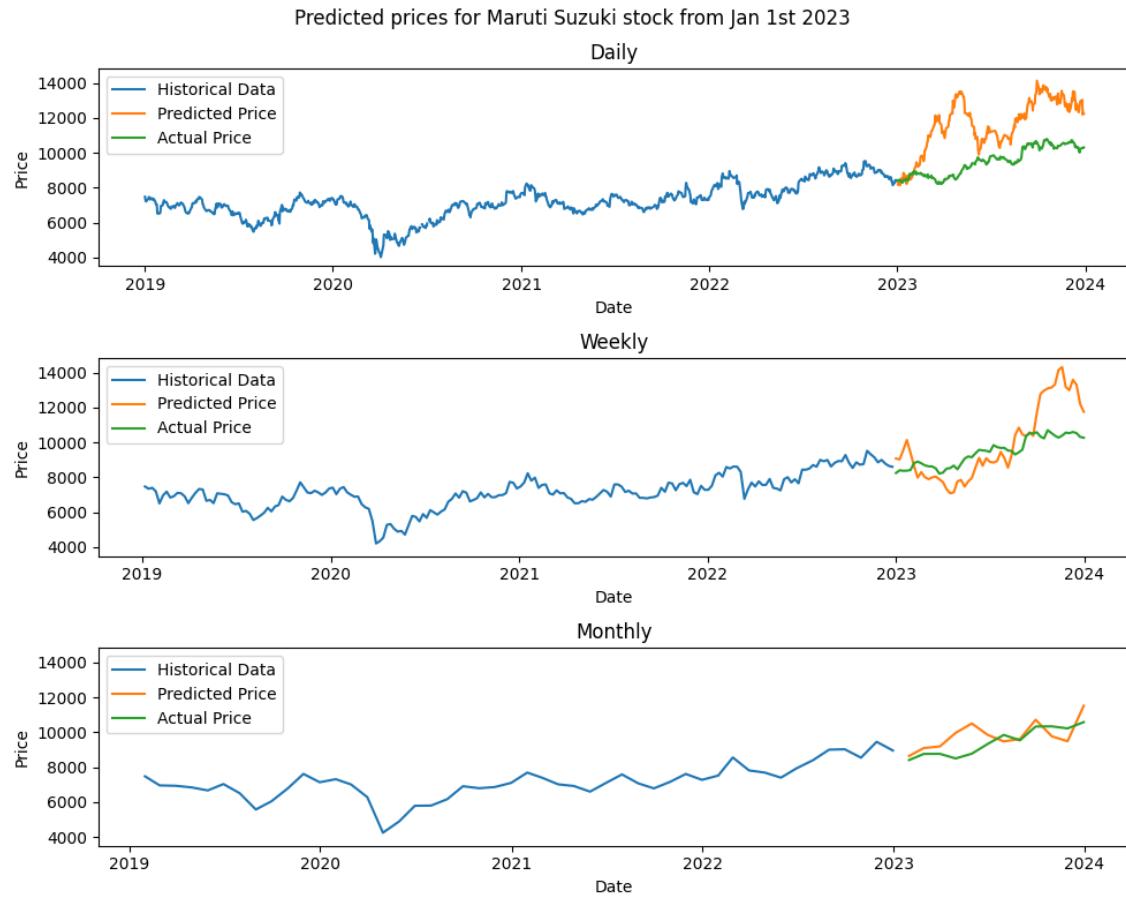


LT BO PREDICTIONS

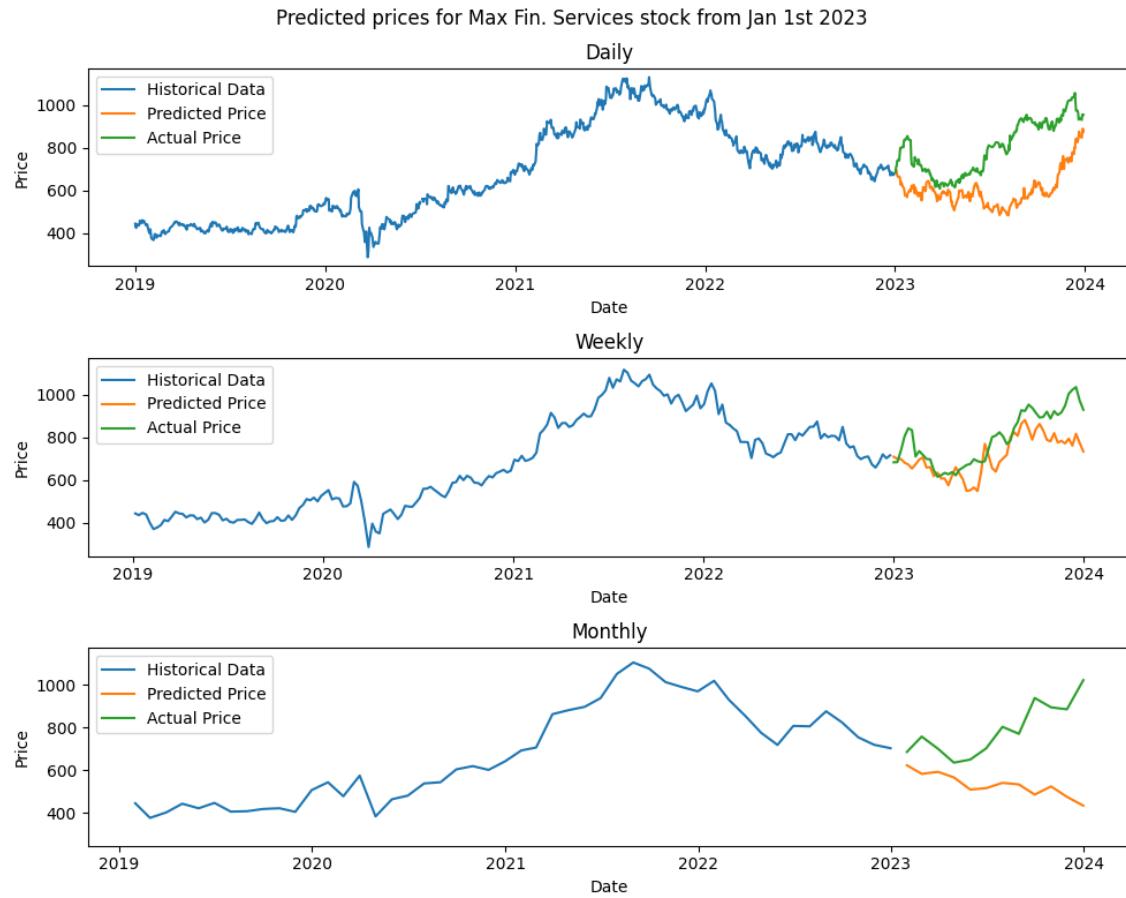
Predicted prices for Larsen & Toubro stock from Jan 1st 2023



