Stock Selection within Sectors:

Sector-Specific Screening Models, Out-of-Sample Evaluation, and Economic Value

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July 2026

Abstract

This paper completes a three-part study of the top-down investment process, descending from market-level drawdown prediction and sector rotation to the final layer: security selection within sectors. It addresses a critical question that analysts face: within a given sector, which measurable characteristics signal future relative returns best and most reliably, and how should they be combined into a stock screen? Using a survivorship-free, point-in-time panel of S&P 500 constituents from 2000 to 2025, I evaluate 25 pre-registered firm characteristics and eleven competing selection models (nine sector-specific, two pooled) under a purged walk-forward protocol with monthly refits and false-discovery-rate control. Three principal findings emerge. First, the factor evidence is strongly conditional. Short interest is the most pervasive and decay-resistant signal, while within-sector momentum is absent except in Utilities and under stress; sector-level forecastability concentrates in six of eleven sectors and fails precisely where accounting comparability breaks down; and the payoff to selection rises monotonically with the drawdown probability estimated in the first paper of the series, so that stock selection pays when the macro layer is worried. A signal's favourable range is, moreover, frequently an interior zone rather than an extreme, and the paper reports level-by-level return profiles with favourable zones, in screening units, for every characterisable signal in every sector. Second, on how the factors should be combined into a single score, simple discipline beats clever estimation: approaches that fix each signal's expected direction in advance, whether fixed-weight composites or a machine-learning model held to those same directions, earn pooled out-of-sample rank information coefficients of 0.016 to 0.027, while models that estimate the weights freely add nothing, and often detract. A diagnostic explains why rather than merely showing that it happens: even an estimator handed the correct prior cannot reliably learn how hard to lean on it, so imposing the discipline in advance beats trying to estimate it. Third, the skill is economically material: long–short tercile books earn factor-spanning alphas with t-statistics of roughly 2.7 to 2.9 at the one-month horizon, a long-only tracking-error-targeted implementation retains a net information ratio of 0.80 at realistic costs, and the integrated three-layer framework raises the Sharpe ratio of a passive holding from 0.89 to 1.12 while adding 12.2 percentage points of active return in the 2022 drawdown. Five of six pre-registered success criteria pass; the sixth returns a split verdict and is reported as such.

Keywords: cross-sectional return prediction, stock screening, sector models, walk-forward evaluation, multiple testing, factor investing.

1 Introduction

Every active equity mandate answers three questions in sequence: how much market risk to carry, which sectors to favour, and which stocks to hold. The first two papers of this series addressed the first two questions: *Leading Indicators of S&P 500 Drawdowns* (March 2026) built horizon-specific models of market-level drawdown risk, and *Out-of-Sample Forecastability of GICS Sector Excess Returns* (May 2026) established that sector rotation signals carry genuine but conditional out-of-sample content. This paper completes the framework at the security level, and the three papers are bound by an exact decomposition: for any stock i in sector s,

$$r_i \;=\; r_{\mathrm{SPX}} \;+\; \big[\, r_s - r_{\mathrm{SPX}} \,\big] \;+\; \big[\, r_i - r_s \,\big]$$

The first term is the subject of the first paper (Uyar, 2026a), the second of the second paper (Uyar, 2026b); here I model the third (the return of a stock relative to its own sector) so that the series is additive rather than overlapping, and so that a final exercise can run all three layers as one portfolio. The dependent variable choice does real work: by construction it strips out the market and sector effects already modelled, isolating pure selection skill, and it has an immediate consequence I treat as one of my findings: the celebrated momentum premium, much of it industry momentum, largely vanishes once the sector return is netted out.

I frame the problem the way the institutional workflow actually runs. The first paper supplies the market view and the second the sector preference; what remains is the analyst's question, and it is the question of this paper: within the chosen sector, which measurable characteristics signal future relative returns best and most reliably, and how should they be translated into a screening rule? An analyst who has decided to overweight a sector cannot fundamentally research seventy names; they screen first and research the shortlist. The question is therefore not only whether within-sector returns are forecastable in a statistical sense, but whether a sector-specific screening rule produces a tractable shortlist that reliably beats handing the analyst the unscreened sector, and survives transaction costs. This framing also disciplines my relationship with the factor zoo: the contribution claimed is not the discovery of new anomalies but a pre-registered, sector-conditional mapping of well-established ones, evaluated under one strict protocol.

The design commitments were fixed before estimation and are reported as such. Twenty-five signals across seven families were locked before any result was computed, with ex-ante expected signs and a sector applicability matrix; eleven sector hypotheses were committed in advance and are confronted (including the failures) in the sector chapters; six success criteria with numerical thresholds were pre-registered, and the paper's language is bound to them. Two synthetic-data gates (planted-signal recovery and a placebo on shuffled returns) were required to pass before any real result was read.

Three sets of results follow. **The factor evidence is conditional: on signal, on sector, and on regime.** Short interest is the most pervasive signal in the book and the most decay-resistant across sub-periods; valuation carries the largest long-horizon ICs but lost almost ninety per cent of its early-sample strength after 2012; within-sector momentum is flatly absent, consistent with the industry-momentum literature once the sector component is removed. Across sectors, a fixed-model tier classification places six sectors in the High tier and identifies Financials, Real Estate, Information Technology and Utilities as sectors where selection models should not be trusted, a contrast I make vivid with a winner's-curse exhibit: scoring each sector by its best-performing model after the fact, rather than one fixed model, would have lifted Utilities from a negative information coefficient all the way to the 'High' tier. Most striking, selection efficacy is regime-dependent in exactly the direction that binds the trilogy together: conditioning on the drawdown probabilities of the first paper, every headline model's IC rises monotonically from approximately zero, or worse, in calm regimes to 0.04 in stressed ones. The macro layer does not merely time the market; it times when stock selection pays.

Combining the factors is where sophistication fails: priors beat estimation. The naive equal-weight composite of sign-aligned signals (M1), an IC-weighted composite with non-negativity restrictions (M2), and monotonicity-constrained gradient boosting (M6) earn pooled out-of-sample rank ICs of 0.016–0.027 across horizons, while every freely estimated linear model (OLS, ridge, elastic net, and pooled and hierarchical variants) delivers nothing or worse. The mechanism is identified, not asserted: a ridge estimator that shrinks toward the equal-weight prior itself (M11), with near-total shrinkage available, still underperforms the pure prior, because the in-window validation signal is too weak to detect the benefit of heavy discipline. The resulting chain (prior above prior-targeted estimation above unrestricted estimation, at every horizon) is the cross-sectional analogue of the sign-restriction result of Campbell and Thompson (2008), and the reason the rest of the paper relies on restricted models.

The skill survives implementation. Jegadeesh–Titman overlapping tercile books earn factor-spanning alphas of 3–5% annualised at the one-month horizon, with t-statistics of 2.7–2.9, a positive finding under my pre-registered standard, deliberately not described as strong evidence, which I reserved for $t \geq 3$. A long-only, sector-neutral, tracking-error-targeted portfolio with a turnover buffer retains a net information ratio of 0.80 net of ten basis points a side. The integrated three-layer portfolio (drawdown model scaling equity, sector model tilting sectors, selection model picking stocks) converts a 0.89-Sharpe passive ride into a 1.12-Sharpe one at a quarter less volatility, is certainty-equivalent-positive for the mean–variance investor of the series, and added 12.2 percentage points over the benchmark in 2022, the year all three layers agreed.

The remainder of the paper proceeds as follows. Section 2 places the study in the literature. Section 3 describes the data infrastructure, whose construction choices (point-in-time membership, delisting returns, report-date timing, the primary-share-class rule, and a retroactive sector taxonomy) do more for the credibility of the results than any model choice. Section 4 presents the methodology: the protocol, the candidate models, the evaluation framework, and the multiple-testing programme. The answer to the paper's question then unfolds in three steps. Section 5 establishes which factors signal future returns at all, pooled across sectors where statistical power lives. Section 6 takes the evidence to sector resolution: the forecastability tiers, the signal map, and the level-by-level return profiles with favourable zones in screening units. Section 7 settles how the factors should be combined into a score, a contest the simplest disciplined rules win, and closes with the family-weight question. Section 8 converts the resulting screen into economic value. Section 9 reports four add-on studies: family ablations, an industry-taxonomy robustness check, the regime-conditional analysis, and a short-side application of the screen. Section 10 presents the integrated three-layer backtest, Section 11 the current market assessment, Section 12 the screening rules by sector, Section 13 the limitations, and Section 14 concludes.

2 Related Literature

The cross-section of expected stock returns is the most heavily mined field in empirical finance, and the modern literature is as much about discipline as discovery. Harvey, Liu and Zhu (2016) catalogue hundreds of published factors and argue that the multiple-testing problem demands t-statistics above three for new discoveries; Hou, Xue and Zhang (2020) show that most published anomalies fail replication under careful construction; McLean and Pontiff (2016) document that predictor returns decay materially after publication; and Green, Hand and Zhang (2017) find that only a modest subset of characteristics provide independent information. This paper is built around those warnings rather than against them: a small pre-registered library of established signals, false-discovery-rate control applied to every test family, out-of-sample evaluation as the primary metric, explicit sub-period decay analysis, and a Model Confidence Set (Hansen, Lunde and Nason, 2011) to control the winner's curse inherent in model competitions.

The individual signals are anchored in well-known results: valuation in Basu (1977), Fama and French (1992) and the enterprise-multiple evidence of Loughran and Wellman (2011); payout in Boudoukh, Michaely, Richardson and Roberts (2007); profitability in Novy-Marx (2013) and Hou, Xue and Zhang (2015); accruals in Sloan (1996); asset growth in Cooper, Gulen and Schill (2008); issuance in Pontiff and Woodgate (2008); momentum and reversal in Jegadeesh and Titman (1993), Jegadeesh (1990), George and Hwang (2004) and Blitz, Huij and Martens (2011); analyst-based signals in Chan, Jegadeesh and Lakonishok (1996), Bernard and Thomas (1989), Jegadeesh, Kim, Krische and Lee (2004) and Diether, Malloy and Scherbina (2002); risk-based effects in Frazzini and Pedersen (2014), Ang, Hodrick, Xing and Zhang (2006) and Altman (1968); and short interest in Asquith, Pathak and Ritter (2005) and Boehmer, Jones and Zhang (2008).

Three strands matter for the design. First, the industry dimension: Moskowitz and Grinblatt (1999) show that much of momentum is industry momentum, and Asness, Porter and Stevens (2000) show that industry-relative characteristics forecast differently from raw ones; both motivate my sector-relative dependent variable and predict weak-to-absent within-sector momentum, which is what I find. Second, the estimation-versus-restriction strand: Campbell and Thompson (2008) demonstrate that economically motivated sign restrictions rescue out-of-sample predictability at the index level; DeMiguel, Garlappi and Uppal (2009) show that the 1/N portfolio defeats estimated optimisers; and Lewellen (2015) finds that simple combinations of characteristics forecast as well as estimated ones. My model competition operationalises this debate within a single protocol and adds a diagnostic (the prior-target ridge) that locates the failure point in the estimation of shrinkage intensity itself. Third, machine learning in asset pricing: Gu, Kelly and Xiu (2020) establish that trees and networks can outperform linear benchmarks, with gains concentrated where nonlinearities matter, and Freyberger, Neuhierl and Weber (2020) document those nonlinearities nonparametrically at the characteristic level; my gradient-boosted models inherit their role, and the finding that monotonicity constraints in the prior direction are what make boosting work here connects the machine-learning strand back to the restriction strand.

Finally, the paper inherits its evaluation standards from its own series: the Campbell–Thompson out-of-sample logic and walk-forward refits of the second paper; Diebold–Mariano comparisons with the Harvey, Leybourne and Newbold (1997) correction; block-bootstrap inference; and an insistence, learned there, that conclusions be shown robust to the selection methodology itself. Where the second paper flags formal multiple-testing control as future work, this paper delivers it.

3 Data

The credibility of any stock-level backtest is decided in its data construction, where survivorship bias and look-ahead contamination do their damage. This section documents the construction choices and the audits that certify them; the headline is that the reconstructed universe tracks the official index at 6.6 basis points per month over twenty-five years.

3.1 Universe and returns

The universe is the point-in-time membership of the S&P 500 from January 2000 to December 2025, taken from the CRSP constituent file: a stock enters the estimation cross-section only in the months it belonged to the index, and deleted names remain through their deletion month. Prices and returns come from the CRSP 2.0 monthly and daily files, in which delisting returns are integrated directly into the return series, neutralising the delisting bias documented by Shumway (1997): Lehman Brothers' final observation, a September 2008 return of -99.7%, is carried in the panel rather than silently dropped, and the panel passes named-event checks for Lehman, Bear Stearns and Enron, the 2018 GICS restructuring, and the continuity of the Google–Alphabet link through its 2015 rename. Where a company lists multiple share classes in the index (Alphabet at the sample end), only the primary class (the largest by trailing average dollar volume) enters the cross-section, so one company's economic substance is never counted twice in a twenty-name sector. The final panel holds 152,872 company-months and 491 companies in December 2025; 1.9% of company-months lacking a research-quality CRSP–Compustat link are dropped with disclosure.

Two boundary facts are disclosed rather than hidden. First, the CRSP constituent file carries an annual update cycle ending December 2024; membership through 2025 is extended from the final cut and corrected using contemporaneous Compustat constituent records, which identify eighteen 2025 additions by name and date, matching the actual 2025 index calendar. These entrants lack price history in the panel and are therefore absent from roughly 1.5% of late-2025 cross-sections; 2025 deletions are not yet recorded by the vendor, so departed names persist until the next CRSP cut, a conservative bias, since departed names are typically weak performers and retaining them drags measured selection skill down. Second, the evaluation sample ends in December 2025, the reach of the CRSP 2.0 files, while fundamentals, analyst and short-interest data extend into 2026 and serve the closing market assessment.

3.2 Universe audit

Monthly membership counts remain within 497–507 throughout (the upper allowance reflecting multi-class listings), and the decisive audit is return-level: the cap-weighted price return of the reconstructed universe, using lagged market-cap weights and primary-class members, is compared with the official CRSP S&P 500 return over the 300 months from 2000 to 2024. The mean absolute difference is 6.6 basis points per month with correlation 0.9998 and a trend of -1.0 basis point per decade; the worst single months ($\pm$40 basis points) coincide with float-adjustment and index-implementation episodes: July 2002, September 2008, and December 2020, the month of Tesla's index entry. The comparison is price-return on both sides by design, testing membership, delistings, weights and prices on a like-for-like basis; the residual wedge is consistent with the index's float adjustment against my full-cap reconstruction and shows no drift.

3.3 Sector taxonomy

Point-in-time discipline applies to membership, not to the classification scheme: under the as-classified taxonomy, Communication Services would contain roughly five telecommunications names before September 2018 and Real Estate would not exist before September 2016, making sector-specific estimation impossible. I therefore map the current eleven-sector GICS structure backwards, the same convention as the backfilled sector indices used in the second paper. Firms alive across the 2018 restructuring carry their first post-restructuring sector over their full history; firms that exited earlier are mapped at the legacy group level where unambiguous (legacy Media to Communication Services, the legacy Real Estate group out of Financials). Thirteen firms classified under the legacy 'Internet Software & Services' industry required manual assignment, because the official restructuring split that industry case by case: twelve enterprise-software firms remain in Information Technology, and Activision moves to Communication Services with the Interactive Home Entertainment sub-industry.

3.4 Signals

Twenty-five candidate signals across seven families were locked before estimation; the library, definitions, expected signs and anchor citations appear in Table 1. The families follow the canonical dimensions of the cross-sectional literature (valuation, profitability, quality, momentum, analyst expectations, risk, and short-interest positioning) with one deliberate adaptation: analyst views enter through rating changes and revisions rather than levels, since near-universal buy ratings make levels uninformative.

Signal	Family	Definition (point-in-time)	Sign	Anchor
Earnings yield	Valuation	Trailing 12M earnings / price	+	Basu (1977)
Book-to-price	Valuation	Book equity / market cap	+	Fama & French (1992)
Free-cash-flow yield	Valuation	(CFO - capex) / enterprise value	+	Lakonishok et al. (1994)
EBITDA/EV	Valuation	Trailing EBITDA / enterprise value	+	Loughran & Wellman (2011)
Net payout yield	Valuation	(Dividends + net repurchases) / market cap	+	Boudoukh et al. (2007)
Gross profitability	Profitability	(Revenue - COGS) / total assets	+	Novy-Marx (2013)
Return on equity	Profitability	Trailing earnings / lagged book equity	+	Hou, Xue & Zhang (2015)
Operating margin trend	Profitability	YoY change in EBIT / sales	+	Soliman (2008)
Total accruals	Quality	(Earnings - operating cash flow) / assets	−	Sloan (1996)
Asset growth	Quality	YoY growth in total assets	−	Cooper, Gulen & Schill (2008)
Net share issuance	Quality	12M log change in adjusted shares	−	Pontiff & Woodgate (2008)
Price momentum	Momentum	Cumulative return, t-12 to t-2	+	Jegadeesh & Titman (1993)
Short-term reversal	Momentum	Month t-1 return	−	Jegadeesh (1990)
52-week-high proximity	Momentum	Price / trailing 52-week high	+	George & Hwang (2004)
Residual momentum	Momentum	12-1 momentum on FF3 residuals	+	Blitz, Huij & Martens (2011)
Revision breadth	Expectations	(Up - down FY1 revisions) / estimates, 3M	+	Chan et al. (1996)
Revision magnitude	Expectations	3M change in mean FY1 EPS / price	+	Chan et al. (1996)
Earnings surprise (SUE)	Expectations	Latest quarterly surprise, price-scaled	+	Bernard & Thomas (1989)
Recommendation change	Expectations	-(3M change in mean recommendation)	+	Jegadeesh et al. (2004)
Forecast dispersion	Expectations	Std. of FY1 estimates / |mean|	−	Diether et al. (2002)
Market beta	Risk	60M rolling beta	−	Frazzini & Pedersen (2014)
Idiosyncratic volatility	Risk	12M std. of daily FF3 residuals	−	Ang et al. (2006)
Distress (Altman Z)	Risk	Altman composite (non-financials)	+	Altman (1968)
Short interest ratio	Positioning	Shares short / shares outstanding	−	Asquith et al. (2005)
Δ Short interest	Positioning	3M change in short interest ratio	−	Boehmer et al. (2008)

Table 1: The pre-registered signal library. Signs are ex-ante expectations, imposed as restrictions in the composite models and as monotonicity constraints in gradient boosting. Fundamentals enter on their Compustat report dates (RDQ, or period end plus three months where missing); analyst data on IBES consensus snapshot and announcement dates; short interest on its publication dates.

A coverage rule drops any signal from a sector-month in which fewer than 60% of the names have a value for it, so a thinly populated signal never drives the scores. Each month, the signals that remain are standardised into within-sector z-scores and winsorised at ± 3, so that each stock is compared only with its sector peers, not with the rest of the market. Realised coverage matches this design: the apparent gaps in the coverage table are the pre-registered exclusions plus two data facts, namely that short interest begins only in July 2006 and revision magnitude is undefined in fiscal-year rollover months.

3.5 Dependent variable and timing

For stock i in sector s at month-end t and horizon h $\in \{1, 3, 6, 12\}$, the dependent variable is the forward cumulative log return relative to the stock's own cap-weighted sector index. Within a sector-month the sector term is a common constant, so rankings are unaffected by its choice, though it matters for portfolio accounting. Timing is strictly forward-looking: signals are measured at the close of month t from information knowable at t, the dependent variable spans t+1 to t+h, and nothing dated after the origin (signal values, standardisation parameters, model or weighting choices) touches a forecast. Distributed lags of the signals are deliberately excluded; the momentum, revision and trend signals already encode history, and drift in the signal–return mapping is handled by recency weighting in estimation rather than by enlarging the predictor set.

3.6 Inputs from the companion papers

The regime analysis of Section 9 and the integration of Section 10 draw on the fitted outputs of the first two papers: the horizon-specific drawdown-probability series of the first and the recursive sector-return forecasts of the second. These are used directly, as produced and validated in those papers, to which I refer the reader for their construction.

4 Methodology

4.1 Protocol

All models share one pseudo-out-of-sample design, inherited deliberately from the second paper so that the three layers can later be run on common origins: a rolling 120-month training window, monthly refits, and out-of-sample origins from January 2011: approximately 179 at the one-month horizon and 168 at twelve months. Training windows are purged: at horizon h, the final h cross-sections are excluded because their forward windows are unrealised at the origin. Training observations receive exponentially decaying weights with a 36-month half-life, the panel analogue of the time-varying-parameter result of the second paper; Section 7 shows the headline model is robust to this choice and to the rolling-versus-expanding window decision. Every estimated quantity (composite weights, screening choices, penalty parameters) is computed strictly inside the training window.

Before any real result was read, the pipeline was required to pass two synthetic gates: recovery of a planted signal with a known information coefficient in simulated data, and a placebo run on return-shuffled real data in which out-of-sample ICs must concentrate on zero. Both passed: the planted signal was recovered at its known coefficient, and on the placebo the no-estimation composite's out-of-sample IC was 0.002 (standard error 0.008), indistinguishable from zero.

4.2 The model suite

Code	Model	Architecture	Specification
M0	Equal-weight sector portfolio	Benchmark	Zero-selection-skill reference for all evaluation
M1	Equal-weight composite	Sector-specific	Mean of sign-aligned z-scores; no estimation
M2	IC-weighted composite	Sector-specific	Weights $\propto$ trailing 60M rank IC, floored at zero, walk-forward
M3	Panel OLS, screened	Sector-specific	Top-6 signals by trailing |IC|
M4	Panel Ridge	Sector-specific	All valid signals; penalty by walk-forward validation
M5	Panel Elastic Net	Sector-specific	Sparse selection; mixing and penalty validated
M6	Gradient boosting	Sector-specific	XGBoost, monotone in the prior direction of every signal
M7	Pooled Ridge	Pooled (robustness)	All sectors stacked on sector-standardised signals
M8	Pooled gradient boosting	Pooled (robustness)	Sector indicators as features
M9	Rank combination	Sector-specific	Equal-weight average of M1–M6 within-sector ranks
M10	Hierarchical Ridge	Sector-specific	Sector coefficients shrunk toward the pooled fit
M11	Prior-target Ridge	Sector-specific	Shrinkage toward the equal-weight prior direction

Table 2: The model suite. M1–M6, M9, M10 and M11 are estimated independently per sector; M7 and M8 are pooled robustness checks of the sector-specific architecture. M11, the prior-target ridge, is a diagnostic of the central result (Section 7.2).

4.3 Evaluation

My primary statistic is the out-of-sample Spearman rank information coefficient, the quantity behind the fundamental law of active management (Grinold, 1989): within each sector-month, the rank correlation between a model's scores and the realised forward relative returns. These are pooled across sectors by cross-section size, with Newey–West t-statistics (lag h) and moving-block bootstrap confidence intervals (six-month blocks, 400 replications). Beyond the one-month horizon, portfolio evaluation uses Jegadeesh–Titman overlapping cohorts, so that at six months one-sixth of the book re-forms each month and the returns stay monthly and non-overlapping. The books are within-sector top-minus-bottom 30% portfolios, aggregated across sectors by inverse-volatility sleeve weights (with equal weights as a robustness check) and tested for spanning against the Fama–French five factors (Fama and French, 2015) plus momentum, using HAC standard errors. To compare models I use Diebold–Mariano tests (Diebold and Mariano, 1995) under a loss fixed in advance (the negative monthly pooled rank IC) with the Harvey–Leybourne–Newbold small-sample correction; and because best-of-suite leaderboards are biased by the winner's curse, I report the Model Confidence Set of Hansen, Lunde and Nason (2011) alongside them. The univariate screen spans 1,048 testable signal–sector–horizon cells, where all inference carries Benjamini–Hochberg false-discovery-rate control at q = 5%; and the word 'strong' is reserved for claims meeting the $t \geq 3$ standard of Harvey, Liu and Zhu (2016).

