

Equity Momentum Under Complete Trial Accounting: A Selected Survivor and Failed Deep-History Replication

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Abstract

AlphaMax is ALPHAC's US-equity long/short momentum program. Its canonical signal is 12-minus-1 cross-sectional momentum: rank securities by split-adjusted return from approximately twelve months ago through one month ago, then hold a dollar-neutral long/short portfolio. This paper does not present a single favourable backtest as proof. It reconciles the entire charged family: 115 distinct hypothesis identities recorded from 2026-06-20 through 2026-08-17 across the primary and Sharadar research ledgers.

The evidence is deliberately uncomfortable. A frozen 2023–2026 construction reported net Sharpe 0.91 and maximum drawdown 8.68% in the persisted deployed-path artifact. The later, preregistered 2005–2026 replication reported net Sharpe approximately -0.05 and a drawdown exceeding one third, failing its DSR and return gates. Construction studies did not rescue the family: a 4-by-4 weighting and breadth grid failed its family-wise Reality Check, and beta-neutral, volatility-scaling, and short-tail modifications were not adopted. The correct claim is therefore not “momentum is proven.” It is that AlphaMax is a live paper research sleeve with a plausible mechanism, a selected short-window survivor, a failed deep-history replication, and an explicit forward burden of proof.

Claim boundary

This paper supports four claims only:

1. The economic hypothesis and implementation can be stated precisely.
2. Every charged identity in this family is enumerated in the public machine-readable manifest.
3. Positive, null, and negative results are preserved together, including later corrections.
4. Current paper trading is forward evidence collection, not external attestation and not proof of the governing Sharpe or drawdown objectives.

It does **not** establish a forward Sharpe, expected maximum drawdown, future return, investment capacity, or live-money performance. The program remains paper-only and not externally attested.

Economic mechanism and falsifiable hypothesis

The hypothesis is delayed cross-sectional price adjustment: stocks with high intermediate-horizon returns continue to outperform recent losers for a limited horizon. ALPHAC excludes the most recent month because short-horizon reversal can contaminate the continuation signal. The mechanism is falsified for this implementation if a point-in-time, survivorship-aware, net-of-cost walk-forward cannot produce positive and statistically defensible returns after the complete family-wide search is charged.

The literature motivates a prior, not a result:

- Jegadeesh and Titman document intermediate-horizon return continuation and later partial reversal in US equities ([Journal of Finance, 1993](#)).
- Asness, Moskowitz, and Pedersen find common momentum structure across asset classes and connect it to funding-liquidity risk ([Journal of Finance, 2013](#)).
- Daniel and Moskowitz show that momentum can crash during panic-state rebounds, making tail and regime tests load-bearing rather than decorative ([Journal of Financial Economics, 2016](#)).
- Barroso and Santa-Clara study volatility management as a response to momentum's time-varying risk ([Journal of Financial Economics, 2015](#)).
- Korajczyk and Sadka demonstrate that trading costs and capacity materially constrain momentum implementations ([Journal of Finance, 2004](#)).
- Novy-Marx isolates the intermediate horizon as the principal source of the effect ([Journal of Financial Economics, 2012](#)).

These papers do not validate ALPHAC's data, universe, execution, or selected configuration.

Literature and overlap decision

The literature supports treating intermediate-horizon momentum as one economic family. It does not support counting each allocator, universe, cadence, quality overlay, volatility forecast, or breadth choice as an independent sleeve. ALPHAC therefore assigns all 115 identities below to one family, charges every implementation to the union trial denominator, and grants the family at most one portfolio-sleeve slot. Residual momentum, reversal overlays, and quality-conditioned momentum are not credited as diversification unless future evidence demonstrates both an independent mechanism and sufficiently low out-of-sample return correlation. None does so here.

Exact ALPHAC implementation

The canonical feature is `eq_mom_252_21`:



The factor is computed on the equity session grid and cross-sectionally standardized inside the point-in-time eligible universe. Corporate actions must be knowable by the decision timestamp; universe membership is applied before cross-sectional transforms. Portfolio weights decided using information through session `t` become effective on `t+1`, preventing same-close execution.

The pre-registered deep-history specification fixed a top-200 liquidity universe with hysteresis, 30 names per side, dollar neutrality, quarterly rebalancing, a trailing-126-session 12% volatility target, 2.0-times gross cap, purged anchored-expanding walk-forward, and explicit equity costs. A later operational construction used a wider top-2000 universe, 100 names per side, inverse-volatility leg weights, quarterly signal horizon, and explicit commission, spread, latency, and borrow costs. Those are different hypotheses. The ledger correctly charges changes in universe, breadth, cadence, allocator, or signal; only `start` / `end` rolling-window changes are exempt from the hypothesis count.

Trial lineage

The public manifest binds this family key to 115 distinct identities. The grouping below is an accounting view, not permission to collapse the denominator.

