

The ABCs of Hedge Funds: Alphas, Betas, and Costs

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The authors decomposed their estimated pre-fee 1995–2009 hedge fund return of 11.13 percent into fees (3.43 percent), an alpha (3.00 percent), and a beta (4.70 percent). The year-by-year results show that alphas were positive during every year of the past decade, even during the recent financial crisis.

In 2008, hedge funds had negative returns and net withdrawals, which interrupted a 20-year stream of almost continuous positive aggregate performance and asset growth. In 1990, some 530 hedge funds managed about \$50 billion in assets; by the end of 2009, more than 8,000 hedge funds were managing \$1.6 trillion.¹ The strategy mix of the hedge fund industry has also changed. In 1990, the industry was dominated by funds that followed a global macro strategy; in 2008, a sizable majority of funds followed equity-based strategies, such as long-short equity and event-driven approaches. Hedge funds have gained increasing acceptance among both institutional and individual investors.

Our study updates Brown, Goetzmann, and Ibbotson (1999), who found statistically significant alphas in the hedge fund industry over 1989–1995, before substantial amounts of hedge fund data were available.² With access to data for 1995–2009, we were able to analyze a relatively complete 15-year dataset that corrected for both survivorship bias (by including dead funds) and backfill bias (by excluding backfill data). Many other researchers have studied hedge funds, including Fung and Hsieh (2000, 2004, 2009); Asness, Krail, and Liew (2001); and Liang (2000).

Despite the growing mainstream use of hedge funds, the industry is largely unregulated because it generally consists of either limited partnerships or offshore corporations. Although this lack of regulation gives hedge fund managers tremendous flexibility, it makes accurate

measurement of performance difficult. Because hedge funds are not required to report their returns, most hedge fund returns are reported to data collectors voluntarily. Several data vendors collect and measure hedge fund returns,³ but most of the published data are subject to two biases. The first is survivorship bias. When a fund fails, it is often removed from a database, together with its performance history. Its removal creates a survivorship bias because the database contains only successful funds. The second common bias is backfill. Hedge funds tend to start reporting performance after a period of good performance, and that history of good performance (or backfill) may be incorporated into the database.⁴

With both a management fee and an incentive fee, hedge funds' fee structure is different from that of traditional long-only managers. The typical hedge fund fee structure consists of a 1.5 percent management fee and a 20 percent incentive fee.⁵ Although the usual management fee for mutual funds may be in the same range as that for hedge funds, incentive fees are rare in the mutual fund industry. Incentive fees are generally associated with high-water marks—that is, they are earned only after past losses have been recovered.

One must distinguish between the returns that come from alpha and those that come from beta. The alpha component is added value and does not appear to be present in the mutual fund industry in aggregate. But the returns from beta can be readily produced by investing in mutual funds or by investing directly in a diversified portfolio of stocks and bonds without any special skill on the part of the investment manager. Presumably, the high alphas that the hedge fund industry has earned, together with their low correlations with other asset classes, have led to the growing interest in this industry and the corresponding high cash inflows.

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Table 4. Impact of Fund Size on Returns, January 1995–December 2009

Category	Equal Weighted, Live + Dead, No Backfill			End-of-Sample Category, Min. AUM (\$ millions)
	Compound Annual Return	Standard Deviation	Sharpe Ratio	
Largest 1%	11.59%	11.83%	0.18	103,696
Largest 5%	9.04	9.81	0.15	7,865
Largest 10%	8.66	9.42	0.15	3,511
Largest 20%	9.24	8.69	0.18	2,057
Largest 50%	8.50	6.75	0.20	473
Smallest 50%	6.85	7.20	0.13	1

Note: Categories were formed at the beginning of each period, with the returns measured afterward (out of sample); AUM amounts are as of December 2009.

consistent with their higher standard deviations. Second, managers of large funds may have greater skill than the average fund manager and thus be able to deliver above-average returns. Third, managers of large funds have more resources and may be able to focus more on managing the funds instead of managing their business. Even if the second and third explanations are valid, the extra risk seems to mitigate any return advantage that the large funds might enjoy.

