



Structural Analysis for Complex Systems

The Hedge Fund Landscape

The Field, Its Failures, and the Structural Gap

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QuantoMathics™ and QSIA™ are its brands (framework and methodology).

All evidence is drawn from public-domain sources unless otherwise stated.

Contents

Methodology Note	4
Executive Summary	4
I. The Scale of the Industry	6
1 What a Hedge Fund Promises	6
2 The Size of the Field	6
3 The Fee Structure, and a Two-Sided Trend	6
4 The Concentration of Capital	7
II. The Failure Record	8
5 How Often Funds Close	8
6 The Statistics Everyone Cites, and Their Foundation	8
7 Why Funds Fail: The Recurring Architecture	8
8 The Half That Are Not Investment Failures	9
9 Redemptions and the Liquidity Trap	9
III. The Notable Failures	10
10 Long-Term Capital Management (1998)	10
11 Amaranth Advisors (2006)	10
12 Archegos Capital Management (2021)	11
13 Melvin Capital (2021 to 2022)	11
14 A Note on Madoff	11
IV. The Challenges Facing the Field	12
V. The Structural Gap	13
15 What the Instruments Test	13

16 The Signature the Metrics Miss	13
17 What This Overview Introduces	13
Sources	15
Scope of Work	17

Methodology Note

Most assessments of the hedge fund industry measure returns, fees, or assets raised. This report asks a different question: what does the public evidence show about why hedge funds fail, and whether the conditions that produce those failures are the ones the industry's risk tools are built to test?

By a fund's *structure* (or *architecture*) this report means its configuration: how its positions are arranged (leverage, concentration, and the liquidity its strategy assumes) and how its controls are arranged (the processes that verify and constrain it), as distinct from its measured outputs (returns, risk metrics, compliance status). Two failure families follow. In a position-structure failure, the arrangement of the book cannot hold under stress; in a control-structure failure, the processes around the book break down. A *regime* is the prevailing state of correlations, liquidity, and volatility in which a fund operates, and a *regime change* is a transition that breaks the assumptions the fund's structure depends on. The instruments of the field read outputs; this report asks about configuration. The word operates at two scales here: a single fund's configuration, and the field's, how the industry's instruments, incentives, and shared assumptions are arranged. Both are matters of configuration, not of measured output.

This report applies the research standards of QSIA™ (QuantoMathics™ Structural Integrity Analysis), a structural diagnostic methodology; see <https://qsia.us>. Quantitative claims are sourced at point of first use. Where a widely repeated statistic lacks a verified empirical foundation, that is stated plainly rather than passed along. Where sources disagree, the disagreement is shown. Figures vary by data provider and by definition, and the provider is named alongside the number. All data is drawn from public sources and is current as of the date of this draft.

This is a landscape survey. It outlines the field and its structural challenges. It does not analyze any single firm; that is the work of the case studies this overview introduces, beginning with Long-Term Capital Management.

Executive Summary

The hedge fund industry manages roughly \$5.2 trillion (HFR, Q1 2026), near a record high after fourteen consecutive quarterly gains. It is also an industry with a high and persistent failure rate: in any given year a measurable share of funds close, and the median fund does not survive much beyond five years.

The conventional account of why hedge funds fail points to markets and luck: a bad bet, an adverse move, a once-in-a-generation shock. The evidence points somewhere more consistent. The failures that matter share a recognizable architecture. Three features recur across the largest blowups: heavy leverage, concentration into a narrow set of positions, and reliance on the ability to exit positions that turn out to be illiquid under stress. When a shock arrives, these three interact, and a fund that looked sound on every conventional measure cannot sustain its own structure.

Separately, a large body of evidence finds that a substantial share of hedge fund failures

are not investment failures at all. The most cited study of failed funds attributes about half of failures to operational causes, fraud, misrepresentation, and process breakdown, rather than to losing trades (Capco, 2003).

The instruments the industry relies on, value-at-risk models, performance track records, compliance reviews, and operational due diligence, test the surface of a fund. None of them tests whether the fund's architecture can hold when the regime changes. That is the structural gap this report documents, and it is the gap the case studies that follow examine one subject at a time, beginning with Long-Term Capital Management.

