



ANALYSIS GROUP
ECONOMIC, FINANCIAL and STRATEGY CONSULTANTS

Hedge Funds: Risk and Return



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Topics

- **Two Principal Sources of Bias in Hedge Fund Returns: Backfill and Survivorship**
- **Persistence of Fund Performance**
- **Demise or Success: Why hedge funds stop reporting**
- **Implications for Investors**

Research Papers:

Hedge Funds: Risk and Return, by Burton Malkiel and Atanu Saha, *Financial Analysts Journal*, December 2005

Do Hedge Funds Stop Reporting?, by Alex Grecu, Burton Malkiel, and Atanu Saha, April 2006

The Importance of Hedge Funds

- **At the end of 2005, more than \$1 trillion U.S. dollars were invested in hedge funds around the globe.**
- **Market makers on the floor of the New York Stock Exchange have estimated that during 2004, trades by hedge funds often accounted for more than half of the total daily number of shares changing hands.**
- **Investments in hedge funds have become an important part of the asset mix of institutions and even wealthy individual investors.**



A Preview of Our Key Findings

- **The putative argument for investing in hedge funds is straightforward: With higher rates of return and lower risk, they appear to be more attractive than the general stock market.**
- **The empirical evidence in our research suggests that hedge funds are far riskier and provide lower returns than are commonly supposed.**
- **Although some hedge funds have provided generous returns, investors face the risk of buying poorly performing funds, or worse, failing ones.**

The TASS Database

- **TASS is a unit of Tremont Capital Management. It was purchased by Tremont in 1999.**
- **TASS is one of the most comprehensive data services that cover all varieties of hedge funds.**
- **Reporting to TASS is voluntary for hedge funds.**
- **TASS data encompass both live and defunct funds.**
 - **Defunct funds are those that have stopped reporting to TASS**



Biases in Published Hedge Fund Indexes

- ***End of Life Reporting Bias:*** Funds do not report unfavorable returns in the months immediately prior to exit
- ***Backfill Bias:*** Funds begin reporting once results are favorable; the most favorable of the early results are “backfilled” into the database
- ***Survivorship Bias:*** Unsuccessful funds exit, leaving only the more successful funds in the database, biasing the average returns upwards

Backfill Bias in Hedge Fund Returns

| Year | Backfilled | | Non-Backfilled | | Difference |
|------------------------|--------------|-------|----------------|-------|-------------|
| | Mean Return | Count | Mean Return | Count | |
| 1994 | 0.4% | 1,076 | -11.5% | 22 | 12.0% |
| 1995 | 17.2% | 1,318 | 10.4% | 52 | 6.9% |
| 1996 | 19.4% | 1,299 | 12.4% | 331 | 7.1% |
| 1997 | 19.8% | 1,307 | 13.1% | 555 | 6.7% |
| 1998 | 9.6% | 1,352 | -2.0% | 751 | 11.7% |
| 1999 | 31.5% | 1,408 | 28.2% | 913 | 3.3% |
| 2000 | 14.7% | 1,463 | 2.1% | 1,030 | 12.6% |
| 2001 | 8.2% | 1,522 | 2.8% | 1,119 | 5.4% |
| 2002 | 6.1% | 950 | 0.9% | 1,747 | 5.2% |
| 2003 | 19.5% | 936 | 17.2% | 2,065 | 2.3% |
| Arithmetic Mean | 14.7% | | 7.3% | | 7.3% |

Note: Totals may not add due to rounding.

- **Backfilled returns tend to be substantially higher than contemporaneously reported ones, particularly in the early years**
- **The difference between backfilled and non-backfilled returns is statistically significant in most years**

Survivorship Bias in Hedge Fund Returns

| Year | LIVE | | LIVE + DEFUNCT | | Difference |
|------------------------|--------------|-------|----------------|-------|-------------|
| | Mean Return | Count | Mean Return | Count | |
| 1996 | 17.3% | 58 | 12.4% | 331 | 4.9% |
| 1997 | 19.4% | 138 | 13.1% | 555 | 6.3% |
| 1998 | 2.2% | 232 | -2.0% | 751 | 4.2% |
| 1999 | 34.1% | 361 | 28.2% | 913 | 5.9% |
| 2000 | 9.4% | 504 | 2.1% | 1,030 | 7.3% |
| 2001 | 7.1% | 678 | 2.8% | 1,119 | 4.3% |
| 2002 | 2.5% | 1,273 | 0.9% | 1,747 | 1.6% |
| 2003 | 18.0% | 1,770 | 17.2% | 2,065 | 0.8% |
| Arithmetic Mean | 13.7% | | 9.3% | | 4.4% |

- There is a substantial difference between the mean returns of live and defunct funds.
- In almost all years, this difference is statistically significant.
- The average of the returns of all (live and defunct) funds is about 4.4% lower than the returns of live funds.

