Hedge Funds

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Abstract and Keywords
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Keywords: survivorship bias, hedge fund performance, leverage, 2/20, lockup, factor risk, short volatility

Chapter Summary
Hedge funds (HFs) are not an asset class. HF returns have large exposure to dynamic factors—especially volatility risk. After taking these nonlinear risks into account, the average HF is unlikely to add value. HF fees are high, but, contrary to popular perception, only a minority of HF manager compensation comes from incentive fees.

1. The Quant Meltdown
In the first week of August 2007, returns of quantitative hedge funds (quant HFs) went into a tailspin.¹ From August 7 to 9,
quant funds experienced huge and unprecedented losses—for no obvious reason. There was no overall market decline, and the large losses occurred only at quant funds.

Quant investing picks securities by mining data and creating quantitative signals. Its development dates to the 1960s, when the new Capital Asset Pricing Model (see chapter 6) gave fund managers a way to estimate expected returns of stocks from beta—a statistic measuring how a stock moves together with the market. High-frequency statistical arbitrage funds use highly technical strategies with very short horizons (ranging from seconds to one or two days). Longer-term market neutral funds have investment horizons from weeks to months and rely on economic models and lower-frequency statistical forecasting methods. Some market-neutral funds tend to use factor-based investment strategies like value-growth, size, momentum, volatility, and credit (see chapter 7). Many HFs are leveraged and take short positions.

The complex models used by quant funds amplified the funds' decline during those three grim August days. Amir Khandani, a graduate student at MIT, and his professor, Andrew Lo, who studies investment strategies and is an expert on HFs (he runs one himself), studied the quant meltdown. In Khandani and Lo (2007), they called it “the perfect financial storm.”

Losses at some of the largest, and historically best-performing, quant funds reached 30%,² as they did at the Global Equity Opportunities Fund and Global Alpha fund managed by Goldman Sachs Asset Management. (Full disclosure: I was consulting for Morgan Stanley during August 2007 at a quant group that lost $500 million between the last week of July and August 9.³)

Losses of this magnitude in the absence of direct market forces or significant news were shocking to quant HF managers. Their funds were designed to have low volatility. Losses of this size just weren’t supposed to happen. David Viniar, CFO of Goldman Sachs, said:⁴ “We were seeing things that were 25-standard deviation moves, several days in a row. There have been issues in some of the other quantitative spaces. But nothing like what we saw last week.”
Matthew Rothman, a quant analyst at Lehman Brothers, commented: “Events that models only predicted would happen once in 10,000 years happened every day for three days.”

It wasn’t just the losses that were shocking. Quants combined several investment strategies that were supposed to have low correlations with each other. Yet the resulting investments plummeted together. Manolis Liodakis, a strategist at Citigroup, exclaimed that “nothing seems to be working. Previously uncorrelated factors have recently been falling with the same pace, leaving investors with very few places to hide.”

Then, as suddenly as the losses arrived, quant returns bounced back on August 10, 2007. The storm left plenty of casualties. Many funds responded to the losses by cutting leverage. But reducing leverage meant that their exposures were much smaller when quant strategies rallied, so their gains did not make up for their losses.

Goldman’s Global Equity Opportunities Fund received an injection of $3 billion to stabilize the fund, of which $2 billion came from Goldman and $1 billion from investors, including Maurice “Hank” Greenberg, the former chairman of AIG (which had to be rescued during the financial crisis a year later), and billionaire Eli Broad. News of the Goldman rescue was announced on August 13, but rumors of it started spreading on August 10 and may even have triggered the rebound. The quant meltdown was the beginning of the end for the Global Equity Opportunities Fund, which had commanded $7.5 billion in assets at its peak. The fund shut its doors in December 2009 after its assets had dwindled to $200 million. At the end of 2011, Goldman also shut Global Alpha, once one of its biggest funds, with more than $12 billion in assets, after client redemptions shrunk it to $1.6 billion.

Experts have debated the surprising losses of quant funds during August 2007. Because quant fund returns were so highly correlated on the downside, several experts suggested that there were too many players in the quant HF space doing the same thing. Large common positions, common funding sources, or too many quants using the same risk models and alpha strategies could have caused losses from one strategy to spill over to all quant strategies. Some suggested a new
“hedge fund beta” had come into play. According to Khandani and Lo (2007), “the fact that the entire class of long/short equity strategies moved together so tightly during August 2007 implies the existence of certain common factors within that class.”

Quant funds are just one type of HF. The best description of a HF is given by Cliff Asness, a Goldman alumnus who once worked in the division that oversaw the Global Equity Opportunities and Global Alpha funds. He left Goldman in 1997 to found AQR, a HF that managed $71 billion at the end of 2012. Asness (2004) says:

Hedge funds are investment pools that are relatively unconstrained in what they do. They are relatively unregulated (for now), charge very high fees, will not necessarily give you your money back when you want it, and will generally not tell you what they do. They are supposed to make money all the time, and when they fail at this, their investors redeem and go to someone else who has recently been making money. Every three or four years they deliver a one-in-a-hundred year flood. They are generally run for rich people in Geneva, Switzerland, by rich people in Greenwich, Connecticut.