I. The Scale of the Industry

1 What a Hedge Fund Promises

A hedge fund is a privately offered, actively managed pool that pursues absolute return: a positive result in most market conditions, with low correlation to traditional stocks and bonds, achieved through tools most regulated funds cannot use freely, including leverage, short selling, derivatives, and concentrated positions. The classic compensation model is "2 and 20": a 2% annual management fee plus 20% of profits.

The promise is not "beat the stock market." It is capital preservation and return that does not move with the market. That distinction matters for every performance comparison in this report, and it is routinely lost in public commentary.

2 The Size of the Field

Global hedge fund assets reached about \$5.22 trillion in the first quarter of 2026 (HFR, Q1 2026), the fourteenth consecutive quarterly gain. The industry first crossed \$5 trillion in 2025, on a record annual increase of \$642.8 billion (HFR, January 2026). The industry has grown roughly twentyfold since 2000, from on the order of \$200 billion, through a sharp contraction in the 2008 crisis, to its present scale.

The headline number depends on who is counting. BarclayHedge reported a comparable \$5.2 trillion roughly a year earlier than HFR, using a broader fund universe (BarclayHedge, year-end 2024). The lesson for any figure in this field: cite the provider with the number. The count of active funds is even less settled; databases cover several thousand products, but a clean industry-wide population figure is not reliably available without a fresh primary source.

3 The Fee Structure, and a Two-Sided Trend

The "2 and 20" standard (a 2% management fee plus 20% of profits, with management fees historically ranging from roughly 1% to 4%) now sits well above the measured average and applies to a minority of funds. Industry averages have drifted to roughly 1.3% management and 16% performance (HFR, 4Q 2025).

The common claim that fees are simply falling is only half the story. One fee-research provider found that the management fee investors actually paid rose to 1.77% in 2024, from 1.62% in 2023, surpassing its prior peak, as strong performance restored managers' pricing power (fee-research data cited by the Wall Street Journal, 2025). At large multi-manager firms, pass-through expense models push the all-in cost well above any headline rate. Fees are compressing in name and rising in practice at the same time, depending on the segment.

4 The Concentration of Capital

The industry's growth is uneven. By the first half of 2025, roughly 550 firms each managing more than \$1 billion together ran about \$3.6 trillion, on the order of 85% of the assets in its tracked universe (With Intelligence, Global Billion Dollar Club, H1 2025). The largest multi-strategy platforms captured the bulk of new inflows. The field is increasingly a small number of very large managers alongside a long tail of smaller funds operating under a heavier relative cost and a thinner capital base, which is also where most closures occur.

II. The Failure Record

5 How Often Funds Close

In recent years roughly 300 to 600 funds have launched and a few hundred have liquidated annually; 2025 saw about 562 launches against about 287 liquidations, the lowest liquidation count in two decades (HFR, January 2026). Across longer windows, peer-reviewed studies put annual database attrition at roughly 8 to 9% (Chan, Getmansky, Haas and Lo, 2005; Baquero, ter Horst and Verbeek, 2005).

A critical distinction governs all of these numbers. Database attrition is not the same as failure. Of the funds that leave a database each year, many do so for benign reasons: they close to new capital, merge, or the manager retires. The share that truly fails is closer to 3% per year. Any mortality figure that does not separate attrition from failure cannot be read at face value.

6 The Statistics Everyone Cites, and Their Foundation

The most repeated claim about hedge fund mortality is that roughly 20% of funds fail in their first year and about half by their fifth. The figure is widely quoted. It is also industry folklore rather than a sourced finding.

The "first-year" number appears to be a misremembered version of an early industry study whose actual figure was a low single-digit first-year rate and about 20% in the second year (Howell, 2001). The "half by year five" conflates two different facts: that the median fund's life is around five years, which makes "half gone by five" close to true by definition, and a separate finding that about half of fund failures are operational in nature (Capco, 2003). Neither supports the headline as stated.