4.4 Pre-registered success criteria

Criterion	Threshold
Aggregate OOS rank IC, h = 1	$\geq +0.02$ with FDR-surviving significance
Aggregate L/S spanning alpha (FF5+UMD)	$t \geq 2.0$ positive finding; $t \geq 3.0$ for 'strong evidence' language
Long-only net active IR at 10 bps	≥ 0.3
Shortlists vs unscreened sector (h = 6, 12)	Median IR advantage > 0 in ≥ 7 of 11 sectors, robust to $N \in \{5, 10, 20\}$
Sector-specific vs pooled architecture	Sector-specific wins ≥ 6 of 11 sectors by DM (M4 vs M7; M6 vs M8)
Sector tiers	≥ 3 sectors in the High tier under a fixed-model classification, robust to composite-weight alternatives

Table 3: Success criteria committed before estimation. Results below threshold are reported as negative findings; the add-on analyses of Section 9 were fenced off from these criteria in advance.

5 Pooled Factor Evidence: Which Signals Forecast Returns

The first half of the paper's question is which of the twenty-five candidate factors signal future relative returns at all, and how reliably. Reliability is given three meanings, each reported: the size of the IC, its survival under false-discovery control, and its stability across sub-periods. Of 1,048 testable signal–sector–horizon cells, 149 are significant at the raw 5% level against roughly 52 expected under a global null (evidence that real signal is present in aggregate) but only 10 survive Benjamini–Hochberg control, a sober statement about how thin per-sector evidence is at these sample sizes. I answer pooled across sectors first, where statistical power lives (Table 4), and take the evidence to sector resolution in Section 6.

Signal	Family	h=1	h=3	h=6	h=12
Earnings yield	Valuation	+0.018 (3.0)	+0.020 (2.1)	+0.024 (1.8)	+0.031 (1.6)
Book-to-price	Valuation	+0.005 (0.6)	+0.009 (0.7)	+0.014 (0.7)	+0.017 (0.7)
FCF yield	Valuation	+0.027 (4.9)	+0.032 (3.6)	+0.043 (3.4)	+0.046 (2.6)
EBITDA/EV	Valuation	+0.016 (2.1)	+0.022 (1.8)	+0.031 (1.7)	+0.045 (1.8)
Net payout yield	Valuation	+0.013 (2.4)	+0.020 (2.3)	+0.032 (2.6)	+0.043 (2.7)
Gross profitability	Profitability	+0.005 (1.0)	+0.003 (0.4)	+0.007 (0.6)	+0.013 (0.9)
ROE	Profitability	+0.001 (0.1)	-0.006 (-0.8)	-0.013 (-1.2)	-0.018 (-1.2)
Margin trend	Profitability	+0.001 (0.1)	-0.006 (-0.8)	-0.006 (-0.6)	-0.003 (-0.3)
Accruals	Quality	+0.011 (3.0)	+0.013 (2.3)	+0.015 (2.1)	+0.009 (1.1)
Asset growth	Quality	+0.005 (0.8)	+0.008 (0.9)	+0.016 (1.3)	+0.030 (1.8)
Net issuance	Quality	+0.012 (2.6)	+0.015 (2.4)	+0.025 (2.8)	+0.035 (2.8)
Momentum 12-1	Momentum	+0.004 (0.4)	-0.003 (-0.2)	-0.005 (-0.2)	-0.005 (-0.2)
Short-term reversal	Momentum	+0.013 (1.8)	+0.015 (2.0)	+0.007 (1.1)	+0.003 (0.4)
52-week high	Momentum	-0.003 (-0.3)	-0.010 (-0.7)	-0.007 (-0.4)	-0.003 (-0.1)
Residual momentum	Momentum	+0.002 (0.4)	+0.001 (0.2)	+0.001 (0.1)	+0.004 (0.3)
Revision breadth	Expectations	+0.003 (0.5)	+0.001 (0.2)	+0.007 (0.8)	+0.012 (1.2)
Revision magnitude	Expectations	+0.006 (0.9)	+0.006 (0.8)	+0.012 (1.2)	+0.008 (0.7)
SUE	Expectations	+0.010 (2.5)	+0.004 (0.7)	+0.010 (1.4)	+0.007 (1.0)
Recommendation change	Expectations	-0.002 (-0.7)	+0.001 (0.2)	+0.007 (1.3)	+0.005 (0.8)
Dispersion	Expectations	+0.002 (0.3)	+0.000 (0.0)	-0.004 (-0.3)	-0.007 (-0.4)
Beta	Risk	+0.001 (0.1)	-0.001 (-0.1)	-0.001 (0.0)	+0.003 (0.1)
Idiosyncratic vol.	Risk	+0.004 (0.5)	+0.007 (0.5)	+0.012 (0.6)	+0.022 (0.9)
Altman Z	Risk	-0.006 (-0.9)	-0.014 (-1.2)	-0.017 (-1.1)	-0.023 (-1.1)
Short interest	Positioning	+0.022 (4.2)	+0.026 (3.4)	+0.027 (2.7)	+0.031 (2.3)
Δ Short interest	Positioning	+0.011 (2.9)	+0.010 (2.4)	+0.012 (2.5)	+0.018 (3.5)

Table 4: Pooled out-of-sample-style rank ICs by horizon, with Newey–West t-statistics in parentheses (lag = h); signals are sign-aligned, so a positive entry means the prior direction earned. Sample: 2000–2025, 311 monthly cross-sections.

Valuation is the strongest family and behaves like a textbook: free-cash-flow yield is the single strongest signal in the library ($t = 4.9$ at one month), and every valuation IC rises monotonically with horizon, a term structure that echoes the horizon effects of the second paper. The free-cash-flow form dominates the book-to-price form decisively at the pooled level (book-to-price never reaches $t = 1$), a finding with practical content for screen construction, though Section 6 shows book-to-price predicting returns in Energy, Industrials and Financials, the three book-anchored sectors. **Short interest is the most pervasive signal**: significant at every horizon, a top-three signal in five of eleven sectors, and (Section 5.1) nearly immune to the sub-period decay that halves most families. The positioning family, the most 'novel' inclusion, is the addition a traditional value-quality screen would most benefit from.

Within-sector momentum is absent. Twelve-one momentum, 52-week-high proximity and residual momentum are flat to negative at every horizon; only one-month reversal carries modest content. This is not a data artefact but a decomposition result: much of the momentum premium is industry momentum (Moskowitz and Grinblatt, 1999), and my sector-relative dependent variable strips that component into the second paper's territory. What remains (pure stock-level trend inside large-cap sectors, post-2000) appears to be noise on average, though it revives in two specific places: stressed regimes (Section 9.3) and, of all sectors, Utilities (Section 6). Two further contrarian results deserve note: ROE attracts a negative long-horizon IC (after within-sector standardisation, high profitability proxies for expensive), and the Altman composite runs against its prior (within an index of large solvent firms, the 'distressed' tail rallies in recoveries). Both argue for models that can dampen a prior rather than impose it unconditionally.

5.1 Sub-period stability

Family (h=1)	2000–2012	2013–2025	Change	Reading
Valuation	+0.028	+0.003	-0.025	Severe decay
Quality	+0.015	+0.003	-0.012	Severe decay
Positioning	+0.018	+0.015	-0.003	Decay-resistant
Momentum	+0.005	+0.003	-0.001	Weak throughout
Profitability	+0.003	+0.002	-0.001	Weak throughout
Expectations	+0.001	+0.006	+0.005	Improving
Risk	-0.005	+0.004	+0.009	Regime change

Table 5: Pooled one-month ICs by sub-period. The pattern matches the post-publication decay of McLean and Pontiff (2016) where it should (valuation and accrual-type quality, the most published families) and not where it shouldn't: short interest persists, and defensive risk signals turn on after 2012.

The split carries a point that strengthens rather than weakens the paper: the out-of-sample evaluation window (2011–2025) sits almost entirely in the hard era. The economic results of Section 8 were earned after the great valuation decay, not propped up by the easy 2000s.

5.2 Why some signals persist and others decay

The sub-period pattern is not noise; it follows an economic logic that tells an analyst which of the full-sample results to lean on going forward. The signals that persist share a property: they are protected by frictions that make them costly or risky to arbitrage away. Short interest is the positioning of informed, capital-constrained traders, and acting on it faces borrow cost, recall risk and squeeze risk, the limits to arbitrage that keep the premium alive; the defensive risk signals that strengthen after 2012 pay in precisely the stressed regimes documented in Section 9.3, a state-dependent compensation for bearing risk when it hurts most, which no amount of patient capital competes away. The signals that decay share the opposite property: free-cash-flow yield, the earnings yield, EV/EBITDA and accruals are the canonical published anomalies of the value and quality literatures, cheap to compute and easy to trade at scale, and their fade after 2012 is the McLean and Pontiff (2016) post-publication decay, the signature of crowding as capital arbitrages a known, frictionless signal toward its own implementation cost.

The distinction is not that valuation stopped working but that the frictionless, widely published edges have eroded while the friction-protected ones have endured. For a practitioner this sharpens the full-sample screen of Section 12: the positioning and stress-conditional tilts deserve the most weight going forward, and the broad valuation rules are best read as historically powerful but structurally decaying.

Pooled evidence is, however, the average of eleven very different answers. The next section shows how different, sector by sector, signal by signal, and level by level.

6 Sector-Level Results: Which Signals Work Where

Pooled answers do not build sector screens; this section takes the factor question to the resolution at which it is used, in three exhibits of increasing detail. Table 6 grades each sector's overall selection-forecastability, scored with the pre-registered equal-weight composite; the grades anticipate the contest of Section 7, which shows that nothing more elaborate reliably beats that composite, so the tiers do not hang on a modelling choice. Table 7, the central exhibit, maps every signal's composite IC in every sector. Table 9 then gives each sector's complete level-by-level return profile, with favourable zones in the units an analyst screens on. Per-sector estimates carry wide intervals (the reason headline claims rest on the pooled book), so the map should be read for structure, not third decimals; cells marked * contain at least one FDR-surviving horizon.

Sector	Tier (M1-fixed)	Composite IC	Best-model view	Load-bearing family
Cons. Discretionary	High	+0.068	+0.068 High	Risk
Health Care	High	+0.061	+0.062 High	Risk
Materials	High	+0.056	+0.057 High	Risk
Industrials	High	+0.052	+0.058 High	Valuation
Energy	High	+0.037	+0.038 High	Risk
Cons. Staples	High	+0.035	+0.052 High	Risk
Comm. Services	Moderate	+0.026	+0.041 High	Expectations
Financials	Low	-0.013	-0.011 Low	Expectations
Info. Technology	Low	-0.019	+0.034 Moderate	Risk
Utilities	Low	-0.031	+0.047 High	Expectations
Real Estate	Low	-0.051	+0.010 Low	Momentum

Table 6: Selection-forecastability tiers under a fixed scoring model (composite of horizons, weighted 10/20/30/40 as in the second paper). The 'best-model view' selects the maximum IC across the suite per cell, an upward-biased procedure shown only for the contrast: it would promote Utilities by nearly eight IC points, from honestly negative to 'High'. Load-bearing family from the ablation study of Section 9.1.

6.1 The signal map

Signal	Enrgy	Matrl	Indus	ConsD	Stapl	Hlth	Finan	InfoT	Comm	Util	RealE
Earnings yield	+.01	-.02	+.08*	+.01	+.04	+.06	+.02	-.01	+.01	+.02	—
Book-to-price	+.07	-.02	+.07	-.02	-.01	+.02	+.04	-.01	-.01	+.03	-.02
FCF yield	+.06	+.04	+.02	+.04	+.10*	+.06	—	+.03	+.06	-.03	-.03
EBITDA/EV	+.03	+.02	+.06	+.02	+.06	+.06	—	-.00	+.05	+.02	—
Net payout	+.06	-.02	+.03	+.05	+.04	+.04	+.03	+.03	-.01	+.00	+.02
Gross profit.	-.03	+.04	-.03	+.01	-.01	+.01	—	+.04	+.06	-.01	+.01
ROE	-.00	-.02	-.02	-.00	-.00	-.02	-.03	+.01	+.00	-.05	-.02
Margin trend	-.06	-.01	-.00	+.03	-.02	+.02	-.04	-.01	+.04	+.01	-.05
Accruals	+.01	+.06	-.04	+.03	+.02	+.00	—	+.03	+.03	+.01	—
Asset growth	+.01	-.02	+.05	+.02	+.01	+.03	—	+.01	+.01	—	—
Net issuance	+.03	-.01	+.01	+.05	+.01	+.04	+.05	+.01	-.00	+.02	—
Momentum 12-1	+.01	+.02	-.02	-.00	-.02	-.00	-.01	-.03	+.04	+.04	-.01
Reversal 1M	-.01	+.00	+.02	-.00	+.02	+.03*	+.01	+.01	-.01	-.02	+.02
52-wk high	-.00	-.01	-.02	+.02	-.01	-.01	-.02	-.01	+.02	+.01	-.04
Resid. momentum	+.01	+.03	-.01	+.03	-.03	-.00	+.01	-.01	-.01	+.03	+.00
Rev. breadth	+.03	+.02	-.01	+.01	+.01	+.02	-.00	-.01	+.04	+.01	-.02
Rev. magnitude	+.06	+.03	-.01	+.00	+.01	+.01	-.00	-.00	+.06	+.02	-.01
SUE	+.01	+.00	+.03	+.01	-.02	+.00	+.01	+.00	+.05	-.01	+.01
Rec. change	+.00	+.02	+.00	+.00	+.01	-.00	+.00	-.01	+.02	+.04	-.01
Dispersion	-.03	+.02	-.02	+.02	+.01	-.01	-.01	-.00	-.02	+.00	-.06
Beta	-.00	+.02	+.01	-.00	-.01	-.01	+.00	+.03	-.01	-.02	-.02
Idio. vol.	+.04	-.02	+.03	+.05	+.03	+.03	-.00	+.02	-.02	-.02	-.06
Altman Z	-.02	+.02	-.06	-.01	-.01	-.03	—	+.00	+.03	-.07	—
Short interest	+.08	+.01	+.04	+.03	+.06	+.02	+.00	+.04	+.06*	-.05	+.01
Δ Short int.	+.02	+.02	+.03	+.02	+.00	+.00	+.00	+.01	+.04	-.00	+.01

Table 7: The signal map: composite rank IC of every signal in every sector (horizons weighted 10/20/30/40), generated directly from the univariate results file. * marks cells with at least one FDR-surviving horizon; a dash marks pre-registered accounting exclusions. Read columns to build a sector screen; read rows to see where a signal travels.

6.2 Reading the map

The High tier (six sectors) runs on cash-flow valuation and positioning. Free-cash-flow yield leads Staples (+0.10, the strongest cell in the study, four FDR-surviving horizons) and Health Care; earnings yield carries Industrials at every horizon (four FDR-surviving cells); Energy is led, strikingly, not by valuation but by short interest, with book-to-price (useless pooled) earning +0.07 in the one sector where reserves sit on the balance sheet. Materials is the accruals sector, and low-risk signals lead Consumer Discretionary. Against the pre-registered priors the tier is a mixed scorecard, reported as committed: the valuation-led predictions for Energy and the cyclicals were directionally right, but Health Care's hypothesised dominance of the expectations family materialised as valuation instead (the model buys the sector's deratings) and momentum, predicted to lead four sectors, leads none of them. Table 8 confronts all eleven predictions with what actually led: three hits, two partial, five misses, and one sector with no material signal. A pre-registration earns its credibility precisely by recording misses like these.

Sector	Predicted leading families (ex ante)	Realised leader (Section 6)	Verdict
Energy	Valuation; Momentum	Valuation (short interest the strongest single signal)	Hit
Materials	Valuation; Momentum	Expectations, then Valuation (FCF yield)	Partial
Industrials	Momentum; Quality; Expectations	Valuation (earnings yield)	Miss
Cons. Disc.	Momentum; Expectations; Positioning	Valuation, then Quality (net issuance)	Miss
Cons. Staples	Profitability; Risk	Valuation (FCF yield)	Miss
Health Care	Expectations; Profitability	Valuation (EBITDA/EV)	Miss
Financials	Valuation; Profitability	Valuation (book-to-price)	Hit (weak)
Info. Tech.	Momentum; Expectations; Profitability	Profitability (gross profit.)	Hit (weak)
Comm. Svcs.	Momentum; Valuation	Expectations, then Valuation (short interest)	Partial
Utilities	Risk; Valuation	Momentum, then Expectations	Miss
Real Estate	Valuation; Risk	No family materially forecasts	Inconclusive

Table 8: The eleven pre-registered sector hypotheses confronted with results. Predicted families and their rationale were fixed in the frozen specification; realised leaders are the strongest families in the signal map of Table 7. Hit requires the realised top family to be among those predicted; Partial that a predicted family appears but does not lead; Miss otherwise; Inconclusive marks a sector with no family above the noise.

The Low tier is the more instructive half, and the map explains it. Financials' best signals (issuance, book-to-price, payout) are exactly its pre-registered, book-anchored prior; they are simply too weak (+0.03 to +0.05) to survive averaging with everything that fails there, which is the difference between a correct prior and a usable screen. Real Estate has no signal above +0.02 and several of the map's most negative cells (idiosyncratic volatility at -0.06): the within-REIT cross-section, where the accounting families are largely inapplicable by design, is the closest thing to unforecastable in this study. Information Technology fails through its momentum cell (-0.03) and thin everything else, its respectable best-model view a selection artefact. Utilities supplies the map's best irony: momentum (dead pooled, dead in the priors) is its strongest signal (+0.04), yet the sector's composite is deeply negative at -0.031 because the average signal fails badly there; the lesson is that a Low tier does not mean no signal exists; it means the default composite should not be trusted, and a Utilities-only momentum screen is a hypothesis for future work, not a result. The alignment runs through the whole map: selection forecastability concentrates where accounting comparability is strongest, and Health Care and Industrials sit in the High tier of both this paper's selection classification and the second paper's rotation classification.

6.3 Sector return profiles: what each level of each indicator has paid

The map of Table 7 gives directions; this section gives the full dose-response. For each sector I sort every month's cross-section into quintiles of each signal's raw value (Q1 lowest to Q5 highest, sector-months with at least fifteen covered names), pool the forward six-month relative return of each quintile over 2000–2025, and translate the favourable quintiles back into natural units using the median monthly boundaries. Table 9 presents, sector by sector, the complete set of characterisable profiles (nineteen to twenty-five signals per sector after the pre-registered accounting exclusions and coverage rules), each with its favourable zone stated in the units an analyst would screen on and its shape classification. Three reading rules: returns are relative to cap-weighted sector benchmarks, which sit below zero on average in the mega-cap era, so the information is in differences across quintiles, not levels; this is a descriptive, full-sample characterisation, not a walk-forward result; and with fewer than ten names per quintile-month, zones should be read to the nearest quintile, not the second decimal.

Across the full set, monotonicity is the exception, echoing the nonparametric characteristic shapes of Freyberger, Neuhierl and Weber (2020): of 262 characterisable profiles only 26 are cleanly monotone, while 96 are hump-shaped and 39 are U-shaped, and the remaining 101 are irregular or flat. More of a good thing is frequently not better, and the favourable-zone column makes the non-monotonicity operational.

How to read these panels. For each signal, the sector's stocks are re-sorted every month into five equal groups (quintiles) by the raw value of that signal: Q1 holds the fifth of names with the lowest values, Q5 the fifth with the highest. The convention never changes: Q5 is always the highest raw value, so for valuation yields Q5 holds the cheapest names, for short interest the most heavily shorted, for beta the highest-beta. The large figure in each cell is the average return over the following six months (annualised, relative to the sector) earned by names in that quintile; the small figure beneath it is that quintile's typical raw-value range, so every row defines its own buckets in screening units. 'Favourable zone' names the winning quintile(s); 'Shape' gives the verdict on the whole profile in plain words: 'more is better' and 'less is better' are clean monotone relationships, 'sweet spot in middle' means both tails underperform the centre, 'extremes beat middle' the reverse, and 'irregular' means no stable pattern. Worked example from Panel A: Energy names with short interest below 0.4% (Q1) went on to beat the sector by 0.8% a year, while the most heavily shorted fifth (Q5, short interest above 3.7%) lagged it by 7.7% a year; the profile reads 'less is better'.

Panel A. Energy

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Earnings yield	-3.1 *(<2.2%)*	-1.8 *(2.2%–4.6%)*	-2.8 *(4.6%–6.7%)*	-2.5 *(6.7%–9.2%)*	-0.3 *(>9.2%)*	Q5: above 9.2%	Irregular
Book-to-price	-5.5 *(<0.32)*	-2.6 *(0.32–0.42)*	+0.2 *(0.42–0.55)*	-1.2 *(0.55–0.71)*	-2.5 *(>0.71)*	Q3: 0.42 to 0.55	Sweet spot in middle
FCF yield	-3.0 *(<-1.9%)*	-5.0 *(-1.9%–0.9%)*	-3.2 *(0.9%–2.8%)*	-3.4 *(2.8%–5.7%)*	+2.4 *(>5.7%)*	Q5: above 5.7%	Extremes beat middle
EBITDA/EV	-2.0 *(<7.8%)*	-3.4 *(7.8%–11.6%)*	-3.3 *(11.6%–14.8%)*	-2.8 *(14.8%–18.9%)*	+0.5 *(>18.9%)*	Q5: above 18.9%	Extremes beat middle
Net payout yield	-6.1 *(<0.4%)*	-4.2 *(0.4%–1.4%)*	-4.0 *(1.4%–2.8%)*	+1.0 *(2.8%–4.8%)*	+0.2 *(>4.8%)*	Q4: 2.8% to 4.8%	Sweet spot in middle
Gross profitability	-1.2 *(<11.0%)*	-3.1 *(11.0%–15.3%)*	-1.7 *(15.3%–19.1%)*	-1.3 *(19.1%–23.0%)*	-3.3 *(>23.0%)*	Q1: below 11.0%	Irregular
ROE	-3.5 *(<5.7%)*	-1.5 *(5.7%–11.0%)*	-3.2 *(11.0%–14.9%)*	+0.2 *(14.9%–20.8%)*	-2.4 *(>20.8%)*	Q4: 14.9% to 20.8%	Sweet spot in middle
Margin trend	+1.7 *(<-3.6%)*	-3.1 *(-3.6%–0.6%)*	-0.8 *(-0.6%–1.7%)*	-4.8 *(1.7%–4.9%)*	-4.1 *(>4.9%)*	Q1: below -3.6%	Irregular
Accruals	-3.5 *(<-11.3%)*	-1.8 *(-11.3%–-8.5%)*	+0.3 *(-8.5%–-6.0%)*	-1.9 *(-6.0%–-4.0%)*	-3.6 *(>-4.0%)*	Q3: -8.5% to -6.0%	Sweet spot in middle
Asset growth	-1.9 *(<-0.3%)*	-2.8 *(-0.3%–4.3%)*	-2.1 *(4.3%–8.7%)*	+0.9 *(8.7%–16.5%)*	-5.3 *(>16.5%)*	Q4: 8.7% to 16.5%	Sweet spot in middle
Net issuance	+2.2 *(<-1.9%)*	-1.1 *(-1.9%–0.1%)*	-4.4 *(0.1%–0.6%)*	-2.9 *(0.6%–2.2%)*	-4.9 *(>2.2%)*	Q1: below -1.9%	Irregular
Momentum 12-1	-4.2 *(<-6.0%)*	-1.4 *(-6.0%–3.3%)*	-2.0 *(3.3%–11.4%)*	-1.6 *(11.4%–26.7%)*	-2.4 *(>26.7%)*	Q2-Q4: -6.0% to 26.7%	Sweet spot in middle
Reversal 1M	-4.5 *(<-3.4%)*	-2.2 *(-3.4%–0.1%)*	-2.1 *(-0.1%–2.5%)*	-1.6 *(2.5%–5.3%)*	-1.3 *(>5.3%)*	Q4-Q5: above 2.5%	More is better
52-wk high	-3.8 *(<0.82)*	-1.6 *(0.82–0.89)*	-1.2 *(0.89–0.93)*	-3.5 *(0.93–0.97)*	-1.3 *(>0.97)*	Q2-Q3: 0.82 to 0.93	Irregular
Resid. momentum	-4.2 *(<-2.65)*	-1.9 *(-2.65–-1.26)*	+0.4 *(-1.26–-0.01)*	-2.5 *(-0.01–1.42)*	-3.2 *(>1.42)*	Q3: -1.26 to -0.01	Sweet spot in middle
Rev. breadth	-2.2 *(<-27.6%)*	-4.6 *(-27.6%–-4.9%)*	-2.7 *(-4.9%–8.6%)*	-1.9 *(8.6%–25.7%)*	-0.2 *(>25.7%)*	Q5: above 25.7%	Extremes beat middle
Rev. magnitude	-4.1 *(<-0.4%)*	-2.4 *(-0.4%–-0.1%)*	-3.1 *(-0.1%–0.1%)*	-0.2 *(0.1%–0.3%)*	+0.1 *(>0.3%)*	Q4-Q5: above 0.1%	Irregular
SUE	-1.6 *(<-0.1%)*	-4.5 *(-0.1%–0.0%)*	-2.0 *(0.0%–0.1%)*	-1.1 *(0.1%–0.3%)*	-3.3 *(>0.3%)*	Q4: 0.1% to 0.3%	Extremes beat middle
Rec. change	-0.5 *(<-0.09)*	-3.7 *(-0.09–0.03)*	-1.8 *(-0.03–0.02)*	-2.4 *(0.02–0.08)*	-2.7 *(>0.08)*	Q1: below -0.09	Extremes beat middle
Dispersion	-4.1 *(<0.05)*	-2.2 *(0.05–0.08)*	-1.9 *(0.08–0.10)*	-2.2 *(0.10–0.14)*	-1.1 *(>0.14)*	Q5: above 0.14	Irregular
Beta	-3.3 *(<0.93)*	-2.6 *(0.93–1.12)*	-1.4 *(1.12–1.28)*	-2.7 *(1.28–1.47)*	-1.5 *(>1.47)*	Q3: 1.12 to 1.28	Irregular
Idio. volatility	+0.3 *(<1.3%)*	-0.1 *(1.3%–1.6%)*	-2.0 *(1.6%–1.8%)*	-6.0 *(1.8%–2.0%)*	-3.5 *(>2.0%)*	Q1-Q2: below 1.6%	Extremes beat middle
Altman Z	-1.9 *(<1.42)*	-2.9 *(1.42–2.07)*	-5.6 *(2.07–2.79)*	+1.8 *(2.79–3.74)*	-2.1 *(>3.74)*	Q4: 2.79 to 3.74	Sweet spot in middle
Short interest	+0.8 *(<0.4%)*	-0.6 *(0.4%–0.9%)*	-1.1 *(0.9%–1.7%)*	-6.7 *(1.7%–3.7%)*	-7.7 *(>3.7%)*	Q1: below 0.4%	Less is better
Δ Short interest	-7.0 *(<-0.6%)*	-0.3 *(-0.6%–-0.1%)*	-0.1 *(-0.1%–0.1%)*	-2.1 *(0.1%–0.6%)*	-6.2 *(>0.6%)*	Q2-Q3: -0.6% to 0.1%	Sweet spot in middle

Favourable profile: Lightly shorted names (short interest below 0.4%) with shrinking share counts, mid-strength balance sheets (Altman Z 2.8–3.7) and disciplined payout (2.8–4.8%); free-cash-flow cheapness pays only at its extreme tail, and a change in short interest in either direction is a warning.

