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Demystifying Hedge Funds: A Review

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OVERVIEW

Hedge Funds are lightly regulated private investment vehicles whose managers have substantial discretion. They fall into the category of alternative investments. Often using leverage, these funds invest in a variety of asset classes, including equities, fixed income, commodities, and foreign currencies. Hedge funds are marketed to investors who can tolerate a greater degree of risk. According to the *Financial Times* and *Hedge Fund Research*, these funds manage over $2 trillion globally.[1]

Investors and academics have struggled to understand whether hedge funds beat the market and cover the fees they charge. Answering this question is challenging given the limited transparency and light disclosure requirements. Despite high fees and several high-profile fund failures, hedge funds continue to attract capital as net inflows for 2010 topped $55.5 billion US dollars.[2]

In this paper, I attempt to understand the mystique behind hedge funds. This article has two sections. The first section provides a brief description of hedge fund basics, including key differences between hedge funds and mutual funds. The second section discusses academic studies on hedge funds.

The helpful comments of Jim Davis and Gerard O'Reilly are gratefully acknowledged.

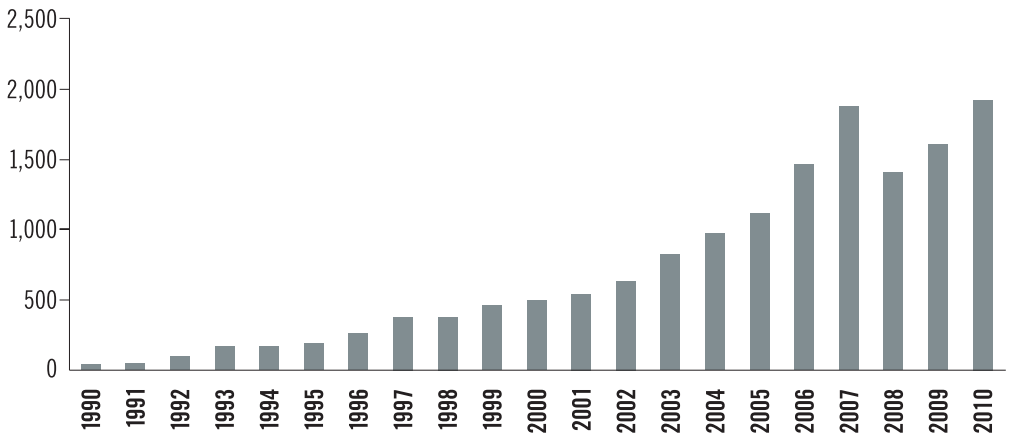
1. HFR Global Hedge Fund Industry Press Release for Q1 2011: http://www.hedgefundresearch.com/pdf/pr_20110419.pdf.
2. HFR Global Hedge Fund Industry Press Release for 2010: http://www.hedgefundresearch.com/pdf/pr_20110119.pdf.

HEDGE FUND BASICS

The first hedge fund set up by Alfred W. Jones in 1949 invested mainly in equities and used short selling and leverage. Since then, the hedge fund industry has grown in both scope and variety. Figure 1 reports by year the aggregate assets under management, and Figure 2 reports by year the number of hedge funds in operation. Data is provided by Hedge Fund Research. From 1990 to 1999, hedge fund assets under management increased ten-fold, and the number of hedge funds increased five-fold. While industry growth has slowed in the last decade, assets under management still increased by an average of 14% each year from 1999 to 2010. The only major slowdown in growth for hedge funds occurred during the financial crisis, when assets declined by nearly 25% between 2007 and 2008.