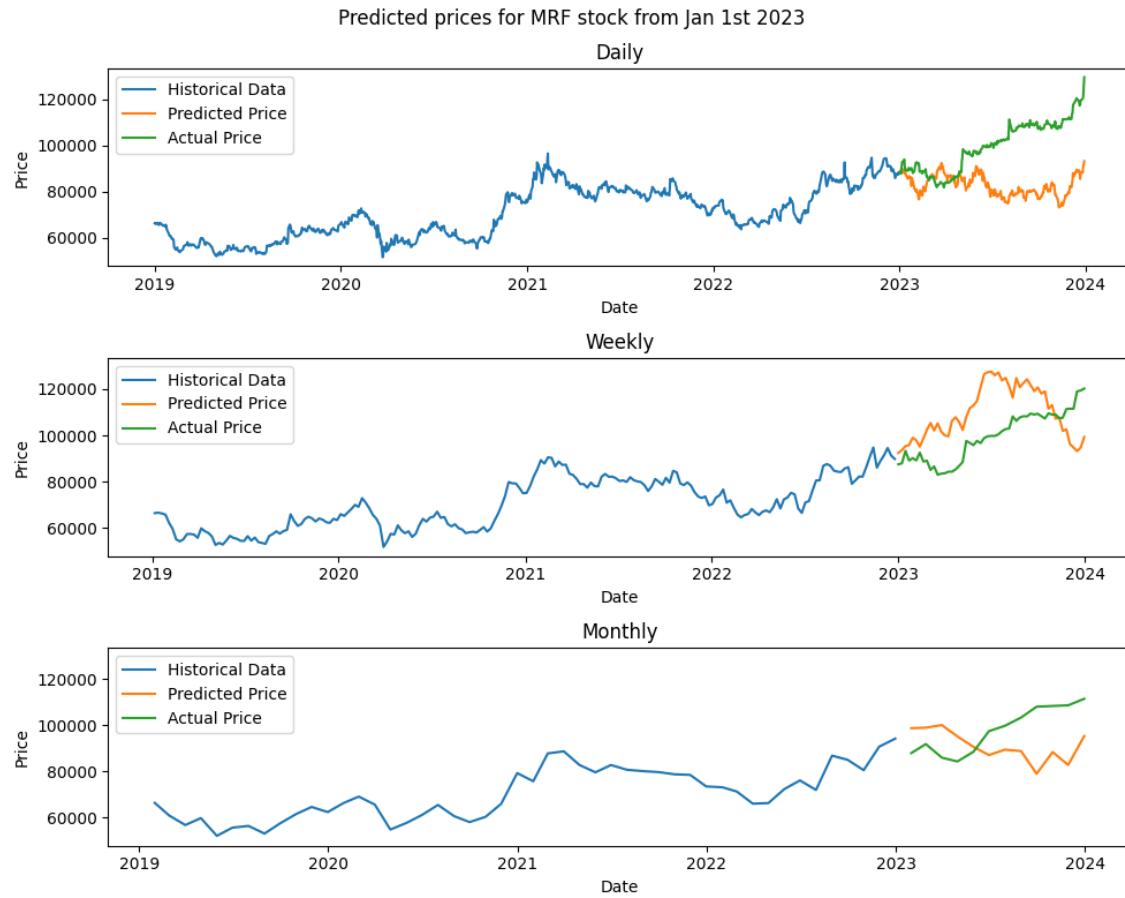
MARUTI BO PREDICTIONS



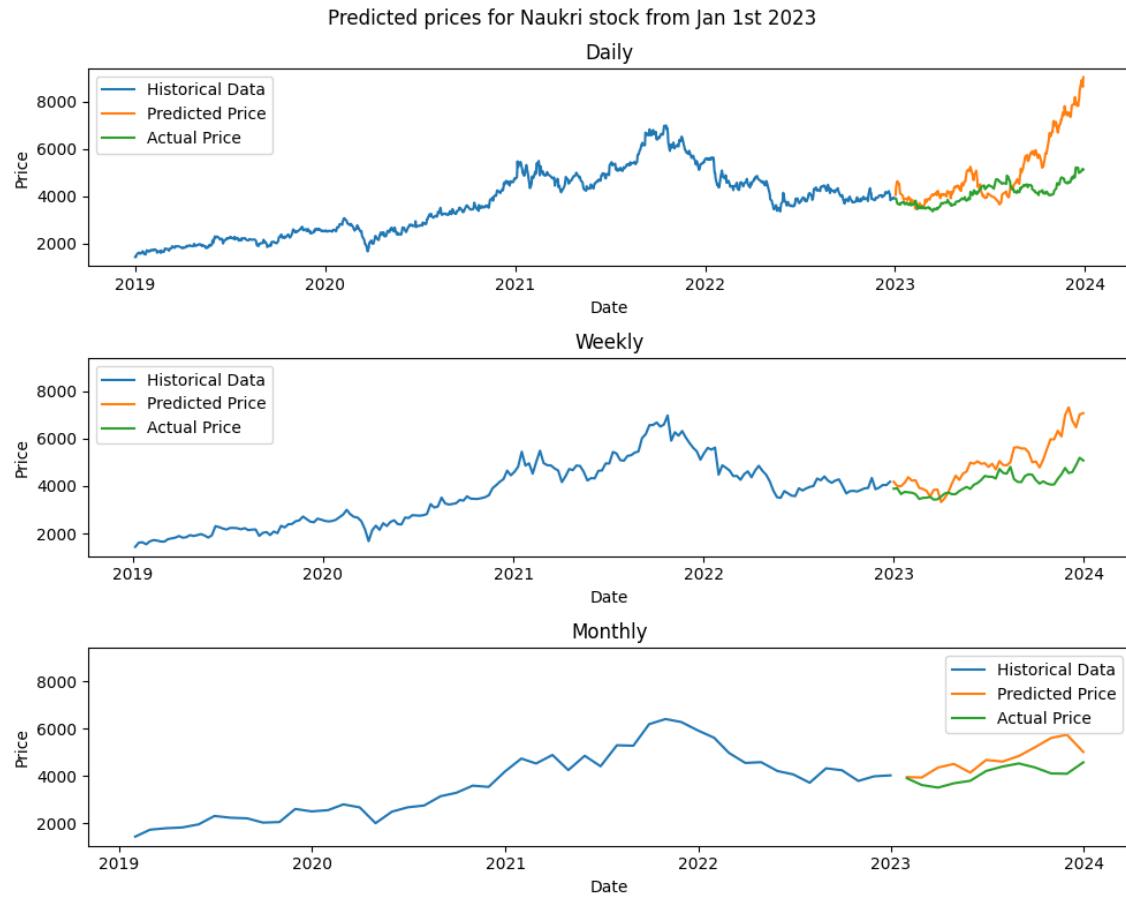
MFSL BO PREDICTIONS



MRF NS PREDICTIONS

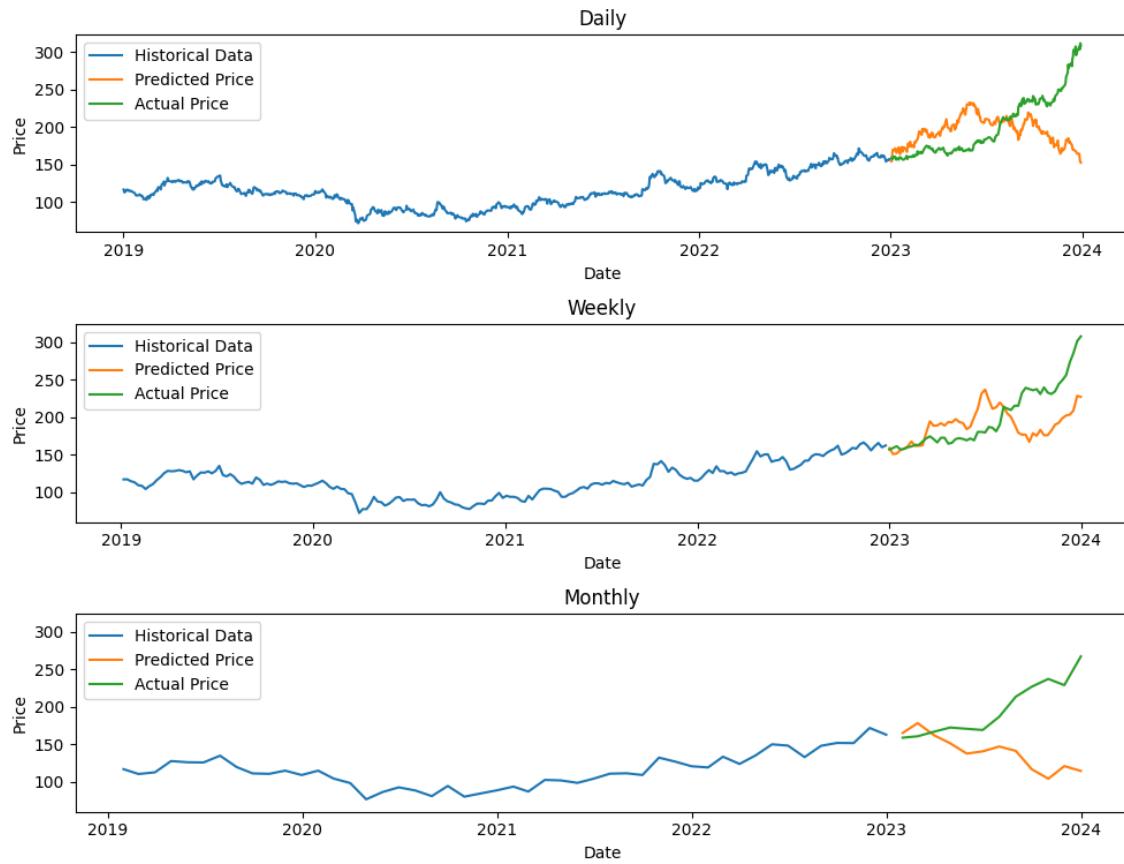


NAUKRI BO PREDICTIONS

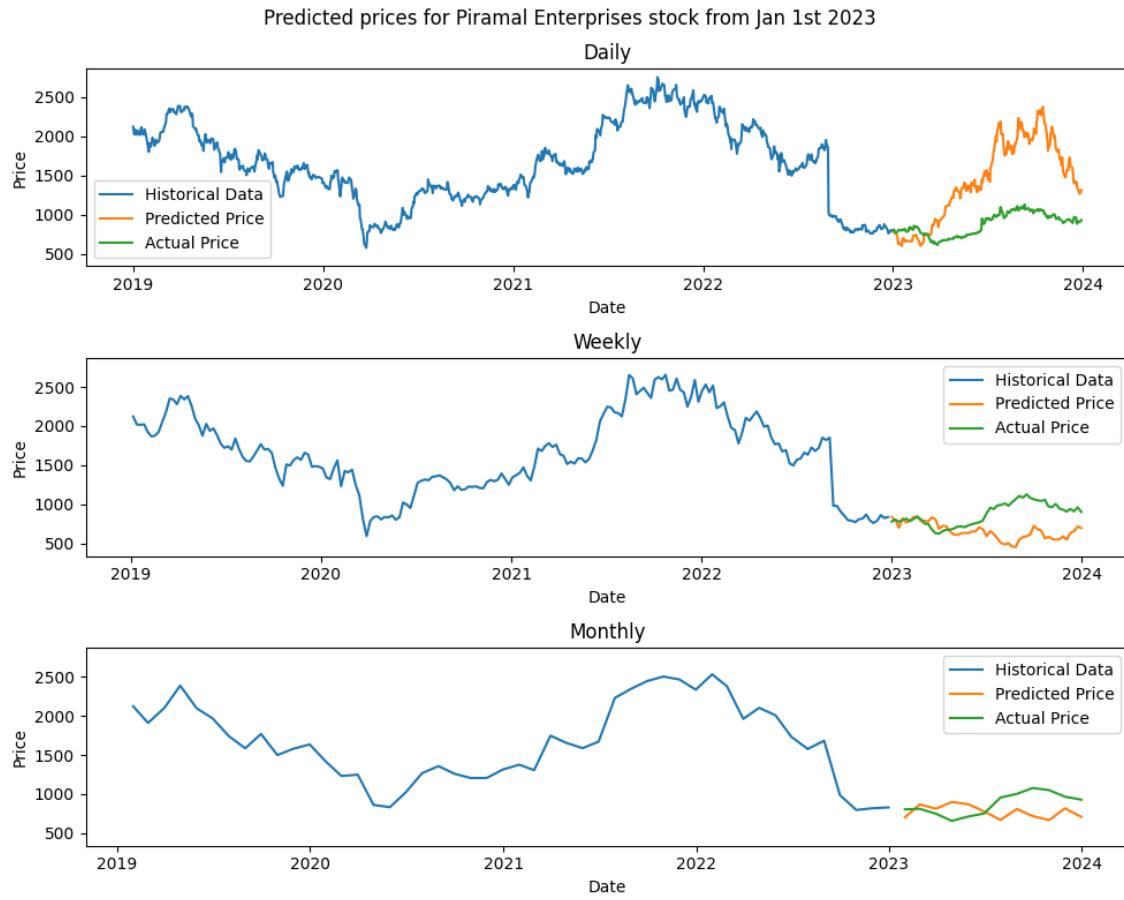


