# Calculate the Beta of Nifty50 VS JWS Steels

In [ ]:
```
# Importing the libraries

import pandas as pd
import yfinance as yf
import seaborn as sns
import matplotlib.pyplot as plt
import datetime as dt
import statsmodels.api as sm
from colorama import Fore, Style
```

# Fetching the last 5 years with monthly frequency of Nifty Data

In [ ]:
```
# Define the ticker symbol for the Nifty 50 ("^NSEI") which is ^NSEI in Yahoo Fi
ticker_symbol = "^NSEI"

end_date = dt.datetime.now()
end_date
```

Out[ ]:
```
datetime.datetime(2024, 4, 4, 12, 44, 52, 573244)
```

In [ ]:
```
# Subtract 5 years
five_years_ago = end_date - dt.timedelta(days=365*5)
start_date = five_years_ago

print("Five years ago from", end_date, "is", start_date)
```

```
Five years ago from 2024-04-04 12:44:52.573244 is 2019-04-06 12:44:52.573244
```

In [ ]:
```
# Fetch historical data
NIFTY50_data = yf.download(ticker_symbol, start=start_date, end=end_date, interv
```

```
[**********100%%**********]  1 of 1 completed
```

In [ ]:
```
df1 = NIFTY50_data.copy() # Create the duplicate copy
df1 = df1.drop(['Open', 'High', 'Low', 'Close','Volume'], axis=1) # delete the u
df1
```

Out[ ]:

| Date | Adj Close |
|---|---|
| **2019-05-01** | 11922.799805 |
| **2019-06-01** | 11788.849609 |
| **2019-07-01** | 11118.000000 |
| **2019-08-01** | 11023.250000 |
| **2019-09-01** | 11474.450195 |
| **2019-10-01** | 11877.450195 |
| **2019-11-01** | 12056.049805 |
| **2019-12-01** | 12168.450195 |
| **2020-01-01** | 11962.099609 |
| **2020-02-01** | 11201.750000 |
| **2020-03-01** | 8597.750000 |
| **2020-04-01** | 9859.900391 |
| **2020-05-01** | 9580.299805 |
| **2020-06-01** | 10302.099609 |
| **2020-07-01** | 11073.450195 |
| **2020-08-01** | 11387.500000 |
| **2020-09-01** | 11247.549805 |
| **2020-10-01** | 11642.400391 |
| **2020-11-01** | 12968.950195 |
| **2020-12-01** | 13981.750000 |
| **2021-01-01** | 13634.599609 |
| **2021-02-01** | 14529.150391 |
| **2021-03-01** | 14690.700195 |
| **2021-04-01** | 14631.099609 |
| **2021-05-01** | 15582.799805 |
| **2021-06-01** | 15721.500000 |
| **2021-07-01** | 15763.049805 |
| **2021-08-01** | 17132.199219 |
| **2021-09-01** | 17618.150391 |
| **2021-10-01** | 17671.650391 |
| **2021-11-01** | 16983.199219 |
| **2021-12-01** | 17354.050781 |

| Date | Adj Close |
|---|---|
| **2022-01-01** | 17339.849609 |
| **2022-02-01** | 16793.900391 |
| **2022-03-01** | 17464.750000 |
| **2022-04-01** | 17102.550781 |
| **2022-05-01** | 16584.550781 |
| **2022-06-01** | 15780.250000 |
| **2022-07-01** | 17158.250000 |
| **2022-08-01** | 17759.300781 |
| **2022-09-01** | 17094.349609 |
| **2022-10-01** | 18012.199219 |
| **2022-11-01** | 18758.349609 |
| **2022-12-01** | 18105.300781 |
| **2023-01-01** | 17662.150391 |
| **2023-02-01** | 17303.949219 |
| **2023-03-01** | 17359.750000 |
| **2023-04-01** | 18065.000000 |
| **2023-05-01** | 18534.400391 |
| **2023-06-01** | 19189.050781 |
| **2023-07-01** | 19753.800781 |
| **2023-08-01** | 19253.800781 |
| **2023-09-01** | 19638.300781 |
| **2023-10-01** | 19079.599609 |
| **2023-11-01** | 20133.150391 |
| **2023-12-01** | 21731.400391 |
| **2024-01-01** | 21725.699219 |
| **2024-02-01** | 21982.800781 |
| **2024-03-01** | 22326.900391 |
| **2024-04-01** | 22434.650391 |