Figure 1

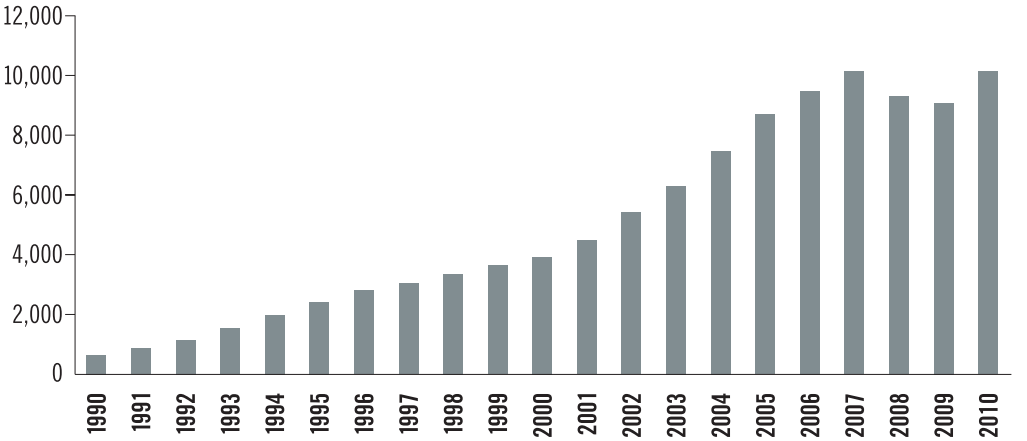
Global hedge fund assets under management by year



Source: Hedge Fund Research.

Figure 2

Number of hedge funds by year



Source: Hedge Fund Research.

With the tremendous growth in total assets under management, the variety of strategies that hedge funds employ has also increased. Hedge funds come in several different flavors: convertible arbitrage, dedicated short bias, long/short equity, equity market neutral, global macro, sector rotation, managed futures, fixed income arbitrage, distressed debt, event driven and statistical arbitrage. Some hedge fund strategies are "technical" in nature, seeking to profit from price differentials between related securities. Other strategies are "fundamental" and try to identify stock mispricing. Many hedge funds are multi-strategy and employ a variety of trading strategies in combination with each other.

Types of Strategies

Convertible arbitrage strategies involve buying a firm's convertible bonds and short selling the same firm's common stock. Convertible bonds can be exchanged for a predetermined number of shares of stock. The option to convert causes these bonds to have equity-like characteristics. Consider a convertible bond has a par value of $1,000 and a conversion ratio of 50:1. If the holder converts, the bond will be exchanged for 20 shares of common stock. If the value of the stock rises above $50 ($1,000/20), the value associated with converting the bond to stock will be greater than the bond's par value. Convertible arbitrage strategies do not perform well during periods when interest rates rise.

Short bias strategies take explicit bets on declines in equity markets. These funds either employ market timing by varying the short position in equities or short specific securities to profit from a bankruptcy or restructuring. These strategies are exposed to unlimited risk and perform poorly in rising equity markets.

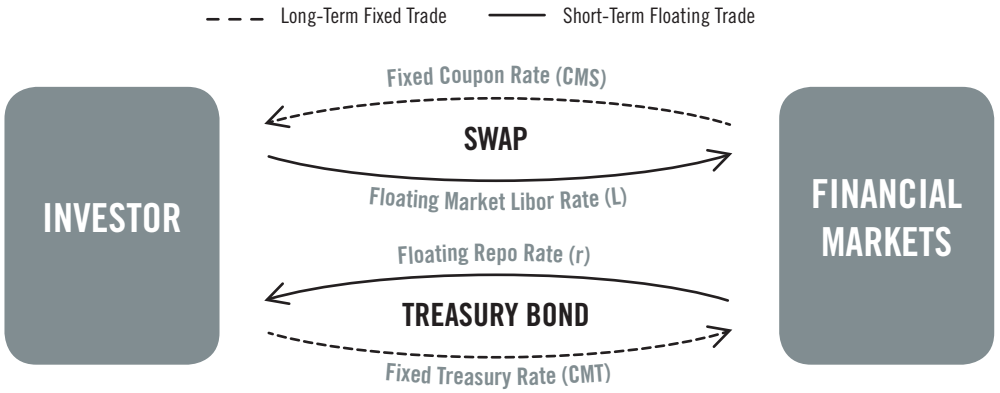
Long/short equity strategies take long and short positions in stocks. These strategies are profitable if their long positions outperform their short positions. The performance is driven by the manager's ability to buy winners and short sell losers. Often these funds have greater total long holdings than short positions. Equity market neutral funds are similar to long/short equity strategies but typically attempt to "manage" risk. These portfolios are designed to have low market, industry, and country tilts. Leverage is applied to magnify returns. The majority of equity market neutral funds are quantitative in nature. These funds select stocks based on a variety of factors, including relative value, momentum, earnings revisions, and earnings quality. The performance of these funds is driven by the underlying factor returns.