The Bias Issue and Indices. These results show that survivorship bias and backfill bias can be quite large for individual hedge fund return data in the TASS hedge fund database. Analysis that does not correct for these biases can lead to overstated results. Value-weighted indices are likely to have less severe biases than equal-weighted indices because large funds are more likely than small funds to survive. Also, because large funds have usually been around longer, they are proportionally less likely to have backfill data during the sample period. We compared returns from two popular hedge fund indices with our equal-weighted portfolios. The HFRI Fund Weighted Composite Index is an equal-weighted index, whereas the CSFB/Tremont Hedge Fund Index is a value-weighted index. The two indices returned roughly 10 percent a year over the same period. Although their returns were higher than the 7.70 percent return on the equal-weighted portfolio in the sample of live-plus-dead funds with no backfill data, they were far less than the biased 14.88 percent return on the sample of live-only funds with backfill data. Moreover, because most of the hedge fund indices (such as the HFRI and CSFB/Tremont indices) are created on the fly, we believe that their return biases are much smaller than the biases in historical datasets. The biases in indices, however, are more likely to occur in their older data.

Sources of Hedge Fund Returns

After controlling for both the survivorship and the backfill bias in the returns, we investigated the sources of hedge fund returns. Hedge funds are often characterized as investment vehicles that are not particularly correlated with the traditional stock and bond markets because a large percentage of their returns are generated through manager skill. In other words, compared with traditional investment vehicles (e.g., mutual funds), a portion of hedge fund returns comes partly from a positive net alpha component.

In our study, we focused on determining what portion of hedge fund returns is derived from traditional long beta exposures (i.e., stocks, bonds, and cash) and what portion is from hedge fund alpha. Asness (2004a, 2004b) proposed breaking hedge fund alpha into (1) beta exposure to other hedge funds and (2) manager skill alpha. Fung and Hsieh (2004) analyzed hedge fund returns with traditional betas and nontraditional betas, which include trend-following exposure (or momentum) and several derivatives-based factors. They found that adding the nontraditional beta factors can explain up to 80 percent of the monthly return variation in hedge fund indices. Jaeger and Wagner (2005) also increased their R^2 s by adding in other hedge fund factors and concluded that hedge funds “generate returns primarily through risk premiums and only secondarily through imperfect markets” (p. 22). Using the seven-factor model proposed by Fung and Hsieh (2004), we conducted a separate analysis that included nontraditional betas.

Although we believe that a portion of the hedge fund returns can be explained by nontraditional betas (or hedge fund betas), these nontraditional beta exposures are neither well specified nor agreed upon and are not readily available to individual or institutional investors. A substantial portion of alpha can always be thought of as betas

waiting to be discovered or implemented. Nevertheless, because hedge funds are the primary way to gain exposure to these nontraditional betas, the latter should be viewed as part of the added value that hedge funds provide as compared with traditional long-only managers.

Therefore, we concentrated our analysis on separating the hedge fund returns by using only the traditional stock, bond, and cash beta exposures that are easily accessible by investors without hedge funds. We calculated the average amount of hedge fund returns that comes from long-term beta exposures versus the hedge fund value-adding alpha. We also compared the fees that hedge funds charge with the amount of alpha that hedge funds add.

Data and Model. We analyzed the performance of a universe of about 6,169 hedge funds in the TASS database over January 1995–December 2009. We focused on the sample of live-plus-dead funds without backfill data. This approach corrected for both the survivorship and the backfill bias, as well as the problems with the TASS database noted by Aggarwal and Jorion (2010)—in particular, the fact that TASS notes the entry date of funds in its database. We found a corrected overall compound return of 7.70 percent for this equal-weighted sample, compared with an 8.04 percent return on S&P 500 Index stocks over the same period.¹⁰

For our analysis, we used the equal-weighted index for the live-plus-dead funds without backfill data because it had the least amount of both survivorship bias and backfill bias. Using the same methodology, we also constructed indices for each of nine hedge fund subcategories in the TASS database. The

nine subcategories are convertible arbitrage, emerging market, equity market neutral, event driven, fixed-income arbitrage, global macro, long-short equity, managed futures, and dedicated short.

Aggregate Alpha, Beta, and Cost Results.

We based the attribution on the return-based style analysis model developed by Sharpe (1992) for mutual funds. We maintained the constraint that all style weights sum to 1. We allowed individual style weights to be negative or above 1 to account for shorting and leverage. We also included both lagged betas and contemporaneous betas to control for the impact of stale pricing on hedge fund returns.¹¹ The benchmarks that we used in the return-based analysis are the S&P 500 total returns (including both concurrent and with one-month lag), U.S. intermediate-term government bond returns (including one-month lag), and cash (U.S. Treasury bills).¹² Again, in this analysis, we chose to include only the traditional stocks, bonds, and cash as the beta exposures because we were mostly interested in the value added by hedge funds to investors with portfolios allocated only to traditional stocks, bonds, and cash.