# Fetching the last 5 years with monthly frequency of JSW Steel Limited data.

In [ ]:
```
# Define the ticker symbol for the JSW Steel Limited ("JSWSTEEL.NS") which is JS
ticker_symbol = "JSWSTEEL.NS"
```

In [ ]:
```
# Fetch historical data
JSW_data = yf.download(ticker_symbol, start=start_date, end=end_date, interval="
```

```
[**********************100%%**********************]  1 of 1 completed
```

In [ ]:
```
df2 = JSW_data.copy() # Craete the duplicate
df2 = df2.drop(['Open', 'High', 'Low', 'Close','Volume'], axis=1) #delete the un
df2
```

Out[ ]:

| Date | Adj Close |
|---|---|
| **2019-05-01** | 253.232819 |
| **2019-06-01** | 257.799774 |
| **2019-07-01** | 221.310715 |
| **2019-08-01** | 205.835037 |
| **2019-09-01** | 217.667328 |
| **2019-10-01** | 215.821503 |
| **2019-11-01** | 247.579453 |
| **2019-12-01** | 255.625412 |
| **2020-01-01** | 237.308990 |
| **2020-02-01** | 223.110199 |
| **2020-03-01** | 138.438141 |
| **2020-04-01** | 171.000671 |
| **2020-05-01** | 174.361038 |
| **2020-06-01** | 179.235962 |
| **2020-07-01** | 208.485474 |
| **2020-08-01** | 258.092010 |
| **2020-09-01** | 265.697021 |
| **2020-10-01** | 295.590942 |
| **2020-11-01** | 335.003052 |
| **2020-12-01** | 370.397461 |
| **2021-01-01** | 350.930542 |
| **2021-02-01** | 378.289459 |
| **2021-03-01** | 448.121613 |
| **2021-04-01** | 686.698853 |
| **2021-05-01** | 680.050537 |
| **2021-06-01** | 654.222168 |
| **2021-07-01** | 704.970032 |
| **2021-08-01** | 664.192749 |
| **2021-09-01** | 645.549744 |
| **2021-10-01** | 646.370850 |
| **2021-11-01** | 587.688904 |
| **2021-12-01** | 633.620239 |

| Date | Adj Close |
|---|---|
| **2022-01-01** | 607.539307 |
| **2022-02-01** | 606.090454 |
| **2022-03-01** | 707.709229 |
| **2022-04-01** | 702.396423 |
| **2022-05-01** | 532.484375 |
| **2022-06-01** | 545.283325 |
| **2022-07-01** | 608.167175 |
| **2022-08-01** | 664.102783 |
| **2022-09-01** | 629.000610 |
| **2022-10-01** | 671.123169 |
| **2022-11-01** | 740.281860 |
| **2022-12-01** | 764.828430 |
| **2023-01-01** | 713.444885 |
| **2023-02-01** | 664.401489 |
| **2023-03-01** | 685.213806 |
| **2023-04-01** | 722.257751 |
| **2023-05-01** | 693.379395 |
| **2023-06-01** | 781.508179 |
| **2023-07-01** | 813.324219 |
| **2023-08-01** | 779.650024 |
| **2023-09-01** | 779.599976 |
| **2023-10-01** | 736.349976 |
| **2023-11-01** | 801.099976 |
| **2023-12-01** | 880.250000 |
| **2024-01-01** | 818.650024 |
| **2024-02-01** | 800.099976 |
| **2024-03-01** | 830.200012 |
| **2024-04-01** | 869.000000 |

In [ ]:
```
df1.shape # check the column of nifty50
```

Out[ ]:
```
(60, 1)
```

In [ ]:
```
df2.shape # check the column of JSW
```

Out[ ]: (60, 1)

## Merge the Data based on date

In [ ]:
```
df = df1.merge(df2, on="Date") # Merge the Both data
df = df.rename(columns={'Adj Close_x': 'Nifty Closing',
                        'Adj Close_y': 'JSW Closing'})
df
```

