Cleaning of Data

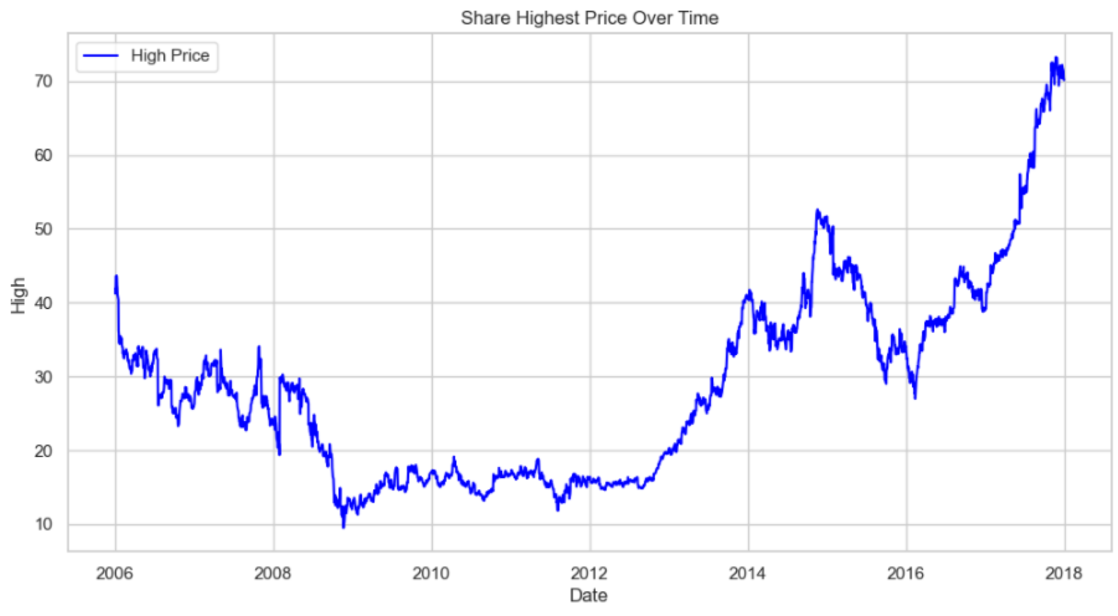
```
[3]: df.drop(columns='Unnamed: 0', inplace =True)
     df.head()
```

[3]:

Date	Open	High	Low	Close	Volume	Name
2006-01-03	39.69	41.22	38.79	40.91	24232729	AABA
2006-01-04	41.22	41.90	40.77	40.97	20553479	AABA
2006-01-05	40.93	41.73	40.85	41.53	12829610	AABA
2006-01-06	42.88	43.57	42.80	43.21	29422828	AABA
2006-01-09	43.10	43.66	42.82	43.42	16268338	AABA

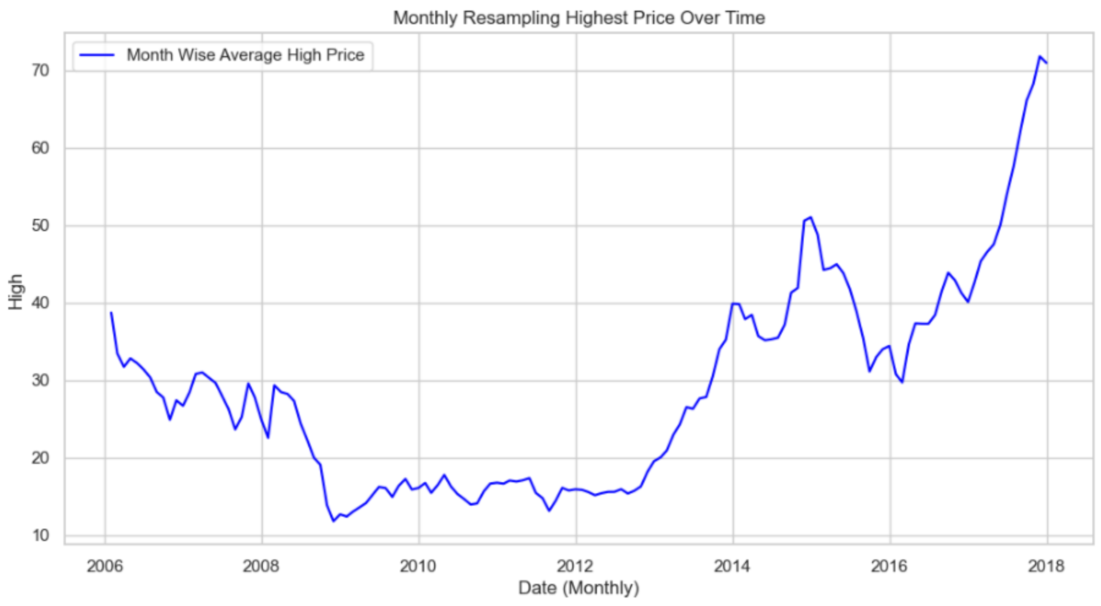
Plotting High Stock Prices

```
[9]: sns.set(style="whitegrid")

     plt.figure(figsize=(12, 6))
     sns.lineplot(data=df, x='Date', y='High', label='High Price', color='blue')

     plt.xlabel('Date')
     plt.ylabel('High')
     plt.title('Share Highest Price Over Time')

     plt.show()
```