Global macro funds base their investment decisions in anticipation of certain macroeconomic events. These managers attempt to time asset classes by rotating in and out of stocks, bonds, commodities, and currencies. In contrast with equity and fixed income hedge fund products, global macro funds usually have fewer positions. Sector rotation funds tilt their portfolios toward certain industries. Managed futures funds or commodity trading advisors (CTA) invest in futures contracts and other derivatives.

Fixed income arbitrage consists of simultaneously buying and selling bonds that have similar characteristics. These bonds may have the same issuer and could have small differences according to maturity or coupon rates. Distressed debt funds invest in speculative grade debt or the debt of firms that are currently in reorganization or bankruptcy. Swap-spread strategies are a typical fixed income trade that involves picking up yield differences by taking long positions in a swap and a short position in Treasuries (Duarte, Longstaff, and Yu 2007). The swap allows the investor to receive a fixed coupon rate (CMS) and pay a market-based floating Libor rate (L). The short position in the Treasury bond pays a fixed coupon (CMT), and the collateral for the short position earns the repo rate (r). Figure 3 displays the payoffs from such a strategy. This trade loses money during periods when the Libor rate rises relative to the repo rate.

Figure 3

Swap-spread trade example



Fixed swap spread: **SS = CMS – CMT** Floating swap spread: **S = L – r**

If SS > S, swap spread strategy is profitable

Event-driven hedge funds base investment decisions on a specific catalyst such as a spinoff, merger, acquisitions, CEO change, or index change. Merger or risk arbitrageurs buy acquisition target stocks after an acquisition has been announced. In cash mergers, the acquiring firm pays for the target firm in cash, and the stock of the target usually trades below the purchase price. In a stock merger, the acquiring firm pays for the target firm in stock, usually offering a conversion ratio between the acquiring firm and target firm's stock price. The target usually trades at a discount to the stock price implied by the conversion ratio. The arbitrageurs will buy the target and take a short position in the acquirer. The fund profits if the target's stock price rises to its cash target or conversion price (e.g., Mitchell and Pulvino 2001). Merger arbitrage strategies lose money when acquisitions are cancelled as the stock price of the target often drops sharply.

Statistical arbitrage involves pair trading or identifying two stocks that have similar characteristics (beta, sector, country membership) but different past short-term returns. The stock with the lower past returns is purchased while the stock with the higher past returns is sold short. The strategy pays off if the stock with lower past returns rises relative to the stock with higher past returns. Portfolios formed on these strategies exhibit high turnover, as the holding period is anywhere from a minute to several days.

Comparison to Mutual Funds

Table 1 lists differences between hedge funds and mutual funds. Mutual funds have several advantages over hedge funds. First, mutual funds are regulated and provided protection under the Investment Company Act of 1940. Hedge funds are generally not subject to the same level of regulatory scrutiny as mutual funds.[3]

Table 1

Differences between hedge funds and mutual funds

	Hedge Funds	Mutual Funds
Structure	• Limited partnership: general partner (fund manager) makes investment decisions; limited partner provides majority of capital	• Management company makes investment decisions; individuals provide capital • Funds are either open-end (redeemable) or closed-end (exchange traded)
Incorporation	• Incorporated offshore to avoid taxes	• Incorporated where investors reside
Standard Fees	• 1.5–2.0% management fee • 15–25% incentive fee subject to a high water mark	• 0.05–1.50% management fees • 12b-1 fees for marketing and distribution
Regulation	• Lightly regulated	• Regulated by and must register with SEC • Subject to the Investment Company Act of 1940 • Separate custody of assets • Annual audits
Disclosure	• HF with over $100 million (US) must report long positions quarterly • No reporting requirement on derivatives or short positions	• Quarterly reporting of positions; daily reporting of fund NAV

Continued on next page.

3. Hedge funds typically rely on an exemption from regulation under the Investment Company Act of 1940 for funds with less than 100 beneficial owners, or for funds that are owned entirely by "qualified purchasers." Investment advisors for hedge funds with less than $150 million in total assets are exempt from registration under the Investment Advisers Act of 1940. Such advisors, however, must maintain records and submit reports as the SEC determines necessary or appropriate, including Form ADV (used by all persons registering with the SEC as investment advisors), and the completion of a subset of items on such form. In addition, exempt reporting advisors are subject to examination by the SEC.