Out[ ]:

| Date | Nifty Closing | JSW Closing |
|---|---|---|
| **2019-05-01** | 11922.799805 | 253.232819 |
| **2019-06-01** | 11788.849609 | 257.799774 |
| **2019-07-01** | 11118.000000 | 221.310715 |
| **2019-08-01** | 11023.250000 | 205.835037 |
| **2019-09-01** | 11474.450195 | 217.667328 |
| **2019-10-01** | 11877.450195 | 215.821503 |
| **2019-11-01** | 12056.049805 | 247.579453 |
| **2019-12-01** | 12168.450195 | 255.625412 |
| **2020-01-01** | 11962.099609 | 237.308990 |
| **2020-02-01** | 11201.750000 | 223.110199 |
| **2020-03-01** | 8597.750000 | 138.438141 |
| **2020-04-01** | 9859.900391 | 171.000671 |
| **2020-05-01** | 9580.299805 | 174.361038 |
| **2020-06-01** | 10302.099609 | 179.235962 |
| **2020-07-01** | 11073.450195 | 208.485474 |
| **2020-08-01** | 11387.500000 | 258.092010 |
| **2020-09-01** | 11247.549805 | 265.697021 |
| **2020-10-01** | 11642.400391 | 295.590942 |
| **2020-11-01** | 12968.950195 | 335.003052 |
| **2020-12-01** | 13981.750000 | 370.397461 |
| **2021-01-01** | 13634.599609 | 350.930542 |
| **2021-02-01** | 14529.150391 | 378.289459 |
| **2021-03-01** | 14690.700195 | 448.121613 |
| **2021-04-01** | 14631.099609 | 686.698853 |
| **2021-05-01** | 15582.799805 | 680.050537 |
| **2021-06-01** | 15721.500000 | 654.222168 |
| **2021-07-01** | 15763.049805 | 704.970032 |
| **2021-08-01** | 17132.199219 | 664.192749 |
| **2021-09-01** | 17618.150391 | 645.549744 |
| **2021-10-01** | 17671.650391 | 646.370850 |
| **2021-11-01** | 16983.199219 | 587.688904 |
| **2021-12-01** | 17354.050781 | 633.620239 |

| Date | Nifty Closing | JSW Closing |
|---|---|---|
| **2022-01-01** | 17339.849609 | 607.539307 |
| **2022-02-01** | 16793.900391 | 606.090454 |
| **2022-03-01** | 17464.750000 | 707.709229 |
| **2022-04-01** | 17102.550781 | 702.396423 |
| **2022-05-01** | 16584.550781 | 532.484375 |
| **2022-06-01** | 15780.250000 | 545.283325 |
| **2022-07-01** | 17158.250000 | 608.167175 |
| **2022-08-01** | 17759.300781 | 664.102783 |
| **2022-09-01** | 17094.349609 | 629.000610 |
| **2022-10-01** | 18012.199219 | 671.123169 |
| **2022-11-01** | 18758.349609 | 740.281860 |
| **2022-12-01** | 18105.300781 | 764.828430 |
| **2023-01-01** | 17662.150391 | 713.444885 |
| **2023-02-01** | 17303.949219 | 664.401489 |
| **2023-03-01** | 17359.750000 | 685.213806 |
| **2023-04-01** | 18065.000000 | 722.257751 |
| **2023-05-01** | 18534.400391 | 693.379395 |
| **2023-06-01** | 19189.050781 | 781.508179 |
| **2023-07-01** | 19753.800781 | 813.324219 |
| **2023-08-01** | 19253.800781 | 779.650024 |
| **2023-09-01** | 19638.300781 | 779.599976 |
| **2023-10-01** | 19079.599609 | 736.349976 |
| **2023-11-01** | 20133.150391 | 801.099976 |
| **2023-12-01** | 21731.400391 | 880.250000 |
| **2024-01-01** | 21725.699219 | 818.650024 |
| **2024-02-01** | 21982.800781 | 800.099976 |
| **2024-03-01** | 22326.900391 | 830.200012 |
| **2024-04-01** | 22434.650391 | 869.000000 |

In [ ]:
```
df.columns
```

Out[ ]:
```
Index(['Nifty Closing', 'JSW Closing'], dtype='object')
```

In [ ]:
```
df.shape # Check the data size
```

Out[ ]: (60, 2)

In [ ]:
```
df['Nifty50_Return'] = round(df['Nifty Closing'].pct_change() * 100,2) # Calcula
df['JSW_Return'] = round(df['JSW Closing'].pct_change() * 100,2) # Calculating t
df = df.dropna() # Delete the null values
df
```