NTPC BO PREDICTIONS

Predicted prices for NTPC Corp. stock from Jan 1st 2023

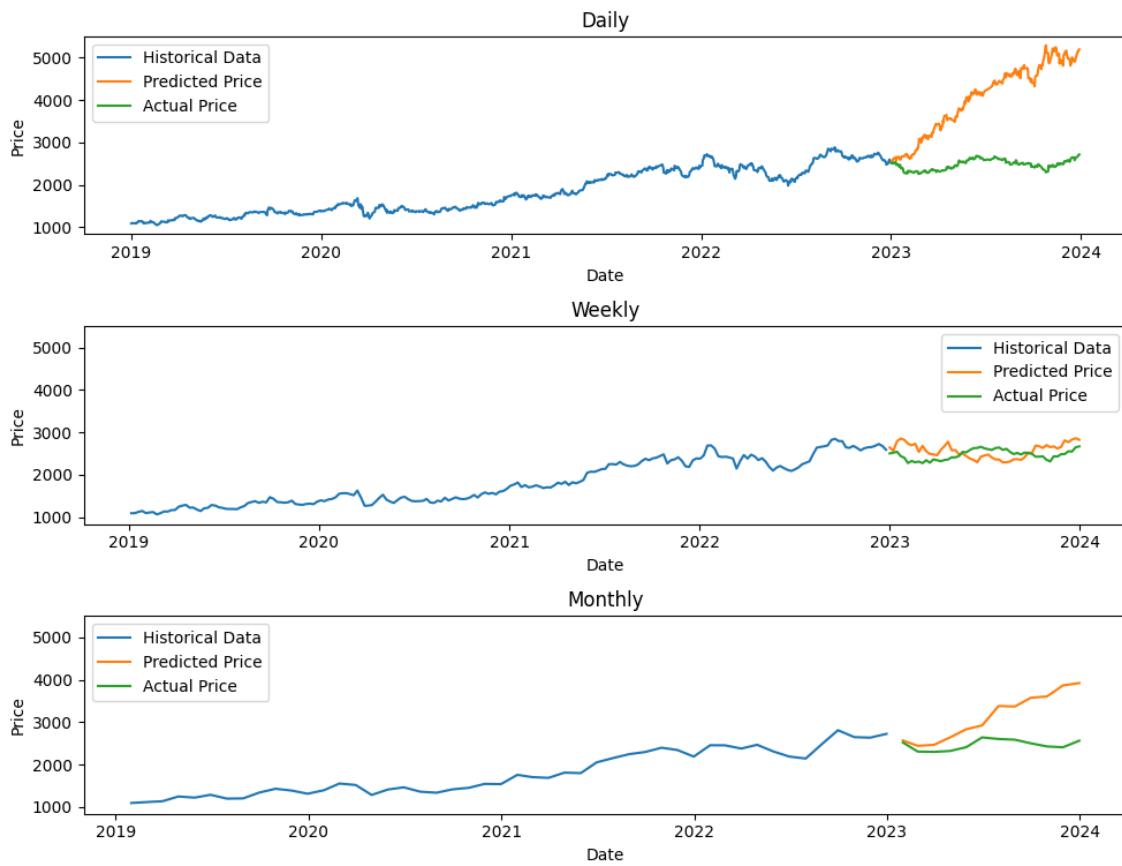


PEL NS PREDICTIONS



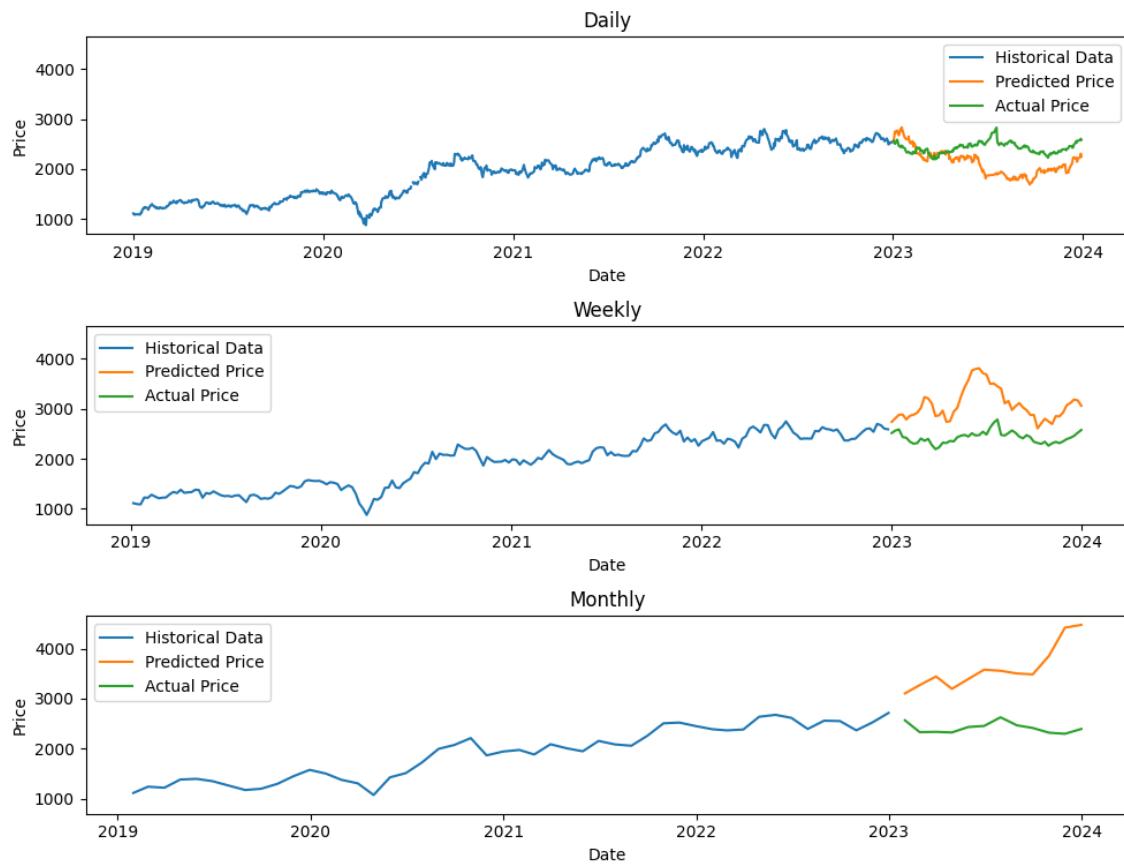
PIDILITIND BO PREDICTIONS

Predicted prices for Pidlite Industries stock from Jan 1st 2023