Table 5 presents the equal-weighted compound annual return for each of the nine categories, as well as the equal-weighted index of all the funds. The overall annual compound return of the equal-weighted index was 7.70 percent over the period, with an annualized alpha of 3.00 percent. Note that all nine subcategories had positive alphas over the entire 15-year period, and four of them had a statistically significant alpha at the 5 percent level. The overall alpha estimate of 3.00 percent is also

Table 5. Regression Results, January 1995–December 2009

Subcategory	Compound Annual Return	Annual Alpha	Betas (sum of betas = 1)			R ²
			Stocks	Bonds	Cash	
Convertible arbitrage	7.41%	2.79%	0.34	-0.21	0.87	0.35
Emerging market	8.81	4.66	0.65	-0.67	1.02	0.39
Equity market neutral	7.08	2.86*	0.08	0.04	0.87	0.17
Event driven	8.33	3.94*	0.31	-0.29	0.99	0.52
Fixed-income arbitrage	6.57	2.91*	0.11	-0.16	1.05	0.12
Global macro	7.67	2.54	0.16	0.26	0.58	0.09
Long-short equity	9.99	4.79*	0.49	-0.29	0.80	0.55
Managed futures	5.03	0.57	-0.05	0.59	0.46	0.10
Dedicated short	-0.34	1.91	-0.90	0.35	1.55	0.56
Overall equal weighted	7.70%	3.00%*	0.34	-0.21	0.87	0.48

Notes: This table reports regression results for equal-weighted indices' (live plus dead, no backfill) post-fee returns. The betas for stocks and bonds are the sums of their betas and their lagged betas.

*Significant at the 5 percent level.

statistically significant at the 5 percent level.¹³ Our results confirm that hedge funds added alpha over the period and also provided excellent diversification benefits to stock, bond, and cash portfolios.¹⁴

In Table 6, we subtracted the 3.00 percent alpha return, leaving a 4.70 percent return to be explained by the stock, bond, and cash betas. We estimated fees on the basis of the funds' median fees (usually a 1.5 percent management fee and a 20 percent incentive fee), which resulted in an overall fee estimate of 3.80 percent. Adding that estimate to the reported post-fee return gave us an

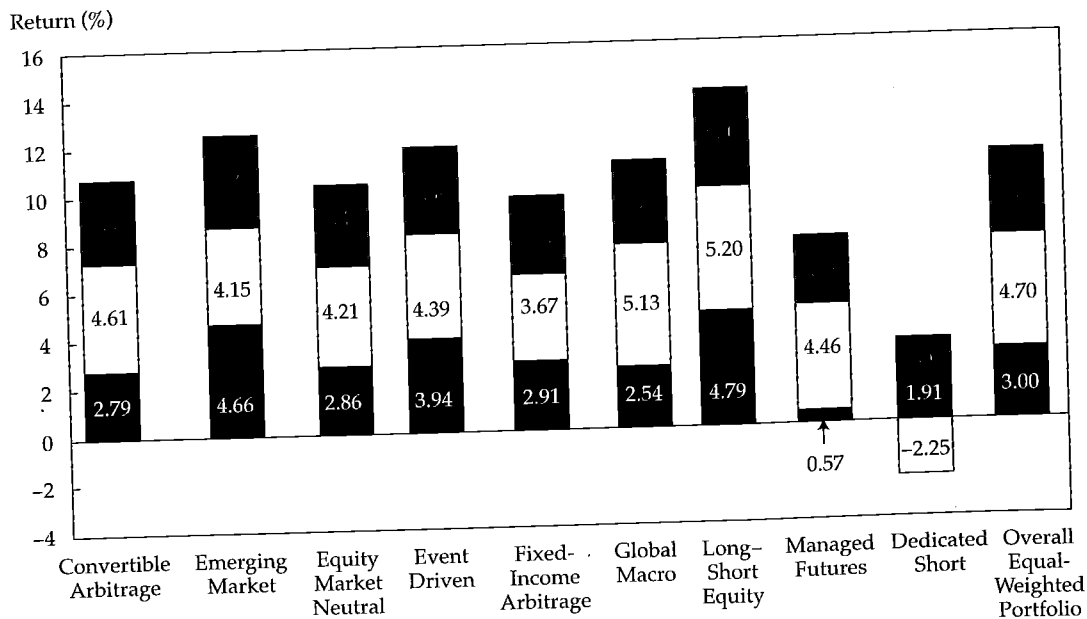
estimated pre-fee return of 11.13 percent for the index.¹⁵ We separated the pre-fee return of 11.13 percent for the overall sample into the fees (3.43 percent) and the post-fee return (7.70 percent), which we further decomposed into the alpha of 3.00 percent and the systematic beta return of 4.70 percent. Note that both the systematic return and the fees exceed the (post-fee) alpha, which is nevertheless significantly positive. Figure 1 illustrates the breakdown into fees, systematic beta returns, and alphas for each of the nine subcategories of funds and the overall equal-weighted sample.