Panel B. Materials

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Earnings yield	+1.1 *(<2.5%)*	-0.6 *(2.5%–3.9%)*	-1.8 *(3.9%–5.1%)*	+0.5 *(5.1%–6.7%)*	-3.3 *(>6.7%)*	Q1: below 2.5%	Irregular
Book-to-price	-0.4 *(<0.22)*	-0.8 *(0.22–0.29)*	-0.6 *(0.29–0.38)*	+0.3 *(0.38–0.55)*	-3.0 *(>0.55)*	Q4: 0.38 to 0.55	Sweet spot in middle
FCF yield	-7.5 *(<1.7%)*	+1.4 *(1.7%–3.0%)*	-1.8 *(3.0%–4.3%)*	-0.3 *(4.3%–6.2%)*	+2.4 *(>6.2%)*	Q5: above 6.2%	Irregular
EBITDA/EV	-2.4 *(<7.3%)*	-0.5 *(7.3%–9.0%)*	-1.1 *(9.0%–11.0%)*	-0.1 *(11.0%–13.4%)*	-0.1 *(>13.4%)*	Q4-Q5: above 11.0%	Irregular
Net payout yield	+0.8 *(<1.6%)*	+0.4 *(1.6%–2.7%)*	+0.1 *(2.7%–4.0%)*	-2.5 *(4.0%–6.2%)*	-0.2 *(>6.2%)*	Q1-Q3: below 4.0%	Extremes beat middle
Gross profitability	-4.7 *(<14.9%)*	-0.9 *(14.9%–20.3%)*	-0.8 *(20.3%–25.4%)*	+0.0 *(25.4%–33.9%)*	+1.3 *(>33.9%)*	Q5: above 33.9%	More is better
ROE	+0.2 *(<6.7%)*	+0.6 *(6.7%–14.5%)*	-1.1 *(14.5%–20.0%)*	-1.1 *(20.0%–27.5%)*	-2.9 *(>27.5%)*	Q1-Q2: below 14.5%	Irregular
Margin trend	-2.9 *(<-1.6%)*	-0.5 *(-1.6%–0.4%)*	-1.3 *(-0.4%–0.6%)*	+1.3 *(0.6%–1.8%)*	-1.5 *(>1.8%)*	Q4: 0.6% to 1.8%	Sweet spot in middle
Accruals	+4.4 *(<-6.6%)*	+1.7 *(-6.6%–-5.0%)*	-3.3 *(-5.0%–-3.7%)*	-1.1 *(-3.7%–-2.2%)*	-5.9 *(>-2.2%)*	Q1: below -6.6%	Irregular
Asset growth	-1.1 *(<-3.0%)*	-2.2 *(-3.0%–1.3%)*	-2.2 *(1.3%–4.6%)*	+1.2 *(4.6%–10.6%)*	-0.5 *(>10.6%)*	Q4: 4.6% to 10.6%	Sweet spot in middle
Net issuance	-0.8 *(<-2.9%)*	+0.5 *(-2.9%–-1.1%)*	-2.2 *(-1.1%–0.1%)*	-2.4 *(0.1%–0.8%)*	+0.4 *(>0.8%)*	Q2: -2.9% to -1.1%	Extremes beat middle
Momentum 12-1	-2.6 *(<-5.9%)*	-0.6 *(-5.9%–4.8%)*	-0.6 *(4.8%–14.2%)*	-0.9 *(14.2%–27.2%)*	-0.1 *(>27.2%)*	Q2-Q5: above -5.9%	Irregular
Reversal 1M	-1.6 *(<-2.8%)*	+0.1 *(-2.8%–-0.1%)*	-0.8 *(-0.1%–2.2%)*	-1.1 *(2.2%–5.4%)*	-1.1 *(>5.4%)*	Q2: -2.8% to -0.1%	Sweet spot in middle
52-wk high	-2.0 *(<0.83)*	+0.5 *(0.83–0.90)*	-1.0 *(0.90–0.95)*	-1.0 *(0.95–0.99)*	-1.1 *(>0.99)*	Q2: 0.83 to 0.90	Sweet spot in middle
Resid. momentum	-1.8 *(<-3.13)*	-3.7 *(-3.13–-1.40)*	+0.8 *(-1.40–0.13)*	+0.2 *(0.13–1.87)*	+0.1 *(>1.87)*	Q3-Q4: -1.40 to 1.87	Sweet spot in middle
Rev. breadth	-2.5 *(<-25.7%)*	-0.2 *(-25.7%–-7.4%)*	-0.9 *(-7.4%–0.0%)*	-1.5 *(0.0%–12.9%)*	+0.3 *(>12.9%)*	Q5: above 12.9%	Irregular
Rev. magnitude	-1.6 *(<-0.4%)*	-3.4 *(-0.4%–-0.1%)*	-0.8 *(-0.1%–0.0%)*	-0.0 *(0.0%–0.1%)*	+1.8 *(>0.1%)*	Q5: above 0.1%	Extremes beat middle
SUE	-2.2 *(<-0.0%)*	+0.2 *(-0.0%–0.0%)*	-1.4 *(0.0%–0.1%)*	-1.3 *(0.1%–0.2%)*	-1.4 *(>0.2%)*	Q2: -0.0% to 0.0%	Sweet spot in middle
Rec. change	-1.0 *(<-0.11)*	-2.8 *(-0.11–-0.02)*	-1.9 *(-0.02–0.02)*	-0.3 *(0.02–0.11)*	+1.3 *(>0.11)*	Q5: above 0.11	Extremes beat middle
Dispersion	+1.0 *(<0.01)*	-1.0 *(0.01–0.02)*	+0.9 *(0.02–0.04)*	-3.1 *(0.04–0.08)*	-1.9 *(>0.08)*	Q1: below 0.01	Extremes beat middle
Beta	+1.1 *(<0.79)*	-0.7 *(0.79–0.97)*	-1.5 *(0.97–1.16)*	+0.4 *(1.16–1.44)*	-3.5 *(>1.44)*	Q1: below 0.79	Irregular
Idio. volatility	-0.5 *(<1.1%)*	-1.1 *(1.1%–1.2%)*	-3.0 *(1.2%–1.5%)*	+0.8 *(1.5%–1.8%)*	-0.7 *(>1.8%)*	Q4: 1.5% to 1.8%	Sweet spot in middle
Altman Z	-4.0 *(<1.86)*	-1.1 *(1.86–2.43)*	-1.0 *(2.43–3.14)*	+0.7 *(3.14–3.91)*	-0.5 *(>3.91)*	Q4: 3.14 to 3.91	Sweet spot in middle
Short interest	-0.8 *(<0.4%)*	-0.4 *(0.4%–0.9%)*	-2.7 *(0.9%–1.6%)*	-2.0 *(1.6%–3.0%)*	-4.1 *(>3.0%)*	Q1-Q2: below 0.9%	Irregular
Δ Short interest	-1.0 *(<-0.7%)*	-2.3 *(-0.7%–-0.1%)*	+1.5 *(-0.1%–0.1%)*	-2.7 *(0.1%–0.7%)*	-5.6 *(>0.7%)*	Q3: -0.1% to 0.1%	Sweet spot in middle

Favourable profile: Cash converters: deeply negative accruals (below -6.6% of assets), free-cash-flow yields above 6.2%, gross profitability above 34%, improving estimates and solid balance sheets; stable short interest beats falling or rising.

Panel C. Industrials

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Earnings yield	-3.6 *(<3.6%)*	-1.0 *(3.6%–4.6%)*	+2.1 *(4.6%–5.4%)*	+2.8 *(5.4%–6.5%)*	+2.7 *(>6.5%)*	Q3-Q5: above 4.6%	Irregular
Book-to-price	-3.1 *(<0.18)*	+0.5 *(0.18–0.28)*	+1.7 *(0.28–0.34)*	+2.0 *(0.34–0.44)*	+1.9 *(>0.44)*	Q3-Q5: above 0.28	Irregular
FCF yield	-2.9 *(<2.4%)*	+2.2 *(2.4%–3.7%)*	+1.1 *(3.7%–4.7%)*	+1.1 *(4.7%–5.9%)*	+1.3 *(>5.9%)*	Q2: 2.4% to 3.7%	Sweet spot in middle
EBITDA/EV	-4.3 *(<7.9%)*	+1.0 *(7.9%–9.3%)*	+2.9 *(9.3%–10.5%)*	+2.7 *(10.5%–12.3%)*	+0.4 *(>12.3%)*	Q3-Q4: 9.3% to 12.3%	Sweet spot in middle
Net payout yield	-4.2 *(<1.4%)*	+1.9 *(1.4%–2.9%)*	+2.8 *(2.9%–4.1%)*	+1.4 *(4.1%–5.9%)*	+1.2 *(>5.9%)*	Q3: 2.9% to 4.1%	Sweet spot in middle
Gross profitability	+1.3 *(<17.5%)*	+0.6 *(17.5%–22.0%)*	+0.4 *(22.0%–27.7%)*	+0.8 *(27.7%–37.8%)*	+0.2 *(>37.8%)*	Q1-Q2: below 22.0%	Irregular
ROE	-0.3 *(<10.1%)*	+1.6 *(10.1%–16.8%)*	+1.6 *(16.8%–21.1%)*	+1.0 *(21.1%–29.3%)*	-1.0 *(>29.3%)*	Q2-Q4: 10.1% to 29.3%	Sweet spot in middle
Margin trend	-0.4 *(<-1.0%)*	+0.5 *(-1.0%–0.1%)*	+1.1 *(-0.1%–0.5%)*	+1.2 *(0.5%–1.4%)*	-0.4 *(>1.4%)*	Q2-Q4: -1.0% to 1.4%	Sweet spot in middle
Accruals	-2.1 *(<-5.8%)*	+1.2 *(-5.8%–-3.9%)*	+1.1 *(-3.9%–-2.7%)*	+2.1 *(-2.7%–-1.3%)*	+0.7 *(>-1.3%)*	Q4: -2.7% to -1.3%	Sweet spot in middle
Asset growth	+0.9 *(<-0.4%)*	+3.4 *(-0.4%–3.2%)*	+1.2 *(3.2%–6.7%)*	-0.6 *(6.7%–12.4%)*	-2.1 *(>12.4%)*	Q2: -0.4% to 3.2%	Sweet spot in middle
Net issuance	+0.0 *(<-3.4%)*	+1.3 *(-3.4%–-1.7%)*	+1.7 *(-1.7%–-0.3%)*	+0.8 *(-0.3%–0.5%)*	-1.1 *(>0.5%)*	Q2-Q3: -3.4% to -0.3%	Sweet spot in middle
Momentum 12-1	-0.4 *(<-3.5%)*	+1.2 *(-3.5%–7.4%)*	+1.2 *(7.4%–16.9%)*	+0.9 *(16.9%–28.8%)*	-0.1 *(>28.8%)*	Q2-Q4: -3.5% to 28.8%	Sweet spot in middle
Reversal 1M	-0.0 *(<-3.0%)*	+1.8 *(-3.0%–0.1%)*	+1.1 *(0.1%–2.4%)*	+0.9 *(2.4%–5.2%)*	-0.7 *(>5.2%)*	Q2-Q3: -3.0% to 2.4%	Sweet spot in middle
52-wk high	-0.1 *(<0.86)*	+0.9 *(0.86–0.91)*	+1.4 *(0.91–0.96)*	-0.1 *(0.96–1.00)*	+1.0 *(>1.00)*	Q2-Q3: 0.86 to 0.96	Irregular
Resid. momentum	-0.3 *(<-2.88)*	+0.4 *(-2.88–-1.18)*	+1.4 *(-1.18–0.30)*	+1.4 *(0.30–2.07)*	-0.1 *(>2.07)*	Q3-Q4: -1.18 to 2.07	Sweet spot in middle
Rev. breadth	-0.1 *(<-16.5%)*	+1.1 *(-16.5%–0.0%)*	+0.7 *(0.0%–1.3%)*	+1.1 *(1.3%–11.7%)*	+0.2 *(>11.7%)*	Q2-Q4: -16.5% to 11.7%	Sweet spot in middle
Rev. magnitude	+2.2 *(<-0.1%)*	+0.4 *(-0.1%–0.0%)*	+0.2 *(-0.0%–0.0%)*	+1.6 *(0.0%–0.1%)*	+0.4 *(>0.1%)*	Q1: below -0.1%	Irregular
SUE	+0.8 *(<0.0%)*	-1.8 *(0.0%–0.0%)*	+0.8 *(0.0%–0.1%)*	+0.8 *(0.1%–0.1%)*	+2.1 *(>0.1%)*	Q5: above 0.1%	Extremes beat middle
Rec. change	-0.8 *(<-0.10)*	+1.1 *(-0.10–0.02)*	+1.1 *(-0.02–0.02)*	+1.4 *(0.02–0.10)*	-0.0 *(>0.10)*	Q2-Q4: -0.10 to 0.10	Sweet spot in middle
Dispersion	+0.5 *(<0.01)*	+0.6 *(0.01–0.01)*	+1.6 *(0.01–0.02)*	-0.2 *(0.02–0.03)*	+0.6 *(>0.03)*	Q3: 0.01 to 0.02	Sweet spot in middle
Beta	+1.0 *(<0.87)*	+1.1 *(0.87–1.03)*	+1.5 *(1.03–1.17)*	+1.2 *(1.17–1.38)*	-1.9 *(>1.38)*	Q1-Q4: below 1.38	Irregular
Idio. volatility	+1.3 *(<1.0%)*	+2.3 *(1.0%–1.1%)*	+1.2 *(1.1%–1.3%)*	+1.0 *(1.3%–1.5%)*	-2.8 *(>1.5%)*	Q2: 1.0% to 1.1%	Sweet spot in middle
Altman Z	-0.1 *(<2.09)*	+1.8 *(2.09–2.84)*	+3.0 *(2.84–3.64)*	-1.4 *(3.64–4.75)*	-0.4 *(>4.75)*	Q3: 2.84 to 3.64	Sweet spot in middle
Short interest	+0.3 *(<0.4%)*	+0.7 *(0.4%–0.8%)*	+0.3 *(0.8%–1.5%)*	-0.8 *(1.5%–3.3%)*	-3.7 *(>3.3%)*	Q1-Q3: below 1.5%	Irregular
Δ Short interest	-0.3 *(<-0.6%)*	-0.4 *(-0.6%–-0.1%)*	+0.4 *(-0.1%–0.1%)*	-0.6 *(0.1%–0.6%)*	-3.0 *(>0.6%)*	Q3: -0.1% to 0.1%	Irregular

Favourable profile: Moderately valued cash generators growing slowly: EBITDA/EV of 9–12%, payout of 3–4%, earnings yields above 4.6%, asset growth of roughly 0–3%; the un-cash-generative (FCF Q1) and aggressively expanding tails are the danger zones.

Panel D. Cons. Disc.

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Earnings yield	-4.8 *(<3.4%)*	-6.5 *(3.4%–4.7%)*	-1.0 *(4.7%–5.8%)*	-3.0 *(5.8%–7.5%)*	-3.4 *(>7.5%)*	Q3: 4.7% to 5.8%	Sweet spot in middle
Book-to-price	-2.0 *(<0.14)*	-3.8 *(0.14–0.24)*	-3.1 *(0.24–0.32)*	-4.4 *(0.32–0.53)*	-5.0 *(>0.53)*	Q1: below 0.14	Irregular
FCF yield	-6.6 *(<1.9%)*	-6.2 *(1.9%–3.5%)*	-2.1 *(3.5%–4.8%)*	-2.0 *(4.8%–6.7%)*	-2.2 *(>6.7%)*	Q3-Q5: above 3.5%	Irregular
EBITDA/EV	-5.2 *(<7.5%)*	-4.6 *(7.5%–9.2%)*	-3.2 *(9.2%–11.0%)*	-1.8 *(11.0%–13.8%)*	-4.7 *(>13.8%)*	Q4: 11.0% to 13.8%	Sweet spot in middle
Net payout yield	-5.7 *(<1.8%)*	-6.2 *(1.8%–3.6%)*	-2.0 *(3.6%–5.3%)*	-2.7 *(5.3%–7.8%)*	-0.8 *(>7.8%)*	Q5: above 7.8%	Irregular
Gross profitability	-5.3 *(<23.9%)*	-3.0 *(23.9%–37.5%)*	-4.2 *(37.5%–51.7%)*	-2.4 *(51.7%–66.6%)*	-3.6 *(>66.6%)*	Q4: 51.7% to 66.6%	Sweet spot in middle
ROE	-3.3 *(<8.8%)*	-6.2 *(8.8%–16.2%)*	-1.7 *(16.2%–22.1%)*	-5.4 *(22.1%–32.2%)*	-2.1 *(>32.2%)*	Q3: 16.2% to 22.1%	Extremes beat middle
Margin trend	-6.7 *(<-1.2%)*	-3.2 *(-1.2%–-0.3%)*	-3.1 *(-0.3%–0.3%)*	-2.4 *(0.3%–1.1%)*	-2.3 *(>1.1%)*	Q3-Q5: above -0.3%	More is better
Accruals	-2.2 *(<-8.0%)*	-2.6 *(-8.0%–-5.7%)*	-4.8 *(-5.7%–-3.8%)*	-3.5 *(-3.8%–-1.5%)*	-5.4 *(>-1.5%)*	Q1-Q2: below -5.7%	Irregular
Asset growth	-2.4 *(<-2.0%)*	-3.9 *(-2.0%–2.6%)*	-4.2 *(2.6%–7.0%)*	-3.3 *(7.0%–13.6%)*	-4.6 *(>13.6%)*	Q1: below -2.0%	Irregular
Net issuance	+0.4 *(<-5.0%)*	-3.2 *(-5.0%–-2.7%)*	-4.0 *(-2.7%–-0.9%)*	-5.1 *(-0.9%–0.6%)*	-6.4 *(>0.6%)*	Q1: below -5.0%	Less is better
Momentum 12-1	-6.5 *(<-10.4%)*	-2.5 *(-10.4%–-3.3%)*	-1.9 *(-3.3%–16.2%)*	-1.9 *(16.2%–32.5%)*	-5.7 *(>32.5%)*	Q2-Q4: -10.4% to 32.5%	Sweet spot in middle
Reversal 1M	-5.4 *(<-4.3%)*	-3.2 *(-4.3%–-0.4%)*	-2.3 *(-0.4%–2.7%)*	-3.4 *(2.7%–6.3%)*	-4.1 *(>6.3%)*	Q3: -0.4% to 2.7%	Sweet spot in middle
52-wk high	-7.4 *(<0.79)*	-3.6 *(0.79–0.89)*	-2.5 *(0.89–0.95)*	-2.5 *(0.95–1.00)*	-2.8 *(>1.00)*	Q3-Q5: above 0.89	Irregular
Resid. momentum	-8.2 *(<-3.20)*	-3.9 *(-3.20–-1.41)*	-2.2 *(-1.41–0.11)*	-1.9 *(0.11–1.82)*	-2.3 *(>1.82)*	Q3-Q5: above -1.41	Irregular
Rev. breadth	-5.0 *(<-21.2%)*	-4.0 *(-21.2%–-1.5%)*	-2.7 *(-1.5%–3.0%)*	-2.9 *(3.0%–18.8%)*	-3.9 *(>18.8%)*	Q3-Q4: -1.5% to 18.8%	Sweet spot in middle
Rev. magnitude	-5.1 *(<-0.2%)*	-2.1 *(-0.2%–-0.0%)*	-2.8 *(-0.0%–0.0%)*	-4.0 *(0.0%–0.1%)*	-2.5 *(>0.1%)*	Q2-Q3: -0.2% to 0.0%	Irregular
SUE	-4.9 *(<-0.0%)*	-2.9 *(-0.0%–0.0%)*	-4.1 *(0.0%–0.1%)*	-3.1 *(0.1%–0.2%)*	-4.3 *(>0.2%)*	Q2: -0.0% to 0.0%	Sweet spot in middle
Rec. change	-4.9 *(<-0.10)*	-3.4 *(-0.10–-0.02)*	-4.3 *(-0.02–0.02)*	-3.1 *(0.02–0.09)*	-3.0 *(>0.09)*	Q4-Q5: above 0.02	Irregular
Dispersion	-1.5 *(<0.01)*	-4.3 *(0.01–0.02)*	-2.8 *(0.02–0.03)*	-3.8 *(0.03–0.05)*	-6.0 *(>0.05)*	Q1: below 0.01	Irregular
Beta	-2.4 *(<0.76)*	-3.9 *(0.76–0.99)*	-3.8 *(0.99–1.23)*	-3.2 *(1.23–1.50)*	-5.0 *(>1.50)*	Q1: below 0.76	Irregular
Idio. volatility	-0.4 *(<1.2%)*	-1.3 *(1.2%–1.5%)*	-3.5 *(1.5%–1.7%)*	-5.7 *(1.7%–2.0%)*	-7.6 *(>2.0%)*	Q1: below 1.2%	Less is better
Altman Z	-4.1 *(<2.47)*	-3.1 *(2.47–3.35)*	-5.5 *(3.35–4.43)*	-1.6 *(4.43–6.18)*	-4.1 *(>6.18)*	Q4: 4.43 to 6.18	Sweet spot in middle
Short interest	-4.6 *(<0.5%)*	-5.2 *(0.5%–1.3%)*	-6.8 *(1.3%–2.8%)*	-7.2 *(2.8%–5.9%)*	-10.0 *(>5.9%)*	Q1-Q2: below 1.3%	Less is better
Δ Short interest	-5.8 *(<-1.0%)*	-6.3 *(-1.0%–-0.2%)*	-5.3 *(-0.2%–0.2%)*	-7.4 *(0.2%–1.0%)*	-9.4 *(>1.0%)*	Q3: -0.2% to 0.2%	Irregular

Favourable profile: Quiet, buying-back, lightly shorted stocks: daily idiosyncratic volatility below 1.2%, net issuance below -5% (substantial repurchases), short interest below 1.3%; cheapness helps only in moderation (earnings yield sweet spot 4.7–5.8%).