Investor Base	• SEC-designated accredited investors: pension funds, endowments, funds of funds, high net worth individuals, sovereign wealth funds	• Individuals and institutions
Types of Investments	• Long, short, and derivative positions • Leverage	• Typically long positions only • Restricted use of derivatives and leverage
Investor Withdrawals	• Subject to a 30-day notice • Possible for manager to block withdrawals • Redemption fee • Lock-up period	• Daily withdrawal of capital • Redemption fees in some cases
Investment Size	• Varies, minimum range from $1 million to $5 million	• Lower minimum investments ($1,000 to $10,000)
Governance	• Low requirement for oversight	• Must have a board of directors where the majority of directors are independent

Second, hedge funds charge higher fees than mutual funds. Hedge fund fees include a 1–2% management fee and an incentive fee based on gross profits above a hurdle rate (usually London interbank offering rate or a one-year Treasury bill rate). Losses must be recovered before the manager can earn an incentive fee. If the fund loses 20%, the fund would have to generate a +25% return to start earning incentive fees.

$$\$1 \times (1 - 20\%) \times (1 + 25\%) = \$1$$

The incentive fee is equivalent to a call option on the investment return. The incentive fees induce managers to take on more risk (using leverage), as the value of a call option increases with volatility. Managers whose funds have incurred past losses often shut down the fund and re-open a new fund instead of trying to earn back the losses. The high hedge fund attrition rate or rate at which hedge funds close is partially due to this behavior. Brown, Goetzmann, and Park (2001) take a look at intra-year return performance of CTAs. They find that funds that outperform in the first half of the year reduce risk, while funds that performed poorly increase risk.[4]

4. Brown, Harlow, and Starks (1996) find a relation between past performance and risk levels for mutual fund managers.

Table 2

Numeric example

	Scenario 1		Scenario 2		Scenario 3	
Initial Investment	100		100		100	
Probability of Positive Outcome	90%		70%		63%	
Single-Period Return	5%	-5%	10%	-10%	15%	-15%
Expected Single-Period Return	4.0%		4.0%		4.0%	
Standard Deviation	3.0%		9.2%		14.5%	
Management Fee	2.00		2.00		2.00	
Performance Fee	0.98	0.00	1.96	0.00	2.94	0.00
Investor's Ending Wealth	101.92	93.10	105.84	88.20	109.76	88.30
Manager's Ending Wealth	2.98	2.00	3.96	2.00	4.94	2.00
Investor's Expected Wealth	101.04		100.55		100.06	
Manager's Expected Wealth	2.88		3.37		3.86	

The effect of volatility on manager pay is best explained using an example. Table 2 considers three separate, single-period investment scenarios. The investor's beginning wealth is $100. The manager charges a 2% management fee and a 20% performance fee. The manager collects the $2 management fee at the beginning of the investment period. The underlying investments in the three scenarios have identical expected returns (4.0%). The range between the positive and negative outcomes increases from scenario 1 to scenario 3, while the probability of a positive outcome decreases. For example, in scenario 1 the probability the investment will have a +5% single period return is 90%. In scenario three, the probability of a +15% return is 63%. In this way, the expected return is held constant while the "risk" (standard deviation) of the investment increases.

For each scenario, the investor's and manager's ending wealth are computed for positive and negative investment returns. For example, in scenario 1, if the investment return is +5%, the investor's ending wealth is ($98 x 1.05) - ($98 x 5% x 20%) = 101.92. The second term is the manager's performance fee. From here, the probability of a positive outcome is used to compute the investor's and manager's expected ending wealth. In scenario 1, the investor's expected ending wealth is 0.9 x 101.92 + 0.1 93.10 = 101.04. Manager's pay increases as the volatility of the underlying investment increases, while the investor's expected ending wealth decreases. Stated differently, the manager has an incentive to increase the risk of the underlying investment at the expense of the investor.

