Stock price analysis

1. Plotting a histogram of Spotify's daily returns
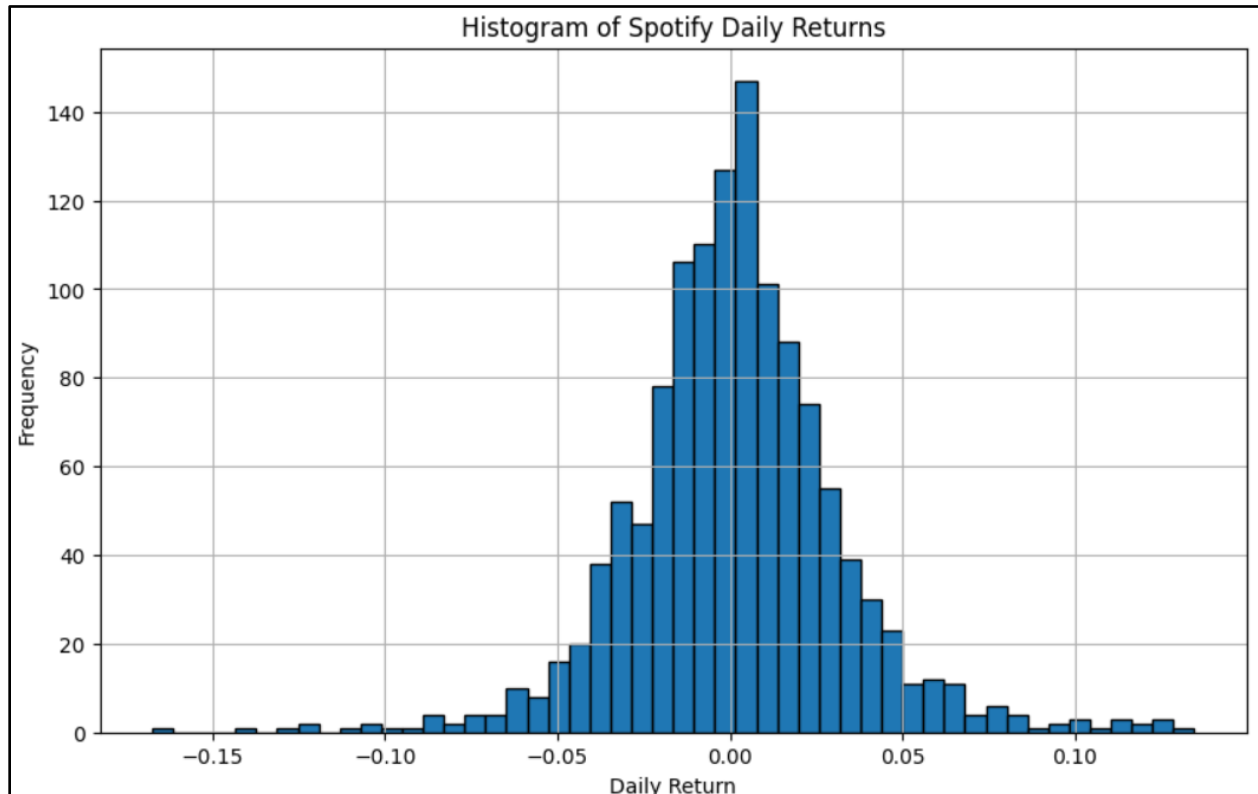

Histogram of Spotify Daily Returns

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.

2. 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.

3. 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.