Panel E. Cons. Staples

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Earnings yield	-4.7 *(<3.5%)*	-2.0 *(3.5%–4.5%)*	-1.4 *(4.5%–5.2%)*	+0.7 *(5.2%–6.3%)*	+0.4 *(>6.3%)*	Q4-Q5: above 5.2%	Irregular
Book-to-price	+1.0 *(<0.09)*	-1.6 *(0.09–0.16)*	-2.1 *(0.16–0.25)*	-1.5 *(0.25–0.45)*	-2.1 *(>0.45)*	Q1: below 0.09	Irregular
FCF yield	-7.0 *(<2.8%)*	-3.8 *(2.8%–3.6%)*	-0.5 *(3.6%–4.2%)*	+1.4 *(4.2%–5.3%)*	+2.8 *(>5.3%)*	Q5: above 5.3%	More is better
EBITDA/EV	-3.7 *(<7.0%)*	-2.3 *(7.0%–8.5%)*	-2.5 *(8.5%–9.6%)*	-0.3 *(9.6%–11.1%)*	+0.5 *(>11.1%)*	Q5: above 11.1%	Irregular
Net payout yield	-2.2 *(<2.1%)*	-5.2 *(2.1%–3.5%)*	-0.6 *(3.5%–4.5%)*	-0.1 *(4.5%–6.2%)*	+2.4 *(>6.2%)*	Q5: above 6.2%	Extremes beat middle
Gross profitability	+0.1 *(<24.6%)*	-1.6 *(24.6%–36.5%)*	-2.8 *(36.5%–49.4%)*	-0.9 *(49.4%–69.8%)*	-1.5 *(>69.8%)*	Q1: below 24.6%	Extremes beat middle
ROE	-2.0 *(<10.2%)*	-1.8 *(10.2%–18.4%)*	-2.1 *(18.4%–27.0%)*	+0.2 *(27.0%–41.1%)*	-0.9 *(>41.1%)*	Q4: 27.0% to 41.1%	Sweet spot in middle
Margin trend	-0.1 *(<-0.8%)*	-0.8 *(-0.8%–-0.1%)*	-2.3 *(-0.1%–0.3%)*	-2.7 *(0.3%–0.9%)*	-0.7 *(>0.9%)*	Q1-Q2: below -0.1%	Extremes beat middle
Accruals	-0.9 *(<-6.7%)*	+0.3 *(-6.7%–-4.7%)*	-2.9 *(-4.7%–-3.1%)*	-1.6 *(-3.1%–-1.5%)*	-1.3 *(>-1.5%)*	Q2: -6.7% to -4.7%	Sweet spot in middle
Asset growth	-1.3 *(<-2.0%)*	-1.0 *(-2.0%–1.7%)*	-1.1 *(1.7%–5.3%)*	-0.9 *(5.3%–11.1%)*	-2.1 *(>11.1%)*	Q1-Q4: below 11.1%	Irregular
Net issuance	+0.7 *(<-2.8%)*	-0.4 *(-2.8%–-1.2%)*	-1.9 *(-1.2%–-0.1%)*	-1.6 *(-0.1%–0.4%)*	-3.2 *(>0.4%)*	Q1: below -2.8%	Irregular
Momentum 12-1	-2.4 *(<-5.1%)*	+0.4 *(-5.1%–4.6%)*	-0.3 *(4.6%–13.0%)*	-1.4 *(13.0%–22.6%)*	-2.9 *(>22.6%)*	Q2: -5.1% to 4.6%	Sweet spot in middle
Reversal 1M	-1.7 *(<-2.7%)*	-0.5 *(-2.7%–-0.2%)*	-1.2 *(-0.2%–2.1%)*	-0.9 *(2.1%–4.7%)*	-2.0 *(>4.7%)*	Q2-Q4: -2.7% to 4.7%	Sweet spot in middle
52-wk high	-2.5 *(<0.86)*	-0.6 *(0.86–0.92)*	-0.9 *(0.92–0.96)*	-0.6 *(0.96–1.00)*	-1.8 *(>1.00)*	Q2-Q4: 0.86 to 1.00	Sweet spot in middle
Resid. momentum	+0.5 *(<-2.33)*	-1.7 *(-2.33–-0.68)*	-1.3 *(-0.68–0.61)*	-1.0 *(0.61–2.19)*	-3.3 *(>2.19)*	Q1: below -2.33	Irregular
Rev. breadth	-1.0 *(<-17.2%)*	-1.7 *(-17.2%–-2.8%)*	-1.5 *(-2.8%–0.0%)*	-0.9 *(0.0%–13.7%)*	-1.3 *(>13.7%)*	Q3-Q5: above -2.8%	No effect
Rev. magnitude	-1.9 *(<-0.1%)*	-1.6 *(-0.1%–-0.0%)*	-0.8 *(-0.0%–0.0%)*	-0.9 *(0.0%–0.1%)*	-0.6 *(>0.1%)*	Q3-Q5: above -0.0%	Irregular
SUE	-0.4 *(<-0.0%)*	-1.5 *(-0.0%–0.0%)*	-1.0 *(0.0%–0.1%)*	-3.0 *(0.1%–0.1%)*	-2.4 *(>0.1%)*	Q1: below -0.0%	Irregular
Rec. change	-0.8 *(<-0.10)*	-1.5 *(-0.10–-0.02)*	-1.9 *(-0.02–0.01)*	-1.9 *(0.01–0.09)*	-0.2 *(>0.09)*	Q5: above 0.09	Extremes beat middle
Dispersion	-0.3 *(<0.01)*	-0.2 *(0.01–0.01)*	-0.8 *(0.01–0.01)*	-3.4 *(0.01–0.02)*	-1.7 *(>0.02)*	Q1-Q3: below 0.01	Extremes beat middle
Beta	-2.1 *(<0.35)*	+0.0 *(0.35–0.47)*	-0.0 *(0.47–0.59)*	-4.3 *(0.59–0.79)*	-1.0 *(>0.79)*	Q2-Q3: 0.35 to 0.59	Sweet spot in middle
Idio. volatility	+1.0 *(<0.9%)*	-0.2 *(0.9%–1.1%)*	-1.2 *(1.1%–1.2%)*	-1.7 *(1.2%–1.4%)*	-4.2 *(>1.4%)*	Q1: below 0.9%	Less is better
Altman Z	-0.8 *(<2.46)*	-0.9 *(2.46–3.37)*	-3.0 *(3.37–4.36)*	+0.1 *(4.36–5.53)*	-2.3 *(>5.53)*	Q4: 4.36 to 5.53	Sweet spot in middle
Short interest	+0.1 *(<0.2%)*	-0.3 *(0.2%–0.6%)*	-2.9 *(0.6%–1.3%)*	-4.6 *(1.3%–3.1%)*	-4.5 *(>3.1%)*	Q1-Q2: below 0.6%	Irregular
Δ Short interest	-3.8 *(<-0.5%)*	-3.4 *(-0.5%–-0.1%)*	-1.3 *(-0.1%–0.1%)*	-1.5 *(0.1%–0.5%)*	-2.8 *(>0.5%)*	Q3-Q4: -0.1% to 0.5%	Sweet spot in middle

Favourable profile: The full quality-income profile: free-cash-flow yields above 5.3%, payout above 6.2%, earnings yields above 5.2%, with low idiosyncratic volatility (below 0.9%), low beta (0.35–0.59) and short interest below 0.6%.

Panel F. Health Care

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Earnings yield	-3.4 (<2.2%)	-2.2 (2.2%–3.3%)	-0.2 (3.3%–4.3%)	+0.4 (4.3%–5.7%)	+2.0 (>5.7%)	Q5: above 5.7%	More is better
Book-to-price	-0.9 (<0.14)	-0.6 (0.14–0.21)	-1.8 (0.21–0.30)	-0.7 (0.30–0.42)	+0.8 (>0.42)	Q5: above 0.42	Extremes beat middle
FCF yield	-5.0 (<2.3%)	-1.8 (2.3%–3.5%)	-1.1 (3.5%–4.7%)	+0.5 (4.7%–6.6%)	+3.0 (>6.6%)	Q5: above 6.6%	More is better
EBITDA/EV	-4.4 (<5.2%)	-1.4 (5.2%–6.8%)	-2.5 (6.8%–8.5%)	+1.7 (8.5%–10.8%)	+1.4 (>10.8%)	Q4-Q5: above 8.5%	Irregular
Net payout yield	-3.8 (<0.4%)	-1.8 (0.4%–1.8%)	-1.4 (1.8%–3.3%)	+1.5 (3.3%–5.2%)	+2.4 (>5.2%)	Q5: above 5.2%	More is better
Gross profitability	-2.1 (<22.3%)	-1.0 (22.3%–31.5%)	+0.7 (31.5%–37.6%)	+0.3 (37.6%–44.9%)	-0.5 (>44.9%)	Q3-Q4: 31.5% to 44.9%	Sweet spot in middle
ROE	-0.8 (<8.4%)	-0.1 (8.4%–14.9%)	-0.1 (14.9%–20.1%)	-1.8 (20.1%–27.0%)	-0.7 (>27.0%)	Q1-Q3: below 20.1%	Extremes beat middle
Margin trend	-1.4 (<-1.5%)	-0.9 (-1.5%–-0.2%)	+0.1 (-0.2%–0.5%)	+0.2 (0.5%–1.5%)	-1.4 (>1.5%)	Q3-Q4: -0.2% to 1.5%	Sweet spot in middle
Accruals	-0.7 (<-6.4%)	-1.0 (-6.4%–-4.5%)	-0.4 (-4.5%–-3.1%)	+0.7 (-3.1%–-1.6%)	-2.1 (>-1.6%)	Q4: -3.1% to -1.6%	Sweet spot in middle
Asset growth	-0.1 (<0.1%)	+0.3 (0.1%–4.8%)	+1.1 (4.8%–10.5%)	-1.0 (10.5%–19.7%)	-3.6 (>19.7%)	Q3: 4.8% to 10.5%	Sweet spot in middle
Net issuance	+2.0 (<-3.0%)	+0.6 (-3.0%–-1.4%)	-1.0 (-1.4%–-0.1%)	+0.1 (-0.1%–0.9%)	-4.9 (>0.9%)	Q1: below -3.0%	Irregular
Momentum 12-1	+1.1 (<-6.5%)	-1.8 (-6.5%–-4.7%)	-0.6 (4.7%–15.0%)	-0.5 (15.0%–27.3%)	-1.6 (>27.3%)	Q1: below -6.5%	Irregular
Reversal 1M	+0.4 (<-3.6%)	-0.6 (-3.6%–0.1%)	+0.2 (0.1%–2.9%)	-1.0 (2.9%–6.1%)	-2.1 (>6.1%)	Q1: below -3.6%	Irregular
52-wk high	+0.6 (<0.83)	-1.1 (0.83–0.90)	-1.8 (0.90–0.96)	+0.0 (0.96–1.00)	-1.3 (>1.00)	Q1: below 0.83	Irregular
Resid. momentum	-0.6 (<-2.78)	+0.9 (-2.78–-1.08)	-0.8 (-1.08–0.37)	-1.6 (0.37–2.07)	-1.2 (>2.07)	Q2: -2.78 to -1.08	Sweet spot in middle
Rev. breadth	-1.1 (<-9.4%)	-0.8 (-9.4%–0.0%)	-0.3 (0.0%–4.2%)	-1.0 (4.2%–12.7%)	+0.0 (>12.7%)	Q5: above 12.7%	Irregular
Rev. magnitude	+0.8 (<-0.1%)	-1.2 (-0.1%–0.0%)	-0.2 (0.0%–0.0%)	-1.2 (0.0%–0.1%)	+1.2 (>0.1%)	Q5: above 0.1%	Extremes beat middle
SUE	+0.1 (<0.0%)	-1.6 (0.0%–0.0%)	-1.0 (0.0%–0.1%)	-1.0 (0.1%–0.1%)	+0.3 (>0.1%)	Q5: above 0.1%	Extremes beat middle
Rec. change	-0.2 (<-0.09)	-1.2 (-0.09–0.02)	-1.1 (-0.02–0.02)	-0.4 (0.02–0.09)	-0.3 (>0.09)	Q1: below -0.09	Extremes beat middle
Dispersion	-0.3 (<0.01)	-0.1 (0.01–0.01)	-0.7 (0.01–0.01)	-1.1 (0.01–0.03)	-1.0 (>0.03)	Q1-Q3: below 0.01	No effect
Beta	-0.8 (<0.53)	-0.4 (0.53–0.70)	+0.4 (0.70–0.85)	-0.0 (0.85–1.05)	-2.4 (>1.05)	Q3-Q4: 0.70 to 1.05	Sweet spot in middle
Idio. volatility	+0.8 (<1.1%)	+1.4 (1.1%–1.3%)	+1.1 (1.3%–1.5%)	-1.2 (1.5%–1.8%)	-5.4 (>1.8%)	Q1-Q3: below 1.5%	Irregular
Altman Z	+1.5 (<2.67)	-0.2 (2.67–3.45)	-1.9 (3.45–4.58)	-0.0 (4.58–7.15)	-1.8 (>7.15)	Q1: below 2.67	Irregular
Short interest	-1.2 (<0.2%)	-0.9 (0.2%–0.5%)	-1.6 (0.5%–1.0%)	-3.4 (1.0%–2.5%)	-3.8 (>2.5%)	Q1-Q3: below 1.0%	Irregular
Δ Short interest	-3.3 (<-0.5%)	-1.2 (-0.5%–-0.1%)	-1.2 (-0.1%–0.1%)	-1.9 (0.1%–0.5%)	-4.1 (>0.5%)	Q2-Q4: -0.5% to 0.5%	Sweet spot in middle

Favourable profile: Cash-flow value across the board: free-cash-flow yields above 6.6%, EBITDA/EV above 8.5%, earnings yields above 5.7% and payout above 5.2%, with repurchasers favoured and only the most volatile tail penalised.

Panel G. Financials

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Earnings yield	-0.6 (<4.2%)	-1.6 (4.2%–6.2%)	-1.6 (6.2%–7.7%)	-1.2 (7.7%–9.4%)	+1.5 (>9.4%)	Q5: above 9.4%	Extremes beat middle
Book-to-price	+0.1 (<0.37)	-1.7 (0.37–0.56)	-1.9 (0.56–0.73)	+0.2 (0.73–0.93)	-0.1 (>0.93)	Q4-Q5: above 0.73	Extremes beat middle
Net payout yield	-3.4 (<1.6%)	-0.8 (1.6%–3.5%)	-1.0 (3.5%–5.2%)	-0.1 (5.2%–7.2%)	+0.7 (>7.2%)	Q5: above 7.2%	Irregular
ROE	-0.1 (<7.7%)	-1.0 (7.7%–11.5%)	-2.4 (11.5%–14.0%)	+1.4 (14.0%–19.2%)	-1.0 (>19.2%)	Q4: 14.0% to 19.2%	Sweet spot in middle
Margin trend	+0.1 (<-3.2%)	-1.3 (-3.2%–-0.7%)	+0.0 (-0.7%–1.0%)	+0.1 (1.0%–3.1%)	-2.9 (>3.1%)	Q3-Q4: -0.7% to 3.1%	Irregular
Net issuance	+3.1 (<-4.1%)	-1.7 (-4.1%–-1.8%)	-0.0 (-1.8%–-0.3%)	-1.8 (-0.3%–0.6%)	-2.6 (>0.6%)	Q1: below -4.1%	Irregular
Momentum 12-1	-1.7 (<-1.9%)	-2.4 (-1.9%–5.9%)	-0.7 (5.9%–13.4%)	+1.4 (13.4%–22.0%)	+0.0 (>22.0%)	Q4: 13.4% to 22.0%	Sweet spot in middle
Reversal 1M	-2.9 (<-2.6%)	-0.0 (-2.6%–0.2%)	+1.1 (0.2%–2.5%)	-0.9 (2.5%–5.1%)	-0.8 (>5.1%)	Q3: 0.2% to 2.5%	Sweet spot in middle
52-wk high	-1.7 (<0.86)	-1.6 (0.86–0.92)	-0.6 (0.92–0.96)	+0.0 (0.96–1.00)	+0.5 (>1.00)	Q4-Q5: above 0.96	More is better
Resid. momentum	-2.6 (<-2.50)	-1.4 (-2.50–-0.81)	-0.1 (-0.81–0.68)	+0.1 (0.68–2.33)	+0.7 (>2.33)	Q4-Q5: above 0.68	More is better
Rev. breadth	-3.1 (<-25.0%)	-1.0 (-25.0%–-4.5%)	+0.5 (-4.5%–4.8%)	-0.1 (4.8%–20.4%)	+0.4 (>20.4%)	Q3-Q5: above -4.5%	Irregular
Rev. magnitude	-2.3 (<-0.2%)	-1.6 (-0.2%–-0.0%)	-0.1 (-0.0%–0.1%)	+0.3 (0.1%–0.2%)	+1.1 (>0.2%)	Q5: above 0.2%	More is better
SUE	-3.3 (<-0.0%)	-1.2 (-0.0%–0.0%)	+0.3 (0.0%–0.1%)	+0.2 (0.1%–0.2%)	+1.8 (>0.2%)	Q5: above 0.2%	Irregular
Rec. change	-1.3 (<-0.09)	-1.2 (-0.09–-0.02)	-0.1 (-0.02–0.02)	-0.2 (0.02–0.09)	-0.4 (>0.09)	Q3-Q5: above -0.02	Irregular
Dispersion	+0.1 (<0.01)	-1.3 (0.01–0.02)	-0.4 (0.02–0.03)	+0.7 (0.03–0.04)	-2.1 (>0.04)	Q4: 0.03 to 0.04	Irregular
Beta	+0.4 (<0.75)	+1.0 (0.75–1.03)	-1.0 (1.03–1.24)	-0.8 (1.24–1.48)	-2.9 (>1.48)	Q1-Q2: below 1.03	Irregular
Idio. volatility	+1.6 (<0.9%)	-0.2 (0.9%–1.0%)	-0.6 (1.0%–1.2%)	-0.8 (1.2%–1.3%)	-3.3 (>1.3%)	Q1: below 0.9%	Less is better
Short interest	-3.8 (<0.0%)	+0.1 (0.0%–0.3%)	+0.2 (0.3%–0.7%)	-0.9 (0.7%–1.6%)	-4.1 (>1.6%)	Q2-Q3: 0.0% to 0.7%	Sweet spot in middle
Δ Short interest	-2.2 (<-0.4%)	-0.3 (-0.4%–-0.1%)	-0.9 (-0.1%–0.0%)	-1.3 (0.0%–0.4%)	-3.6 (>0.4%)	Q2-Q3: -0.4% to 0.0%	Sweet spot in middle

Favourable profile: Repurchasers (net issuance below -4.1%) with positive earnings surprises, payout above 7.2% and low idiosyncratic risk; both the most-shorted and the entirely unshorted names underperform the moderate middle.

Panel H. Info. Tech.

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Earnings yield	-8.3 (<1.7%)	-5.7 (1.7%–3.1%)	-5.0 (3.1%–4.1%)	-3.1 (4.1%–5.5%)	-5.1 (>5.5%)	Q4: 4.1% to 5.5%	Sweet spot in middle
Book-to-price	-6.1 (<0.14)	-3.3 (0.14–0.22)	-6.9 (0.22–0.30)	-6.3 (0.30–0.43)	-4.5 (>0.43)	Q2: 0.14 to 0.22	Sweet spot in middle
FCF yield	-8.7 (<2.9%)	-7.5 (2.9%–4.5%)	-6.3 (4.5%–5.7%)	-3.0 (5.7%–7.3%)	-2.1 (>7.3%)	Q5: above 7.3%	More is better
EBITDA/EV	-7.4 (<4.5%)	-6.8 (4.5%–6.5%)	-4.0 (6.5%–8.3%)	-4.4 (8.3%–11.3%)	-4.4 (>11.3%)	Q3-Q5: above 6.5%	Irregular
Net payout yield	-7.6 (<0.9%)	-8.1 (0.9%–2.2%)	-5.1 (2.2%–3.6%)	-4.0 (3.6%–5.6%)	-1.7 (>5.6%)	Q5: above 5.6%	Irregular
Gross profitability	-9.0 (<22.7%)	-7.5 (22.7%–31.4%)	-4.9 (31.4%–37.0%)	-2.5 (37.0%–44.9%)	-3.6 (>44.9%)	Q4: 37.0% to 44.9%	Sweet spot in middle
ROE	-6.8 (<7.0%)	-6.2 (7.0%–14.1%)	-6.0 (14.1%–20.3%)	-4.0 (20.3%–29.7%)	-4.2 (>29.7%)	Q4-Q5: above 20.3%	Irregular
Margin trend	-5.9 (<-2.3%)	-5.6 (-2.3%–-0.3%)	-5.3 (-0.3%–0.8%)	-5.8 (0.8%–2.9%)	-5.5 (>2.9%)	Q1-Q5: any level	No effect
Accruals	-4.0 (<-9.7%)	-4.7 (-9.7%–-6.8%)	-5.0 (-6.8%–-4.3%)	-5.3 (-4.3%–-2.4%)	-8.0 (>-2.4%)	Q1-Q2: below -6.8%	Less is better
Asset growth	-4.5 (<-2.1%)	-3.0 (-2.1%–3.9%)	-4.8 (3.9%–9.6%)	-6.1 (9.6%–18.4%)	-8.5 (>18.4%)	Q2: -2.1% to 3.9%	Sweet spot in middle
Net issuance	-4.2 (<-3.4%)	-4.1 (-3.4%–-1.3%)	-6.5 (-1.3%–-0.1%)	-4.8 (-0.1%–1.2%)	-7.5 (>1.2%)	Q1-Q2: below -1.3%	Irregular
Momentum 12-1	-4.0 (<-8.5%)	-3.4 (-8.5%–4.5%)	-3.8 (4.5%–16.1%)	-6.4 (16.1%–31.6%)	-9.6 (>31.6%)	Q1-Q3: below 16.1%	Irregular
Reversal 1M	-6.2 (<-4.1%)	-6.3 (-4.1%–-0.1%)	-4.2 (-0.1%–3.0%)	-5.0 (3.0%–6.7%)	-5.5 (>6.7%)	Q3: -0.1% to 3.0%	Sweet spot in middle
52-wk high	-6.0 (<0.79)	-6.4 (0.79–0.89)	-4.0 (0.89–0.95)	-5.0 (0.95–1.00)	-5.9 (>1.00)	Q3: 0.89 to 0.95	Sweet spot in middle
Resid. momentum	-5.2 (<-3.18)	-4.7 (-3.18–-1.20)	-4.4 (-1.20–0.40)	-5.2 (0.40–2.20)	-7.2 (>2.20)	Q2-Q3: -3.18 to 0.40	Sweet spot in middle
Rev. breadth	-5.4 (<-10.4%)	-4.1 (-10.4%–0.0%)	-5.3 (0.0%–2.8%)	-6.4 (2.8%–13.7%)	-5.9 (>13.7%)	Q2: -10.4% to 0.0%	Sweet spot in middle
Rev. magnitude	-3.4 (<-0.2%)	-6.0 (-0.2%–0.0%)	-3.2 (0.0%–0.1%)	-4.4 (0.1%–0.2%)	-5.8 (>0.2%)	Q3: 0.0% to 0.1%	Irregular
SUE	-6.1 (<0.0%)	-5.9 (0.0%–0.0%)	-4.9 (0.0%–0.1%)	-7.1 (0.1%–0.2%)	-3.8 (>0.2%)	Q5: above 0.2%	Extremes beat middle
Rec. change	-4.4 (<-0.09)	-5.0 (-0.09–-0.03)	-5.5 (-0.03–0.02)	-6.0 (0.02–0.08)	-6.3 (>0.08)	Q1-Q2: below -0.03	Less is better
Dispersion	-4.4 (<0.01)	-5.1 (0.01–0.02)	-6.8 (0.02–0.03)	-6.8 (0.03–0.05)	-4.2 (>0.05)	Q5: above 0.05	Extremes beat middle
Beta	-4.5 (<0.94)	-1.4 (0.94–1.09)	-4.4 (1.09–1.31)	-9.2 (1.31–1.57)	-7.4 (>1.57)	Q2: 0.94 to 1.09	Sweet spot in middle
Idio. volatility	-3.2 (<1.2%)	-4.2 (1.2%–1.4%)	-5.6 (1.4%–1.7%)	-6.8 (1.7%–2.1%)	-7.6 (>2.1%)	Q1: below 1.2%	Less is better
Altman Z	-4.3 (<2.33)	-4.8 (2.33–3.57)	-6.0 (3.57–5.14)	-4.8 (5.14–7.95)	-7.0 (>7.95)	Q1-Q2: below 3.57	Irregular
Short interest	-3.8 (<0.3%)	-6.2 (0.3%–0.7%)	-6.3 (0.7%–1.5%)	-6.7 (1.5%–3.3%)	-9.3 (>3.3%)	Q1: below 0.3%	Less is better
Δ Short interest	-7.2 (<-0.6%)	-6.0 (-0.6%–-0.1%)	-5.7 (-0.1%–0.1%)	-5.6 (0.1%–0.6%)	-8.1 (>0.6%)	Q2-Q4: -0.6% to 0.6%	Sweet spot in middle

Favourable profile: Profitable cash generators that have not already run: market-like beta (0.94–1.09), gross profitability of 37–45%, free-cash-flow yields above 7.3%, minimal short interest, and past-year returns below roughly +16% (the momentum tail reverses here).