Third, hedge funds are closed off to the average investor. Hedge funds require large minimum investment amounts (ranging from several million dollars) limiting the investor base to wealthy individuals and large institutions. When investors redeem capital, hedge funds often charge redemption fees and take up to 30 days to deliver the capital. Hedge funds often subject investors to lock-up periods where, for a predefined period, clients are not able to withdraw capital. During the financial crisis, many hedge funds blocked withdrawals. Mutual funds in comparison may charge a redemption fee. These funds maintain daily liquidity to account for investor redemptions.

The academic literature lists several potential advantages to investing in hedge funds over mutual funds. First, hedge funds are not required to disclose their positions or returns. The lack of transparency makes it difficult for other managers to mimic hedge fund strategies. Mutual funds, in contrast, report daily returns and holdings each quarter. Second, hedge funds take short positions and use derivatives to leverage their positions and/or limit market exposure. Most mutual funds take only long positions (Almazan, Brown, Carlson, and Chapman 2004). These potential advantages, however, come at a cost. The lack of disclosure on hedge fund strategies coupled with short track records make it difficult to quantify excess returns and the risks associated with hedge funds. These risks may be greatly increased with the use of leverage, derivatives, and shorting. This implies the possible range of expected outcomes an investor may experience can be large and not easy to measure beforehand.

ACADEMIC LITERATURE ON HEDGE FUNDS

Hedge funds are an important topic within capital markets research. This section provides a summary of academic studies on hedge funds. The following disclaimers apply. Due to space limitations, describing every paper on hedge funds is not possible. As a result, some good papers on hedge funds have been left out of this survey. I attempt to include research studies that have received attention from financial professionals. Working papers that have not completed the journal review process are not included in this survey. I've tried my best to discuss the major findings in a structured manner.[5]

The majority of papers on hedge funds discuss the risk-return characteristics of hedge fund portfolios. The three main questions researchers try to address are:

- Do hedge funds outperform their benchmarks? If so, do they also cover the fees they charge?
- How are hedge fund returns correlated with other asset classes? In other words, what is special about the way hedge funds invest?
- How volatile are hedge fund returns?

For the third question, there is consensus that hedge funds are riskier than traditional asset classes (e.g., equities, fixed income). This is not surprising, as leverage increases the range of potential outcomes yielding larger variations in possible hedge fund returns. There is much more debate on the first two questions. The average hedge fund's return documented by academic papers ranges from wild outperformance to substantial underperformance. The

5. For a recent review paper on hedge funds, please see Stultz (2007).

difficulty in answering the first question is due to biases in hedge fund research datasets. The second question is hampered by the lack of a representative hedge fund style. Since hedge funds deploy different strategies, it's hard to draw conclusions on the relations between hedge fund returns and other asset classes.

Pitfalls of Hedge Fund Databases

Most hedge fund papers use either the Hedge Fund Research (HFR) or the Tremont Advisors Statistical Services (TASS) dataset.[6] Both data providers collect information from voluntary hedge fund disclosures. Hedge funds report returns for marketing purposes, as this data is shared with prospective hedge fund investors. Hedge funds can report returns for both current and past periods.

Since investors tend to invest in funds with high past returns, this creates a potential incentive issue related to reporting.[7] Voluntary disclosure creates the following issues for research databases: 1) reporting accuracy, 2) survivorship bias, 3) self-selection bias, and 4) backfill bias.

Accuracy of Reporting

Both HFR and TASS rely on voluntary disclosures by hedge fund managers regarding their past performance. The numbers that these fund managers provide are not required to be audited or verified by an external source. Additionally, certain types of hedge funds invest in securities that do not have a readily available price. The fund's reported return in this case will be an estimate. Using the TASS database, Liang (2003) documents that 7% of live firms do not list an auditor. Of the firms that do list an auditor, 36% did not list an audit date. It is not clear whether these funds did not report an audit date or were not audited recently. Liang (2003) also compares TASS and U.S. Offshore Fund Directory databases. He finds greater discrepancies in reported performance for those funds that have gone out of business, have fewer investors, invest in multiple sectors, and use leverage.