Table 6. Sources of Returns: Alphas, Betas, and Costs, January 1995–December 2009

Subcategory	Pre-Fee Return	Fees	Post-Fee Return	Alpha	Systematic Beta Return	Alpha/Fee Ratio	Info Ratio	Sharpe Ratio
Convertible arbitrage	10.76%	3.35%	7.41%	2.79%	4.61%	0.83	0.45	0.97
Emerging market	12.51	3.70	8.81	4.66	4.15	1.26	0.39	0.64
Equity market neutral	10.34	3.27	7.08	2.86	4.21	0.88	1.01	2.24
Event driven	11.91	3.58	8.33	3.94	4.39	1.10	0.96	1.41
Fixed-income arbitrage	9.72	3.14	6.57	2.91	3.67	0.92	0.67	1.43
Global macro	11.08	3.42	7.67	2.54	5.13	0.74	0.39	1.14
Long-short equity	13.99	4.00	9.99	4.79	5.20	1.20	0.71	1.02
Managed futures	7.79	2.76	5.03	0.57	4.46	0.21	0.06	0.52
Dedicated short	1.17	1.50	-0.34	1.91	-2.25	1.28	0.15	0.08
Overall equal weighted	11.13%	3.43%	7.70%	3.00%	4.70%	0.88	0.60	1.13

Notes: This table reports the equal-weighted indices' (live plus dead, no backfill) post-fee returns and alphas from Table 5, with systematic beta return being the difference between the post-fee returns and alphas. Fees are based on median fees (usually a 1.5 percent management fee and a 20 percent incentive fee). Pre-fee returns are post-fee returns plus fees.

Figure 1. Sources of Hedge Fund Returns by Category: Alphas, Betas, and Costs, January 1995–December 2009



We also conducted a separate analysis that included nontraditional betas. We used the seven-factor model proposed by Fung and Hsieh (2004) with the equal-weighted overall index. The results are reported in Table 7. Although the R^2 is higher than that of the model that includes only stocks, bonds, and cash, the estimated alpha remains significantly positive. Our alpha estimate is similar to those reported in Fung and Hsieh (2004), albeit with a much longer data history. This finding suggests that even accounting for the nontraditional betas, hedge funds added significant alpha over the period.

Year-by-Year Results. Table 8 and Figure 2 show the results of our examination of the year-

by-year return results. The aggregate hedge fund returns were positive in all years except 1998 and 2008; from 2000 to 2002, however, the returns were low.

Using an out-of-sample three-year rolling window, we conducted a year-by-year analysis to estimate the annual hedge fund beta and alpha return. The year-by-year alpha and systematic beta results are reported in Table 8, with the yearly decomposition illustrated in Figure 3. These results are even more favorable for hedge funds because the hedge-fund alpha was positive in every year except 1998. Even in 2008, when the overall equal-weighted hedge fund return was -16.74 percent, we estimated the alpha to be 6.38 percent. This consistently

Table 7. Fung-Hsieh Seven-Factor Model, January 1995–December 2009

Factor	Proxy	Beta	t-Value
Bond trend-following factor	Return of PTFS bond look-back straddle	-0.008	-1.21
Currency trend-following factor	Return of PTFS currency look-back straddle	0.013	2.46
Commodity trend-following factor	Return of PTFS commodity look-back straddle	0.014	2.04
Equity market factor	S&P 500 monthly total return	0.265	12.65
Size spread factor	Wilshire Small Cap 1750 Index return – Wilshire Large Cap 750 Index monthly return	0.199	5.99
Bond market factor	Monthly change in the 10-year Treasury constant maturity yield	-2.523	-0.46
Credit spread factor	Monthly change in the Moody's Baa yield less 10-year Treasury constant maturity yield	-29.858	-4.65
Annual alpha		4.94%*	4.3
R^2		0.63	