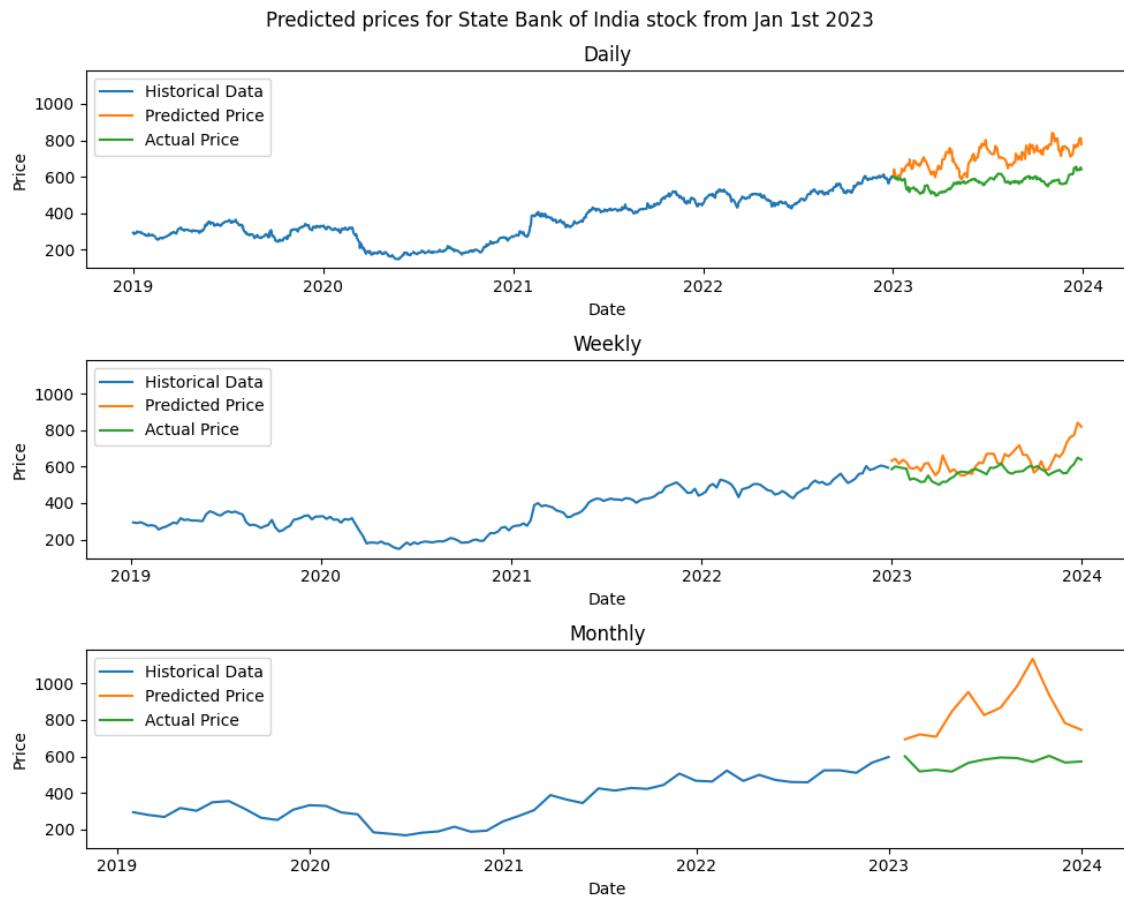


RELIANCE BO PREDICTIONS

Predicted prices for Reliance Industries stock from Jan 1st 2023

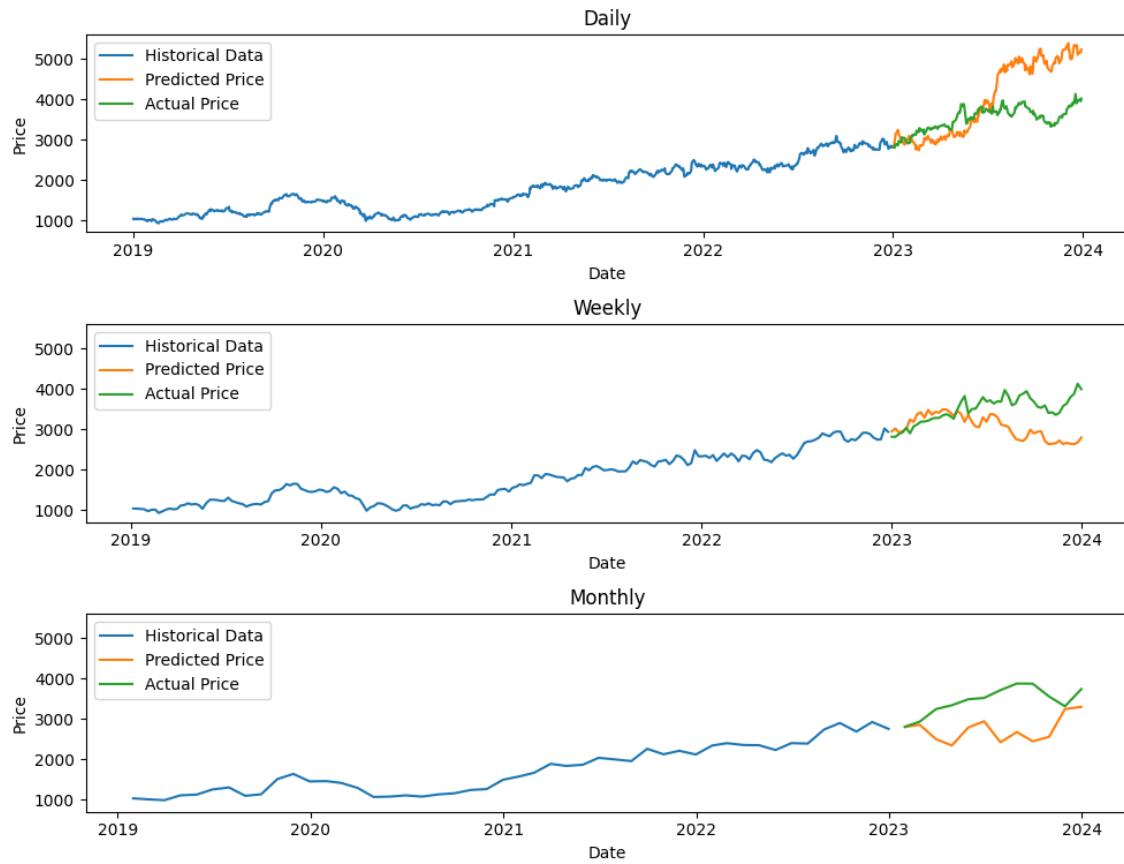


SBIN BO PREDICTIONS