Resampling Data

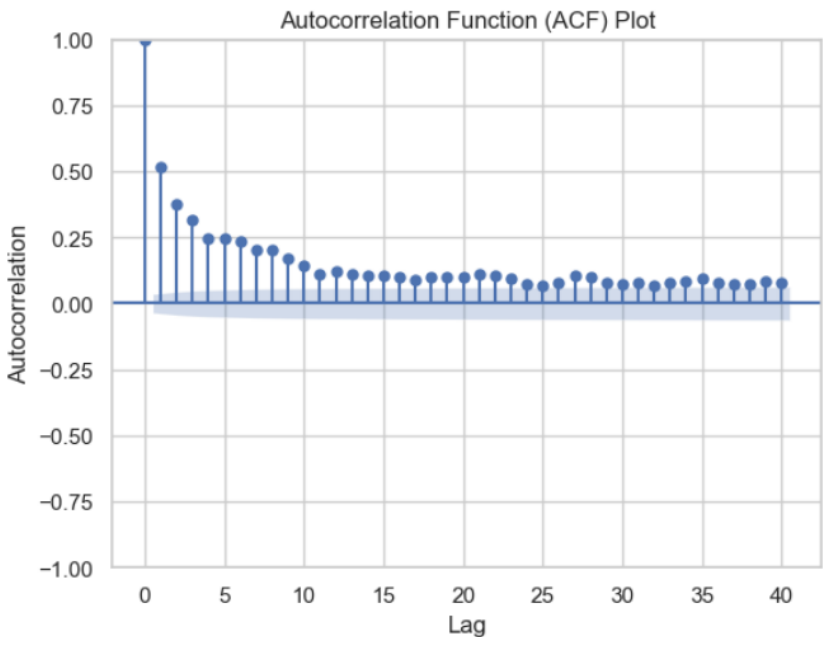
[7]:
```
df_resampled = df.resample('ME').mean(numeric_only=True)

sns.set(style="whitegrid")

plt.figure(figsize=(12, 6))
sns.lineplot(data=df_resampled, x=df_resampled.index, y='High', label='Month Wise Average High Price', color='b

plt.xlabel('Date (Monthly)')
plt.ylabel('High')
plt.title('Monthly Resampling Highest Price Over Time')

plt.show()
```



Detecting Seasonality with Autocorrelation

```
[11]: if 'Date' not in df.columns:
          print("'Date' is already the index or not present in the DataFrame.")
      else:
          df.set_index('Date', inplace=True)

      plt.figure(figsize=(12, 6))
      plot_acf(df['Volume'], lags=40)
      plt.xlabel('Lag')
      plt.ylabel('Autocorrelation')
      plt.title('Autocorrelation Function (ACF) Plot')
      plt.show()
```

```
'Date' is already the index or not present in the DataFrame.
<Figure size 1200x600 with 0 Axes>
```