Notes: This table reports results from the seven-factor model for equal-weighted indices' (live plus dead, no backfill) post-fee returns. PTFS stands for primitive trend-following strategy. The three trend-following factors were downloaded from David A. Hsieh's website: <http://faculty.fuqua.duke.edu/~dah7/HFRFData.htm>.

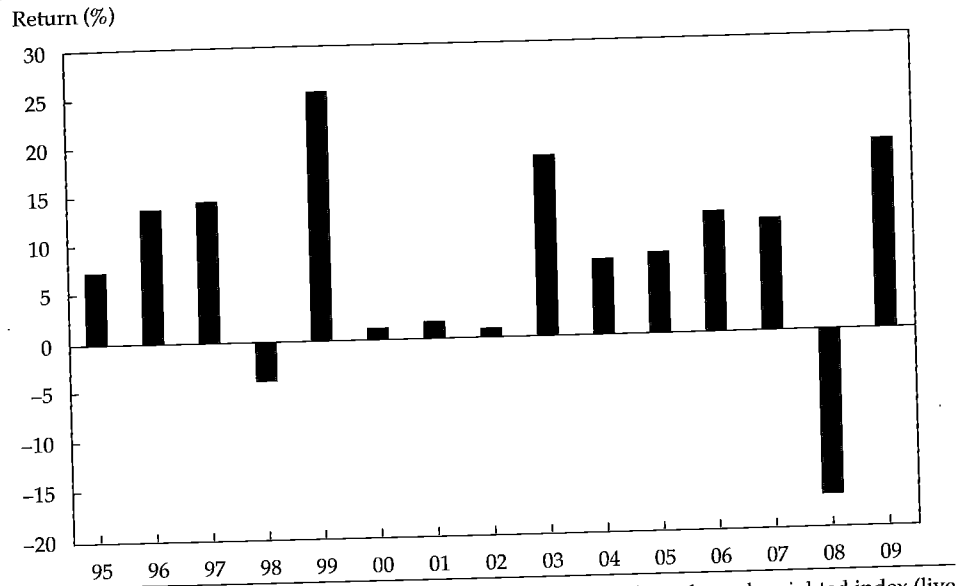
*Significant at the 5 percent level.

Table 8. Year-by-Year Post-Fee Returns, Alphas, Systematic Beta Returns, and Betas

Year	Post-Fee Return	Alpha	Systematic Beta Return	Beta		
				Stocks	Bonds	T-Bills
1998	-3.78%	-15.28%	13.33%	0.55	-0.60	1.06
1999	25.54	7.32	17.16	0.48	-0.70	1.22
2000	1.19	6.40	-5.03	0.52	-0.94	1.42
2001	2.02	10.62	-8.22	0.33	-1.27	1.94
2002	1.09	10.29	-8.57	0.32	-0.41	1.10
2003	18.50	12.42	5.40	0.21	-0.25	1.04
2004	7.87	2.93	4.86	0.33	0.21	0.45
2005	8.51	4.67	3.71	0.35	0.31	0.33
2006	12.53	3.18	9.09	0.44	0.35	0.21
2007	11.52	4.72	6.41	0.67	0.18	0.15
2008	-16.74	6.38	-22.17	0.55	-0.06	0.51
2009	19.25	7.78	10.44	0.39	-0.11	0.72