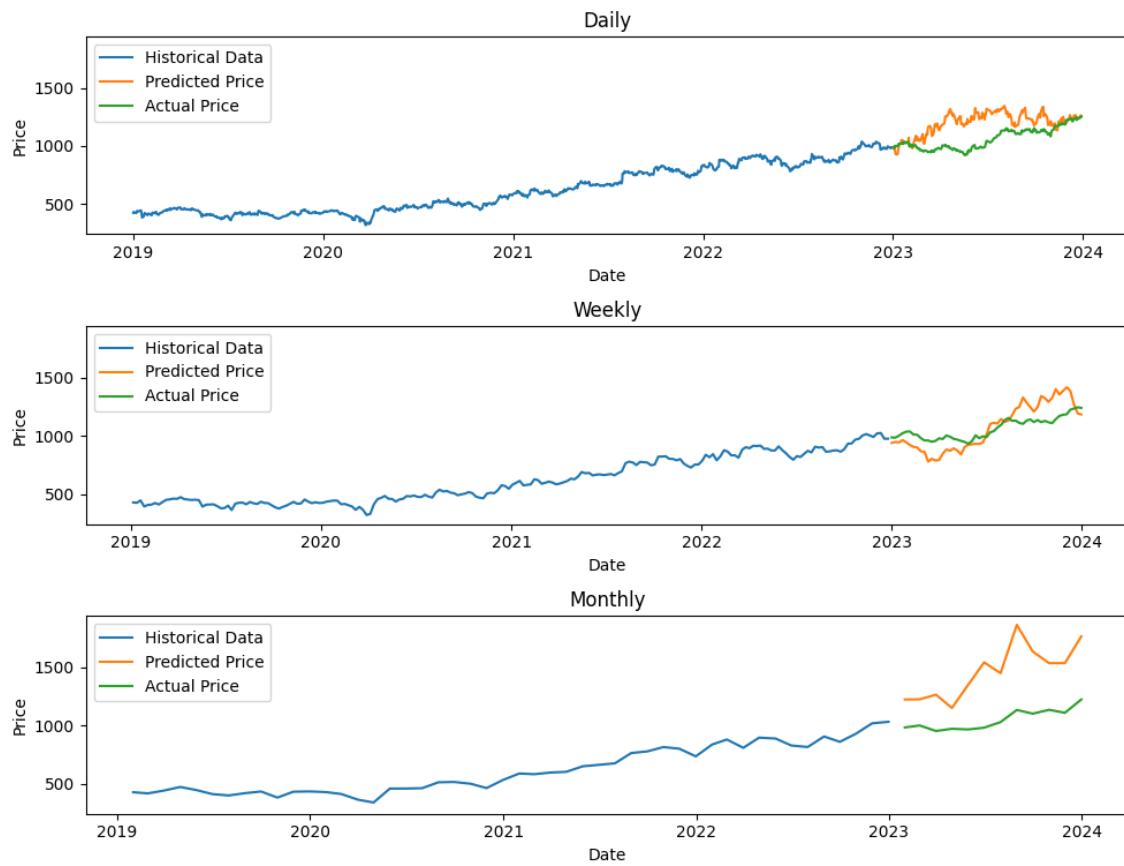
SIEMENS NS PREDICTIONS

Predicted prices for Siemens stock from Jan 1st 2023



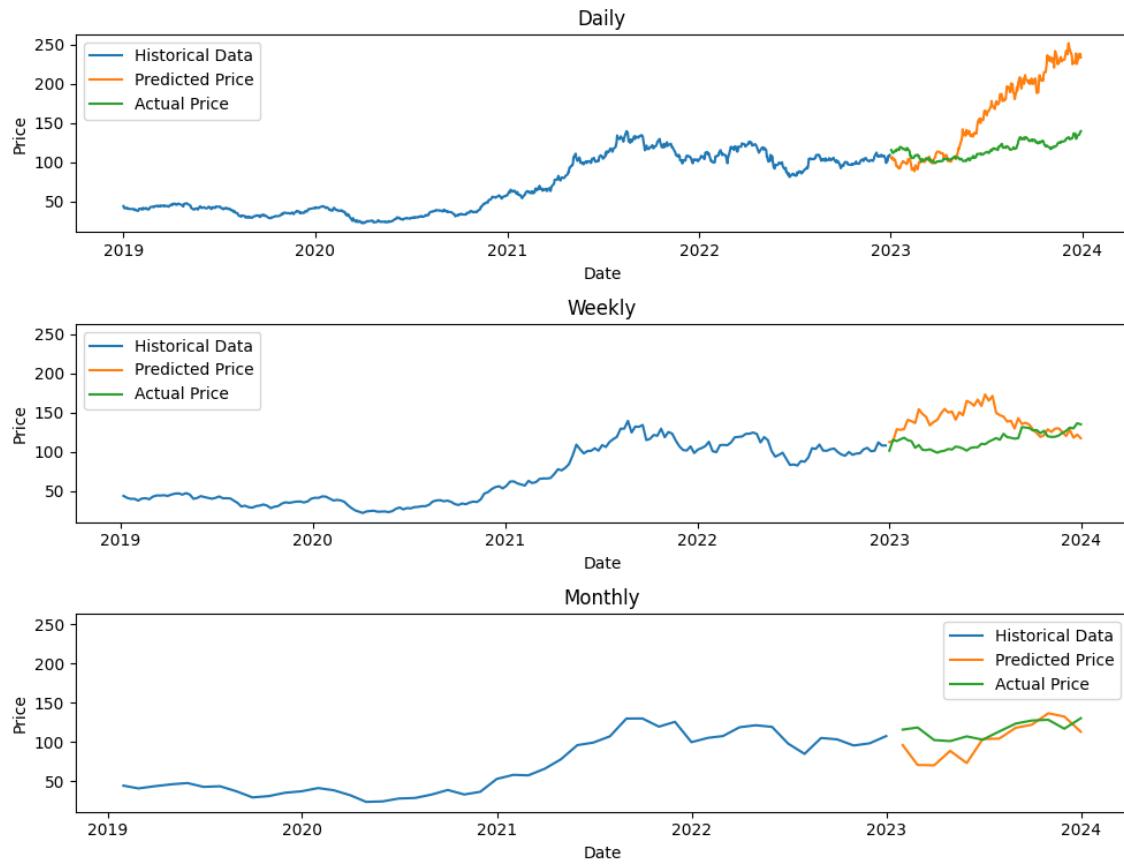
SUNPHARMA BO PREDICTIONS

Predicted prices for Sun Pharma stock from Jan 1st 2023



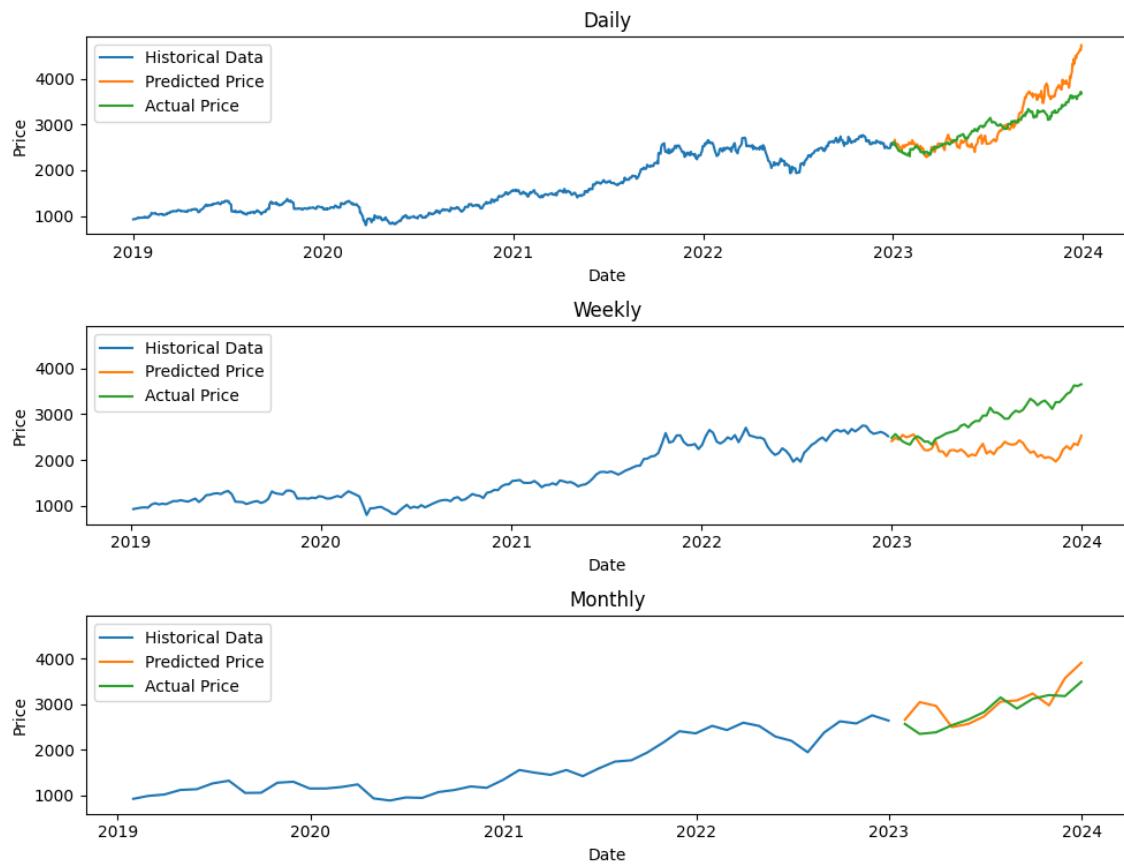
