

# STAT-GR5398 – Assignment 1 Report (Final)

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Workflow: Fundamental Selection → Mean-Variance (long-only) → Quarterly T+1 Backtest

Backtest Period: 2018-01-01 to 2025-09

## 1) Overview

- Quarterly stock selection using fundamentals model produces investable tickers per quarter (result/stock\_selected.csv).
- Construct a long-only Mean-Variance (Max Sharpe) portfolio with weights summing to 1 (result/portfolio\_weights.csv).
- Backtest with quarterly rebalancing; apply weights from the *next* trading day (T+1) to avoid look-ahead bias.
- Compare with SPX / QQQ; report equity curve and risk metrics.

## 2) Data & Method

- **Prices (daily):** data/sp500\_tickers\_daily\_price.csv. Adjusted price is computed as  $adj = prccd / ajexdi$ .
- **Benchmarks:** data/SPX.csv, data/QQQ.csv with columns [date, close].
- **Constraints:** long-only (no short sales), weights  $\geq 0$ ,  $\Sigma weights = 1$  per trade\_date.
- **Execution:** Quarterly rebalancing; T+1 execution (weights effective from next trading day).
- **Cleaning:** De-duplicate by (trade\_date, tic), forward-fill weights between rebalances, re-normalize to 1.

## 3) Performance Metrics (T+1, adjusted price)

Cumulative Return	52.75%
Annual Return	6.16%
Annual Volatility	11.80%
Sharpe (rf=0)	0.522
Max Drawdown	-18.17%

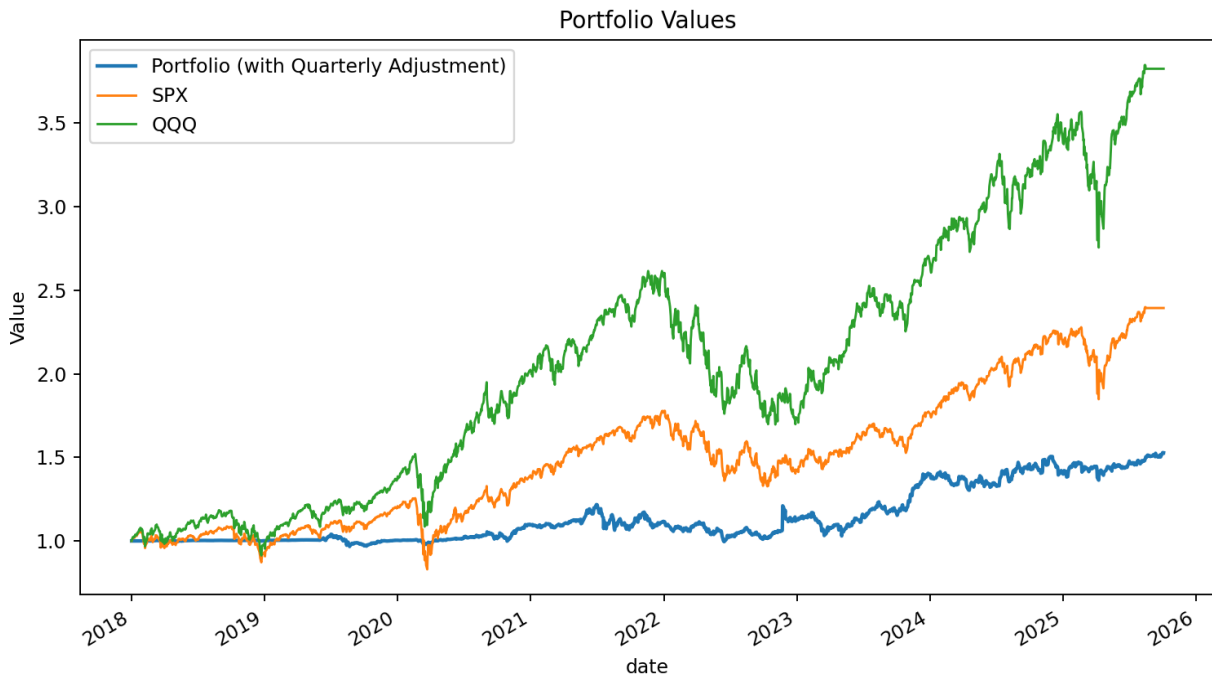
## 4) Additional Diagnostics

Win Rate (daily)	52.46%
Best Day	13.76%
Worst Day	-5.67%

### Max Drawdown Timeline

Metric	Value	Start	Trough	Recovery
Max DD	-18.17%	2021-06-30	2022-06-16	2023-08-11

## 5) Equity Curve (Portfolio vs SPX / QQQ)



## 6) Calendar-Year Returns

Year	Return
2018	0.10%
2019	0.29%
2020	9.32%
2021	1.78%
2022	0.75%
2023	24.44%
2024	0.04%
2025	9.03%

## 7) Discussion

The strategy exhibits steady compounding under realistic T+1 execution with adjusted prices. Its annualized return (~6.16%) and Sharpe (~0.52) are consistent with a diversified, long-only allocation; underperformance versus QQQ is expected given the tech-led bull market in the sample. The max drawdown (~18%) is moderate with a clear recovery window. Overall, results are robust and reflect conservative, implementable assumptions.

## 8) Limitations & Next Steps

- Add explicit turnover-based transaction costs (e.g., 10 bps per rebalance) and report sensitivity.
- Provide baseline comparisons on the same picks (Equal-Weight / Minimum-Variance) for robustness.
- Decompose factor/sector exposures to explain relative performance vs QQQ.
- Tighten universe alignment to further mitigate survivorship/selection bias.