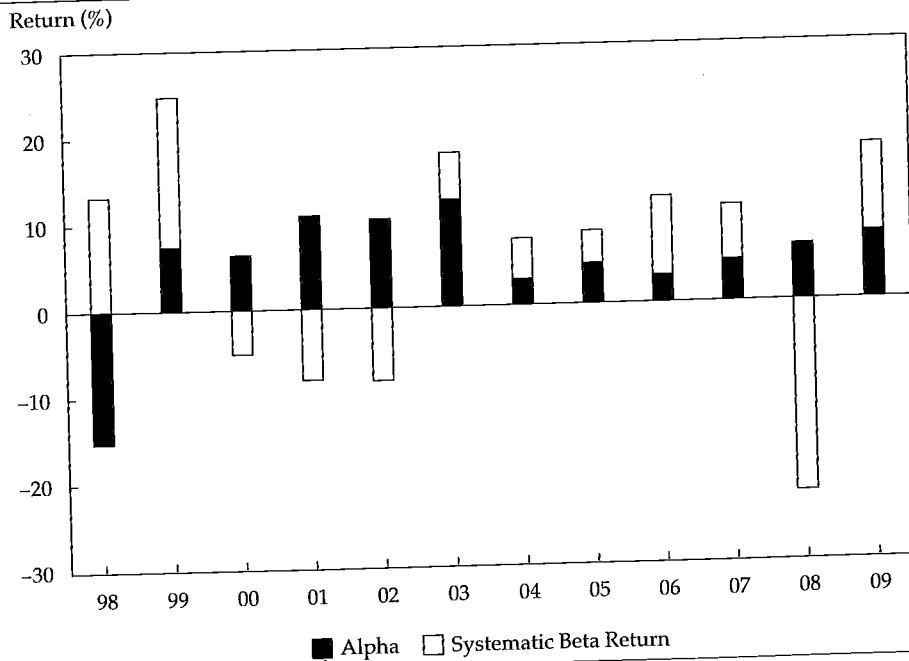
Notes: This table reports the year-by-year return results for the overall equal-weighted index (live plus dead, no backfill), with the out-of-sample sum of betas equal to 1. The betas for stocks and bonds are the sums of their betas and their lagged betas.

Figure 2. Year-by-Year Compound Net Hedge Fund Returns, January 1995–December 2009



Note: This figure depicts the year-by-year return results for the least biased equal-weighted index (live plus dead, no backfill).

Figure 3. Year-by-Year Hedge Fund Alpha and Systematic Beta Returns, 1998–2009



high alpha is quite remarkable given the variety of market conditions over the period: the 1990s bubbles, the 2000–02 bear market, the 2003–07 bull market, and the recent global financial crisis. The annual results confirm that hedge funds have added a significant amount of alpha to stock, bond, and cash portfolios over the period. The results also show that hedge funds exhibit tactical asset alloca-

tion skills, especially in reducing beta exposures during bear markets. For example, the estimated stock beta exposure was quite low during the 2000–02 bear market. Although hedge funds did not avoid the beta exposure in 2008 nor fully participate in the 2009 market, they nevertheless kept their positive alpha throughout the financial crisis of 2008–2009.

The positive hedge fund aggregate alphas for the last 11 years suggest that hedge funds really do produce value. The substantial stock market beta associated with hedge funds also suggests that they are not truly and fully an "absolute return." In fact, hedge funds vary with the market from year to year.

Conclusion

We attempted to measure the sources of hedge fund returns. In particular, we estimated what portions of the returns come from alpha, beta, and costs. We considered the portion that comes from alpha most relevant because investors would have difficulty in achieving it with stock, bond, and cash portfolios.

To measure returns, the first step is to select data that are as bias free as possible. We studied a period (January 1995–December 2009) for which we could delineate the backfill data and include the dead funds. We included both live and dead funds so that we could correct for survivorship bias. We excluded backfill data that managers submitted when they joined the database. Our results suggest that both survivorship bias and backfill bias are potentially serious problems. The equal-weighted sample of funds that existed at the end of the sample period had a compound return of 14.88 percent net of fees. Including dead funds reduced this return to 11.72 percent. Excluding the backfill data further reduced the return to 7.70 percent net of fees.

Both biases were much smaller for the value-weighted index of hedge funds. Large funds had much lower attrition rates, and many joined the database before the start of the sample period (1995). Even when backfill data existed, they were likely given a low weight. After both biases were removed, the large funds outperformed the small funds. The largest 1 percent of funds had a return of 11.59 percent, the largest 20 percent of funds had a return of 9.24 percent, and the smallest 50 percent of funds had a return of 6.85 percent. The large funds, however, also had commensurately higher risk.

For the equal-weighted index of hedge funds, we estimated a pre-fee return of 11.13 percent, which consisted of fees of 3.43 percent, an alpha of 3.00 percent, and beta returns of 4.70 percent. The alpha estimate was statistically significant at the 5 percent level. All nine subcategories of funds had positive alphas, and the alphas of four of the subcategories were statistically significant.