The industry's most-cited statistic about its own failure rate has no verified empirical foundation. This is itself a structural observation: a field can repeat a number about its own survival for decades without the number ever having been established. The same pattern, a confident figure resting on no traceable evidence, recurs across the assessment industries.

The defensible central estimate, drawn from the academic record, is a median fund life of roughly five years, with mean life longer because a small number of durable managers pull the average up (Gregoriou, 2002; Amin and Kat, 2003).

7 Why Funds Fail: The Recurring Architecture

Across the documented failures, three structural features recur together. Each is benign on its own and dangerous in combination.

- **Leverage.** Borrowing magnifies both gains and losses. A modest adverse move on a

heavily levered book becomes a fatal one.

- **Concentration.** Capital pressed into a narrow set of correlated positions removes the diversification that would otherwise absorb a shock.
- **Illiquidity under stress.** A position that can be exited in calm markets cannot always be exited in a crisis, precisely when exit is needed, and a fund large enough in that position becomes its own obstacle to leaving.

The mechanism by which these three combine is well described in the literature on tightly coupled financial systems, where leverage and illiquidity interact so that a shock forces propagating, self-reinforcing sales (Bookstaber, 2007). When the three align, a fund does not fail because its thesis was wrong. It fails because its structure cannot sustain the stress its own size and leverage create.

8 The Half That Are Not Investment Failures

A second, less visible failure mode is operational. The most cited study of failed funds, drawing on a database of more than one hundred closures over two decades, found that about half of all failures could be attributed to operational causes alone, rather than to losing trades (Capco, 2003). These two figures answer different questions on different populations: the roughly three percent above is how many funds fail each year, measured across the fund population, while this one is the composition of those failures, that of the funds which do fail, about half fail for operational rather than investment reasons, drawn from samples of failed funds. Within those operational losses, process and control failures lead, followed by client and business-practice issues and by internal fraud, which includes misrepresentation and unauthorized trading. The point is that most are breakdowns of controls and process, not only outright fraud. Later studies of fund-of-funds portfolios echo rather than refute the result, reporting operational problems as the primary cause in a similar or higher share, on the order of 54%, of failed funds (consistent with Christory, Daul and Giraud, 2006). A large share of hedge fund failures have nothing to do with the quality of the investing.

This matters for how failure is anticipated. A fund can have sound positions and still fail on the architecture around them: the controls, the verification, the separation of duties. Performance data cannot see that. It is a structural condition.

9 Redemptions and the Liquidity Trap

A hedge fund's capital is, in effect, demandable: investors can ask for their money back. When markets fall, redemption requests rise, and the fund must sell into a falling market exactly when liquidity is scarcest, which drives prices down further and invites more redemptions (Liu and Mello, 2011). The same illiquidity that earns a premium in calm markets becomes the trap in a crisis (Aragon, 2007). In October 2008, investors pulled on the order of \$40 billion, and gates and suspensions spread across the industry as funds tried to avoid forced sales.

III. The Notable Failures

When large hedge funds fail, the same family of position-structure features appears, though no two cases instantiate it identically: each draws on leverage, concentration, and illiquidity in its own proportion. In the largest cases the effects reach beyond the fund itself.

10 Long-Term Capital Management (1998)

The defining case. LTCM was run by an elite team that included two winners of the 1997 Nobel Memorial Prize in Economics, Myron Scholes and Robert C. Merton. Its strategy was relative-value arbitrage: small, supposedly low-risk bets that prices which had diverged would converge, scaled up with heavy leverage.

On about \$4.7 to \$5 billion of capital, the fund held roughly \$125 billion in assets, a balance-sheet leverage near 25 to 1, and derivative positions with a notional value around \$1.25 trillion (President's Working Group on Financial Markets, 1999). When Russia defaulted on its debt in August 1998, capital fled to safety and the spreads LTCM had bet would narrow widened instead. The fund lost about \$4.6 billion in under four months. Its positions were too large to unwind without moving the market against itself. Its funding structure compounded the exposure: short-term borrowing against long-term, illiquid relative-value positions meant that leverage, concentration, and the assumption of orderly exit were tightly coupled, so that when spreads moved against the fund, the coupling forced self-reinforcing selling.