Out[ ]:

| Date | Nifty Closing | JSW Closing | Nifty50_Return | JSW_Return |
|---|---|---|---|---|
| **2019-06-01** | 11788.849609 | 257.799774 | -1.12 | 1.80 |
| **2019-07-01** | 11118.000000 | 221.310715 | -5.69 | -14.15 |
| **2019-08-01** | 11023.250000 | 205.835037 | -0.85 | -6.99 |
| **2019-09-01** | 11474.450195 | 217.667328 | 4.09 | 5.75 |
| **2019-10-01** | 11877.450195 | 215.821503 | 3.51 | -0.85 |
| **2019-11-01** | 12056.049805 | 247.579453 | 1.50 | 14.71 |
| **2019-12-01** | 12168.450195 | 255.625412 | 0.93 | 3.25 |
| **2020-01-01** | 11962.099609 | 237.308990 | -1.70 | -7.17 |
| **2020-02-01** | 11201.750000 | 223.110199 | -6.36 | -5.98 |
| **2020-03-01** | 8597.750000 | 138.438141 | -23.25 | -37.95 |
| **2020-04-01** | 9859.900391 | 171.000671 | 14.68 | 23.52 |
| **2020-05-01** | 9580.299805 | 174.361038 | -2.84 | 1.97 |
| **2020-06-01** | 10302.099609 | 179.235962 | 7.53 | 2.80 |
| **2020-07-01** | 11073.450195 | 208.485474 | 7.49 | 16.32 |
| **2020-08-01** | 11387.500000 | 258.092010 | 2.84 | 23.79 |
| **2020-09-01** | 11247.549805 | 265.697021 | -1.23 | 2.95 |
| **2020-10-01** | 11642.400391 | 295.590942 | 3.51 | 11.25 |
| **2020-11-01** | 12968.950195 | 335.003052 | 11.39 | 13.33 |
| **2020-12-01** | 13981.750000 | 370.397461 | 7.81 | 10.57 |
| **2021-01-01** | 13634.599609 | 350.930542 | -2.48 | -5.26 |
| **2021-02-01** | 14529.150391 | 378.289459 | 6.56 | 7.80 |
| **2021-03-01** | 14690.700195 | 448.121613 | 1.11 | 18.46 |
| **2021-04-01** | 14631.099609 | 686.698853 | -0.41 | 53.24 |
| **2021-05-01** | 15582.799805 | 680.050537 | 6.50 | -0.97 |
| **2021-06-01** | 15721.500000 | 654.222168 | 0.89 | -3.80 |
| **2021-07-01** | 15763.049805 | 704.970032 | 0.26 | 7.76 |
| **2021-08-01** | 17132.199219 | 664.192749 | 8.69 | -5.78 |
| **2021-09-01** | 17618.150391 | 645.549744 | 2.84 | -2.81 |
| **2021-10-01** | 17671.650391 | 646.370850 | 0.30 | 0.13 |
| **2021-11-01** | 16983.199219 | 587.688904 | -3.90 | -9.08 |
| **2021-12-01** | 17354.050781 | 633.620239 | 2.18 | 7.82 |
| **2022-01-01** | 17339.849609 | 607.539307 | -0.08 | -4.12 |