We found not only that the alpha was significantly positive during the entire period but also that hedge fund alphas stayed positive from year to year. The alpha was positive for all years except 1998. This finding implies that the average hedge fund manager

added value in both bear and bull markets. Further examination of the stock beta estimates suggests that hedge fund managers, on average, underweighted equities in their portfolios during the technology bubble collapse. But hedge funds did not substantially reduce their beta in 2008, earning a negative return for the year. Nevertheless, hedge funds continued to produce positive alphas in both 2008 and 2009, continuing an unbroken 11-year string of positive alphas.

Our findings are only a reflection of historical returns. As relatively new investment options, hedge funds are very dynamic. We expect them to continue to evolve. A significant amount of money has flowed into hedge funds in the past several years. Therefore, we cannot be assured that the high past alphas we have measured are a reliable predictor of future alphas in the hedge fund industry.

This article qualifies for 1 CE credit.

Appendix A. Methodology

We measured returns on the following six subsamples:

- Live funds with backfill data
- Live funds without backfill data
- Live and dead funds with backfill data
- Live and dead funds without backfill data
- Dead funds with backfill data
- Dead funds without backfill data

Table A1 shows the number of funds in each subsample for each year.

For each subsample, we formed three portfolios and calculated the monthly returns for each, as follows:

- An equal-weighted portfolio.
- A value-weighted portfolio (with the previous month's assets under management [AUM]). Many funds report AUM only once a quarter. We imputed the AUM amount by using the return figures if the AUM amount was not reported that month. We excluded from the value-weighted portfolio any funds with no AUM data.
- An equal-weighted portfolio with only the subsample of funds that have reported an AUM amount. This portfolio is referred to as "equal weighted with AUM" to differentiate it from the full-sample equal-weighted portfolio.

Table A2 shows the percentage of history backfilled for each subcategory of strategies and for the overall equal-weighted index. **Table A3** provides detailed summary return statistics for each of the three portfolios across the six subsample databases.

Table A1. Number of Funds in the Six Subsamples, January 1995–January 2009

Date	Live + Dead, No Backfill	Live, No Backfill	Dead, No Backfill	Live + Dead with Backfill	Live with Backfill	Dead with Backfill
Jan. 1995	41	9	32	744	144	600
Jan. 1996	198	23	175	936	188	748
Jan. 1997	360	51	309	1,126	241	885
Jan. 1998	512	78	434	1,351	299	1,052
Jan. 1999	644	118	526	1,552	378	1,174
Jan. 2000	708	148	560	1,745	449	1,296
Jan. 2001	895	205	690	1,897	534	1,363
Jan. 2002	1,284	361	923	2,141	682	1,459
Jan. 2003	1,465	468	997	2,359	797	1,562
Jan. 2004	1,648	572	1,076	2,655	953	1,702
Jan. 2005	1,943	746	1,197	2,992	1,171	1,821
Jan. 2006	2,287	973	1,314	3,203	1,437	1,766
Jan. 2007	2,409	1,208	1,201	3,289	1,696	1,593
Jan. 2008	2,624	1,683	941	3,070	1,940	1,130
Jan. 2009	2,537	2,164	373	2,537	2,164	373

Notes: Funds of funds are excluded. Funds are listed as dead if they subsequently died at any time during the sample period (January 1995–December 2009). For example, the 50 funds listed in December 1994 were living at the beginning of 1995; 41 of those funds subsequently stopped reporting (died). Aggarwal and Jorion (2010) noted that in March 1999, Tremont Capital Management purchased the TASS database and merged the Tremont data into the TASS data from April 1999 through November 2001. TASS counts the data entry date as the initial date, with all prior data considered backfill data. Thus, this table shows a high proportion of backfill data in the early years. Our results focus on the first column in the table (Live + Dead, No Backfill), which can be a relatively small sample but is corrected for both biases.