Asness, Krail and Liew (2001) show that annualized quarterly volatility for an index of hedge fund returns is larger than annualized monthly volatility, which they attribute to the smoothing of reported returns. Getmansky, Lo, and Makarov (2004) find that hedge fund returns exhibit positive serial correlation or the tendency of one period's returns to be positively related to the next period's return. They suggest this effect is due to hedge funds holding illiquid securities that do not have readily available prices. This bias lowers reported volatility and inflates measures such as the Sharpe ratio that penalize volatility. Agarwal, Daniel, and Naik (2011) document that hedge fund returns are reliably higher during December relative to the rest of the year, which they attribute to hedge funds managing returns upwards to earn higher incentive fees. Bollen and Pool (2009) document that hedge funds report a greater proportion of small positive returns relative to small negative returns. Their findings possibly indicate that when hedge funds report performance they spread large gains over several periods to avoid reporting losses to attract and retain investors.

6. Certain earlier papers also used Managed Account Reports and U.S. Offshore Funds Directory hedge fund databases.

7. In the mutual fund literature, several papers document a positive relationship between fund flows and past returns (see for example Sirri and Tufano [1998]).

Survivorship Bias

Survivorship bias occurs when funds that cease reporting are removed by the data vendor. Funds stop reporting to data vendors for a variety of reasons. Two potential reasons include fund closures and poor return performance. The "survivors" or successful fund managers that are not removed from the database will not be representative of the average fund. Average returns are over-estimated as poor performers are excluded. The magnitude of the survivorship bias is related to the percentage of funds that fail (records of those funds are deleted) and the level of returns upon fund failure.

The general approach taken in the literature to analyze the effect of survivorship bias involves calculating the difference in performance of the funds that stopped reporting (dead funds) and those that continue to report (live funds). Malkiel and Saha (2005) use this approach and show that live funds beat the dead funds by 8.3% annually on average over the period 1996–2003. When comparing all funds (including the dead funds) to only the surviving live funds, the average annualized returns drop from 13.5% to 9.3%. Fung and Hsieh (2000), and Goetzmann and Ibbotson (1999) arrive at similar estimates of 3.0% for the survivorship bias effect on hedge fund returns.

Self-Selection Bias

Self-selection bias arises if firms selectively report performance. Firms may not report their returns if their fund performance was poor. A fund with extremely poor performance would look like a poor performer relative to its peers in the database and would have a difficult time raising capital.

Backfill Bias

Hedge funds often backfill historical return performance when they begin reporting to a data vendor. If the fund started reporting in 2009, it may include performance from 2007 and 2008 when making the initial performance disclosure. Funds are unlikely to backfill if previous returns are poor. Jagannathan and Novikov (2010) estimate that, when a new hedge fund is added to the TASS database, an average of twenty-five months of past return performance is added.

Using the TASS database that reports when a hedge fund started reporting returns (and hence all returns reported before that date would be backfilled), Malkiel and Saha (2005) find that, over the period 1996–2003, backfilled returns are on average 5% higher than non-backfilled returns. Fung and Hsieh (2000) estimate that accounting for this bias reduces average hedge fund returns by 1.4% per year. The common treatment to account for backfill bias involves removing the first 24–27 months of returns for each fund.

Average Hedge Fund Returns

Do hedge funds outperform their benchmarks and the fees they charge? The answer to this question is particularly important for any investor who plans to invest in a hedge fund. The lack of disclosure on returns and positions makes it hard to determine how much (if any) alpha hedge funds generate. The use of derivatives and leverage by hedge funds obscures interpretations of a standard factor regression. The biases reported in the previous section also need to be taken into account when making meaningful comparisons to market returns. For these reasons, the academic literature is mixed on whether hedge funds outperform their benchmarks.

In an early paper on this topic, Ackermann, McEnally, and Ravenscraft (1999) find that hedge funds generate higher returns than mutual funds but do not cover the fees they charge. Liang (2001) finds that hedge funds over the period 1990–1999 on average underperform the S&P 500 Index by 4.6%. Using information from 13-F filings, Griffin and Xu (2009) find no evidence of outperformance by hedge funds. Amin and Kat (2003) find evidence suggesting that most hedge funds and hedge fund indices underperform the S&P 500.[8]

Chen, Ibbotson and Zhu (2011) find that hedge funds have average returns of 11.24% per year where 3.78% is paid in fees, 4.62% is related to market or beta exposure, and 3.01% is alpha. While their measure of alpha is reliably different from zero, the estimate is based on equally weighted hedge fund returns. Smaller funds may potentially be driving their result. Smaller hedge funds tend to be younger, have shorter track records, and are subject to a greater degree of bias.