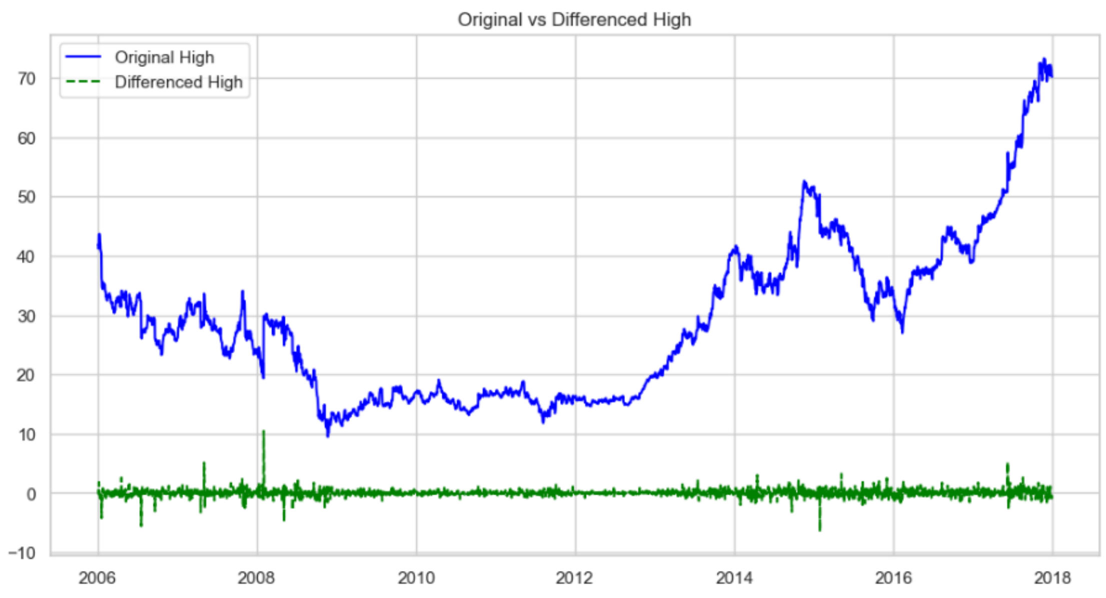
Testing Stationarity with ADF test

```
[12]: from statsmodels.tsa.stattools import adfuller

      result = adfuller(df['High'])
      print('ADF Statistic:', result[0])
      print('p-value:', result[1])
      print('Critical Values:', result[4])
```

```
ADF Statistic: 0.7671404880535945
p-value: 0.9910868050318213
Critical Values: {'1%': np.float64(-3.4325316347197403), '5%': np.float64(-2.862503905260741), '10%': np.float6
4(-2.5672831121111113)}
```

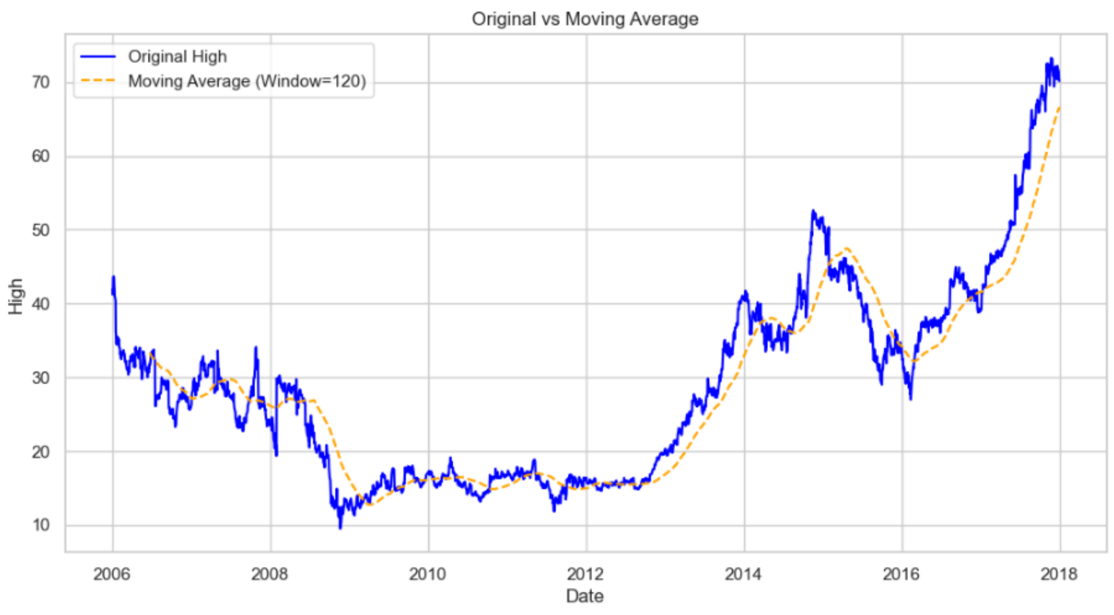
Differencing to Achieve Stationarity

```
[13]: df['high_diff'] = df['High'].diff()

      plt.figure(figsize=(12, 6))
      plt.plot(df['High'], label='Original High', color='blue')
      plt.plot(df['high_diff'], label='Differenced High', linestyle='--', color='green')
      plt.legend()
      plt.title('Original vs Differenced High')
      plt.show()
```