Panel I. Comm. Svcs.

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Earnings yield	-8.1 (<2.0%)	-3.4 (2.0%–4.5%)	-2.7 (4.5%–6.0%)	-2.2 (6.0%–8.0%)	-3.7 (>8.0%)	Q3-Q4: 4.5% to 8.0%	Sweet spot in middle
Book-to-price	-5.1 (<0.19)	-4.9 (0.19–0.29)	+0.4 (0.29–0.45)	-1.2 (0.45–0.73)	-8.4 (>0.73)	Q3: 0.29 to 0.45	Sweet spot in middle
FCF yield	-9.2 (<3.2%)	-5.0 (3.2%–4.5%)	-4.8 (4.5%–5.7%)	-0.8 (5.7%–7.6%)	+0.7 (>7.6%)	Q5: above 7.6%	More is better
EBITDA/EV	-7.4 (<7.4%)	-4.6 (7.4%–10.1%)	-5.9 (10.1%–12.5%)	-3.0 (12.5%–15.2%)	+1.2 (>15.2%)	Q5: above 15.2%	Irregular
Net payout yield	-4.3 (<1.3%)	-4.3 (1.3%–3.8%)	-4.0 (3.8%–5.5%)	-1.9 (5.5%–7.7%)	-3.1 (>7.7%)	Q4: 5.5% to 7.7%	Sweet spot in middle
Gross profitability	-7.3 (<14.9%)	-5.7 (14.9%–20.7%)	-6.0 (20.7%–25.5%)	+0.4 (25.5%–34.9%)	-1.6 (>34.9%)	Q4: 25.5% to 34.9%	Sweet spot in middle
ROE	-9.0 (<5.2%)	-3.6 (5.2%–11.5%)	-0.1 (11.5%–17.8%)	-2.4 (17.8%–26.1%)	-5.1 (>26.1%)	Q3: 11.5% to 17.8%	Sweet spot in middle
Margin trend	-5.6 (<-1.8%)	-4.6 (-1.8%–-0.3%)	-4.4 (-0.3%–0.7%)	-3.1 (0.7%–2.1%)	-2.5 (>2.1%)	Q4-Q5: above 0.7%	More is better
Accruals	+0.5 (<-8.8%)	-7.0 (-8.8%–-6.1%)	-4.7 (-6.1%–-4.0%)	-4.2 (-4.0%–-1.9%)	-3.2 (>-1.9%)	Q1: below -8.8%	Extremes beat middle
Asset growth	-2.4 (<-2.2%)	-1.4 (-2.2%–1.1%)	-6.2 (1.1%–4.9%)	-2.7 (4.9%–12.3%)	-6.3 (>12.3%)	Q2: -2.2% to 1.1%	Sweet spot in middle
Net issuance	-3.5 (<-3.3%)	-1.0 (-3.3%–-0.6%)	-5.5 (-0.6%–0.5%)	-5.5 (0.5%–1.6%)	-3.1 (>1.6%)	Q2: -3.3% to -0.6%	Sweet spot in middle
Momentum 12-1	-6.6 (<-11.0%)	-3.9 (-11.0%–0.9%)	-1.0 (0.9%–10.8%)	-4.3 (10.8%–26.8%)	-3.2 (>26.8%)	Q3: 0.9% to 10.8%	Sweet spot in middle
Reversal 1M	-5.7 (<-4.0%)	-3.0 (-4.0%–-0.8%)	-4.3 (-0.8%–1.8%)	-3.5 (1.8%–5.0%)	-3.1 (>5.0%)	Q2: -4.0% to -0.8%	Irregular
52-wk high	-6.2 (<0.82)	-3.2 (0.82–0.89)	-4.5 (0.89–0.94)	-2.1 (0.94–0.98)	-3.1 (>0.98)	Q4: 0.94 to 0.98	Sweet spot in middle
Resid. momentum	-3.4 (<-2.89)	-1.6 (-2.89–-0.95)	-3.4 (-0.95–0.48)	-4.3 (0.48–2.00)	-4.9 (>2.00)	Q2: -2.89 to -0.95	Sweet spot in middle
Rev. breadth	-7.1 (<-20.3%)	-4.8 (-20.3%–-5.8%)	-2.7 (-5.8%–0.0%)	-3.2 (0.0%–9.6%)	-2.1 (>9.6%)	Q5: above 9.6%	Irregular
Rev. magnitude	-9.1 (<-0.2%)	-1.8 (-0.2%–-0.0%)	-6.9 (-0.0%–0.0%)	+1.4 (0.0%–0.1%)	-1.1 (>0.1%)	Q4: 0.0% to 0.1%	Sweet spot in middle
SUE	-8.4 (<-0.0%)	-5.4 (-0.0%–0.0%)	-4.8 (0.0%–0.1%)	+2.0 (0.1%–0.2%)	-3.8 (>0.2%)	Q4: 0.1% to 0.2%	Sweet spot in middle
Rec. change	-3.3 (<-0.09)	-4.2 (-0.09–-0.03)	-3.6 (-0.03–0.01)	-5.2 (0.01–0.07)	-3.0 (>0.07)	Q5: above 0.07	Extremes beat middle
Dispersion	-5.2 (<0.02)	-0.6 (0.02–0.03)	-3.3 (0.03–0.04)	-6.2 (0.04–0.08)	-4.6 (>0.08)	Q2: 0.02 to 0.03	Sweet spot in middle
Beta	-5.7 (<0.70)	-0.1 (0.70–0.95)	-1.6 (0.95–1.10)	-0.9 (1.10–1.36)	-9.0 (>1.36)	Q2: 0.70 to 0.95	Sweet spot in middle
Idio. volatility	-0.9 (<1.1%)	-4.8 (1.1%–1.3%)	-2.4 (1.3%–1.5%)	-4.2 (1.5%–1.9%)	-6.1 (>1.9%)	Q1: below 1.1%	Irregular
Altman Z	-7.0 (<0.93)	-4.6 (0.93–1.51)	-5.0 (1.51–2.06)	+0.1 (2.06–3.39)	-1.4 (>3.39)	Q4: 2.06 to 3.39	Sweet spot in middle
Short interest	-6.7 (<0.3%)	-1.7 (0.3%–0.8%)	-5.0 (0.8%–1.9%)	-2.1 (1.9%–5.3%)	-12.1 (>5.3%)	Q2: 0.3% to 0.8%	Sweet spot in middle
Δ Short interest	-5.9 (<-0.6%)	-4.6 (-0.6%–-0.1%)	-4.4 (-0.1%–0.1%)	-4.8 (0.1%–0.8%)	-8.1 (>0.8%)	Q2-Q4: -0.6% to 0.8%	Sweet spot in middle

Favourable profile: Modest short interest (0.3–0.8%), market-like beta (0.70–0.95), positive surprises and rising estimates, and strong free cash flow; both the most-shorted and highest-beta tails are heavily penalised. The smallest sector: read with its Moderate tier.

Panel J. Utilities

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Earnings yield	+1.0 (<4.1%)	-1.1 (4.1%–5.2%)	-0.2 (5.2%–6.0%)	+1.1 (6.0%–6.8%)	+0.4 (>6.8%)	Q4-Q5: above 6.0%	Extremes beat middle
Book-to-price	-1.2 (<0.42)	+0.4 (0.42–0.51)	+0.3 (0.51–0.59)	+0.8 (0.59–0.68)	-0.9 (>0.68)	Q2-Q4: 0.42 to 0.68	Sweet spot in middle
FCF yield	+0.2 (<-2.3%)	-2.2 (-2.3%–-1.1%)	-1.0 (-1.1%–-0.1%)	-0.9 (-0.1%–1.5%)	+0.2 (>1.5%)	Q1: below -2.3%	Extremes beat middle
EBITDA/EV	-0.3 (<9.3%)	-0.1 (9.3%–10.3%)	+1.1 (10.3%–11.4%)	+0.5 (11.4%–12.7%)	+1.3 (>12.7%)	Q5: above 12.7%	Irregular
Net payout yield	-4.0 (<1.3%)	+0.5 (1.3%–2.6%)	-0.9 (2.6%–3.4%)	-2.3 (3.4%–4.2%)	+1.4 (>4.2%)	Q5: above 4.2%	Irregular
Gross profitability	-0.4 (<7.5%)	-0.2 (7.5%–8.2%)	+0.4 (8.2%–8.9%)	+0.7 (8.9%–9.7%)	+1.2 (>9.7%)	Q4-Q5: above 8.9%	More is better
ROE	+2.3 (<7.6%)	+2.5 (7.6%–10.0%)	-0.2 (10.0%–11.4%)	-1.8 (11.4%–14.1%)	-1.6 (>14.1%)	Q1-Q2: below 10.0%	Irregular
Margin trend	-1.0 (<-1.6%)	+0.8 (-1.6%–-0.4%)	+1.0 (-0.4%–0.7%)	+0.1 (0.7%–2.0%)	+0.7 (>2.0%)	Q2-Q3: -1.6% to 0.7%	Irregular
Accruals	+1.5 (<-5.2%)	-0.0 (-5.2%–-4.0%)	-0.2 (-4.0%–-3.4%)	-1.4 (-3.4%–-2.4%)	-2.0 (>-2.4%)	Q1: below -5.2%	Less is better
Net issuance	+4.2 (<0.1%)	-0.5 (0.1%–0.4%)	+2.3 (0.4%–0.9%)	-3.1 (0.9%–2.7%)	-2.7 (>2.7%)	Q1: below 0.1%	Irregular
Momentum 12-1	-3.6 (<1.9%)	-1.0 (1.9%–8.3%)	+0.7 (8.3%–13.6%)	+1.6 (13.6%–19.6%)	+1.3 (>19.6%)	Q4-Q5: above 13.6%	Irregular
Reversal 1M	-3.4 (<-0.9%)	+0.2 (-0.9%–0.7%)	+0.9 (0.7%–2.1%)	+1.2 (2.1%–3.9%)	+0.5 (>3.9%)	Q3-Q5: above 0.7%	Irregular
52-wk high	-3.9 (<0.89)	-0.6 (0.89–0.94)	+1.4 (0.94–0.96)	+0.7 (0.96–0.99)	+1.7 (>0.99)	Q5: above 0.99	Irregular
Resid. momentum	-3.3 (<-2.05)	-0.9 (-2.05–-0.86)	+0.7 (-0.86–0.18)	+1.2 (0.18–1.51)	+2.1 (>1.51)	Q5: above 1.51	More is better
Rev. breadth	-1.2 (<-10.9%)	-1.0 (-10.9%–0.0%)	+0.9 (0.0%–1.0%)	+0.2 (1.0%–11.5%)	+0.3 (>11.5%)	Q3-Q5: above 0.0%	Irregular
Rev. magnitude	-1.4 (<-0.1%)	-2.0 (-0.1%–0.0%)	+1.1 (0.0%–0.0%)	+1.1 (0.0%–0.1%)	+0.8 (>0.1%)	Q3-Q5: above 0.0%	Irregular
SUE	+1.8 (<-0.1%)	-0.3 (-0.1%–0.0%)	-1.6 (0.0%–0.1%)	-0.1 (0.1%–0.2%)	-1.2 (>0.2%)	Q1: below -0.1%	Irregular
Rec. change	-2.5 (<-0.09)	-0.9 (-0.09–-0.01)	+1.1 (-0.01–0.01)	+0.7 (0.01–0.10)	+0.6 (>0.10)	Q3-Q5: above -0.01	Irregular
Dispersion	+2.5 (<0.01)	+0.5 (0.01–0.01)	-2.4 (0.01–0.02)	-2.6 (0.02–0.03)	+1.8 (>0.03)	Q1: below 0.01	Extremes beat middle
Beta	+1.4 (<0.23)	-0.0 (0.23–0.31)	+0.6 (0.31–0.41)	+1.9 (0.41–0.55)	-3.6 (>0.55)	Q4: 0.41 to 0.55	Irregular
Idio. volatility	+1.1 (<1.0%)	+1.5 (1.0%–1.0%)	+1.0 (1.0%–1.1%)	-0.1 (1.1%–1.3%)	-4.0 (>1.3%)	Q1-Q3: below 1.1%	Irregular
Altman Z	+1.6 (<0.79)	-0.3 (0.79–0.92)	+0.5 (0.92–1.01)	+1.9 (1.01–1.19)	-1.7 (>1.19)	Q4: 1.01 to 1.19	Irregular
Short interest	-0.5 (<0.4%)	-1.7 (0.4%–0.8%)	-1.0 (0.8%–1.6%)	-0.6 (1.6%–2.9%)	+3.1 (>2.9%)	Q5: above 2.9%	Extremes beat middle
Δ Short interest	+1.0 (<-0.6%)	-0.2 (-0.6%–-0.1%)	-0.7 (-0.1%–0.1%)	-1.5 (0.1%–0.6%)	+0.8 (>0.6%)	Q1: below -0.6%	Extremes beat middle

Favourable profile: Trend, not value: non-diluting names (no net issuance), beta of roughly 0.4–0.55, prices at or near their 52-week highs with positive residual momentum, and payout above 4.2%. The earnings-yield profile is U-shaped with its sweet spot at price-to-earnings of roughly 15–17; the very cheapest names are the wildfire-liability tail of Section 11.

Panel K. Real Estate

Signal	Q1 (low)	Q2	Q3	Q4	Q5 (high)	Favourable zone (raw values)	Shape
Book-to-price	+0.5 (<0.21)	-2.1 (0.21–0.34)	-3.0 (0.34–0.43)	-1.3 (0.43–0.54)	-3.8 (>0.54)	Q1: below 0.21	Irregular
FCF yield	+1.4 (<2.7%)	-2.1 (2.7%–3.4%)	-3.3 (3.4%–3.8%)	-1.6 (3.8%–4.3%)	-3.8 (>4.3%)	Q1: below 2.7%	Irregular
Net payout yield	-1.2 (<1.1%)	+0.0 (1.1%–2.8%)	-2.0 (2.8%–3.8%)	-1.9 (3.8%–5.0%)	-7.6 (>5.0%)	Q2: 1.1% to 2.8%	Sweet spot in middle
Gross profitability	-1.2 (<3.7%)	-1.8 (3.7%–4.6%)	-5.7 (4.6%–6.3%)	-1.0 (6.3%–11.2%)	-0.3 (>11.2%)	Q4-Q5: above 6.3%	Extremes beat middle
ROE	-0.8 (<3.6%)	-0.3 (3.6%–6.3%)	-2.9 (6.3%–9.4%)	-4.7 (9.4%–14.8%)	-1.2 (>14.8%)	Q1-Q2: below 6.3%	Extremes beat middle
Margin trend	-3.5 (<-3.0%)	+0.6 (-3.0%–-0.9%)	-1.2 (-0.9%–0.4%)	-1.2 (0.4%–2.1%)	-4.6 (>2.1%)	Q2: -3.0% to -0.9%	Sweet spot in middle
Momentum 12-1	-3.4 (<-0.3%)	-1.9 (-0.3%–7.0%)	-2.5 (7.0%–12.9%)	-1.4 (12.9%–20.0%)	-0.9 (>20.0%)	Q4-Q5: above 12.9%	Irregular
Reversal 1M	-2.9 (<-1.8%)	-0.5 (-1.8%–0.2%)	-1.7 (0.2%–2.1%)	-2.0 (2.1%–4.3%)	-2.7 (>4.3%)	Q2: -1.8% to 0.2%	Sweet spot in middle
52-wk high	-2.5 (<0.87)	-1.3 (0.87–0.92)	-1.5 (0.92–0.95)	-2.9 (0.95–0.98)	-1.3 (>0.98)	Q2-Q3: 0.87 to 0.95	Irregular
Resid. momentum	-1.9 (<-2.07)	-3.0 (-2.07–-0.90)	-3.1 (-0.90–0.24)	-2.3 (0.24–1.42)	+0.2 (>1.42)	Q5: above 1.42	Extremes beat middle
Rev. breadth	-3.7 (<-23.5%)	-2.1 (-23.5%–0.0%)	-0.1 (0.0%–0.0%)	-2.0 (0.0%–20.0%)	-2.5 (>20.0%)	Q3: 0.0% to 0.0%	Sweet spot in middle
Rev. magnitude	-0.1 (<-0.1%)	-2.2 (-0.1%–-0.0%)	-1.0 (-0.0%–0.1%)	-1.2 (0.1%–0.3%)	-2.9 (>0.3%)	Q1: below -0.1%	Irregular
SUE	-3.9 (<-0.1%)	-1.5 (-0.1%–0.0%)	-1.9 (0.0%–0.1%)	-2.3 (0.1%–0.2%)	-0.8 (>0.2%)	Q5: above 0.2%	Irregular
Rec. change	-2.0 (<-0.09)	-2.3 (-0.09–-0.02)	-1.9 (-0.02–0.01)	-1.1 (0.01–0.09)	-2.6 (>0.09)	Q3-Q4: -0.02 to 0.09	Sweet spot in middle
Dispersion	-2.1 (<0.03)	-3.0 (0.03–0.06)	-0.6 (0.06–0.10)	-1.6 (0.10–0.17)	-0.6 (>0.17)	Q5: above 0.17	Extremes beat middle
Beta	-2.4 (<0.48)	-2.0 (0.48–0.71)	-3.5 (0.71–0.86)	-1.2 (0.86–1.13)	-0.9 (>1.13)	Q4-Q5: above 0.86	Extremes beat middle
Idio. volatility	-3.9 (<1.0%)	-4.5 (1.0%–1.1%)	-0.2 (1.1%–1.2%)	-1.9 (1.2%–1.4%)	+0.4 (>1.4%)	Q5: above 1.4%	Irregular
Short interest	-0.7 (<0.1%)	-3.3 (0.1%–0.5%)	-0.3 (0.5%–1.3%)	-2.7 (1.3%–2.9%)	-2.8 (>2.9%)	Q3: 0.5% to 1.3%	Irregular
Δ Short interest	-1.2 (<-0.7%)	-1.6 (-0.7%–-0.1%)	-2.7 (-0.1%–0.1%)	-0.9 (0.1%–0.6%)	-3.3 (>0.6%)	Q4: 0.1% to 0.6%	Irregular

Favourable profile: The noisiest panel in the study, consistent with its Low tier: modest payout (1–3%) beats high yield decisively (the highest-payout REIT quintile loses 7.6% annualised), and conventional quality measures invert; no coherent favourable profile exists.

Table 9: (Panels A–K) Forward six-month relative returns (annualised, %) by raw-value quintile, for every characterisable signal in every sector. Large figures are returns; the small figure beneath each is the quintile's typical raw-value range (median monthly boundaries), so each row defines its own buckets. Q5 is always the highest raw value of the signal: the cheapest names for valuation yields, the most shorted for short interest, the highest beta for beta. 'Favourable zone' states the quintiles within 0.75 percentage points of the best; the Shape column gives the plain-language verdict defined in the reading guide. Returns are relative to the cap-weighted sector benchmark.

Cross-sector regularities. Three elements recur across the panels and amount to the spine of a general within-sector screen: cash generation (a free-cash-flow-yield zone appears in seven panels, always at or near the top of the distribution), repurchases (the lowest net-issuance quintile is favourable in five sectors and the highest quintile in none), and low idiosyncratic volatility (favourable in five, harmful nowhere outside Real Estate). Around that spine the sector character varies sharply: Industrials and Energy favour the middle of the valuation distribution rather than its cheap tail; Information Technology reverses the momentum tail (past-year winners above roughly +16% underperform, the only sector where chasing strength is reliably punished at the top quintile); Utilities is a trend sector in defensive clothing; and Real Estate offers no profile at all.

The geography of the traps. The cheapest-quintile trap is concentrated and large: Energy's lowest-payout and lowest book-to-price quintiles lose five to six points annualised (the leverage-and-depletion tail of a commodity sector), Communication Services punishes its cheapest-book quintile at -8.4, and Real Estate shows the mirror image at the income end, its highest-payout quintile losing 7.6 points (the unsustainable-yield REITs). Financials is the exception that proves the design: its very cheapest earnings-yield quintile is the single favourable one, which is why a single monotone rule across sectors will always mishandle one sector or another. The practical asymmetry runs through the High tier: in Industrials the entire content of the cash-flow signals is avoiding Q1 (un-cash-generative names underperform by three to seven points, while Q2 through Q5 are barely distinguishable), so two-sided rules (exclude the danger zone, prefer the sweet spot) dominate linear tilts.

Implications and limits. For the model contest of Section 7, the panels flag a nuance in advance: the monotone constraints that make boosting work there capture each signal's dominant direction while ignoring curvature that is real but second-order; for screen design, they argue for quintile-zone rules over linear scores. A shape-aware screen, formally tested and walk-forward validated, is the most promising extension this study leaves open. I flag it as future work rather than mining it here: these are descriptive full-sample profiles, some of the curvature is noise at fewer than ten names per quintile-month, and none of it has been tested out of sample.

7 Combining the Factors: The Model Competition

The sector evidence says which factors matter and where; a screen needs one number per stock. This section asks how the qualifying factors should be combined into that number, and runs the question as a formal contest among eleven rules refit monthly under one purged walk-forward protocol: a no-estimation equal-weight composite of sign-aligned signals at one end; IC-weighted, regularised, pooled and hierarchical regressions in between; constrained boosting at the other. The outcome is the paper's central methodological finding: how the factors are combined matters far more than how cleverly the combination is estimated.