Dichev and Yu (2011) estimate hedge fund returns using a dollar-weighted return approach. Dollar-weighted returns take into account the size of the fund when calculating average returns, similar to the concept of internal rate of return (IRR). Dichev and Yu (2011) find that dollar-weighted returns to hedge funds are 3–7% lower than buy-and-hold returns. They show that the reduction in estimated returns completely eliminates any average hedge fund alpha. Bequero, Horst, and Verbeek (2005) find that greater fund flows are associated with poor future performance. A small fund that has high past returns, attracts substantial capital, and then subsequently underperforms will have a dollar-weighted return that is much lower than the buy-and-hold return.

Hedge Fund Attrition Rate

The attrition rate is the percentage of hedge funds that stop reporting returns to the hedge fund data vendors. The non-reporting could occur if a hedge fund liquidates or ceases operations. Using the TASS database, Malkiel and Saha (2005) show attrition rates of hedge funds are on average more than twice as large as mutual funds, with yearly estimates that range from 9.62% to 17.71% over the sample period 1994–2003. They find that newer funds are more likely to close. CTAs have substantially higher attrition rates of around 19–20% (Fung and Hsieh [1997b] and Brown, Goetzmann, and Ibbotson [1999]).

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8. Amin and Kat (2003) use an efficiency measure based on Dybvig (1988).

Estimates of different biases' effect on reported average hedge funds returns documented in select academic studies is summarized in Appendix Table 1.

Predicting Hedge Fund Performance

An important question in hedge research is whether hedge fund managers have "hot" hands or exhibit persistence in performance. In this context, performance persistence relates to being able to predict future hedge fund returns based on past performance over intervals from one quarter to multiple years. In the absence of real hedge fund manager skill, no consistent relation between past and future hedge fund returns should exist.

In a series of early papers on this topic, Brown et al. (1999) and Brown et al. (2003) find no evidence of hedge fund performance persistence using annual return data. Agarwal and Naik (2000) and Baquero, Horst, and Verbeek (2005) suggest that performance persistence is dependent on the frequency at which returns are measured. They find limited evidence of short-term hedge fund persistence using quarterly data but no evidence of persistence at other horizons or across multiple periods. Malkiel and Saha (2005) find no evidence that managers who outperformed in the past year are more likely to outperform in the current year.

In contrast, Jagannathan and Novikov (2011) find evidence of hedge fund return persistence after controlling for style differences. One of the challenges in identifying performance persistence is due to the large attrition rate and look-ahead bias that exists in hedge fund databases. Certain authors have attempted to account for these biases; it is not a trivial exercise. Using bootstrapping and Bayesian econometric techniques, Kosowski, Naik, and Teo (2006) find that top hedge fund managers in one year tend to outperform their peers in the subsequent year.

Titman and Tiu (2011) find that less predictable funds have higher returns. They define less predictable funds as those that have a low R^2 from a factor regression (similar to the Fama/French three-factor model). The less-predictable funds charge higher fees that reduce the net return to investors. Bali, Brown, and Caglayan (2011) link hedge fund performance to macro risk factors. They find evidence that hedge funds with greater exposure to default and lower exposure to inflation risk factors have better performance.

Correlations with Traditional Asset Classes

Using TASS for hedge fund data and Morningstar for mutual funds, Fung and Hsieh (1997a) compare the correlations between fund returns and equity and fixed income indices. They regress individual fund returns on developed and international equities, US government bonds, US corporate bonds and gold. Their measure of interest is the R^2 of the regression, which captures the variation of the return that can be explained by the regression variables. They show that close to half of all mutual funds have R^2 over 75%, while half of all hedge funds have an average R^2 less than 25%. Agarwal and Naik (2000) and Liang (2001) also

find low correlations between hedge fund returns and traditional asset classes. Brown and Goetzmann (2003) find that 20% of the variation in hedge fund returns can be explained by the style of investing the hedge funds use.