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- The average of the returns of all (live and defunct) funds is about 4.4% lower than the returns of live funds.
- Over the same period, the average return of the S&P 500 was 11.4%.

Persistence in Hedge Fund Returns

- **Is past investment success a good predictor of future success?**
 - **Probability of observing repeat “winners” over 1996 – 2003 period is approximately 50-50.**
 - **Results and significance vary by year.**
 - **Little difference in persistence by category of hedge fund.**

Persistence in Hedge Fund Returns 1996 - 2003

Panel A: Dropped Funds Are Considered Losers.

| Year | Winner-Winner | Winner-Loser | Total | % Repeat Winner | Z-test Repeat Winner |
|------|---------------|--------------|-------|-----------------|----------------------|
| 1996 | 11 | 7 | 18 | 61.11% | 0.9 |
| 1997 | 82 | 66 | 148 | 55.41% | 1.3 |
| 1998 | 134 | 125 | 259 | 51.74% | 0.6 |
| 1999 | 145 | 200 | 345 | 42.03% | -3.0 |
| 2000 | 172 | 227 | 399 | 43.11% | -2.8 |
| 2001 | 276 | 199 | 475 | 58.11% | 3.5 |
| 2002 | 304 | 191 | 495 | 61.41% | 5.1 |
| 2003 | 312 | 476 | 788 | 39.59% | -5.8 |
| | | | | 51.56% | 0.0 |

Panel B: Dropped Funds Are Not Considered in This Analysis.

| Year | Winner-Winner | Winner-Loser | Total | % Repeat Winner | Z-test Repeat Winner |
|------|---------------|--------------|-------|-----------------|----------------------|
| 1996 | 11 | 5 | 16 | 68.75% | 1.5 |
| 1997 | 70 | 54 | 124 | 56.45% | 1.4 |
| 1998 | 113 | 104 | 217 | 52.07% | 0.6 |
| 1999 | 124 | 140 | 264 | 46.97% | -1.0 |
| 2000 | 142 | 181 | 323 | 43.96% | -2.2 |
| 2001 | 226 | 150 | 376 | 60.11% | 3.9 |
| 2002 | 275 | 144 | 419 | 65.63% | 6.4 |
| 2003 | 298 | 380 | 678 | 43.95% | -3.1 |
| | | | | 54.74% | 0.9 |

Note: “Winners” are hedge funds that realize a return equal to or larger than the median hedge fund return for that year. “Losers” are hedge funds that realize a return below the median return for that year. Winner-Winner and Winner-Loser counts in Panels A and B are based on medians derived from the universe of funds considered in each panel. Winner-Winner counts differ due to independently calculated medians.

Source: TASS data.

Persistence in Hedge Fund Returns by Category of Fund, 1996 - 2003

| <u>Type of Fund</u> | <u>% Repeat Winner</u> |
|-------------------------|------------------------|
| Convertible Arbitrage | 47.92% |
| Dedicated Short Bias | 35.71% |
| Emerging Markets | 55.96% |
| Equity Market Neutral | 50.47% |
| Event Driven | 57.21% |
| Fixed Income Arbitrage | 53.84% |
| Fund of Funds | 46.21% |
| Global Macro | 44.23% |
| Long/Short Equity Hedge | 55.93% |
| Managed Futures | 41.90% |
| Other | 55.61% |

Source: TASS data.

