



CASE STUDY OF AI COMPANIES

DO AI R&D INVESTMENTS DRIVE STOCK OUTPERFORMANCE?

This study examines if companies that invest the most in R&D offer better returns for shareholders than the broader market benchmark. This analysis includes portfolio backtesting of stock return data, using risk-adjusted performance metrics through Sharpe ratios and cumulative returns.

Using a synthetic Kaggle dataset (2015–2024), we combined exploratory analysis, predictive modeling, and portfolio backtesting to assess the financial implications of R&D intensity.

METHODOLOGY

- *Regression & Tree-based Models* → Quantify impact of R&D, revenue growth, profit, and debt on stock returns.
- *Portfolio Backtesting* → Compare cumulative returns of a “Top R&D Spenders” portfolio vs. a market benchmark.
- *Risk Metrics* → Sharpe ratios for both strategies.
- *Event Analysis* → Stock impact of major AI milestones (e.g., GPT launch).

KEY FINDINGS

PORTFOLIO PERFORMANCE

- **Cumulative Returns:** The R&D-heavy portfolio initially outperformed the market, peaking at ~1.6× growth of \$1. However, performance deteriorated sharply

Sharpe Ratio (Risk-Adjusted Returns):

- **Portfolio Sharpe:** -0.08 → Indicates poor risk-reward balance; the portfolio generated negative excess returns per unit of risk.
- **Market Sharpe:** 0.72 → Benchmark consistently delivered stronger, risk-adjusted performance.

STRATEGIC IMPLICATIONS

TECHNICAL PERSPECTIVE

- Portfolio backtesting confirms that past R&D investment intensity alone is not a reliable alpha factor for predicting excess returns.

FINANCE PERSPECTIVE

- High-R&D firms demonstrated short bursts of upside but lacked stability, exposing investors to drawdowns.

BUSINESS PERSPECTIVE

- For hedge funds & asset managers, R&D intensity may be better used as a secondary screening factor combined with fundamentals (cash flows, profitability) rather than a standalone driver.
- For risk teams, the volatility of the R&D portfolio reinforces the need for diversification and multi-factor strategies.
- For corporate strategy, the results caution against assuming high R&D spending will directly translate into higher shareholder value.