Equity Portfolio Risk–Return and Risk-Adjusted Performance Analysis

A Data Analytics & Finance Project

Prepared by:
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Role / Focus:
Aspiring Data Analyst | Finance & Analytics

Tools Used:
Microsoft Excel

Concepts Applied:
Risk–Return Analysis, Correlation & Covariance,
Portfolio Construction, Sharpe Ratio

Benchmark:
NIFTY 50

Date:
18 January 2026

Stock	Avg Daily Return	Annual Return	Daily Risk	Annual Risk
Nifty 50	0.06%	14.56%	1.14%	18.07%
Reliance	0.07%	18.16%	1.78%	28.23%
HDFC Bank	0.04%	10.77%	1.62%	25.69%
ITC	0.05%	12.14%	1.60%	25.42%
TCS	0.04%	9.44%	1.50%	23.77%
Infosys	0.07%	17.05%	1.73%	27.47%
L&T	0.09%	23.07%	1.74%	27.58%

Stocks such as **L&T and Reliance generated higher annual returns**, but this was accompanied by significantly higher volatility, indicating greater risk exposure.

TCS exhibited comparatively lower volatility among individual stocks, though with lower returns, reflecting more stable performance. ITC delivered moderate returns with moderate risk, rather than being the lowest-risk stock.

The **NIFTY 50 showed lower volatility and moderate returns**, serving as a balanced benchmark for comparing portfolio performance.

	Nifty 50	Reliance	HDFC Bank	ITC	TCS	Infosys	L&T
Nifty 50	1.00	0.71	0.76	0.48	0.57	0.60	0.69
Reliance	0.71	1.00	0.44	0.30	0.38	0.34	0.41
HDFC Bank	0.76	0.44	1.00	0.28	0.30	0.34	0.49
ITC	0.48	0.30	0.28	1.00	0.23	0.23	0.33
TCS	0.57	0.38	0.30	0.23	1.00	0.71	0.32
Infosys	0.60	0.34	0.34	0.23	0.71	1.00	0.35
L&T	0.69	0.41	0.49	0.33	0.32	0.35	1.00

Conditional formatting was applied to the correlation matrix to visually highlight relationships between stocks.

Lower correlations were represented in green, indicating better diversification, while higher correlations were highlighted in red.

The relatively high correlation between individual stocks and the NIFTY 50 is expected, as the index represents overall market movements. This reinforces its suitability as a benchmark rather than a diversification asset within the portfolio.

Stock	Weight	Daily Avg Return	Weighted Return
Reliance	20%	0.07%	0.014%
HDFC Bank	15%	0.04%	0.006%
ITC	15%	0.05%	0.007%
TCS	15%	0.04%	0.006%
Infosys	15%	0.07%	0.010%
L&T	20%	0.09%	0.018%
			0.062%

Total **Portfolio** Return	**15.66%**
NIFTY 50 Return	**14.56%**

The portfolio outperformed the benchmark by approximately **1.1%**, reflecting effective stock selection and weight allocation.

Stocks	Reliance	HDFC Bank	ITC	TCS	Infosys	L&T	Weight
Reliance	0.0003163	0.0001266	0.0000844	0.0001003	0.0001059	0.0001280	0.20
HDFC Bank	0.0001266	0.0002618	0.0000731	0.0000720	0.0000960	0.0001369	0.15
ITC	0.0000844	0.0000731	0.0002563	0.0000552	0.0000649	0.0000930	0.15
TCS	0.0001003	0.0000720	0.0000552	0.0002243	0.0001839	0.0000822	0.15
Infosys	0.0001059	0.0000960	0.0000649	0.0001839	0.0002995	0.0001040	0.15
L&T	0.0001280	0.0001369	0.0000930	0.0000822	0.0001040	0.0003019	0.20

Portfolio Variance	0.0001329
Daily Portfolio Risk	1.15%

Portfolio ANNUAL RISK	18.30%
NIFTY 50 Annual Risk	18.07%
Other Stocks Average Risk	26.36%

Portfolio risk was calculated using the covariance matrix and weight vector, accounting for inter-asset relationships.

Diversification helped reduce portfolio volatility significantly compared to individual stocks.

Risk-Free Rate	7%
Portfolio Sharpe Ratio	**0.47**
NIFTY 50 Sharpe Ratio	**0.42**

A risk-adjusted performance evaluation was conducted using the Sharpe Ratio. Assuming a risk-free rate of **7%**, the constructed **portfolio achieved a Sharpe Ratio of 0.47**, which was higher than the **NIFTY 50 Sharpe Ratio of 0.42**.

This indicates that the **portfolio delivered superior risk-adjusted returns compared to the benchmark index**.

This project analyzed the risk and return characteristics of selected Indian equities using historical daily price data. Individual stock analysis showed that stocks such as **L&T and Reliance delivered higher returns but with higher volatility**, while **TCS exhibited relatively lower volatility** among individual stocks. The **NIFTY 50 demonstrated lower overall risk and moderate returns**, serving as an appropriate benchmark.

Correlation analysis indicated moderate to high correlation between individual stocks and the NIFTY 50, reflecting overall market movements, while lower inter-stock correlations supported diversification benefits. A diversified portfolio was constructed using selected stocks, resulting in an **annual portfolio return of 15.66%**, which outperformed the **NIFTY 50 return of 14.56%**.

Portfolio risk, calculated using the covariance matrix, was approximately **18.3%**, which was significantly lower than the risk of most individual stocks. Risk-adjusted performance evaluation using the Sharpe Ratio showed that the portfolio **0.47** outperformed the benchmark **0.42**, indicating superior risk-adjusted returns.

Overall, the analysis demonstrates that **diversification and appropriate weight allocation can improve portfolio performance while controlling risk**, validating key principles of modern portfolio theory.