Hedge Fund and Mutual Fund Attrition Rate

| Year | Hedge Fund Attrition | | | Mutual Fund Attrition | | | Chi-Square Test Statistic |
|------|----------------------|---------|---------------|-----------------------|---------|--------------|------------------------------|
| | Existing | Exiting | Attrition | Existing | Exiting | Attrition | |
| 1994 | 22 | 3 | 13.64% | 2,407 | 61 | 2.53% | 10.47* |
| 1995 | 52 | 14 | 26.92% | 3,037 | 152 | 5.00% | 48.30* |
| 1996 | 331 | 67 | 20.24% | 3,614 | 139 | 3.85% | 164.70* |
| 1997 | 555 | 69 | 12.43% | 4,643 | 188 | 4.05% | 74.13* |
| 1998 | 751 | 137 | 18.24% | 5,396 | 281 | 5.21% | 176.74* |
| 1999 | 913 | 149 | 16.32% | 5,882 | 319 | 5.42% | 146.32* |
| 2000 | 1,030 | 211 | 20.49% | 6,796 | 521 | 7.67% | 173.36* |
| 2001 | 1,119 | 201 | 17.96% | 7,678 | 597 | 7.78% | 122.88* |
| 2002 | 1,747 | 246 | 14.08% | 8,368 | 663 | 7.92% | 67.01* |
| 2003 | 2,065 | 295 | 14.29% | 9,170 | 754 | 8.22% | 73.20* |

* Statistically significant at 95% or higher level of confidence.

Why Do Funds Stop Reporting

- **Hypothesis: Funds exit because they no longer need additional capital; thus, success, and not failure, explains exit.**
- **We test this hypothesis by:**
 - (a) examining the performance of funds in the period immediately before they exit
 - (b) examining the differences in the characteristics of funds that exit and ones that do not



Characteristics of Exiting Funds

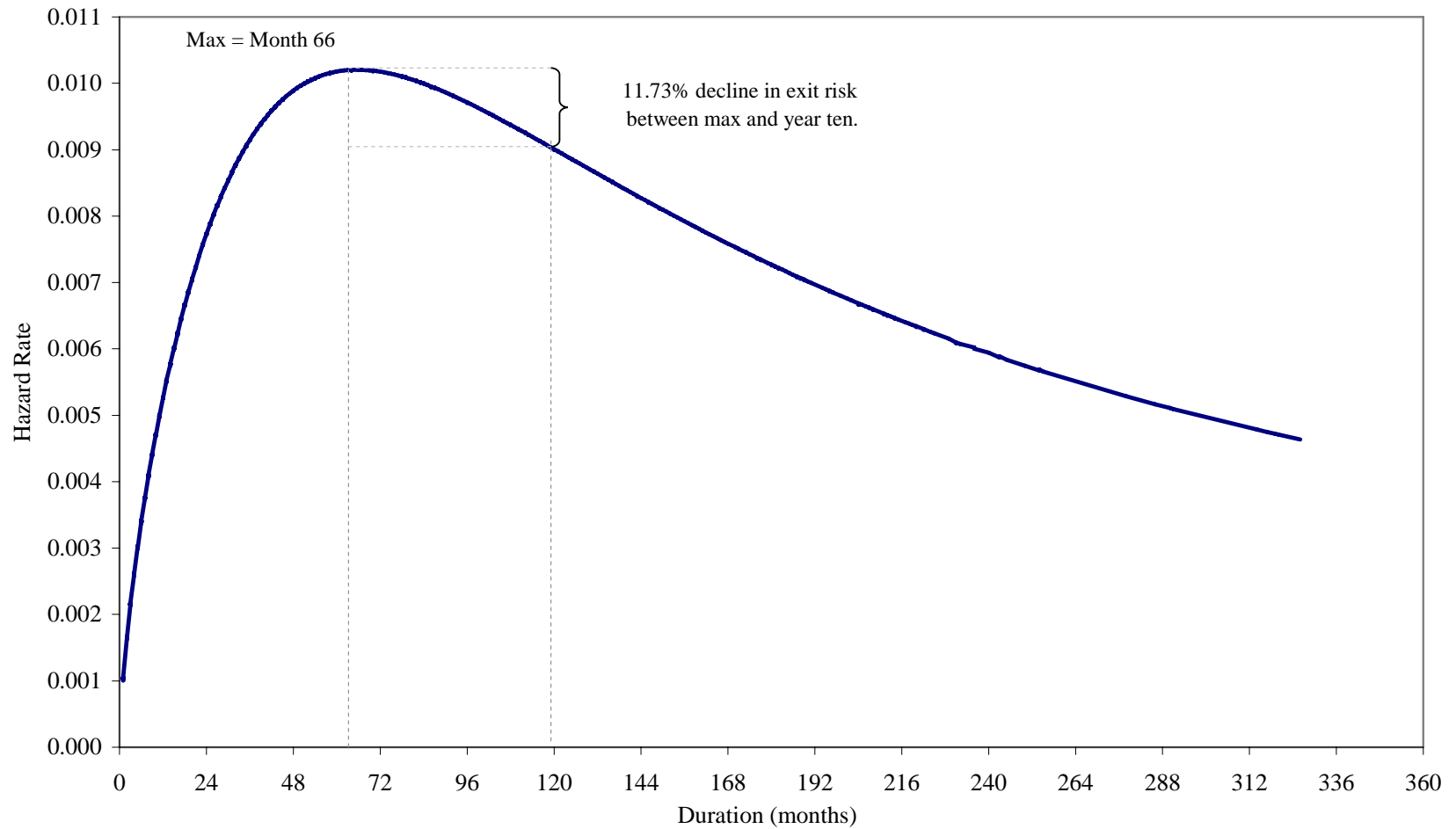
| Performance of Funds That Have Stopped Reporting: 1996-2004 | | |
|--------------------------------------------------------------------|----------------------|----------------------|
| A. Last Three Months | | |
| | Entire Period | Last 3 Months |
| Returns | 0.49% | -0.61% |
| Sharpe Ratio | 0.102 | -1.859 |
| B. Last Six Months | | |
| | Entire Period | Last 6 Months |
| Returns | 0.65% | -0.56% |
| Sharpe Ratio | 0.146 | -1.293 |
| C. Last Nine Months | | |
| | Entire Period | Last 9 Months |
| Returns | 0.85% | -0.45% |
| Sharpe Ratio | 0.153 | -1.551 |