Identity group	Charged identities	Research question
Canonical <code>eq_mom_252_21</code>	23	Universe, cadence, horizon, and walk-forward implementations
Weighting × breadth forensic grids	48	The 16-cell primary grid plus 16 no-drift and 16 volatility-guard return configurations
Construction forensic arms	8	Cadence, breadth, universe, and train/test attribution
Live-window hysteresis arms	6	Exit-band and minimum-hold settings on the selected K=30 construction
Deep-history turnover arms	8	Monthly/quarterly cadence crossed with baseline, hysteresis, hold, and combined settings
Volatility-scaling overlays	5	Whether alternative ex-ante risk forecasts improve the sleeve
Momentum + short reversal	5	Whether recent reversal repairs the core signal
Momentum + operating margin	5	Whether quality conditions the momentum exposure
Momentum + earnings yield	3	Whether value conditions the momentum exposure
Residual reversal	1	Whether residualized reversal adds independent information
Signal-to-noise momentum	1	Whether volatility normalization improves ranking
Momentum ensemble	1	Whether fixed horizon blending improves robustness
Short-horizon equity momentum	1	Whether a 63/42-session definition generalizes
Total	115	Every row remains in the family-wide search burden

Machine labels covered by this family are `eq_mom_252_21`, `eq_rev_21`, `eq_operating_margin`, `eq_earnings_yield`, `eq_rev_resid_21`, `eq_mom_sn_252_21`, `eq_mom_ens`, `eq_mom_63_42`, `forensic_alphamax_construction`, `forensic_alphamax_weighting`, `alphamax_hyst_live`, `alphamax_turnover`, and `alphamax_volscale`. Variant identifiers remain attached to their exact hypothesis keys in the manifest rather than being treated as independent economic families.

The machine-readable source of truth is `/glassbox/trial_packet_manifest.json`. Select identities where `research_family_key` equals `alphamax_equity_momentum`; each row provides the exact `hypothesis_key`, immutable first measurement, source ledger, candidate papers, and missing packet sections.

Results and decisions

Selected short-window artifact

The persisted `k30_dn_63` deployed-path artifact covers 2023-07-06 through 2026-06-01 and reports net Sharpe 0.9071, cumulative return 24.54%, annualized volatility 13.07%, maximum drawdown 8.68%, and annual turnover 4.11. It is the historical survivor that motivated paper deployment. These are backtest statistics from a selected configuration, not forward performance.

Fresh-vendor clean-workspace replay

On 2026-08-24, I reacquired the available Polygon stock data under the owner's current licensed access, reconstructed the exact 375-identifier strategy-window universe union, sealed a private input inventory, and ran the historical command at pinned source commit `fd3e930f41b0a62b222ecda4ab83bae21a4ce9f2` in a temporary workspace outside the repository. The current entitlement begins on 2021-08-23. It excludes 58 requested sessions from 2021-06-01 through 2021-08-20, so the manifest does not claim a complete historical universe lookback. The gap precedes the first leg's training and test periods but intersects the global feature warm-up.

The replay did not reproduce the historical result exactly. Timestamps and configuration matched, but the equity frame and log returns differed. The largest absolute equity-path difference was \$574.69. Historical annualized Sharpe was 0.9071; the fresh-vendor replay produced 0.9213. The historical final equity was \$124,536.21; the replay produced \$124,987.26. Historical maximum drawdown was 8.68%; the replay reported 8.60%. The 27-trial validation context was retained rather than recomputed from a smaller search: historical DSR was 0.3406 and replay DSR was 0.3479. Both failed the 0.95 portfolio-maturity threshold.

This is a failed exact reproduction even though the headline metrics are close and the fresh result is slightly more favourable. The surviving 2026-06-20 artifact remains the historical record and is not regraded. The divergence is consistent with at least one unrecovered historical input difference, including revised vendor rows, exact per-date membership, corporate-action state, or the unavailable warm-up interval. The available evidence does not identify a unique cause. A reviewer must therefore treat the short-window result as version-sensitive and not as a portable strategy reproduction.

Deep-history preregistered replication

The 2005-01-04 through 2026-06-01 preregistered momentum run reports net Sharpe -0.0493, cumulative return -15.07%, annualized volatility 10.66%, a maximum drawdown exceeding one third, and DSR below the 0.95 gate. It was killed under its preregistered rule. This contradiction dominates any honest interpretation: the short-window survivor does not establish durable historical replication.

Construction attribution

The eight-arm construction study showed that universe and cadence decisions materially changed the measured result. On its common 2022–2026 basis, arm Sharpes ranged from 0.172 to 1.613 and DSR values from 0.025 to 0.529. None met the complete admission standard. This dispersion is evidence of specification sensitivity, not a menu from which to select the largest number.

The later 4-by-4 weighting/breadth grid used the 2005–2026 research panel. Challenger net Sharpes ranged from -0.293 to +0.066 against -0.062 for the incumbent cell. Although individual cells could look better, the preregistered White Reality Check returned $p=0.315$. Zero cells were adopted.