TATASTEEL NS PREDICTIONS

Predicted prices for TATA Steel stock from Jan 1st 2023



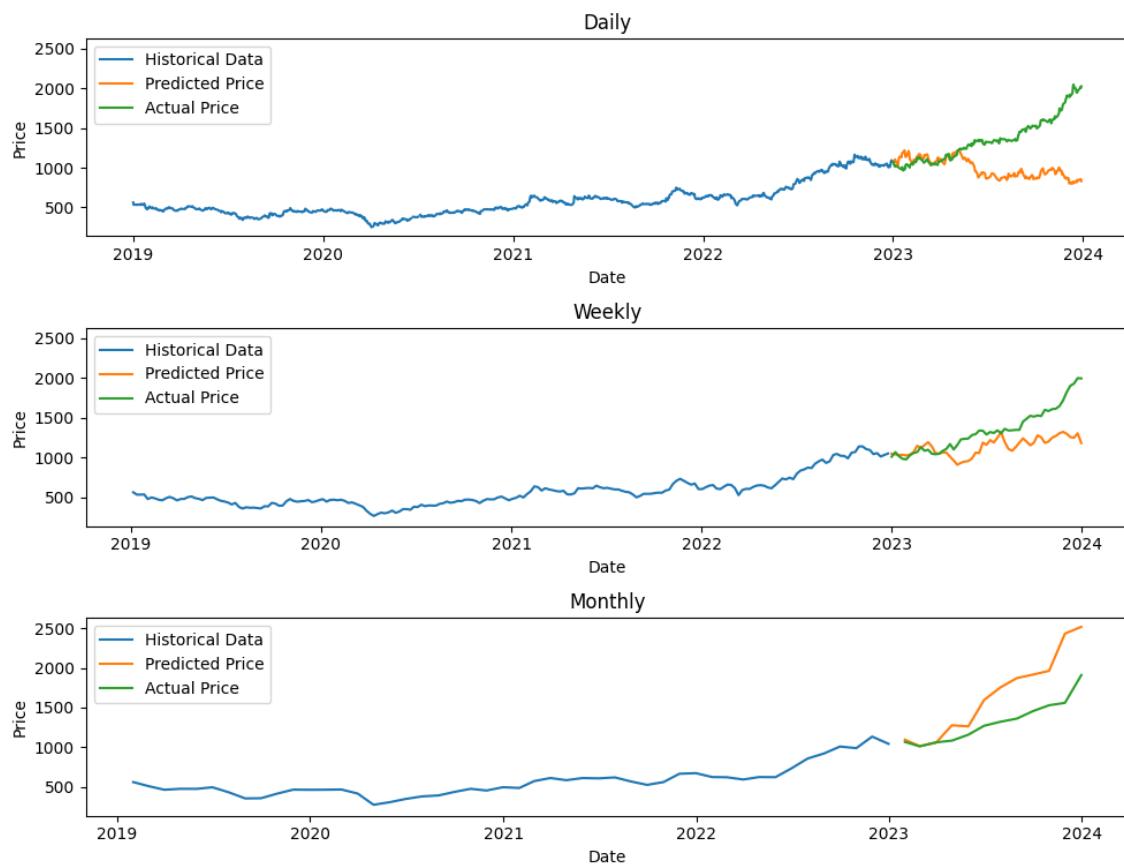
TITAN BO PREDICTIONS

Predicted prices for Titan stock from Jan 1st 2023



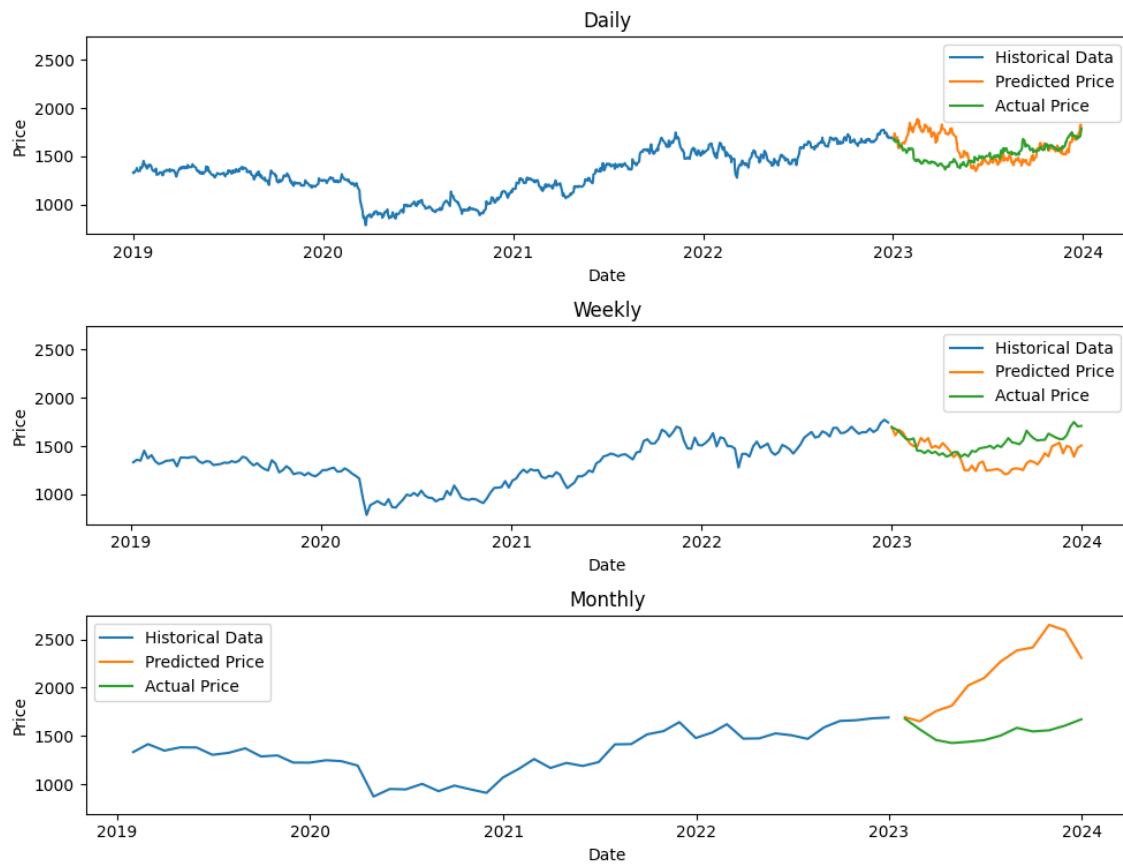