Hedge Fund's Time to Failure

- **To study the exit of funds, we use survival time analysis techniques widely used by researchers who have examined duration data.**
- **In survival analysis models, the variable of interest is the length of the spell, which in our case is the length of time from a hedge fund's inception until it fails or stops reporting.**



Change in a Hedge Fund's Failure Probability



The graph shows at which rate a hedge fund dies given that it has lasted the number of months shown on the horizontal axis

Persistence in Failure Probability

- **One reason why the risk of failure remains considerably higher for hedge funds is the existence of so-called “high water marks.”**
- **Suppose a hedge fund has enjoyed a strong long-run performance but then suffers a sharp loss in net asset value in a single year. Not only will the fund manager fail to earn an incentive fee during that poor year, but also the incentive fee will be earned in the following years only if the net asset value exceeds the previous high net asset value.**
- **The manager may prefer to close the fund and open a new fund that is not burdened by a “high water mark” that limits incentive compensation.**

Impact of Characteristics on Failure Probability

Estimated Coefficients of (Cox) Hazard Model

| | Coefficient | |
|--------------------------------------------------------------|--------------------|---------------------|
| | Estimate | Z-Statistics |
| Sharpe ratio | -0.513 | [11.09]** |
| Volatility | 1.047 | [2.00]* |
| Assets under management | -0.003 | [9.93]** |
| Relative performance among funds in the same category | -0.860 | [3.51]** |
| Indicator variable for Funds of Funds | -0.203 | [2.96]** |

Notes:

- (1) Absolute value of z-statistics in brackets
- (2) * significant at 5%; ** significant at 1%

Conclusions: Implications for Investors

- **Hedge funds have been marketed as an asset class that serves as an excellent diversifier to an all-equity portfolio due to the generous returns provided by hedge funds during all stock market environments.**
- **However, backfill and survivorship biases can cause upward bias in returns calculated from hedge fund databases.**
- **Correcting for such biases, hedge funds have lower returns than are commonly supposed.**
- **Investors in hedge funds take on a substantial risk of selecting a poorly performing fund, or worse, a failing one.**
- **Funds exit because of poor performance, particularly in the months prior to exit.**
- **Since failure rates remain high even for longstanding funds, this risk cannot be mitigated by restricting one's purchases to funds with a long record of past success.**