Asness, Krail, and Liew (2001) argue that the low correlations and volatilities of hedge fund returns are driven by the lack of available prices for securities that hedge funds own. They find that the correlation between CSFB/Tremont hedge fund index returns and the S&P 500 jumps from 52% when calculated on a monthly basis to 64% when calculated on a quarterly basis. To account for the smoothing of returns, Asness et al. (2001) regress monthly hedge fund index returns ($r_{HF\ Index,t}$) on contemporaneous ($r_{m,t}$) and lagged S&P 500 ($r_{m,t-1}, r_{m,t-2}, r_{m,t-3}$) returns.

$$r_{HF\ Index,t} = a + ß_0 \times r_{m,t} + ß_1 \times r_{m,t-1} + ß_2 \times r_{m,t-2} + ß_3 \times r_{m,t-3} + e_t$$

They find the "summed" beta of the current and past three-month market returns is 0.44 in markets where the S&P return is positive (up markets) and 1.38 in markets where the S&P return is negative (down markets). Those summed coefficient estimates are far higher than those of a standard CAPM regression. In down markets, hedge funds appear to have high correlations with market returns.

Table 3

Excerpt from Exhibit 5 Asness, Krail, and Liew (2001)
January 1994–September 2000

	ALL		UP Markets		DOWN Markets	
	Simple Beta w.r.t. S&P 500	Sum of Beta from Lagged Regressions on S&P 500	Simple Beta w.r.t. S&P 500	Sum of Beta from Lagged Regressions on S&P 500	Simple Beta w.r.t. S&P 500	Sum of Beta from Lagged Regressions on S&P 500
	$ß_0$	$ß_0 + ß_1 + ß_2 + ß_3$	$ß_0$	$ß_0 + ß_1 + ß_2 + ß_3$	$ß_0$	$ß_0 + ß_1 + ß_2 + ß_3$
Regression Coefficients	0.37	0.84	0.27	0.44	0.59	1.38

Source: Excerpted with permission, Institutional Investor, Inc. Journals Group.

The majority of papers that use a three-factor model to explain hedge fund returns find low loadings on systematic factors, especially when compared with mutual funds. Low loadings could be related to the non-linear nature of hedge fund payoffs due to the use of leverage and derivatives. To better capture the linear and non-linear risk exposures of hedge fund returns, Agarwal and Naik (2004) augment the traditional factor models with option-based risk factors. Their analysis suggests that traditional frameworks substantially underestimate the tail losses for hedge funds.

Conclusions

Hedge funds are alternative investments with highly uncertain payoffs. Managers of these funds use derivatives and leverage, which increase volatility. These funds carry fees that can be several times larger than those charged by mutual funds. Estimating average hedge fund returns is plagued by the lack of a bias-free research database. As a result of multiple biases, it is difficult to draw conclusions on the average hedge fund return and whether good performance persists. Given high expense ratios and the lack of disclosure on investment strategies, investors should take caution before investing in hedge funds.

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Appendix

Appendix Table 1

Estimates of survivorship bias, backfill bias, and attrition rate

Paper	Database	Time Period	Survivorship Bias	Backfill Bias	Attrition Rate
Ackermann, McEnally, and Ravenscraft (1999)	MAR, HFR	1988–1995	0.2%	0.1%–0.7%	—
Agarwal and Naik (2000)	HFR	1982–1998	—	—	2.2%
Bali, Brown, and Caglayan (2011)	TASS	1994–2008	1.7%	2.1%	9.0%
Baquero, Horst, and Verbeek (2005)	TASS	1994–2000	2.1%	—	8.6%
Brown, Goetzmann, and Ibbotson (1999)	US Offshore Directory	1989–1995	3.0%	—	14.0%
Edwards and Cagayan (2001)	MAR	1990–1998	1.9%	1.2%	—
Fung and Hsieh (1997a)	TASS, Paradigm	1990–1995	—	—	8.6%
Fung and Hsieh (1997b)	TASS, (CTAs only)	1989–1996	3.5%	—	19.0%
Fung and Hsieh (2000)	TASS	1994–1998	3.0%	1.4%	—
Chen, Ibbotson, and Zhu (2011)	TASS	1995–2009	3.0% 0.4% (HFR)	1.4%	— 2.2% (HFR)
Liang (2000)	HFR, TASS	1994–1998	2.2% (TASS)	—	8.3% (TASS)
Liang (2001)	TASS	1990–1999	2.4%	—	8.5%
Malkiel and Saha (2005)	TASS	1994–2003	4.4%	5.0%	15.0–16.0%