To prevent the unwinding from destabilizing the wider system, the Federal Reserve Bank of New York organized a private recapitalization: fourteen banks and brokerages put in \$3.625 billion in exchange for ninety percent of the fund (President's Working Group, 1999). The rescue was Fed-orchestrated, not Fed-funded.

LTCM passed every conventional test available in 1998. Its risk models were state of the art. Its principals had defined modern risk theory. The architecture, extreme leverage on positions assumed to be near-riskless, concentration, and the assumption that it could always exit, is what failed. The trigger was Russia. The cause was the structure. That distinction is the subject of the first case study this overview introduces.

LTCM is also the best-documented hedge fund failure on record, with a dedicated study by the President's Working Group on Financial Markets and an extensive academic literature, which makes it the cleanest available subject for a structural case study.

11 Amaranth Advisors (2006)

A \$9 billion fund that lost roughly \$6.5 billion in under two weeks on concentrated natural gas futures bets, holding so large a share of open interest in some contracts that the positions could not be exited without crushing the price. Concentration and illiquidity, without the systemic reach of LTCM.

12 Archegos Capital Management (2021)

A family office that built roughly \$160 billion of gross exposure to a handful of stocks using total return swaps, an arrangement in which each lending bank saw only its own slice and none saw the whole. When the positions fell, Bill Hwang could not meet the margin calls; the banks liquidated, and combined losses to lenders exceeded \$10 billion (Credit Suisse alone about \$5.5 billion). Hidden leverage, single-name concentration, and correlated forced selling, the same architecture, expressed through a newer instrument.

13 Melvin Capital (2021 to 2022)

A fund crippled by a crowded, visible short position in a small-float stock (GameStop) that retail investors coordinated to squeeze in January 2021. It lost about 53% that month, took a \$2.75 billion rescue infusion, and wound down by May 2022. The structural feature was a known, concentrated, exposed position that others could see and act against.

14 A Note on Madoff

The Madoff fraud is frequently listed among hedge fund failures. It belongs in a different category. It was a Ponzi scheme: there were no real trades and no real leverage, only fabricated statements over roughly \$17 to \$20 billion of actual invested principal (SEC, 2008). It is a case of total operational and verification failure, not of an investment architecture that could not hold. It is named here only to set it apart.

IV. The Challenges Facing the Field

Beyond individual failure, the field faces a set of structural pressures.

- **Performance under scrutiny.** Over the post-2010 equity bull market, hedge fund composites trailed the S&P 500 in every measured window (for example, the Barclay Hedge Fund Index returned about 5% a year from 2011 to 2020 against about 14% for the S&P 500). The comparison is contested in both directions: hedge funds target absolute and risk-adjusted return, not equity outperformance, and the indices that report hedge fund returns are biased upward by survivorship and backfill effects of several percentage points a year (Malkiel and Saha, 2005). The single-index comparison cannot settle the question, but the public perception it creates is itself a pressure on the field.
- **Alpha decay and capacity.** The edge that strategies exploit tends to erode as capital crowds in and as the edge becomes known. Returns to documented strategies fall substantially out of sample and again after publication (McLean and Pontiff, 2016), and high inflows tend to precede lower future returns (Naik, Ramadorai and Stromqvist, 2007).
- **Fees and concentration.** As above, headline fees compress while paid fees and all-in costs can rise, and capital concentrates in the largest platforms, raising the relative cost burden on the smaller funds where most closures occur.
- **Operational and compliance cost.** Industry surveys put average compliance spending at a bit over seven percent of operating costs, with many managers, particularly smaller ones, reporting five to ten percent or more, and aggregate industry compliance costs running into the billions (AIMA, MFA and KPMG global survey). The burden falls hardest on the smaller funds, where most closures occur.
- **Regulation in flux.** On June 5, 2024, the Fifth Circuit vacated the SEC's 2023 Private Fund Adviser Rules in full, holding that the agency had exceeded its authority and that no part of the rule could stand. The surviving regulatory baseline (Form PF reporting, Dodd-Frank registration, and, in Europe, AIFMD II) remains, but the supervisory picture is unsettled.
- **Crowding and systemic risk.** Regulators increasingly warn that concentrated, crowded, and leveraged positions across funds amplify shocks system-wide, citing the 2020 dash for cash, Archegos, and the 2022 UK gilt crisis (Financial Stability Board, 2025). The concern is no longer only that an individual fund can fail, but that many funds positioned alike can fail together.