7.1 Headline results

Model	h=1	h=3	h=6	h=12
M1 equal-weight	+0.016 (1.8)	+0.016 (1.2)	+0.027 (1.5)	+0.027 (1.3)
M2 IC-weighted	+0.022 (2.6)	+0.023 (1.5)	+0.017 (0.8)	+0.002 (0.1)
M3 OLS screened	+0.005 (0.7)	+0.000 (0.0)	-0.006 (-0.3)	-0.018 (-1.1)
M4 Ridge	+0.000 (0.0)	-0.006 (-0.5)	-0.009 (-0.5)	-0.014 (-0.8)
M5 Elastic Net	-0.002 (-0.2)	-0.002 (-0.2)	-0.011 (-0.5)	-0.014 (-0.8)
M6 boosted, monotone	+0.017 (2.3)	+0.015 (1.5)	+0.023 (1.5)	+0.017 (1.2)
M7 pooled Ridge	-0.003 (-0.4)	-0.014 (-1.0)	-0.013 (-0.6)	-0.020 (-1.0)
M8 pooled boosted	+0.011 (1.3)	+0.005 (0.4)	+0.010 (0.5)	+0.002 (0.1)
M9 rank combination	+0.016 (1.8)	+0.010 (0.7)	+0.012 (0.6)	+0.003 (0.1)
M10 hierarchical	-0.001 (-0.2)	-0.011 (-0.9)	-0.014 (-0.7)	-0.016 (-0.8)
M11 prior-target	+0.007 (0.9)	+0.002 (0.2)	+0.003 (0.2)	+0.006 (0.4)

Table 10: Pooled out-of-sample rank ICs (Newey–West t, lag = h), OOS origins 2011–2025. Bootstrap 95% intervals for the leaders at h = 1: M2 [+0.003, +0.035], M6 [+0.001, +0.027]. The Model Confidence Set at 10% retains the prior-respecting models and M11 at every horizon and ejects the unrestricted estimators (M4, M7, M10) at short horizons; 64 of 220 Diebold–Mariano pairs are significant at 5%.

The table divides cleanly along one line, and it is not linear-versus-nonlinear or simple-versus-complex: it is whether the model respects the pre-registered signal directions. The no-estimation composite (M1), the sign-floored IC weighting (M2) and monotonicity-constrained boosting (M6) all work; every freely estimated linear specification fails, including the pooled and hierarchical variants that bring more data to bear. Estimation noise, not information shortage, is the binding constraint: with information coefficients of 0.02–0.04 and twenty-five correlated regressors, a 120-month window cannot estimate weights that beat fixed ones, the cross-sectional incarnation of DeMiguel, Garlappi and Uppal (2009) and Lewellen (2015).

7.2 Locating the failure: the prior-target ridge

M11, the prior-target ridge, isolates why estimation fails. Ridge regression shrinks toward zero, an economically arbitrary target; M11 shrinks toward the equal-weight prior direction itself, with a penalty grid wide enough that near-total shrinkage (effectively M1) was available, and the intensity chosen by the same in-window validation as every other model. The result is a monotone chain at every horizon: M1 above M11 above M4. Handed the correct destination, validation still walks only partway toward it, because with signals this faint the in-window loss difference between weak and strong discipline is statistically invisible. The conclusion is sharper than 'restricted models won': the discipline itself cannot be reliably estimated, which is precisely why imposing it ex ante (the Campbell–Thompson move) works. This also explains M6: boosting succeeds here not because trees discover structure but because the monotonicity constraints let it fit interactions only within the prior directions.

7.3 Architecture and tuning robustness

Two pre-registered checks discipline the design itself. The sector-specific-versus-pooled criterion splits informatively: within the model class that works, sector-specific estimation wins overwhelmingly (M6 beats its pooled twin M8 in nine to ten of eleven sectors at every horizon) while the M4-versus-M7 comparison fails the criterion at three of four horizons, a contest between two models that are both inside the noise and therefore uninformative about architecture. I report the split as committed and read it as qualified vindication: sector-specificity matters where signal exists. The defaulted tuning choices are not load-bearing: switching the headline boosted model to an expanding window moves its IC by at most ±0.001, and removing the 36-month recency half-life costs it 0.002–0.004 (the half-life helps, modestly, exactly as the time-varying-parameter result of the second paper predicts) while no window or half-life setting rescues the ridge family (its worst variant, unweighted at h = 6, deteriorates to -0.018).

7.4 How much weight does each family deserve?

The contest settles how the factors should be combined: simply. What remains is composition, how much of each family a sector screen should hold, and Table 11 gives the descriptive answer. For each sector I take the pooled six-month mean rank ICs of Section 5, floor negative values at zero (the same convention the IC-weighted composite M2 applies on its trailing window), sum them by family, and express each family as a share of the sector total. The shares are a map of where the predictive information sits, not a set of recommended portfolio weights; the distinction matters and is taken up below.

Sector	Valuation	Profitability	Quality	Momentum	Expectations	Risk	Positioning
Energy	41	0	13	0	19	8	20
Materials	15	10	15	16	27	8	8
Industrials	55	0	11	5	6	7	16
Cons. Disc.	26	8	21	14	8	10	13
Cons. Staples	58	0	10	2	11	7	11
Health Care	57	5	13	7	8	6	4
Financials	43	0	25	10	15	0	7
Info. Tech.	23	20	19	0	8	14	16
Comm. Svcs.	19	15	9	10	27	5	15
Utilities	17	5	19	29	29	0	0
Real Estate	10	0	0	34	28	0	28

Table 11: Family shares of sector information, in per cent. For each sector, pooled six-month mean ICs (2000–2025) are floored at zero, summed by signal family, and normalised to 100; rows may not sum exactly to 100 after rounding. The shares describe where the measurable information sits in each sector. They are full-sample, in-sample quantities and are not validated portfolio weights.

Where the information sits. The shares are anything but uniform. Valuation carries more than half of the measurable information in Consumer Staples (58 per cent), Health Care (57) and Industrials (55), and the largest single share in Financials and Energy, but less than a fifth in Utilities, Materials, Communication Services and Real Estate. Utilities reads exactly as its panel suggested: momentum and expectations together carry 58 per cent of its information and valuation 17, the trend sector in defensive clothing in one row of figures. Information Technology is the only sector in which profitability rivals valuation for the lead, and Real Estate concentrates in momentum, expectations and positioning, the three families least connected to reported fundamentals. A reader who carries one fixed mental weighting across sectors is therefore mis-weighted nearly everywhere; this is the within-sector counterpart of the sector map of Table 7.

Why the shares should not become weights. It is tempting to turn Table 11 directly into portfolio weights. The out-of-sample record says otherwise, and the per-sector detail explains why. Comparing the IC-weighted composite M2 with the equal-weight composite M1 sector by sector at the six-month horizon, estimated weights lose in nine of eleven sectors, by margins of 0.002 to 0.021 in eight of them and 0.060 in Energy (0.032 equal-weight against minus 0.028 IC-weighted). The two exceptions are precisely the sectors whose shares deviate most from the cross-sector norm. In Utilities, where the information sits in trend rather than value, equal weights actively fail out of sample (minus 0.033) while learned weights recover a positive score (plus 0.009), a swing of 0.042; in Information Technology learned weights trim the equal-weight loss by 0.010. Estimated weights pay only where a sector's character is unusual enough for the signal in the weights to overcome the estimation noise in them; everywhere else the noise dominates and the flat prior wins. This is the priors-beat-estimation result of the contest above with its geography drawn in: the value of estimation concentrates exactly where the prior is most wrong.

The practical reading. The recommendation is therefore two-tier. Hold the families a sector admits at equal weight as the default, drop the families it excludes, and entertain departures from equal weights only in the one or two sectors whose information shares sit furthest from the norm, Utilities first among them. And read Table 11 as description rather than prescription: the shares are computed over the full sample and would not have been knowable in real time, which is one more reason they map the landscape rather than set the screen.

7.5 A transparent composite: the Index score

The family shares of Table 11 are, read another way, a suggested set of factor weights: they say how much of each sector's screen should come from each family. This subsection turns them into a single number per stock, which ranks the whole market on just two standardised factors and sums the ranks. This is a sector-aware generalisation. For stock i in sector s I standardise every signal within the sector each month, orient each to its pre-registered direction, and combine them in one weighted sum whose weights are read from the data: each signal earns weight in proportion to its own trailing information coefficient, floored at zero so that it counts only while it works as expected. Ranking that score within the sector places every name on a 0 to 100 scale:

$$g_i \;=\; \sum_k w_{s,k}\,\mathrm{sgn}(k)\,z_{i,k}$$

$$w_{s,k} \;=\; \frac{\max\bigl(\mathrm{IC}_{s,k},\,0\bigr)}{\sum_j \max\bigl(\mathrm{IC}_{s,j},\,0\bigr)}$$

$$\mathrm{Index}_i \;=\; 100\cdot\frac{\mathrm{rank}_s\bigl(g_i\bigr)}{n(s)}$$

Here z(i,k) is signal k's within-sector z-score (winsorised at ± 3), sgn(k) its fixed pre-registered direction, and IC(s,k) the trailing mean rank information coefficient of signal k in sector s; the weight w(s,k) floors that coefficient at zero, so a signal contributes only while it earns in its expected direction, and its denominator runs over the signals the stock actually reports, so a name missing a characteristic is re-weighted across the rest rather than penalised. The family weights of Table 11 are recovered exactly as the within-family sums of these signal weights, so the two exhibits are one construction seen at two resolutions.

The score inherits the paper's two central design choices and nothing else. It is built only from the families a sector admits, so the accounting exclusions of Section 3 carry through automatically; and it weights by measured information rather than estimating weights afresh, so it sits on the disciplined side of the Section 7 contest by construction. A reader can compute it for any stock, in or out of the index, from public fundamentals and a single month of cross-section, which is the point: it is the screen the paper recommends, reduced to a number.

The weights are point-in-time and sector-specific. Because the family weights are read from a trailing window of information coefficients rather than fixed by hand, the score answers the practical question directly: at a given date, in a given sector, how much should each factor count? The answer is never the same twice. Figure 1 shows the weights the score assigns to four sectors on the latest cross-section, and they could hardly be more different. Health Care is a valuation sector, sixty per cent of its weight resting on cash-flow and earnings yields; Energy is an expectations sector, thirty-six per cent on analyst revisions and surprises; Utilities splits its weight between valuation and the trend-and-expectations pair that Section 6 flagged as its surprising drivers; Financials spreads across valuation, momentum and expectations with no family above thirty per cent. A single fixed factor weighting, the implicit default of most screens, misweights all four.

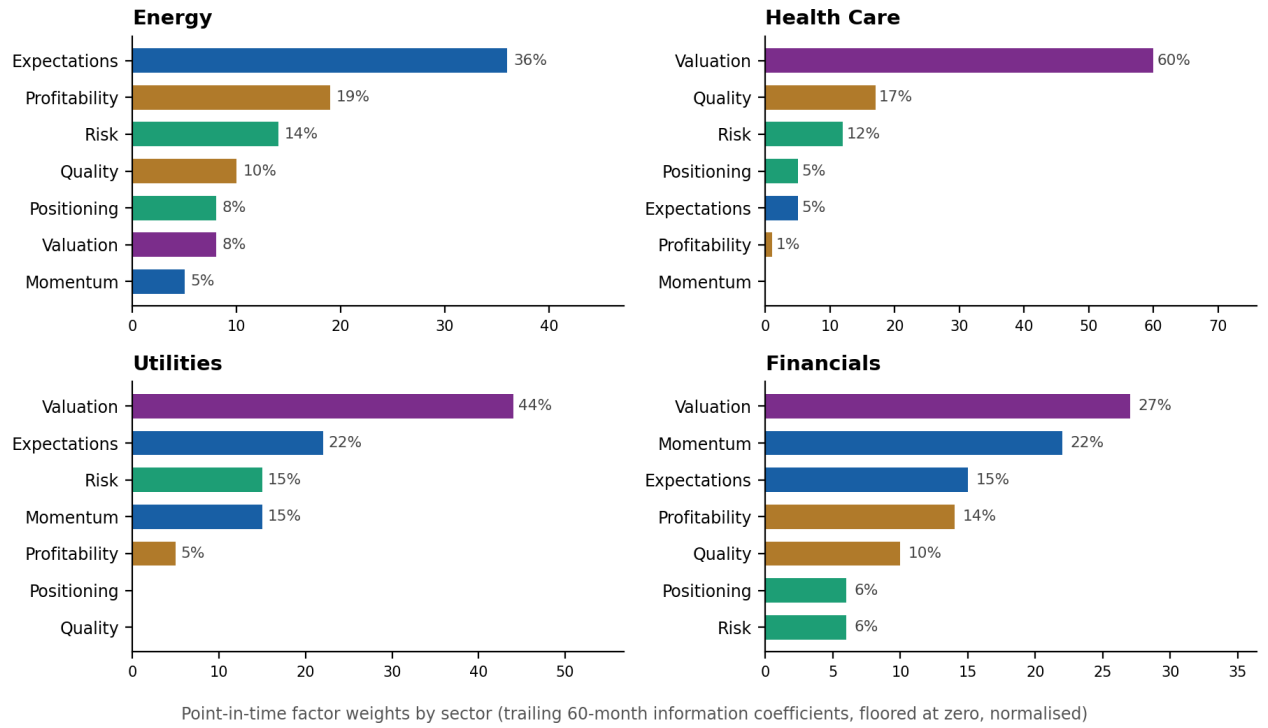

Figure 1: Point-in-time factor weights for four contrasting sectors on the latest cross-section, each signal weighted by its trailing 60-month information coefficient (floored at zero) and aggregated to families within the sector. The weightings differ sharply across sectors and are re-estimated every month; Table 11 reports their long-run averages across all eleven sectors.

The same sector, two decades apart. The weights move through time as well as across sectors, which is why they are re-estimated every month rather than set once. Energy is the clearest case. Across 2005 to 2010 the score would have weighted the sector mostly on momentum and risk, roughly 27 and 21 per cent, the signals that worked through the commodity super-cycle and the crisis; over the most recent five years those gave way almost entirely to expectations at 36 per cent and profitability at 19, as the post-2020 energy cycle turned on earnings revisions and cash generation rather than price trend. An analyst holding the long-run average weights of Table 11 would have the right sector character but the wrong emphasis for the moment; the trailing-window weights track the moment.

From weights to a score. Applying Energy's current weights to its names makes the mechanism concrete. PSX scores a near-top Index of 95 the way the weights intend, almost entirely on an expectations contribution of +0.50, the family the sector now weights most heavily. EQT edges past it to the top Index of 100 by a different route, a momentum reading extreme enough to contribute +0.44 even though the sector now weights momentum lightly, paired with solid profitability at +0.24. A name whose strengths sat only in the lightly-weighted families and were no more than ordinary would score in the middle, which is exactly what weighting by where the sector's information sits is meant to do.

Validation. The live score re-estimates its weights each month from the trailing window, as in the Energy example; to measure it cleanly the validation that follows instead fixes the weights at their full-sample values, giving a static descriptive version rather than a walk-forward forecast. On that footing it does its job. Pooled across sectors and months, its in-sample six-month rank information coefficient is 0.084, well above the 0.046 of the equal-weight composite that ignores the data-driven weights, so weighting each signal by its own floored coefficient adds information rather than noise. And it agrees with the elaborate machine where it should: its within-sector rank correlation with the walk-forward M2 composite, the engine behind every backtest in Sections 8 and 10, is 0.44, meaning a one-line weighted average reproduces much of the ordering that the monthly-refit estimator produces with far more apparatus. The Index is therefore the honest face of the model: not the last word in accuracy, but a rule a practitioner can hold in their head, audit by hand, and apply to a stock the index has never contained.

8 From Statistical Skill to Economic Value

Statistical skill is not yet a result a desk can bank. This section converts the composite scores into portfolios: long–short tercile books first, the signal's natural market-neutral expression and the cleanest read on the alpha's size; then a long-only, sector-neutral implementation at realistic costs; then the screening claim itself, whether shortlists built from the scores beat handing the analyst the unscreened sector.

8.1 Long–short books

Model	h	Spread	IR	FF6 alpha (t)	Net @10bps	Turnover
M2	1	+4.40%	0.62	+4.79% (2.83)	+3.02%	29%
M9	1	+4.06%	0.58	+4.04% (2.91)	+2.60%	30%
M6	1	+3.19%	0.53	+3.10% (2.71)	+1.45%	36%
M6	3	+2.86%	0.53	+2.45% (2.54)	+2.35%	32%
M2	3	+3.35%	0.46	+3.63% (2.28)	+2.97%	24%
M6	6	+2.48%	0.44	+2.58% (2.27)	+2.24%	29%
M1	6	+2.34%	0.39	+2.60% (2.58)	+2.14%	26%
M6	12	+1.84%	0.39	+1.70% (1.74)	+1.73%	27%

Table 12: Jegadeesh–Titman overlapping tercile books, inverse-volatility sector sleeves, annualised. Spanning alphas regress monthly book returns on the Fama–French five factors plus momentum (HAC t in parentheses); 'Net' deducts one-way costs of 10 basis points against measured turnover. Leading rows by information ratio per horizon shown.

Against the pre-registered standard, the one-month books deliver a positive finding (alphas of 3–5% annualised with t-statistics of 2.7–2.9, above the 2.0 threshold and deliberately below the language reserved for $t \geq 3$) and survive realistic costs with 1.5–3.0% to spare. The alphas approximately equal the raw spreads: within-sector long–short construction nets out market and sector exposures by design, so almost none of the spread is factor compensation. Both legs earn that spread, and in close to equal measure: the decomposition in Section 9.4 attributes about 55 per cent of it to the short leg, so these are genuine two-sided books rather than long portfolios with a measurement leg attached. For an investor able to short, they are the market-neutral expression of the signal. Tercile means are monotone in the expected direction in 33–43% of months against a one-sixth (about 17%) random benchmark; the equal-weight tercile levels sit below the cap-weighted sector benchmarks throughout, the documented mega-cap-era artefact of the dependent-variable convention, which affects levels, not spreads. Concentration diagnostics show the books are not hidden industry bets, with mean sub-industry Herfindahls of 0.16–0.33 in ten sectors; Utilities, at 0.49 against a high structural floor, is flagged.

8.2 A long-only implementation

Model	h	Buffer	Active	Turnover	Net IR @10bps	CEQ (γ=3)
M2	1	on	+6.78%	37%/m	0.80	+5.97%
M2	1	off	+6.60%	49%/m	0.72	—
M6	6	on	+4.82%	40%/m	0.63	+4.26%
M6	6	off	+4.12%	55%/m	0.50	—

Table 13: Long-only, sector-neutral, tracking-error-targeted active portfolios with and without the rank-hysteresis buffer (enter at the tercile boundary, exit at 1.5 times it). Active return and information ratio versus the cap-weighted universe; certainty-equivalent for the $\gamma = 3$ investor of the series.

The implementable portfolio comfortably clears the pre-registered bar of 0.3: a net information ratio of 0.80 at ten basis points one-way, about half the frictionless 1.7 the fundamental law of active management (Grinold, 1989) implies from an information coefficient of 0.022 and a nominal breadth near six thousand bets a year (roughly 500 names re-ranked monthly), the shortfall measuring the long-only constraint, costs, and the within-sector correlation of the bets. The buffer is a clean win on both sides of the ledger: turnover falls by about a quarter while gross active return rises, evidence that the hysteresis filters rank noise rather than merely saving costs. Shortlist evaluation completes the screening claim: top-N selections beat the unscreened sector mean in seven to eight of eleven sectors at both $h = 6$ and $h = 12$, for every N in $\{5, 10, 20\}$ and under both fixed scoring models (twelve of twelve pre-registered cells pass) while first-order stochastic-dominance checks hold in 26 of 44 sector-cells, with violations concentrated exactly in the Low-tier sectors. The tier table and the screening claim are the same finding viewed from two sides.

9 Add-On Analyses

Four supplementary studies sit outside the success criteria: family ablations, an industry-taxonomy robustness check, the regime-conditional analysis, and a short-side application of the screen.

9.1 Which families carry the composite?

Dropping each family in turn from the equal-weight composite identifies the load-bearing structure. At the six-month horizon the Risk family is the wall (its removal costs 0.007 of pooled IC, more than twice any other family, and it is the most critical family in six of eleven sectors) with Expectations carrying exactly the sectors where accounting comparability is weakest (Financials, Communication Services, Utilities). Two families have negative marginal value despite respectable univariate records: dropping Momentum or Valuation improves the six-month composite, the former because the signals are dead weight, the latter a subtler point: five correlated valuation slots crowd the composite's diversification even though free-cash-flow yield is the strongest single signal in the library. Marginal contribution inside a correlated composite is not univariate strength; screen builders routinely conflate the two.

9.2 Is it the taxonomy?

Rebuilding the entire construction (standardisation, composite, evaluation) on Fama–French twelve industries instead of GICS sectors changes nothing: the pooled IC is identical to the third decimal place at both tested horizons (+0.0157 versus +0.0156 at one month; +0.0269 versus +0.0268 at six), with marginally stronger t-statistics under FF12. The result is economic, not an artefact of one vendor's classification, and the check was run conservatively, retaining the GICS-relative dependent variable so that any taxonomy mismatch could only hurt the FF12 side.

9.3 When does selection pay? The regime study

Family (h=1 IC)	Calm	Elevated	Stressed	Stressed - calm
Risk	-0.031	+0.026	+0.030	+0.061 *
Momentum	-0.014	+0.013	+0.023	+0.037 *
Positioning	+0.011	+0.013	+0.027	+0.017
Expectations	-0.003	+0.011	+0.012	+0.015
Profitability	-0.011	+0.014	+0.006	+0.017
Quality	+0.011	-0.001	+0.005	-0.006
Valuation	+0.019	-0.008	-0.002	-0.021
Model M1	-0.017	+0.022	+0.044	—
Model M2	-0.005	+0.025	+0.043	—
Model M6	-0.011	+0.025	+0.038	—

Table 14: ICs by regime, where regimes are terciles of the first paper's six-month drawdown probability over the 2011–2024 window (56 months each; tercile bounds 0.12 and 0.25). Asterisks mark stressed-minus-calm differences exceeding two standard errors.

This is the result that binds the trilogy. Every headline model's selection IC rises monotonically with the drawdown probability: from approximately zero, or worse, in calm regimes to 0.04 in stressed ones. The macro layer of the first paper does not merely time market exposure; it times when stock selection is worth doing at all. Of the four pre-registered hypotheses, two confirm and two fail, reported as committed. Low-risk signals improve dramatically under stress, the largest regime effect in the table and an intra-sector flight to safety; valuation is regime-fragile rather than stable. Momentum improves under stress rather than crashing: the momentum-crash prior (Daniel and Moskowitz, 2016) concerned realised crashes, whereas these regimes are ex-ante probabilities and stock-level trend appears to live on cross-sectional dispersion. Quality shows no regime pattern. A practical corollary follows immediately: a selection overlay gated on the drawdown model (switched on when probabilities are elevated, switched off when calm) would have captured most of the alpha at a fraction of the exposure. I leave that design to future work rather than mine it here.

9.4 Inverting the screen: a short application

The portfolio sections hold only long positions; a natural question is whether the findings invert, whether the names the screen ranks lowest underperform as reliably as its top names outperform. The test decomposes the within-sector tercile spread into its two legs: a long leg, the top tercile's return relative to its equal-weight sector peers, and a short leg, the same distance below from the bottom tercile. Measuring against the equal-weight peer mean rather than the cap-weighted benchmark is essential here, because equal-weighted baskets sit structurally below the cap-weighted index in the mega-cap era, and that gap would otherwise masquerade as a short-side edge.

Cut	Long leg	Short leg
Pooled, 1-month horizon	+2.2 (2.6)	+2.8 (2.7)
Pooled, 6-month horizon	+1.4 (3.9)	+1.6 (3.9)
Calm regime (1-month)	+1.2	+0.9
Elevated regime (1-month)	+2.8	+3.6
Stressed regime (1-month)	+2.2	+3.9
Materials (6-month)	+3.8	+4.5
Cons. Discretionary (6-month)	+3.4	+3.3
Health Care (6-month)	+1.8	+2.6
Information Technology (6-month)	-0.9	-0.7
Real Estate (6-month)	-0.4	-0.9

Table 15: Long and short legs of the within-sector tercile spread, annualised per cent, measured against the equal-weight sector peer mean (the long leg is the top tercile's excess over peers, the short leg the bottom tercile's shortfall). Pooled rows carry Newey–West t-statistics; the regime rows split the one-month horizon by terciles of the first paper's drawdown probability; the sector rows show the six-month horizon for the three most and the two least shortable sectors. Out-of-sample 2011–2025.

The screen is close to symmetric, inverting cleanly (Table 15). At the one-month horizon the long leg earns 2.2 per cent a year (t = 2.6) and the short leg 2.8 (t = 2.7), so the bottom of the screen underperforms its peers slightly more than the top outperforms; at six months the two legs are 1.4 and 1.6 per cent, both at t = 3.9. The short leg carries about 55 per cent of the total spread at both horizons. The characteristics that mark winners mark losers in mirror image, which is the cleanest possible evidence that the signal is real rather than a long-only artefact: a spurious score could lift its favourites without an equal and opposite effect on its rejects.

