Stock price analysis

1. **Plotting a histogram of Spotify's daily returns**

A graph of a number of blue bars

Description automatically generated

Key Insights:

* The daily returns range from approximately -0.15 to 0.15, showing variability in the returns.
* The distribution appears to be approximately normal, suggesting that the returns follow a bell-shaped curve, which is typical for financial returns.
* Stability: The concentration around 0 suggests that Spotify's daily returns do not frequently experience extreme changes, indicating some level of stability.
* Risk Assessment: The range of returns (-0.15 to 0.15) provides insight into the potential volatility and risk associated with investing in Spotify.

1. **Calculation of skewness, kurtosis and Shapiro walk test**

**Skewness of Spotify Daily Returns: 0.0570**

**Kurtosis of Spotify Daily Returns: 3.2178**

**Shapiro-Wilk Test p-value: 0.0000**

**Spotify's daily returns are not normally distributed.**

* A skewness close to 0 (as in this case) suggests that the distribution is roughly symmetric
* Kurtosis measures the "tailedness" of the distribution compared to a normal distribution (which has a kurtosis of 3).A kurtosis slightly above 3 suggests that the daily returns have slightly heavier tails, meaning there are more extreme returns than expected in a normal distribution.
* A p-value of 0.0000 confirms that the daily returns are not normally distributed.

**3. Identifying those dates and returns that were smaller than -3 standard deviations or larger than +3 standard deviations**

Outliers (dates with returns beyond ±3 standard deviations):

SPOT Daily Return

Date

2020-03-16 117.639999 -0.105807

2020-03-24 129.690002 0.097394

2020-04-29 155.779999 0.114466

2020-06-18 225.279999 0.127358

2020-06-25 267.470001 0.101334

2020-07-20 291.190002 0.106219

2020-10-30 239.889999 -0.101098

2020-12-02 320.890015 0.125969

2021-02-25 303.059998 -0.094505

2021-04-28 256.839996 -0.123174

2022-01-31 196.259995 0.134582

2022-02-03 159.759995 -0.167570

2022-04-20 122.489998 -0.108580

2022-04-27 96.669998 -0.124445

2022-05-09 94.440002 -0.097822

2022-07-27 116.610001 0.121574

2022-10-26 84.419998 -0.130139

2022-11-10 78.440002 0.098599

2023-01-31 112.720001 0.127200

2023-07-25 140.380005 -0.142560

2023-10-24 170.630005 0.103616

2024-04-23 303.309998 0.114127

2024-07-23 330.790009 0.119614

2024-11-13 467.369995 0.114404

* **For the dates identified in part (4), these were some of the relevant company-specific events:**

|  |  |
| --- | --- |
| Date | Events |
| 2020-03-16 | The COVID-19 epidemic has caused a market-wide crash. |
| 2020-06-18 | Spotify announces exclusive podcast deals (e.g., Joe Rogan’s podcast announcement). |
| 2021-02-25 | Earnings report or market reaction to Q4 2020 results. |
| 2022-02-03 | Regulatory or competitive pressures affecting streaming industry. |

1. **Report Beta, Alpha, R-square, pvalue**

|  |  |  |  |
| --- | --- | --- | --- |
| Beta | Alpha | R-square | pvalue |
| 0.8296 | 0.0011 | 0.1199 | 0.0000 |

* Alpha represents the excess return of the asset (Spotify) relative to the return predicted by the benchmark (market). A positive alpha of 0.0011 means that Spotify has outperformed the benchmark by 0.11% over the period, after accounting for the risk taken (as measured by beta).
* Since Beta < 1, Spotify is less risky than the market, meaning its price tends to move more slowly than the broader market movements.
* An R-squared of 0.1199 means that only about 12% of Spotify's return variation can be explained by the market movements (i.e., the model explains 12% of the variance).
* A p-value of 0.0000 means the relationship between Spotify's returns and the market is statistically significant, and we can reject the null hypothesis that there is no relationship.