That report also generated two complete 16-cell robustness surfaces that were initially omitted from the ledger. The no-drift modelling convention produced net Sharpes from -0.564 to -0.077; the volatility-eligibility guard produced -0.245 to +0.081. They were explicitly labelled robustness views, but they still changed portfolio returns and therefore still consume selection identities. All 32 are now charged. Their persisted summaries do not preserve exact daily curves or higher moments, so this correction cannot manufacture current-union DSR values for them.

Two turnover studies account for another 14 identities. The selected-window $K=30$ hysteresis screen reported net Sharpes from 1.282 to 1.630 over only 728 sessions and large turnover reductions for several exit bands. The deep-history broad-universe study, however, reported net Sharpes from -0.192 to -0.134 across all eight cadence/hold settings. These are parameter screens, not new sleeves; identical ex-post results under some minimum-hold settings are still charged because the settings were separately tried. No short-window improvement is presented as a deep-history or forward Sharpe result.

The beta-neutral study rejected its own premise: estimated market beta was approximately -0.014 on the research panel but +0.319 on the live-book sample, and the treatment had opposite effects across the two contexts. Volatility-scaling and short-tail controls likewise failed their adoption gates. No failed construction is silently promoted into the paper program.

Uncertainty, selection, and forward burden

The family-level annualized Sharpe observations in the identity manifest range from approximately -0.744 to +1.813. That range is not a confidence interval; it is a warning about configuration and sample sensitivity. ALPHAC applies its Deflated Sharpe Ratio against the union of every return hypothesis across all research profiles, not only the variants displayed in this paper. As of this evidence date that union contains 228 identities, and no current legacy restatement clears DSR 0.95.

The governing program objective is an honest forward Sharpe of 1.5 with expected maximum drawdown near 11%, pursued across a diversified book of up to 14 sleeves. AlphaMax has not established those targets. The only acceptable path is a sufficiently long, continuous, broker-reconciled paper record followed by external replication or scrutiny. Targets are design objectives, never guaranteed outcomes and never reasons to weaken a gate.

Execution, costs, and capacity boundary

The research path models one-way equity costs including commission, half-spread, latency, realized turnover, and short borrow. The strategy is dollar-neutral and positions drift between rebalances. The backtester replays point-in-time corporate actions and applies next-session execution semantics.

Capacity claims remain conditional. Breadth and liquidity screens can support a modelled estimate, but borrow availability, market impact, locates, crowding, and crisis liquidity require security-level forward evidence. The website must therefore distinguish modelled capacity from broker-observed execution and must not describe either as live-money proof.

Reproduction map

Primary implementation and evidence paths:

- `src/alphaforge/features/library/equity_price.py`: canonical feature implementation.
- `docs/design/EQUITIES_SLEEVE.md`: point-in-time equity data and feature contract.
- `docs/design/PRE_REGISTRATION.md`: deep-history gate and fixed momentum specification.
- `var/experiments.jsonl` and `var_sharadar/experiments.jsonl`: immutable charged identities.
- `artifacts/walkforward/k30_dn_63/`: selected short-window backtest artifact.
- `artifacts/publication/alphamax_upstream_replay_manifest.json`: public hash-only binding to the private fresh-input packet, source reconstruction, rights boundary, and disclosed entitlement gap.
- `artifacts/publication/alphamax_upstream_clean_workspace.json`: author-run clean-workspace replay receipt and failed exact comparison.
- `artifacts/walkforward/prereg_momentum/`: preregistered deep-history result.
- `artifacts/sweep/alphamax_construction/`: eight-arm attribution study.
- `artifacts/probe/alphamax_weighting/`: family-wise weighting/breadth grid.
- `scripts/probe_alphamax_betaneutral.py`, `scripts/probe_alphamax_shorttail.py`, and `scripts/probe_alphamax_volscale.py`: rejected construction probes.
- `artifacts/research/trial_packet_manifest.json`: exact family/identity join and packet debt.

Reproduction requires the pinned project environment and licensed/source datasets represented by the artifacts. Public artifacts permit claim auditing; they do not imply that every underlying licensed market-data row can be redistributed.

Packet completeness and legacy limitations

This family paper materially improves lineage coverage but does not retroactively create evidence that did not exist. At publication time, the manifest still marks every identity packet incomplete. In particular, some legacy identities lack a contemporaneous preregistration, complete return series, or

independently rerunnable data bundle. Those absences must remain explicit. A later validator may bind this paper to exact identities and credit only sections it can prove; it must not convert “documented legacy absence” into “verified preregistration.”

Decision

Research decision: retain AlphaMax as a paper-only forward experiment; do not claim the historical edge is established; do not adopt any failed construction enhancement; continue broker-reconciled observation under the frozen operational specification.

Publication decision: publish the positive survivor, failed deep-history replication, complete family trial count, and unresolved evidence debt together. Any future promotion requires new forward evidence under unchanged gates, not a more flattering retrospective window.

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