The short side concentrates in stress and in the accounting-comparable (High-tier) sectors. It is not uniform, and where it strengthens is exactly where theory expects. Conditioning on the first paper's drawdown probability, the short leg rises from 0.9 per cent a year in calm regimes to 3.9 in stressed ones, a far sharper regime sensitivity than the long leg's 1.2 to 2.2: bad names fall hardest precisely when the macro layer is worried, the short-side counterpart of the selection-pays-under-stress result of Section 9.3. Across sectors the short leg is largest in Materials, Consumer Discretionary and Health Care (2.6 to 4.5 per cent at six months) and vanishes in Information Technology and Real Estate, the Low-tier sectors, so the tier table of Section 6 governs the short book exactly as it governs the long. An analyst would short from the same sectors they buy in, and avoid shorting where they would not bother to select.

The long–short book is a hedge, not a return engine. This is why the long-only implementation of Section 8 is the headline economic object, even though the signal is two-sided. The long–short tercile books of Section 8.1 do capture both legs, as positive market-neutral alpha; but any dollar-neutral book surrenders the equity premium, so in a market returning some fourteen per cent a year, a short leg worth under three points of selection alpha cannot offset the forgone beta, and the book trails in absolute terms even though its alpha is sound. The short application is therefore valuable as a hedge or a market-neutral overlay, most of all in the stressed regimes where its edge concentrates, not as a stand-alone return engine in a rising market. Three frictions sharpen the point and are why I stop at characterising the signal rather than packaging a strategy: borrow cost and recall risk fall hardest on the small, distressed names the short leg most wants; short squeezes punish exactly the crowded names; and there is a circularity worth naming, since short interest is itself one of the screen's own signals, so the most attractive shorts are partly the already-heavily-shorted, where borrow is dearest and squeezes most frequent. The honest summary is that the screen inverts as a matter of statistical fact, and that turning that fact into a tradable short book is a separate problem this paper does not solve.

10 The Trilogy Integrated

Variant	Return	Volatility	Sharpe	Max DD	Active (IR)
B passive benchmark	+13.99%	14.37%	0.89	-23.5%	—
T timing only	+11.79%	11.00%	0.96	-18.5%	-2.20% (-0.45)
A allocation only	+15.88%	14.43%	1.02	-22.4%	+1.89% (+1.91)
S selection only	+14.27%	14.09%	0.93	-23.7%	+0.28% (+0.39)
TA timing + allocation	+13.14%	11.04%	1.08	-17.6%	-0.85% (-0.17)
TAS full three-layer	+13.32%	10.80%	1.12	-16.8%	-0.67% (-0.13)

Table 16: The integrated backtest, February 2011 – January 2025 (168 months). T scales equity exposure by the first paper's drawdown probability; A tilts sectors by the second paper's recursive-protocol winner forecasts; S tilts stocks within sectors by this paper's M2 scores. Annualised; max drawdown on cumulative returns; attribution (annualised): timing -2.84%, allocation +1.89%, selection +0.28%.

Read naively, the full system returned 0.7 points less than the benchmark; read correctly, it converted return into quality over one of the strongest bull markets on record. Volatility falls by a quarter, the maximum drawdown by 28%, the Sharpe ratio rises from 0.89 to 1.12, and in certainty-equivalent terms for the $\gamma = 3$ investor the system wins, 11.6% to 10.9%. The timing layer is insurance: a -2.8% annual premium in a fourteen-per-cent-a-year decade, repaid with +2.3 points of active return through COVID and +12.2 points in 2022; the year all three layers pulled together is the exhibit that justifies the architecture. The allocation layer is the largest positive contributor (+1.9% at an information ratio of 1.91), vindicating the second paper in portfolio form; the selection layer's deliberately gentle +0.28% inside this layered risk budget understates the standalone results of Section 8, and the regime study explains why its contribution concentrates exactly where the timing layer is de-risking, a layer interaction the framework can exploit but this implementation deliberately does not.

10.1 The investor's experience

Table 16 reports the system in the annualised units of the literature; this subsection reports the same backtest in the units an investor experiences: dollars, calendar years, and drawdowns. The path is free of look-ahead by construction. Month t's portfolio is built from scores estimated on data available at month t only (fundamentals lagged to their report dates, models refit on windows ending at t - h, the first paper's probabilities and the second paper's forecasts taken from their own walk-forward protocols) and earns the following month's returns; every purchase and sale along the path could have been executed at the time.

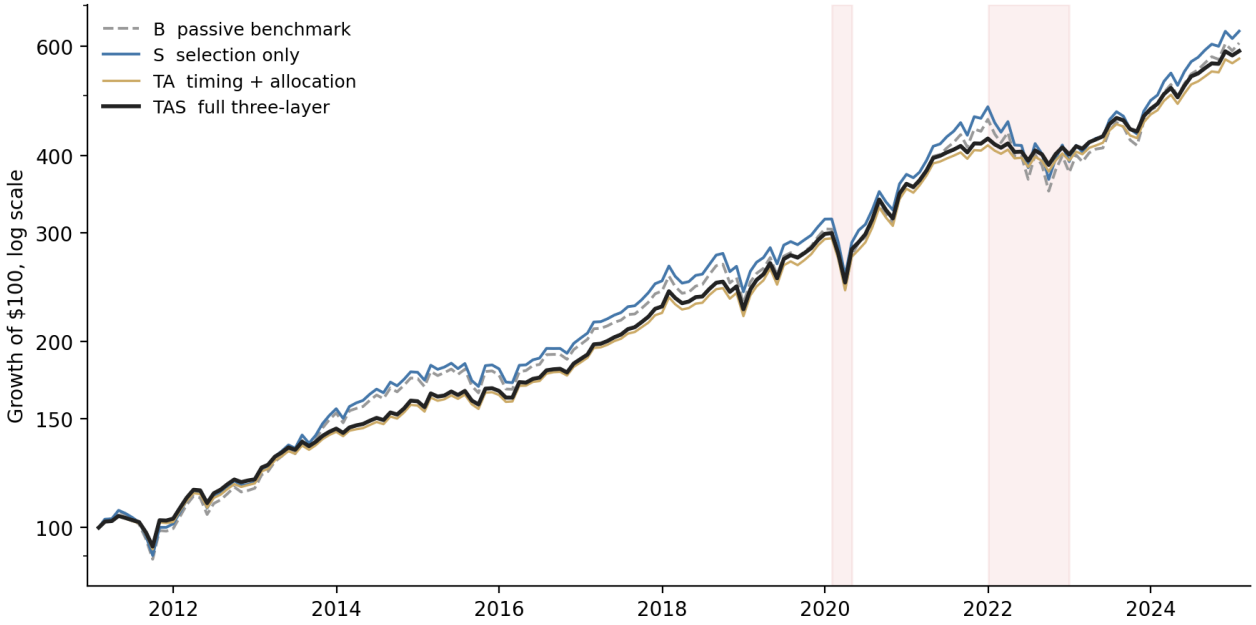

Figure 2: Growth of $100 invested at the start of February 2011, compounded monthly through January 2025, log scale. B is the passive cap-weighted benchmark; S tilts stocks within sectors by this paper's scores at full investment; TA applies the first two papers' timing and allocation layers; TAS is the full three-layer system. Shaded bands mark the COVID drawdown and calendar 2022.

Year	B passive	S selection	TA timing+alloc.	TAS full system
2011 (Feb–Dec)	-0.4	+1.4	+2.1	+3.4
2012	+16.2	+16.6	+15.4	+15.8
2013	+32.3	+31.7	+21.2	+20.8
2014	+13.7	+14.5	+10.3	+10.7
2015	+1.3	+1.3	+4.0	+3.9
2016	+12.1	+12.1	+12.9	+12.6
2017	+22.0	+23.8	+20.2	+21.6
2018	-4.5	-4.0	-1.2	-1.0
2019	+31.9	+31.1	+33.3	+32.4
2020	+18.2	+18.1	+20.6	+20.5
2021	+27.2	+28.6	+17.6	+18.4
2022	-17.9	-18.5	-5.5	-5.8
2023	+26.1	+25.6	+18.7	+18.5
2024	+24.8	+25.9	+21.0	+22.0
2025 (Jan)	+2.9	+2.8	+1.7	+1.7
Growth of $100	$608	$635	$574	$590
Compound annual	+13.76	+14.12	+13.29	+13.52
Max drawdown	-23.5	-23.7	-17.6	-16.8

Table 17: Calendar-year total returns in per cent, with compounded summary statistics. 2011 runs February to December and 2025 is January only, where the evaluation window ends. Compound annual growth differs slightly by convention from the arithmetic annualisation of Table 16.

The path tells the story the summary statistics compress. One hundred dollars in the benchmark becomes $608; in the full system, $590; in the selection-only variant, $635, the largest terminal wealth in the exhibit. That last number is the cleanest dollars-and-cents statement of the selection alpha: the stock layer alone, fully invested with no timing brake, ends $27 ahead of passive at essentially the benchmark's volatility. The full system's pattern is the insurance design made visible: it gives up seven to twelve points in each of the three great melt-up years (2013, 2021, 2023) and collects in every stressed one: +3.8 points in 2011, +3.5 in 2018, +2.3 through COVID, +12.2 in 2022, while never falling more than 16.8% from its peak against the benchmark's 23.5%. Whether the premium was worth the payout is precisely the certainty-equivalent question Table 16 answers in the affirmative for the $\gamma = 3$ investor; what the calendar table adds is the lived texture of that trade, mostly quiet years paying a small premium, redeemed by the stressed ones and 2022 above all, which is what insurance feels like from the inside.

10.2 A concentrated implementation: ten names

The buffered portfolios of Section 8 and the layered system above are diversified by design. A reader may still ask the blunter question: what if one simply bought the ten best names in the best sectors? I answer it with a rule fixed once and run once, with no tuning. At each month-end, rank sectors by the second paper's composite rotation signal and take the top three; within them, buy the top four, three and three names by this paper's walk-forward M2 score; hold equal-weighted for one month, at ten basis points one-way on measured turnover. Every input is the walk-forward output already evaluated, on exactly the alignment of the engine above, so the path contains no look-ahead in its data; the rule itself is deliberately fixed and un-optimised, an illustration of following the papers rather than a tuned strategy.

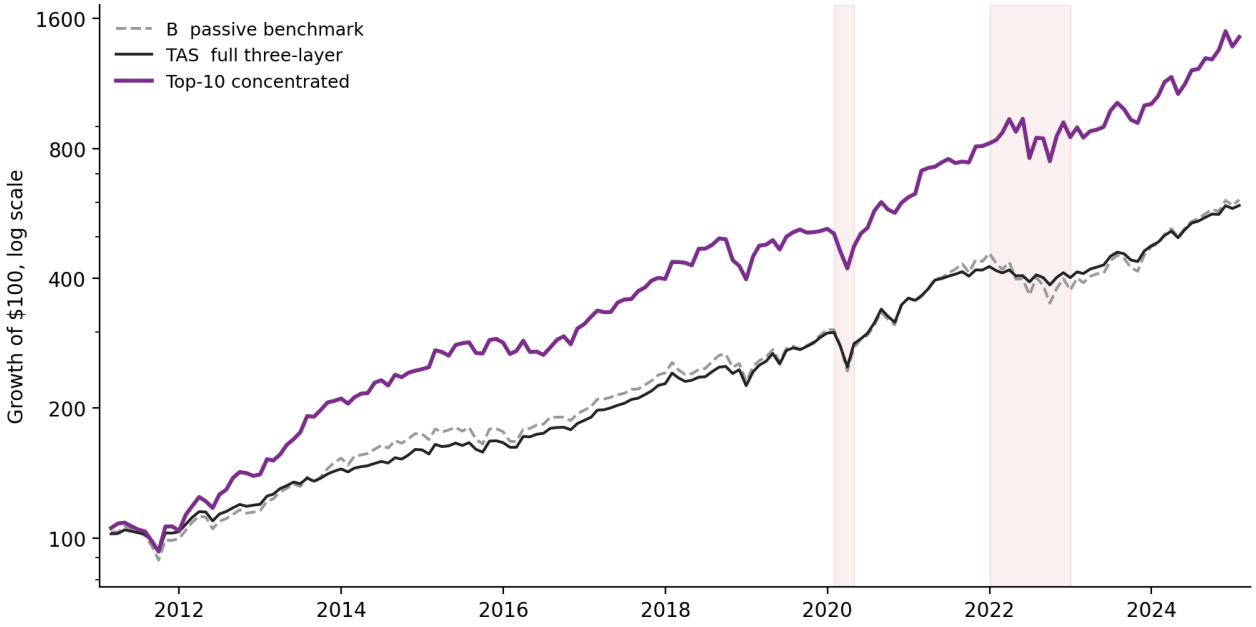

Figure 3: Growth of $100 in the concentrated ten-name rule, February 2011 to January 2025, against the passive benchmark and the full three-layer system, log scale, net of 10 basis points one-way. Shaded bands mark the COVID drawdown and calendar 2022.

Year	Top-10 concentrated	B passive
2011 (Feb–Dec)	+3.9	-0.4
2012	+35.2	+16.2
2013	+49.9	+32.3
2014	+17.0	+13.7
2015	+15.3	+1.3
2016	+10.3	+12.1
2017	+27.2	+22.0
2018	-0.2	-4.5
2019	+30.9	+31.9
2020	+18.3	+18.2
2021	+33.4	+27.2
2022	+3.3	-17.9
2023	+19.3	+26.1
2024	+35.9	+24.8
2025 (Jan)	+5.2	+2.9
Growth of $100	$1,450	$608
Compound annual	+21.04	+13.76
Max drawdown	-20.2	-23.5

Table 18: Calendar-year total returns of the concentrated rule, in per cent, net of 10 basis points one-way against measured turnover. 2011 runs February to December; 2025 is January only, where the evaluation window ends.

The result is the strongest economic exhibit in the series, and it must be read with its caveats attached. One hundred dollars becomes $1,450 against the benchmark's $608: 20.8 per cent a year at a Sharpe ratio of 1.10, an active return of 6.8 points a year at a tracking error of 10.2 (information ratio 0.67), a maximum drawdown shallower than the index (20.2 against 23.5 per cent), and no calendar year worse than the 2018 round trip of minus 0.2 per cent. The layers cooperate visibly: through 2022 the rotation signal held the portfolio in energy and materials (the June list ran Marathon, APA, Occidental and Devon in energy, Nucor, CF and Mosaic in materials) and the rule returned plus 3.3 per cent against minus 17.9 per cent; by January 2025 it held the Communication Services and Financials lists of Table 23.

Three caveats, in descending order of weight. First, turnover: the rule replaces six names a month on average (59 per cent one-way), so the result is cost-sensitive in a way the buffered portfolios of Section 8 are not; at 25 basis points one-way the active return falls to 4.7 points a year and at 50 to 1.2, which makes the rule as stated an exhibit for liquid mega-caps, not a general recipe. Second, concentration: with ten names, idiosyncratic risk dominates any single month, and the realised path is one draw from a wide distribution; the reassurance is that its shape (every layer contributing, 2022 the standout) matches the diversified system, not that its level would repeat. Third, the rule is deliberately un-optimised: it is written down once, with no alternative sector counts, name counts or weighting schemes tried, so it should be read as an illustration rather than a tuned strategy; the only other configuration run, a tier-filtered variant kept as a diagnostic, finishes a third lower, a reminder that concentrated paths scatter widely around the same underlying signals.

10.3 Following all three papers: a thirty-stock portfolio

The integration above tilts a full index; many readers will want the blunter object the three papers jointly imply, a real portfolio of a few dozen names. I build one with a rule that uses each paper for exactly the job it was designed for. The first paper sets how much equity to hold: the drawdown-probability scalar of Table 16 scales the invested fraction, the rest held in cash. The second paper sets where: its sector forecasts, tilted around benchmark weights, decide how many of thirty names each sector receives, so a favoured sector might contribute ten names and a shunned one none. The third paper sets which: within each sector the names are the top of the walk-forward M2 score, the same engine as the Index of Section 7.5. The thirty names are held equally weighted, so the sector counts are the sector weights, and the book is rebalanced monthly. The path is free of look-ahead exactly as in Section 10.1. I report it in two forms: the rotation-tilted book just described, and a sector-neutral equal-weight alternative that holds the same number of names in every sector, so the contribution of the concentration can be read directly.

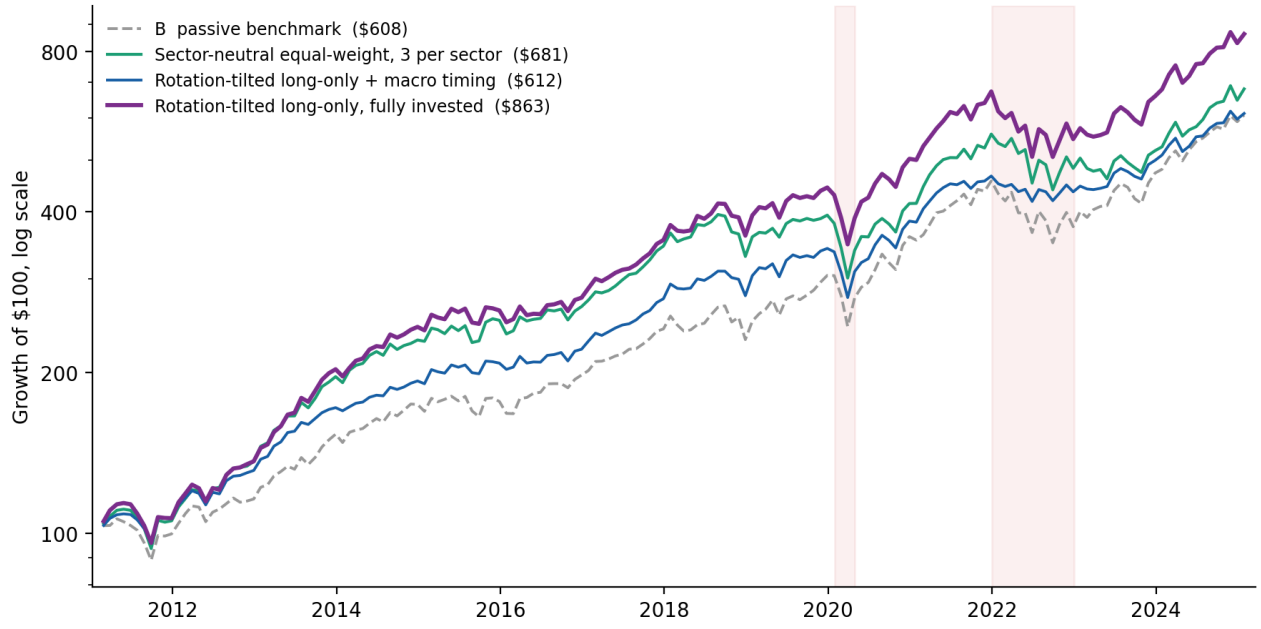

Figure 4: Growth of $100 in the thirty-stock portfolio, February 2011 to January 2025, log scale. The rotation-tilted long-only book, fully invested and in its macro-timed form, is shown against the sector-neutral equal-weight alternative that holds three names in every sector, and the passive benchmark. Shaded bands mark the COVID drawdown and calendar 2022.

Year	Rotation-tilted invested	Tilted + macro timing	Equal-weight, sector-neutral	Benchmark
2011 (Feb–Dec)	+6.6	+6.5	+5.4	-0.4
2012	+27.9	+23.0	+29.2	+16.2
2013	+48.8	+31.2	+44.2	+32.3
2014	+20.1	+12.2	+17.1	+13.7
2015	+7.4	+8.0	+8.9	+1.3
2016	+5.7	+6.2	+6.1	+12.1
2017	+28.3	+24.4	+29.9	+22.0
2018	+1.9	+1.3	-4.4	-4.5
2019	+23.1	+22.7	+19.5	+31.9
2020	+13.2	+12.5	+5.1	+18.2
2021	+33.7	+21.5	+34.9	+27.2
2022	-18.6	-6.6	-13.7	-17.9
2023	+20.3	+14.6	+7.9	+26.1
2024	+25.8	+19.5	+24.3	+24.8
2025 (Jan)	+4.0	+2.5	+5.0	+2.9
Growth of $100	$863	$612	$681	$608
Annualised return	+16.7	+13.6	+14.9	+14.0
Sharpe ratio	1.01	1.09	0.91	0.89
Active return / IR	+2.7 / 0.47	-0.3 / -0.05	+0.9 / 0.16	—
Max drawdown	-24.6	-19.1	-24.0	-23.5

Table 19: The thirty-stock portfolio by calendar year, in per cent, with compounded summary statistics. The rotation-tilted book sets per-sector name counts from the second paper's forecast and holds them fully invested; its timed variant scales equity exposure by the first paper's drawdown probability; the equal-weight alternative is sector-neutral, holding the three top-scored names in every sector (thirty-three in all). All variants weight their names equally. 2011 runs February to December; 2025 is January only.

The tilt earns its concentration. Held fully invested, the rotation-tilted thirty names turn $100 into $863 against the benchmark's $608, an annualised 16.7 per cent at a Sharpe ratio of 1.01, beating the index by 2.7 points a year at an information ratio of 0.47, the cleanest statement in the paper that the three layers compound into a portfolio a practitioner could actually run. Adding the macro-timing layer does what it did in Section 10.1: it trades return for safety, lifting the Sharpe ratio to 1.09 and cutting the worst drawdown from 24.6 to 19.1 per cent while surrendering the excess return in the bull market, insurance with a visible premium. The third line is the diversified control: a sector-neutral book that ignores the rotation signal and simply holds the three best-scored names in every sector. It still beats the benchmark, reaching $681 at an information ratio of 0.16, so within-sector selection adds value entirely on its own; but spreading the names evenly rather than concentrating them where the second paper points costs roughly 1.8 points of active return a year, two-thirds of the total. The concentration the rotation tilt produces is therefore mostly earned rather than a risk taken for free, the within-portfolio echo of the allocation layer's standalone strength in Section 10.

The portfolio today. Run on the latest cross-section, the tilted rule produces the thirty-name book of Table 20. The second paper's signal concentrates it: Communication Services, the one sector with a positive rotation reading, earns the maximum ten names and Health Care eight, while five sectors with the weakest readings hold nothing, so the equal-weight-per-name construction places thirty-three per cent in the former and twenty-seven in the latter. The reader who finds that too concentrated has the equal-weight alternative as the standing counterpart: the same selection engine spread three names to each of the eleven sectors (GOOGL, FOXA and META in Communication Services; EQT, PSX and VLO in Energy; and so on down the columns of Table 23), trading the rotation edge for breadth at the cost in active return shown above. The tier labels of Section 6 are the guide either way: on the tilted book the large Communication Services position sits in a Moderate-tier sector while the Health Care names sit in a High-tier one.

Sector	Names	Weight	Rotation	The thirty holdings (equal-weighted)
Comm. Svcs.	10	33.3%	+1.34	GOOGL, FOXA, META, TTWO, EA, VZ, MTCH, WBD, T, DIS
Health Care	8	26.7%	-0.92	MOH, CI, UHS, ELV, HCA, PFE, BMY, MRK
Cons. Staples	5	16.7%	-0.54	MNST, WMT, KR, EL, MO
Energy	3	10.0%	-0.25	EQT, PSX, VLO
Utilities	2	6.7%	-0.77	EIX, PCG
Real Estate	2	6.7%	-1.11	SPG, AMT
Total	30	100.0%	—	6 sectors held; 5 sectors at zero

Table 20: The thirty-stock portfolio as of the latest cross-section, model output and not investment advice. Name counts are set by the second paper's sector forecast tilted around benchmark weight; holdings are the top of the third paper's walk-forward score within each sector; weights are equal across the thirty names. Five sectors receive no names at the current rotation reading.

10.4 The portfolios compared

This study has built many portfolios, each to answer a narrower question; it is worth ending the section by placing them on one footing. Table 21 reports every implementable variant over the identical 168-month window, from the passive benchmark through the three single-layer overlays and their combinations to the concentrated stock books, on the same eight measures. Read in isolation each portfolio is a point estimate; read together they form a ladder of controlled comparisons in which each step changes exactly one design decision, and the value of that decision is the difference it makes.