TVSMOTOR BO PREDICTIONS

Predicted prices for TVS Motors stock from Jan 1st 2023

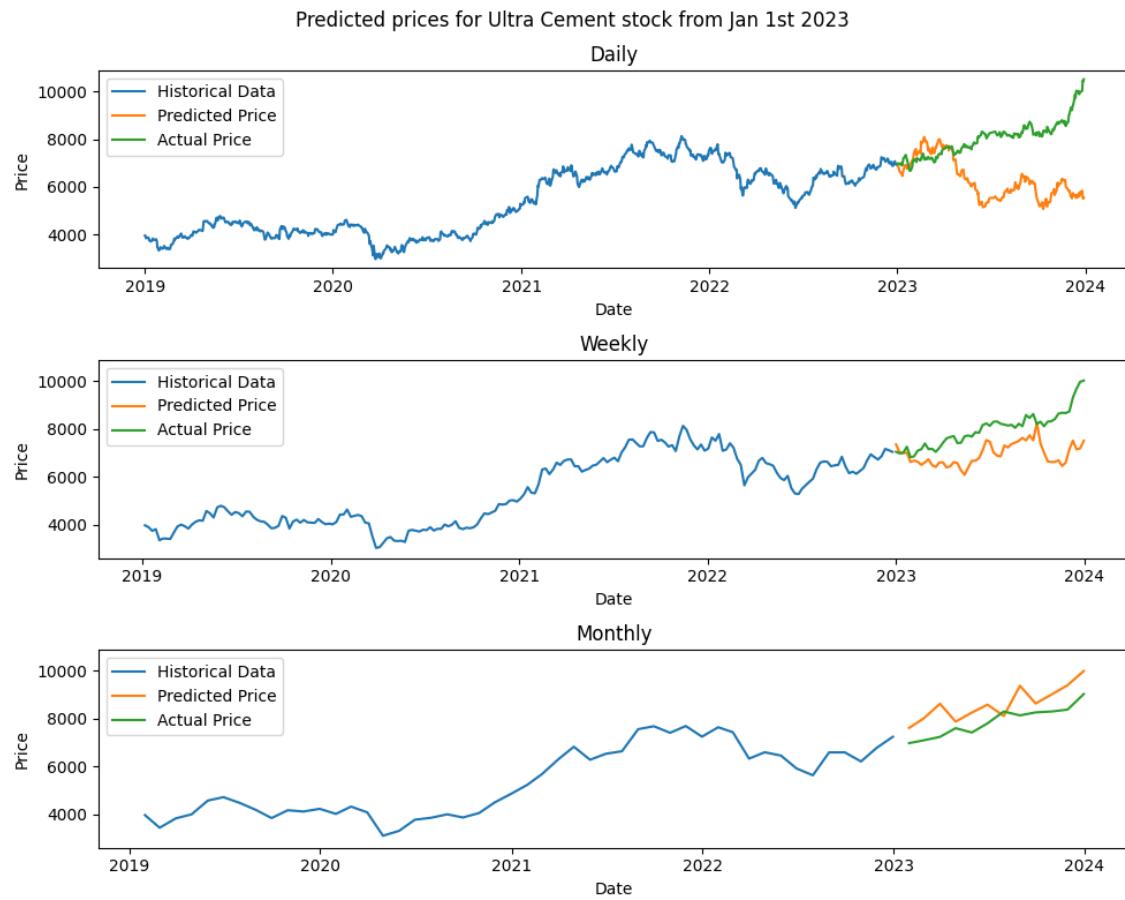


UBL NS PREDICTIONS

Predicted prices for United Breweries stock from Jan 1st 2023

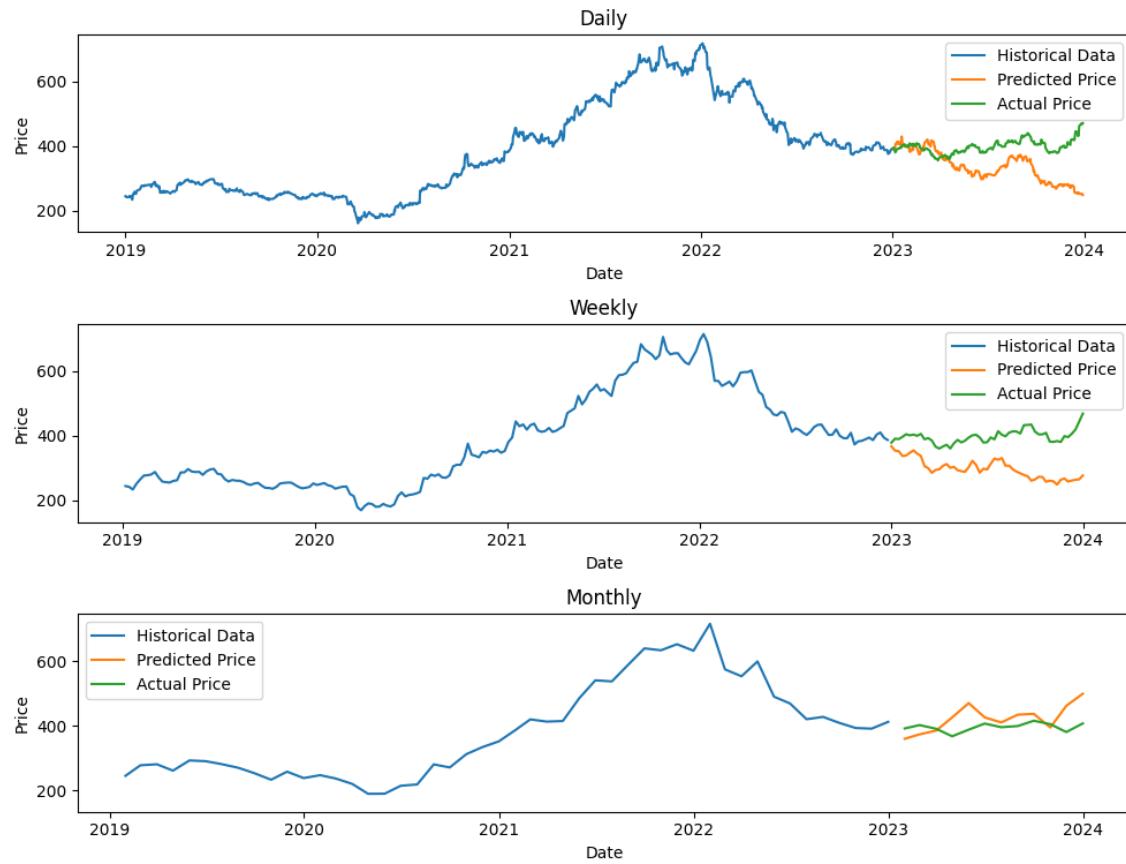


