Momentum Strategy Writeup

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1 Overview

This strategy captures short-term price momentum around S&P 600 index additions by exploiting predictable trade flow distortions. The core hypothesis is that extreme flows around inclusion events induce temporary price pressure. Empirical studies [1, 2] show persistent return drift following index announcements, creating exploitable momentum. My model builds on this by using announcement gap behavior as a predictive signal.

2 Data

- Polygon.io: Daily OHLCV data
- Index inclusion calendar: S&P announcement + inclusion dates
- FRED: Fed Funds Rate

Stocks lacking 60 days of pre-announcement history or recent ADV data were excluded.

3 Trade Logic and Filters

Target: stocks (S&P600) with **extreme predicted trade flow** (ADV > 800%).

Signal logic:

- Compute log return from announcement day to next open
- Z-score vs. returns of all other extreme-flow stocks:

$$Z = \frac{r_i - \mu_r}{\sigma_r}$$

  where r_i is the return of stock i over the announcement gap, μ_r is the mean of peer returns, and σ_r is the standard deviation.
- Enter long if $Z \geq -1$, short if $Z < -1$
- Exit 1 day before inclusion

The short signal logic stems from the idea that a large negative Z-score reflects early selling pressure. This may be due to pre-positioning, liquidity dumping, or informed selling. Beneish and Whaley (1996) and Madhavan et al. (2005) both document early price responses to inclusion announcements, suggesting institutions often start rebalancing during the announcement week. Lewellen (2002) supports the existence of short-term autocorrelation following shocks, further motivating Z-score filters. Gabaix and Koijen (2022) demonstrate that large buying or selling activity — like from passive index funds — can have lasting and outsized impacts on stock prices because the overall supply and demand in equity markets respond very weakly to price changes (i.e. ”an inelastic market”).

Note that this is **not** a mean-reversion strategy, where we would use a negative and positive z-score threshold to signal undervalued or overvalued dislocations, respectfully. In this strategy, we use our knowledge of the inclusion announcement to ride the momentum where long positions are default and short positions are ”outlier” cases, identified using a z-score filter.

4 Risk Management

Because multiple trades can run concurrently, overlapping exposures made stop-loss logic more sensitive. To manage risk, I implemented a global stop-loss of 100k$ (2% of the total portfolio). If cumulative PnL (realized + unrealized) breaches this threshold, all trading halts and open positions are closed. In addition, each trade has its own stop-loss set at 0.1% of the portfolio. These thresholds are intentionally tight because: (i) simultaneous trades can compound losses quickly, and (ii) using daily close prices increases slippage risk due to unobservable intraday moves.

- Max per-trade risk: 0.1% of portfolio
- Global portfolio stop-loss: $100k
- Sizing: min(1% 20-day rolling ADV , 5% of portfolio)

5 Capital Constraints + Fees

- Portfolio: $5M max capital
- Execution fee: $0.01/share
- Overnight cost: Fed Funds + 1.5%

6 Hedging

Each trade is hedged using a cointegrated ETF based on precomputed sector relationships (verified with Engle-Granger). This reduces sector beta, isolating the inclusion-driven price movement.

7 Sharpe Ratio and PnL

- Total Net PnL: `$116,387.91`
- Annualized Sharpe Ratio: `2.99`

Performance is based on per-trade returns, aggregated across discrete signal days. While this may slightly **inflate the Sharpe Ratio** — since it ignores days we didn’t hold a position — using a daily return aggregation would understate performance, given the strategy is event-driven and trades only around short, high-impact inclusion windows throughout the year. Hence, r_d represents the daily returns on days we had an open position.

$$\text{Sharpe Ratio} = \frac{\bar{r}_d - r_f}{\sigma_d} \times \sqrt{252}$$

Note: It may seem unusual to report an annualized Sharpe ratio for a strategy that only trades each stock once, and only in response to a specific event (index inclusion). However, this strategy was applied across a large number of stocks and sectors throughout the year, each reacting to similar inclusion events. While the trades themselves are short-term and idiosyncratic in isolation, the diversity of names and sectors introduced broad market exposure. This makes the strategy more generalizable and repeatable over time. Thus, the Sharpe ratio — based on daily aggregated returns — reflects the overall risk-adjusted performance of the strategy as a whole, rather than per-stock repeatability.