Portfolio	$100 →	Return	Vol.	Sharpe	Max DD	Active	IR
Passive benchmark	$608	+14.0	14.4	0.89	-23.5	—	—
Timing only (Article 1)	$476	+11.8	11.0	0.96	-18.5	-2.2	-0.45
Allocation only (Article 2)	$789	+15.9	14.4	1.02	-22.4	+1.9	+1.91
Selection only (Article 3)	$635	+14.3	14.1	0.93	-23.7	+0.3	+0.39
Timing + allocation	$574	+13.1	11.0	1.08	-17.6	-0.8	-0.17
Full three-layer (TAS)	$590	+13.3	10.8	1.12	-16.8	-0.7	-0.13
30 stocks, equal-weight sector-neutral	$681	+14.9	15.1	0.91	-24.0	+0.9	+0.16
30 stocks, rotation-tilted	$863	+16.7	15.3	1.01	-24.6	+2.7	+0.47
30 stocks, tilted + timing	$612	+13.6	11.4	1.09	-19.1	-0.3	-0.05
10 stocks, concentrated	$1,450	+20.8	17.8	1.10	-20.2	+6.8	+0.67

Table 21: Every implementable portfolio in the paper on one footing, February 2011 to January 2025 (168 months). Return, volatility and active return are annualised per cent; the Sharpe ratio is excess of the risk-free rate; active return and information ratio are measured against the passive benchmark. The overlays (timing, allocation, selection and their combinations) tilt the full index; the stock books hold thirty or ten names. Long–short books are reported separately in Table 12.

Each layer, alone, against the benchmark. The three middle rows isolate the three papers. Allocation is the strongest single source of return: the second paper's sector rotation alone lifts the terminal wealth from $608 to $789 and earns an information ratio of 1.91, the highest in the table, vindicating that paper in portfolio form. Selection alone, the contribution of this paper inside the layered risk budget, is real but gentle, an information ratio of 0.39, a deliberately small tilt beside the standalone long-only 0.80 of Section 8; the gentleness is deliberate, a point the stock books below revisit by turning the selection signal up. Timing alone is the outlier that costs return, dropping to $476, because insurance has a premium in a bull market; its justification is not in its own row but in the drawdown column, where it cuts the worst loss from 23.5 to 18.5 per cent.

The sector tilt, isolated twice. The cleanest single lesson in the table is the value of the second paper's sector weighting, and it appears in two independent places. The first is the allocation overlay just described (plus 1.9 points against the benchmark). The second is internal to the stock book: the equal-weight, sector-neutral thirty holds exactly the same names chosen by exactly the same selection engine as the rotation-tilted thirty, and differs from it only in how many names each sector receives. That single change moves the terminal wealth from $681 to $863 and the active return from 0.9 to 2.7 points, so roughly two-thirds of the tilted book's edge is the sector weighting rather than the stock picking. The equal-weight book is therefore the control that proves the tilt: spreading the same selection evenly gives most of the rotation advantage away, which is the within-portfolio confirmation of the allocation overlay's standalone strength.

Conviction versus protection, the two axes. Stepping back, the portfolios array themselves along two axes the investor can choose between. One is conviction: from the benchmark through selection-only, the equal-weight thirty, the allocation overlay and the rotation-tilted thirty to the concentrated ten, active return climbs from zero to 6.8 points a year as the same signals are expressed more boldly, and volatility climbs with it from 14.4 to 17.8 per cent. The other is protection: switching the timing layer on anywhere along that axis (the full three-layer system, or the tilted thirty with timing) trades two to three points of return for a Sharpe ratio above 1.08 and the shallowest drawdowns in the table, near 17 per cent against the benchmark's 23.5. No single row is the answer, because the table is not a contest but a menu: the full three-layer system for the investor who prizes risk-adjusted smoothness, the rotation-tilted thirty for the one who wants active return with diversification, the concentrated ten for the one who accepts idiosyncratic risk and turnover for the largest edge, and the equal-weight thirty for the one who distrusts the rotation call. What the table establishes jointly, and no single portfolio could, is that all three layers carry genuine and separable information, and that they trade against each other on exactly the terms a top-down process should expect.

Table 21 records what each book returned; the first question a risk manager then asks is what each book is exposed to. Table 22 regresses the active return of the three integrated layers, each book minus the cap-weighted benchmark, on the Fama and French five factors plus momentum. Two things stand out. None of the active return is a repackaged style: the loadings on value, size, profitability, investment and momentum are indistinguishable from zero for every layer, so the edge is genuine alpha, orthogonal to the priced factors. What the system does carry is a deliberate market underweight, a beta of -0.28 that is the timing layer holding cash when the first paper's drawdown probability is high. That underweight is why the full system's raw active return is slightly negative in a market that rose throughout, and why its risk-adjusted picture is the reverse: after controlling for the factors it holds, the full system delivers a factor-adjusted alpha of 3.0 per cent a year with a t-statistic of 3.7, driven largely by the allocation and timing layers rather than by selection, risk-adjusted value that the headline return understates precisely because the book gives up market beta by design. The selection layer taken alone is factor-neutral with a small positive alpha, the same orthogonal edge the long-only implementation of Section 8 runs at higher intensity.

Active book	α **%/yr (t)**	**MKT**	**SMB**	**HML**	**RMW**	**CMA**	**UMD**
Selection (S - B)	+0.3 (1.6)	-0.01	0.00	-0.01	+0.02	0.00	+0.02
Timing + allocation (TA - B)	+2.8 (3.3)	-0.27	+0.04	+0.03	-0.02	-0.01	-0.02
Full system (TAS - B)	+3.0 (3.7)	-0.28	+0.03	+0.02	0.00	-0.01	0.00

Table 22: Factor exposures of the integrated books. Active returns (book minus the cap-weighted benchmark, February 2011 to January 2025) regressed on the Fama–French five factors plus momentum; the alpha is annualised, with HAC (Newey–West, three-lag) t-statistics in parentheses. Style loadings near zero show the active return is not a repackaged factor; the market underweight of the timed books is the first paper's drawdown layer holding cash in stress.

11 Current Market Assessment

In the series' closing convention, the fitted models are applied to the most recent panel month (December 2025; the live deployment refreshes fundamentals from the terminal). Table 23 widens the closing exhibit to the ten highest-scored names in every sector, each tagged with the family that contributes most to its rank, so the reader sees not just which names the model likes but why. Sectors are ordered by the second paper's rotation signal, and the tier label travels with each row as the instruction for how far to trust it. Tags abbreviate the seven families: val, prof, qual, mom, exp, risk and pos.

Sector (tier)	Rotation	Top ten names (leading driver)
Comm. Svcs. (Moderate)	+1.34	GOOGL (risk); FOXA (exp); META (risk); TTWO (prof); EA (mom); VZ (exp); MTCH (exp); WBD (mom); T (exp); DIS (exp)
Energy (High)	-0.25	EQT (mom); PSX (exp); VLO (mom); APA (mom); MPC (mom); DVN (mom); XOM (exp); BKR (mom); CTRA (val); CVX (risk)
Cons. Staples (High)	-0.54	MNST (mom); WMT (mom); KR (qual); EL (mom); MO (mom); PEP (mom); COST (risk); K (risk); PM (mom); HSY (mom)
Utilities (Low)	-0.77	EIX (val); PCG (val); EXC (val); AES (val); EVRG (val); ED (val); ES (val); PPL (val); FE (val); DUK (val)
Health Care (High)	-0.92	MOH (val); CI (val); UHS (val); ELV (val); HCA (val); PFE (val); BMY (val); MRK (val); BIIB (val); REGN (val)
Real Estate (Low)	-1.11	SPG (prof); AMT (prof); HST (exp); CCI (prof); PSA (prof); WELL (mom); CPT (pos); VICI (pos); ESS (pos); MAA (pos)
Materials (High)	—	NEM (mom); ALB (mom); FCX (mom); NUE (mom); ECL (mom); CTVA (mom); CF (exp); MLM (mom); SHW (pos); AVY (pos)
Industrials (High)	—	FDX (val); UAL (val); UPS (val); DAL (val); FTV (qual); TXT (val); NDSN (exp); GD (val); UBER (val); JCI (qual)
Cons. Disc. (High)	—	GM (qual); TPR (qual); BWA (val); F (val); APTV (qual); PHM (val); RL (mom); EXPE (val); DHI (val); NVR (val)
Financials (Low)	—	AIG (val); IVZ (val); ALL (exp); TFC (val); C (val); ACGL (exp); L (val); RF (val); MTB (val); BAC (val)
Info. Tech. (Low)	—	MU (exp); FTNT (prof); NVDA (prof); INTC (exp); AAPL (prof); PTC (exp); ADSK (prof); ORCL (exp); TER (pos); KLAC (prof)

Table 23: Assessment as of 31 December 2025: model output, not investment advice. Rotation signals shown where the winner-model forecast reaches the latest common date. The Utilities and Health Care rows are discussed in the text as the value-trap face and the contrarian face of a valuation-led model; the tier classification and the shape map are what separate them.

Two rows show the same valuation-led model wearing opposite faces, and the tier label is what tells them apart. The Utilities list (EIX, PCG and the other regulated names) is the model reading wildfire-liability distress as cheapness, the very names the Utilities profile of Section 6.3 flagged as the sector's value trap; the Low tier is the standing instruction not to trust it. Health Care is the mirror image: a deep-value sweep of managed care (MOH, CI, UHS, ELV) and large-cap pharma after the sector's 2025 derating, a bold but internally consistent valuation bet that sits in a High tier where the model has earned the benefit of the doubt. The screen offers both with equal conviction; the tier classification and the shape map of Section 6 are what separate the contrarian opportunity from the value trap.

12 Screening Rules by Sector

The dose-response profiles of Section 6.3 translate directly into a screen: within each sector, the favourable end of each load-bearing signal defines a tilt, and the quintile boundaries give it a concrete range. Tables 24 to 34 set out the resulting rules one sector at a time, giving for each the characteristic to screen on, the direction, an approximate range on the most recent cross-section, and the strength of the evidence; an asterisk marks a cell that survives global false-discovery control, and a parenthetical figure is the favourable bucket's annualised edge over the sector mean. Three cautions govern their use. The ranges are cross-sectional, defined against the sector's own constituents each month, so they drift with the peer set; rank a name within its current sector rather than applying a fixed absolute cutoff. No single cutoff is reliable in isolation, because per-sector univariate evidence is thin, only 10 of 149 cells surviving false-discovery control; the validated way to combine the tilts is the Index of Section 7.5, which weights each by its in-sector information coefficient. And every rule inherits the tier of its sector: in the six High-tier sectors the combination forecasts out of sample, in the four Low-tier sectors it does not, with the Moderate-tier Communication Services in between, whatever an individual cell suggests.

Three patterns orient the rulebook before the detail. Valuation works through cash flow rather than the price-earnings ratio: free-cash-flow yield is the most widely useful single tilt, leading or close to it in Materials, Consumer Staples, Health Care, Consumer Discretionary and Energy, while the earnings yield that pays does so at moderate levels, around a price-earnings ratio of fifteen to eighteen in Industrials, rather than at its cheapest. Positioning travels almost everywhere: low short interest is a favourable tilt in seven of the eleven sectors and is the load-bearing signal in Communication Services. And the exceptions carry information of their own: Health Care rewards buying recent one-month losers, the contrarian signature of a sector whose deratings the model reads as opportunities, and Communication Services is the one place within-sector momentum works.

Characteristic	Screen for	Approx. range	Strength
Short interest	Low	$<$ 0.4% of float (avoid $>$ 3.7%)	Primary
Net share issuance	Buybacks, not dilution	issuance below zero	Primary (+2.2%/yr)
FCF yield	High	$>$ 6%	Primary (+2.4%/yr)
EV/EBITDA	Cheap	$<$ ∼5.3×	Secondary
Idiosyncratic volatility	Low	bottom ∼20% of peers	Secondary
Asset growth	Avoid empire-building	avoid $>$ 16%/yr	Avoid-signal

Table 24: Energy (High tier). Positioning and cash value lead; own low short interest and buybacks, screen for high free-cash-flow yield, and avoid asset-growth empire-building.

Characteristic	Screen for	Approx. range	Strength
Accruals	Low (clean earnings)	bottom ∼20%	Primary (+4.4%/yr)
FCF yield	High	$>$ 6%	Primary (+2.4%/yr)
Gross profitability	High	$>$ 34%	Secondary (+1.3%/yr)
Estimate revisions	Positive	top ∼20%	Secondary (+1.8%/yr)

Table 25: Materials (High tier). Quality of earnings and cash value lead, with clean accruals and high free-cash-flow yield in front.

Characteristic	Screen for	Approx. range	Strength
Earnings yield	Moderate to high	P/E ∼15 to 18	Primary* (+2.8%/yr)
EBITDA/EV	Moderately cheap	∼9 to 11%	Primary (+2.9%/yr)
Book-to-price	Cheap	P/B ∼2.3 to 2.9×	Primary (+2.0%/yr)
Short interest	Low	0.4% to 0.8%	Secondary

Table 26: Industrials (High tier). The one sector led by the earnings yield, at moderate rather than deep-value levels, with cheap enterprise multiples alongside.

Characteristic	Screen for	Approx. range	Strength
FCF yield	High	∼5 to 7%	Primary
Idiosyncratic volatility	Low	$<$ ∼1.2%	Primary (clean monotonic)
Short interest	Low	$<$ ∼0.5%	Primary (clean monotonic)
Net share issuance	Buybacks	issuance below zero	Secondary

Table 27: Consumer Discretionary (High tier). A risk-and-positioning sector: low volatility, low short interest and buybacks, with high free-cash-flow yield on top.

Characteristic	Screen for	Approx. range	Strength
FCF yield	High	$>$ 5.3%	Primary* (+2.8%/yr)
Earnings yield	High	P/E $<$ ∼19	Secondary
EBITDA/EV	Cheap	$>$ 11%	Secondary
Short interest	Low	$<$ ∼0.2%	Secondary

Table 28: Consumer Staples (High tier). Free-cash-flow yield is the single strongest screen in the study; cheap earnings and enterprise multiples support it.

Characteristic	Screen for	Approx. range	Strength
1-month reversal	Buy recent losers	reversal $<$ -3.6%	Primary*
FCF yield	High	$>$ 6.6%	Primary (+3.0%/yr)
Earnings yield	High	P/E $<$ ∼17	Primary (+2.0%/yr)
EBITDA/EV	Cheap	∼9 to 11%	Secondary (+1.7%/yr)

Table 29: Health Care (High tier). The contrarian sector: buy recent one-month losers and cheap cash generators, the model treating deratings as opportunities.

Characteristic	Screen for	Approx. range	Strength
Short interest	Low to moderate	0.3 to 0.8%	Primary*
Estimate revisions / surprise	Positive	top ∼20%	Primary (+2.0%/yr)
12-1 momentum	Present	+1% to +11% (12-month)	Secondary (the one momentum sector)

Table 30: Communication Services (Moderate tier). Low short interest is the sector's strongest cell, with positive revisions and the only useful within-sector momentum.

Characteristic	Screen for	Approx. range	Strength
Earnings yield	High	P/E $<$ ∼11	Primary (+1.5%/yr)
Net share issuance	Buybacks	issuance below zero	Fragile (+3.1%/yr)
Earnings surprise	Positive	top ∼20%	Fragile

Table 31: Financials (Low tier). The composite does not forecast out of sample; a high earnings yield is the one durable tilt, with buybacks and surprises only fragile support.

Characteristic	Screen for	Approx. range	Strength
Short interest	Low	$<$ 0.3%	Primary
FCF yield	High	$>$ 7%	Fragile
Accruals	Low	bottom ∼20%	Fragile

Table 32: Information Technology (Low tier). The composite does not forecast; low short interest, high free-cash-flow yield and clean accruals help individually, but the blend is unreliable.

Characteristic	Screen for	Approx. range	Strength
Fundamental signals	Not reliable	value signals invert	Composite -0.031; cheapest names are distressed, not cheap

Table 33: Utilities (Low tier). Not screenable on fundamentals; the value signals invert, the cheapest names being utilities in liability distress rather than bargains.

Characteristic	Screen for	Approx. range	Strength
Fundamental signals	Not reliable	no favourable zone	Composite -0.051, the study's worst

Table 34: Real Estate (Low tier). The study's most negative composite and closest to unforecastable; no accounting screen reliably adds value.

A word on durability. Splitting the sample at end-2012 shows that the tilts have not aged equally. The positioning signals are the most stable: short interest and net issuance hold almost the same pooled edge in both halves. The broad valuation signals have weakened: pooled across the market, free-cash-flow yield, the earnings yield and EV/EBITDA were several times stronger before 2013 than after, and book-to-price and asset growth reversed sign between the halves. The screen's durability therefore rests more on positioning, and on the sector-specific combination whose out-of-sample record is documented in Section 8, than on any single valuation cutoff applied market-wide; the valuation rules are best used within a sector and in combination, not as standalone filters across the whole market. Table 35 sets this out signal by signal.

Signal	Family	2000–2012	2013–2025	Reading
FCF yield	Valuation	+0.043	+0.011	Severe decay
EBITDA/EV	Valuation	+0.032	+0.001	Severe decay
Earnings yield	Valuation	+0.030	+0.006	Severe decay
Book-to-price	Valuation	+0.019	-0.009	Reverses
Net payout yield	Valuation	+0.017	+0.009	Decays
Gross profitability	Profitability	+0.004	+0.006	Weak throughout
Margin trend	Profitability	+0.003	-0.002	Weak throughout
ROE	Profitability	+0.001	+0.000	Weak throughout
Accruals	Quality	+0.018	+0.005	Severe decay
Asset growth	Quality	+0.015	-0.006	Reverses
Net issuance	Quality	+0.014	+0.010	Decay-resistant
1-month reversal	Momentum	+0.018	+0.007	Decays
Residual momentum	Momentum	+0.006	-0.001	Weak throughout
12-1 momentum	Momentum	+0.004	+0.004	Weak throughout
52-week high	Momentum	-0.010	+0.003	Weak throughout
Earnings surprise	Expectations	+0.008	+0.011	Improving
Analyst dispersion	Expectations	+0.006	-0.002	Weak throughout
Revision breadth	Expectations	-0.006	+0.012	Improving
Revision magnitude	Expectations	+0.000	+0.011	Improving
Rec. change	Expectations	-0.003	-0.002	Weak throughout
Altman Z	Risk	-0.016	+0.005	Reverses
Idiosyncratic vol	Risk	+0.001	+0.007	Weak throughout
Beta	Risk	+0.000	+0.001	Weak throughout
Short interest	Positioning	+0.024	+0.021	Decay-resistant
Chg short interest	Positioning	+0.013	+0.009	Decay-resistant

Table 35: Signal durability, the signal-level companion to the family-level split in Table 5. Pooled one-month rank information coefficients in the two halves of the sample. The valuation signals that anchor several of the sector rules, free-cash-flow yield, the earnings yield and EV/EBITDA, were strong before 2013 and weak after, and book-to-price and asset growth reverse sign; positioning and the expectations signals hold or strengthen. Because the ranges in Tables 24 to 34 are fitted on the full sample, the recent column indicates how much to trust each tilt today.

Stacking the rules pays. Pooling the six High-tier sectors and sorting every month by the share of its sector's rules a stock passes, Table 36 shows forward six-month relative returns rising monotonically with rules passed, from minus 3.8 per cent a year for the bottom third to plus 1.5 per cent for the top, a spread of more than five points. These are not paper rules either: the composite that applies them, sector by sector, is the screen behind the long-only book of Section 8, which held a net information ratio of 0.80 after costs, and behind the concentrated and thirty-stock portfolios of Section 10.

Share of sector rules passed	Forward 6-month relative return	Company-months
Top third of rules passed	+1.5%/yr	25,400
Middle third	-0.8%/yr	24,000
Bottom third	-3.8%/yr	34,100

Table 36: Validation of the stacked screen. Pooling the six High-tier sectors over 2000 to 2025, company-months are sorted each month by the share of their sector's rules they pass; the column reports the subsequent six-month return relative to the sector, annualised. Passing more rules lines up with higher forward returns.

Applied across the current cross-section, these rules reproduce the names of Section 11; the screen and the assessment are one instrument, read once as a rule and once as a result.

13 Limitations

The limitations chapter was drafted from a threat register written before results existed; I report it with the discoveries added.

Statistical. Per-sector inference is thin: only 10 of 149 raw-significant univariate cells survive false-discovery control, per-sector model intervals are wide, and the Model Confidence Sets retain seven to nine models per horizon; the competition among prior-respecting models is statistically tight, and I say so rather than crown a unique winner. The aggregate one-month results clear their pre-registered bars, but the spanning alphas sit below the Harvey–Liu–Zhu threshold of three; by my own committed language this is a positive finding, not strong evidence. The architecture criterion split, and the half that failed (M4 versus M7) is uninformative noise-on-noise; I resist reading it as support. Residual selection risk survives pre-registration (design choices made before the freeze still embody judgment) and the regime study's tercile boundaries are computed over the evaluation window, an ex-post element I accept in a fenced-off add-on.

Data. The evaluation sample ends at the December 2025 reach of the CRSP 2.0 files; 2025 membership rests on contemporaneous Compustat records, with eighteen identified entrants absent from roughly 1.5% of late-2025 cross-sections and vendor-unrecorded deletions persisting conservatively. Short interest begins in 2006; revision magnitude is undefined in rollover months; 1.9% of company-months lack a research-quality link. The first paper's probability series is a certified reconstruction, exact in its labels and three-month model and within ± 0.04 of published AUCs elsewhere. Index reconciliation is price-return based, leaving dividend-accrual conventions untested, a deliberate and disclosed trade.

Economic. Cost modelling is turnover-times-spread at assumed levels with no market impact; capacity is argued qualitatively from the large-cap universe, not measured. The long–short books assume frictionless shorting of S&P 500 names (mild, but an assumption) which is why the long-only implementation is the headline economic object. The integration's layer mappings (probability to exposure, forecast to tilt) are fixed ex ante but are one of many reasonable choices; the robustness battery varies the analytical ones, not these. And the entire study lives inside a single index of one country in a 25-year window dominated, late, by mega-cap concentration: external validity to small caps, other markets, or other macro regimes is asserted nowhere.

What survives the caveats. Three regularities are robust to every variation I ran: prior-respecting models beat estimated ones, and the failure is locatable in the estimation of discipline itself; selection skill concentrates in accounting-comparable sectors and in elevated-risk regimes; and the skill is large enough to survive realistic implementation. Where results are weaker (long horizons, Low-tier sectors, the absolute return of the integrated system in a bull market) the paper says so in those words.

14 Conclusion

This series began with a market-level question (when does the S&P 500 draw down?), descended to sectors, and ends here at the level where most active risk is actually taken. The question this paper set for itself was the practitioner's: within a given sector, which measurable factors signal future relative returns best and most reliably, and how should they be turned into a stock screen? The answer, compressed. Which factors: cash-flow valuation and short interest above all, positioning and low-risk broadly, momentum not at all save in Utilities and under stress; on reliability the order sharpens, because short interest is the one signal that survives every horizon and both sub-periods. Where: in six of eleven sectors, the accounting-comparable ones; the tiers, the map and the favourable zones of Section 6 give the sector-by-sector detail, including the zones where more of a good signal turns bad. How to combine: at equal weights over each sector's admitted families, because the contest of Section 7 shows that twenty-five years of monthly cross-sections cannot estimate what that one-line prior already knows, and the prior-target diagnostic locates the failure in the estimation of discipline, not direction. And when to lean on it: when the first paper's drawdown model worries, which turns the trilogy's macro layer into a switch for its selection layer.

Assembled, the three layers do what a top-down process claims to do: the integrated portfolio carries a quarter less risk at a materially higher Sharpe ratio, pays for its insurance in bull markets, and collects in drawdowns: 12.2 points over the index in 2022. The framework's practical residue is deliberately simple: a tier table that says where selection models may be trusted, a screening rule that beats the unscreened sector in every pre-registered test, a regime gate that says when to lean on it, and a fully documented procedure from first pull to final table. The screening layer completes the workflow; the discipline, I hope, outlives the signals.

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