Table A2. Percentage of History Backfilled, January 1995–December 2009

Subcategory	Percentage of History Backfilled
Convertible arbitrage	41%
Emerging market	39
Equity market neutral	38
Event driven	40
Fixed-income arbitrage	44
Global macro	41
Long-short equity	41
Managed futures	52
Dedicated short	52
Overall equal weighted	42

Table A3. Returns on Subsamples, January 1995–December 2009

	Geometric Mean	Arithmetic Mean	Standard Deviation
<i>Equal weighted</i>			
Live + dead, no backfill ^a	7.70%	7.95%	6.81%
Live + dead with backfill	11.72	11.95	6.43
Live, no backfill	12.83	13.10	7.00
Live with backfill	14.88	15.14	6.80
Dead, no backfill	4.17	4.43	7.07
Dead with backfill	8.31	8.55	6.65
<i>Equal weighted with AUM</i>			
Live + dead, no backfill ^a	8.55%	8.80%	6.83%
Live + dead with backfill	11.52	11.75	6.45
Live, no backfill	12.80	13.07	7.06
Live with backfill	14.80	15.06	6.85
Dead, no backfill	5.28	5.57	7.39
Dead with backfill	7.98	8.22	6.68
<i>Value weighted</i>			
Live + dead, no backfill ^a	11.76%	11.94%	5.71%
Live + dead with backfill	12.03	12.17	5.16
Live, no backfill	11.47	11.64	5.63
Live with backfill	12.40	12.52	4.56
Dead, no backfill	9.93	10.23	7.43
Dead with backfill	9.42	9.70	7.14
<i>Benchmarks</i>			
Stocks	8.04%	9.41%	15.81%
Bonds	6.43	6.54	4.60
Cash	3.54	3.54	0.55

^aUnbiased.

Notes

1. HFR, "Investors Return to Hedge Fund Industry as New Model," press release, Hedge Fund Research (20 January 2010).
2. Brown, Goetzmann, and Ibbotson (1999) attempted to estimate the impact of survivorship bias without a complete sample of dead funds. They also recognized the potential selectivity biases in their database. Table A1 (see Appendix A) shows the number of funds in the TASS database for each year.
3. These vendors include Morningstar, Hedge Fund Research, Lipper TASS, Credit Suisse/Tremont, and Zurich Capital Markets.
4. Another bias often cited in the hedge fund literature is selection bias, which refers to not having a representative sample of funds. Back-end bias can also be a problem if hedge funds stop reporting after a bad month. In our study, we concentrated on survivorship bias and backfill bias.
5. This is the typical median fee structure, according to the TASS database.
6. We conducted our analysis by using after-fee return data. We estimated the gross-fee total return on a hedge fund portfolio by applying the median fee structure from the TASS database, which was usually a 1.5 percent management fee and a 20 percent incentive fee.
7. Many funds did not report assets under management (AUM), and we omitted them from the value-weighted sample. For comparison purposes, we also calculated equal-weighted returns for the sample of funds that reported AUM.
8. Table A1 reports the year-by-year number of funds in each of the six subsamples. Table A3 provides detailed summary return statistics for each of the three portfolios across the six subsample databases.
9. Table A1 and Table A2 include additional details on the amount of backfill data in each hedge fund category in the TASS database.
10. Table A3 shows that the compound returns on stocks, bonds, and cash were 8.04 percent, 6.43 percent, and 3.54 percent, respectively.
11. Asness, Krail, and Liew (2001) pointed out that many hedge funds hold, to varying degrees, hard-to-price illiquid securities. For the purposes of monthly reporting, hedge funds often price these securities by using either the last available traded prices or estimates of current market prices. These practices can lead to reported monthly hedge fund returns that are not perfectly synchronous with monthly S&P 500 returns owing to the presence of either stale or managed prices. Nonsynchronous return data can lead to understated estimates of actual market exposure. Lo (2008) has explored this problem in detail.
12. We also ran the analysis with other benchmarks (small cap, growth, value, high yield, etc.), with similar results. We obtained our data from the Ibbotson® SBI® 2010 Classic Yearbook: Market Results for Stocks, Bonds, Bills, and Inflation, 1926–2009 (Chicago: Morningstar, 2010).
13. The betas for stocks and bonds are the sums of their betas and their lagged betas. We also calculated an alpha for the overall equal-weighted index (live plus dead without backfill), with the constraint that the betas sum to 1 relaxed. The alpha is also positive and statistically significant at the 5 percent level.
14. Fung and Hsieh (2004) showed that hedge fund alphas are significantly positive even with the inclusion of nontraditional beta factors.
15. The funds in the TASS database are reported net of fees. Median fund fees are used to estimate fees. For many of the funds, measuring fees perfectly is impossible because many fees are privately negotiated and not reported. Also, the connection between gross returns and net returns is further complicated by high-water marks.

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