V. The Structural Gap

15 What the Instruments Test

The hedge fund industry is among the most heavily instrumented in finance. It runs value-at-risk and stress models, tracks performance and drawdown, conducts operational due diligence, and submits to compliance and regulatory review. Each of these tools is real and useful. Each tests something specific.

Value-at-risk tests how much a portfolio is likely to lose under normal conditions. Performance history tests what a fund has returned. Due diligence tests whether the operational controls exist on paper. Compliance tests adherence to rules. None of them tests the question the failures in this report turn on: whether the fund's architecture, the interaction of its leverage, its concentration, and its liquidity assumptions, can sustain a change in the regime it operates in.

16 The Signature the Metrics Miss

The failures documented here were not, for the most part, failures of measurement. LTCM measured its risk with the best tools available. Amaranth and Archegos had risk functions. What they shared was a structure that the metrics, by design, could not see: positions assumed to be exitable that were not, correlations assumed to be stable that converged to one under stress, leverage that was survivable in the assumed world and fatal in the real one.

A fund can show an impeccable track record, a clean compliance file, and a risk model in good order, and still carry a structure that cannot hold when the regime changes. The conventional instruments operate on the surface of the fund. They do not reach the architecture beneath it. That untested layer is where the failures originate.

17 What This Overview Introduces

This report documents the landscape: the scale of the field, the rate and the recurring shape of its failures, and the pressures it now faces. It establishes that hedge fund failure originates in structure rather than in the measured surface, that a common family of structural features recurs across the cases (each instantiating it in its own proportion), and that the industry's standard instruments, which read outputs, are not built to detect it.

It does not, here, apply a diagnostic to that gap. That is the work of the case studies this overview introduces. The series comprises three subjects, chosen so the same method can be seen reading different structural outcomes: Long-Term Capital Management and Archegos Capital Management, two terminal failures with different roots (a grounding failure and a transparency failure), and Bridgewater Associates, a fifty-year survivor included as the structurally sound counterpoint, to test whether the framework registers integrity and not only its absence. Each is examined condition by condition, beginning with the clearest

embodiment of the failure pattern, Long-Term Capital Management.

The case studies turn on a further distinction: between what was knowable beforehand and what became obvious afterward. Each structural condition is read against a fixed criterion set in advance, so a deficiency is registered on the evidence available at the time, before any outcome and regardless of whether, or when, a failure later arrived. In each failure examined, the condition that mattered, leverage scaled past the capacity to exit, a grounding that held only in the regime that happened to prevail, an architecture in which no party could see the aggregate, was present and documented in the public record before the loss, not discovered by it.

This is a claim about observability, not prediction. A structural reading identifies whether a system can sustain coherent operation under stress; it does not forecast which shock will arrive, or when. Its separation from conventional post-mortem analysis is clearest in the one subject of the series that did not fail: a manager still operating in good standing, where there is no outcome to explain in hindsight and the same reading runs entirely forward.

The worth of a structural reading is that the conditions are there to be read in advance. Conventional analysis explains a failure after it occurs; a structural diagnostic asks, before the outcome and equally of a structure that does not fail, whether the architecture can hold. That prospective quality, not any single score, is what separates it from hindsight.

Sources

This draft attributes figures inline. Sources are gathered here for verification and will be finalized with full citations. Figures flagged in the text as contested or provider-dependent are marked for confirmation.

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Scope of Work

This report is a landscape survey of the hedge fund industry, focused on the structural conditions under which hedge funds fail and the pressures the field now faces. It draws entirely on public sources. It does not evaluate or recommend any individual fund, manager, or strategy, and it offers no investment advice. It documents the structural landscape from which the accompanying case studies proceed.

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