Because this strategy trades selectively around inclusion events, the equity curve reflects a series of discrete outcomes rather than continuous compounding. PnL is generated in bursts, and the portfolio remains idle between qualifying signals. As a result, the curve doesn't follow a smooth growth trajectory like high-frequency or continuously rebalanced strategies. Hence, I have plotted the equity curve **per-trade**:

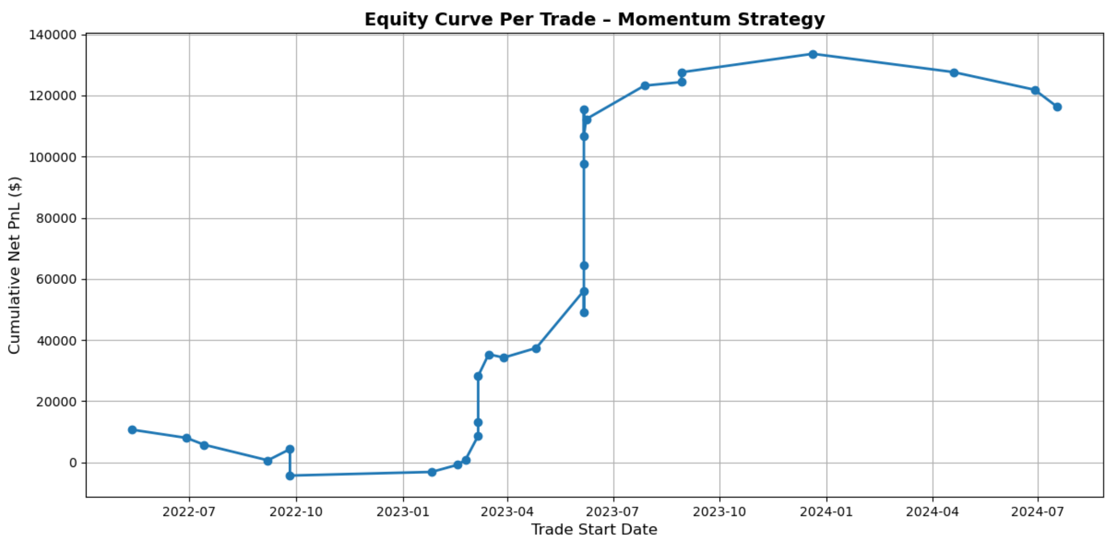

Figure 1: Momentum equity curve per trade (i.e. per stock since each stock was traded once).

The equity curve above shows cumulative net PnL per trade, sorted chronologically by trade entry date. The strategy initially experiences a few minor drawdowns, reflecting the noisiness of early signals. However, starting around early 2023, performance improves significantly as the model consistently captures profitable trades in the post-announcement windows. The sharp upward slope during mid-2023 corresponds to a cluster of high-conviction trades with large positive Z-scores, confirming the strength of the signal logic. Toward the end of the period, returns begin to plateau, likely due to reduced signal frequency or diminishing edge. Overall, the curve supports the viability of the momentum signal when applied across multiple inclusion events. Signal refinements could be improved with more granular pricing data.

8 Holding Period Experiments

- 2-day hold: inconsistent performance
- Exit on inclusion day: increased noise
- Exit 1 day before inclusion: **optimal**

9 Future Improvements

- Use intra-day pricing to improve slippage estimates
- Include implied volatility and sentiment filters

References

[1] Beneish, M. D., & Whaley, R. E. (1996). An anatomy of the "S&P Game". *The Journal of Finance*, 51(5), 1909–1930.

[2] Lewellen, J. (2002). Momentum and autocorrelation in stock returns. *Review of Financial Studies*, 15(2), 533–563.

[3] Madhavan, A., Richardson, M., & Roomans, M. (2005). Why do security prices rise following index additions? Evidence from the S&P 500. *Financial Analysts Journal*, 61(4), 44–54.

[4] Gabaix, X., & Koijen, R. S. J. (2022). In search of the origins of financial fluctuations: The inelastic markets hypothesis. *Journal of Financial Economics*, 146(2), 527–553.