Smoothing Data with Moving Average

[14]:
```
window_size = 120
df['high_smoothed'] = df['High'].rolling(window=window_size).mean()

plt.figure(figsize=(12, 6))

plt.plot(df['High'], label='Original High', color='blue')
plt.plot(df['high_smoothed'], label=f'Moving Average (Window={window_size})', linestyle='--', color='orange')

plt.xlabel('Date')
plt.ylabel('High')
plt.title('Original vs Moving Average')
plt.legend()
plt.show()
```



Original Data Vs Differenced Data

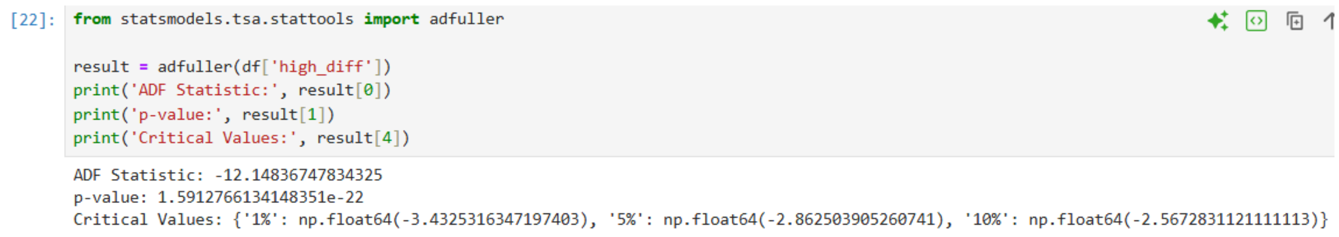
[15]:
```
df_combined = pd.concat([df['High'], df['high_diff']], axis=1)

print(df_combined.head())
```

```
             High  high_diff
Date
2006-01-03  41.22        NaN
2006-01-04  41.90       0.68
2006-01-05  41.73      -0.17
2006-01-06  43.57       1.84
2006-01-09  43.66       0.09
```

[16]:
```
df.dropna(subset=['high_diff'], inplace=True)
df['high_diff'].head()
```

[16]:
```
Date
2006-01-04    0.68
2006-01-05   -0.17
2006-01-06    1.84
2006-01-09    0.09
2006-01-10   -0.32
Name: high_diff, dtype: float64
```

After ADF test



[22]:

```python
from statsmodels.tsa.stattools import adfuller

result = adfuller(df['high_diff'])
print('ADF Statistic:', result[0])
print('p-value:', result[1])
print('Critical Values:', result[4])
```

```
ADF Statistic: -12.14836747834325
p-value: 1.5912766134148351e-22
Critical Values: {'1%': np.float64(-3.4325316347197403), '5%': np.float64(-2.862503905260741), '10%': np.float64(-2.5672831121111113)}
```