ULTRACEMCO BO PREDICTIONS

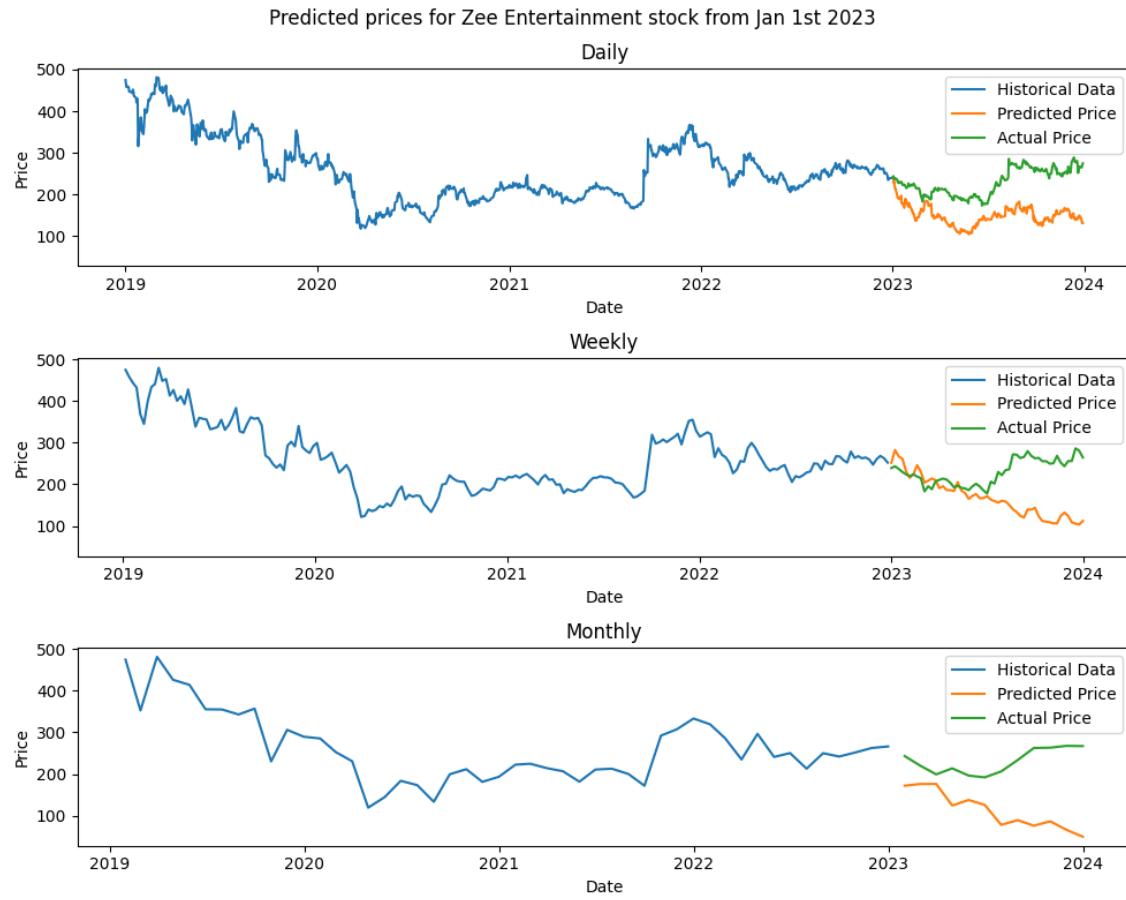


WIPRO BO PREDICTIONS

Predicted prices for Wipro stock from Jan 1st 2023



ZEEL BO PREDICTIONS



ZOMATO BO PREDICTIONS

Predicted prices for Zomato stock from Jan 1st 2023

