

Fund Quality Forecasting with Historical Data Only



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ABSTRACT

A fund quality ranking framework built on historical annual returns from 33,030 funds across 25 sectors. The model uses a modified Sharpe ratio with a 3% volatility floor, the Fynup composite metric, and Monte Carlo weight optimization to forecast quality classes over a five-year horizon. Top-quintile funds show 68% persistence over three years versus 41% for random assignment. The framework eliminates name-based bias and produces audit-ready outputs for institutional allocators.

Keywords: Fund Analysis · Sharpe Ratio · Monte Carlo · Portfolio Construction · Persistence

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Abstract

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SECTION 1

Executive Insight

This paper constructs a fund quality classification framework from historical annual returns only, covering 33,030 funds across 25 sectors. The model avoids name-based bias and forecasts quality quintiles over a five-year horizon using a modified Sharpe ratio, composite scoring, and Monte Carlo weight optimization.

The core finding is that top-quintile funds exhibit 68% persistence over the subsequent three-year window, compared to 41% for random assignment. Bottom-quintile persistence is even stronger at 72%, consistent with the well-documented asymmetry between quality persistence and return persistence. This persistence premium is economically significant and survives sector-level controls.

SECTION 2

Dataset Architecture

The source dataset covers 33,030 funds spanning 25 sector classifications, with annual return observations from inception through the evaluation date. Fund age distribution ranges from under 2 years to over 20 years, with the median at 7.3 years. Sector representation includes equity (domestic,

international, emerging), fixed income (government, corporate, high-yield), balanced, money market, alternatives, and specialty mandates.

No filter is applied for survivorship: the dataset includes both active and terminated funds, eliminating the survivorship bias that inflates apparent quality persistence in most industry studies. Fund identification is stripped prior to scoring, ensuring that brand recognition, marketing materials, and manager reputation play no role in the ranking.

SECTION 3

Modified Sharpe Ratio Construction

The standard Sharpe ratio is undefined or unstable for funds with near-zero volatility. Money market funds, ultra-short duration vehicles, and stable-value strategies routinely exhibit annualized standard deviations below 1%, producing Sharpe ratios that are numerically large but economically meaningless.

The modified Sharpe ratio replaces the denominator with $\max(\sigma, 3\%)$, where 3% represents the minimum volatility that reflects genuine risk-taking. This floor ensures that low-variance funds are ranked on excess return alone, without receiving artificially inflated quality scores. Cross-sector calibration proceeds through sector-specific z-scoring before cross-sector aggregation, preserving within-sector ordinal ranking while enabling cross-mandate comparison.

SECTION 4

Fynup Composite Metric

The Fynup ratio synthesizes seven performance dimensions into a single composite score between 0 and 1. The components are: (1) modified Sharpe ratio, (2) maximum drawdown severity, (3) drawdown recovery time, (4) return consistency measured by the Hurst exponent, (5) downside deviation, (6) Sortino ratio, and (7) annualized excess return above the sector benchmark.

Each component is normalized to a [0, 1] scale using the cross-sectional distribution within its sector. The composite is a weighted average: $\alpha * \text{Sharpe_norm} + \beta * \text{DD_norm} + \gamma * \text{consistency_norm} + \dots$ with weights calibrated by out-of-sample persistence maximization. The optimal weight vector assigns 35% to the Sharpe component, 25% to drawdown metrics, 20% to consistency, and 20% to the remaining factors.

SECTION 5

Monte Carlo Weight Optimization

The weight vector for the Fynup composite is calibrated through Monte Carlo simulation. 100,000 random weight vectors are drawn from a Dirichlet distribution, and each vector produces a full cross-sectional ranking. Out-of-sample persistence is measured as the probability that a fund in the top quintile at time t remains in the top quintile at time $t+3$ years.

The optimal weight vector maximizes this persistence probability. The procedure is repeated across rolling 5-year calibration windows to ensure stability. The Monte Carlo forecast error for the composite score is estimated at 4.2% under the optimal weights, compared to 8.7% for equal-weighted scoring and 12.1% for Sharpe-only ranking.

SECTION 6

Persistence and Validation

The persistence results are the central empirical finding. At the top quintile, 68% of funds remain in the top quintile over the subsequent three-year window. At the bottom quintile, persistence is 72%. The middle quintiles show weaker persistence (48-55%), consistent with a bimodal quality distribution: funds are either consistently good or consistently poor, with the middle representing transient noise.

The persistence premium is robust to sector controls, fund size controls, and fee adjustments. Importantly, persistence in quality class is substantially higher than persistence in raw returns, confirming that quality classification captures a stable fund characteristic rather than a transient performance outcome.

SECTION 7

Exponential Weighting and Recency

Recent returns receive higher weight through an exponential decay function with half-life λ . The decay function $w(t) = \exp(-\lambda * (T - t))$ assigns progressively lower weight to older observations. The optimal half-life, calibrated to maximize out-of-sample quality persistence, is 2.8 years.

This weighting scheme reflects the empirical observation that fund management quality is not stationary: team changes, strategy drift, and organizational shifts cause quality to evolve over time. The exponential weighting captures this non-stationarity while retaining sufficient history for statistical reliability.

SECTION 8

Case Illustration: Best-Indicated Fund

The framework identifies a balanced fund with a Fynup composite score of 0.91 (top 3% of the entire universe). This fund exhibited annualized returns of 8.2%, maximum drawdown of -11.3%, recovery time of 14 months, and a modified Sharpe ratio of 1.42. Its three-year forward persistence probability was estimated at 74%, and the realized outcome confirmed continued top-quintile classification.

In contrast, the bottom-quintile exemplar showed a Fynup score of 0.12, annualized returns of -2.1%, maximum drawdown of -38%, and a modified Sharpe of -0.31. Its three-year forward persistence in the bottom quintile was estimated at 78% and realized at 81%.

SECTION 9

Institutional Implications

For institutional allocators, the framework provides a structured, auditable screening layer that processes the full investable universe without reliance on marketing materials or brand recognition. Outputs integrate directly with governance and reporting workflows, producing documentation that satisfies both internal investment committees and external fiduciary review.

For fund selectors, the persistence premium in the bottom quintile is arguably more valuable than in the top quintile: identifying funds likely to remain poor performers allows negative screening with high confidence. For risk managers, the quality classification provides an early warning system for funds migrating from the top quintile to the middle quintiles, triggering enhanced monitoring.

SECTION 10

Methodology and Citations

Empirical data: 33,030 fund return histories provided by Fynup AG. Modified Sharpe ratio construction follows the adjustments proposed in Lo (2002, Financial Analysts Journal) for autocorrelated returns, extended with the 3% volatility floor for low-variance strategies. Monte Carlo weight calibration uses Dirichlet-distributed random vectors with 100,000 draws per calibration window.

All numerical results are computed from publicly available return data. No proprietary models or non-replicable inputs are required. The framework is designed for annual recalibration with a rolling 5-year estimation window.

KEY EQUATION

$$\text{Modified Sharpe: } S_m = (r - r_d) / \max(\sigma, 3\%)$$

Working Paper 01 — Principal Formula

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