| Date | Nifty Closing | JSW Closing | Nifty50_Return | JSW_Return |
|---|---|---|---|---|
| **2022-02-01** | 16793.900391 | 606.090454 | -3.15 | -0.24 |
| **2022-03-01** | 17464.750000 | 707.709229 | 3.99 | 16.77 |
| **2022-04-01** | 17102.550781 | 702.396423 | -2.07 | -0.75 |
| **2022-05-01** | 16584.550781 | 532.484375 | -3.03 | -24.19 |
| **2022-06-01** | 15780.250000 | 545.283325 | -4.85 | 2.40 |
| **2022-07-01** | 17158.250000 | 608.167175 | 8.73 | 11.53 |
| **2022-08-01** | 17759.300781 | 664.102783 | 3.50 | 9.20 |
| **2022-09-01** | 17094.349609 | 629.000610 | -3.74 | -5.29 |
| **2022-10-01** | 18012.199219 | 671.123169 | 5.37 | 6.70 |
| **2022-11-01** | 18758.349609 | 740.281860 | 4.14 | 10.30 |
| **2022-12-01** | 18105.300781 | 764.828430 | -3.48 | 3.32 |
| **2023-01-01** | 17662.150391 | 713.444885 | -2.45 | -6.72 |
| **2023-02-01** | 17303.949219 | 664.401489 | -2.03 | -6.87 |
| **2023-03-01** | 17359.750000 | 685.213806 | 0.32 | 3.13 |
| **2023-04-01** | 18065.000000 | 722.257751 | 4.06 | 5.41 |
| **2023-05-01** | 18534.400391 | 693.379395 | 2.60 | -4.00 |
| **2023-06-01** | 19189.050781 | 781.508179 | 3.53 | 12.71 |
| **2023-07-01** | 19753.800781 | 813.324219 | 2.94 | 4.07 |
| **2023-08-01** | 19253.800781 | 779.650024 | -2.53 | -4.14 |
| **2023-09-01** | 19638.300781 | 779.599976 | 2.00 | -0.01 |
| **2023-10-01** | 19079.599609 | 736.349976 | -2.84 | -5.55 |
| **2023-11-01** | 20133.150391 | 801.099976 | 5.52 | 8.79 |
| **2023-12-01** | 21731.400391 | 880.250000 | 7.94 | 9.88 |
| **2024-01-01** | 21725.699219 | 818.650024 | -0.03 | -7.00 |
| **2024-02-01** | 21982.800781 | 800.099976 | 1.18 | -2.27 |
| **2024-03-01** | 22326.900391 | 830.200012 | 1.57 | 3.76 |
| **2024-04-01** | 22434.650391 | 869.000000 | 0.48 | 4.67 |

In [ ]:
```
df.columns
```

Out[ ]:
```
Index(['Nifty Closing', 'JSW Closing', 'Nifty50_Return', 'JSW_Return'], dtype
='object')
```

In [ ]:
```
# Perform regression analysis
X = sm.add_constant(df['Nifty50_Return']) # Put the nifty 50 return in x variabl
```

```
model = sm.OLS(df['JSW_Return'], X)  #  Use ordinary least squares regression
results = model.fit() # Fit the model to the data
results = results.summary() #  Summarize the result of the regression</s

# Print regression results
print(results)
```

```
                            OLS Regression Results
==============================================================================
Dep. Variable:             JSW_Return   R-squared:                       0.363
Model:                            OLS   Adj. R-squared:                  0.351
Method:                 Least Squares   F-statistic:                     32.44
Date:                Thu, 04 Apr 2024   Prob (F-statistic):           4.51e-07
Time:                        12:44:54   Log-Likelihood:                -218.22
No. Observations:                  59   AIC:                             440.4
Df Residuals:                      57   BIC:                             444.6
Df Model:                           1
Covariance Type:            nonrobust
==============================================================================
=
                     coef    std err          t      P>|t|      [0.025      0.97
5]
------------------------------------------------------------------------------
-
const              1.1622      1.328      0.875      0.385      -1.497       3.82
1
Nifty50_Return     1.3728      0.241      5.695      0.000       0.890       1.85
6
==============================================================================
Omnibus:                       57.416   Durbin-Watson:                   1.951
Prob(Omnibus):                  0.000   Jarque-Bera (JB):              438.819
Skew:                           2.509   Prob(JB):                     5.15e-96
Kurtosis:                      15.382   Cond. No.                         5.66
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly
specified.
```

So, the beta is:

```
Nifty50_Return     1.3735
```

# Insights

Certainly! The beta coefficient in a regression analysis represents the sensitivity of the dependent variable (in this case, JSW Steel returns) to changes in the independent variable (Nifty 50 returns).

In the regression results you provided, the beta coefficient for Nifty 50 returns is approximately 1.3731. This means that for every 1% increase (or decrease) in the Nifty 50 returns, we can expect JSW Steel returns to increase (or decrease) by approximately 1.3731%.

A beta coefficient greater than 1 indicates that JSW Steel is more volatile than the market represented by the Nifty 50 index. Conversely, a beta coefficient less than 1 would indicate that JSW Steel is less volatile than the market.

Therefore, with a beta coefficient of approximately 1.3731, JSW Steel is expected to experience larger fluctuations in returns compared to the overall market (Nifty 50). It suggests that JSW Steel returns are positively correlated with the movements of the Nifty 50 index, and the stock tends to amplify the movements in the market.