Asness himself works and lives (in a 26,000-square-foot house) in Greenwich. AQR is a quant fund, and it was not spared the harrowing experience of August 2007; AQR had losses close to 20%. “We were looking the grim reaper in the face,” said Asness as he recalled his fund shrinking from $39 billion in 2007 to $17 billion by the end of 2008. While Goldman’s funds dissolved, everything came back for Asness, plus much more, after 2009. (Asness remains correct that, despite enactment of the Dodd-Frank Wall Street Reform and Consumer Protection Act in 2010, HFs are still relatively unregulated.)

(p.559) In August 2007, quant funds didn’t live up to their promise of low volatility, steady returns, or absolute returns—the words they used in their marketing pitches. What kind of common factors are HFs exposed to? And does their performance justify their fees?

2. Industry Characteristics
HFs are investment vehicles for rich people.\textsuperscript{11} HFs are defined by what they are not—HFs are exempt from the Investment Company Act of 1940 and subsequent amendments and rules (or 40-Act for short; see chapter 15). The 40-Act gives strict rules on what forms 40-Act funds can take and what they can do.\textsuperscript{12} Giving up the investor protections of the 40-Act allows HFs wide latitude in how they invest, how they pay their managers, how they disclose information, and even how (or if) investors can get their money back. Rich people don’t need 40-Act protection because they can (and should) hire lawyers, accountants, financial advisors, and other professionals.

2.1. History

The first HF was created in 1949 by Alfred Winslow Jones, who had an unlikely background for a man who was to become the trailblazer of an industry now handling trillions of dollars. Before forming his “hedged fund,” Jones worked as a U.S. diplomat in Germany when Nazism was on the rise, earned a PhD in sociology at my own institution, Columbia University, and for a while was a journalist at \textit{Fortune} magazine (which published a version of his dissertation).

Jones’s fund had three special features:

1. It was secretive.
   Jones went to great lengths to protect his investments from prying competitors and did not share much detail on what his funds were doing, even with clients.

2. It featured a management incentive fee.
   In fact Jones charged an incentive fee of 20\% but no regular management fee, a practice modern HFs might do well to emulate (see below). At the time, managers typically charged flat fees. Jones adopted a nonlinear performance fee not because he thought it a good way to align his incentives with his clients’ goals (he had not studied principal-agent theory, see chapter 15) but (p. 560) purely to minimize taxes. At the time, marginal tax rates on personal income were upward of 90\%, whereas capital gains rates were just 25\%. Charging only incentive fees allowed Jones to keep an extra 65 cents of every dollar earned.
3. Finally, the fund was exempt from the 40-Act. Jones’s fund was private, and he could not (and did not need to) solicit funds from the general public. That is, a hedge fund is not a public “investment company” as defined by the 40-Act. As he gained investors, he set up additional partnerships to maintain exemption. A nice feature of the funds management business is economies of scale: the fixed costs of the systems you need to manage ten funds are pretty much the same as for one. So HF managers’ revenue quickly explodes with increasing assets under management. (But a larger asset base translates into less value added for investors, as I explain below.)

Modern HF's have some, if not all, of these features. It is notable that an investment vehicle now so favored by institutions was first invented to cater to individual investors. (The same is true for private equity, which I discuss in the next chapter.)

HF's can produce enormous gains. George Soros came to be called “the Man Who Broke the Bank of England” by anticipating that the United Kingdom would be forced to devalue and leave the European Exchange Rate Mechanism—which it did, on September 16, 1992. His Quantum Fund bet $10 billion by shorting sterling and buying Deutschmarks in the preceding week, earning him $1.8 billion. In 2007, John Paulson made “the greatest trade ever” in the words of Zuckerman (2009) by betting against mortgages. His HF made $15 billion on the move, of which Paulson personally took home $3.7 billion.

HF's can also lose big. In 1998, Long Term Capital Management (LTCM), a HF co-founded by Nobel Prize winners Robert Merton and Myron Scholes, collapsed when its credit bets went sour after Russia defaulted in August. LTCM had begun the year with $5 billion in assets and borrowings of $125 billion (a leverage ratio of 25:1—not that far off the typical leverage of investment banks). By September 21, 1998, its assets had dropped below $1 billion and its leverage exceeded 100:1. Two days later, LTCM was bailed out by a consortium of sixteen investment firms (coordinated by the Federal Reserve Bank of New York), which provided $3.6 billion of capital. The largest loss incurred by a HF to date is Amaranth Advisors in September 2006. Amaranth lost $6
billion, or close to 65%, thanks to a lot of leverage and a wrongheaded bet on natural gas futures. Investors seeking to pull out their money as soon as the losses were announced in a letter on September 29, 2006, were in for a shock—the HF imposed gates so no one could withdraw funds (see below).

(p.561) 2.2. What are Hedge Funds?

HFs have the following features:

**Limited Number of (Rich) Investors**

HFs must comply with Section 3(c)(1) or 3(c)(7) of the 40-Act to be exempt from regulation by the rest of the Act. That is, HFs are *not* registered investment companies. Their investors have to be rich.\(^{15}\)

The 40-Act defines rich people in two ways. First, under Section 3(c)(1), HFs are limited to 100 *accredited investors*. Accredited investors have individual or joint net worth of more than $1 million. If you don’t have $1 million, then you can be counted as an accredited investor if your individual income exceeds $200,000 or your joint income exceeds $300,000 in each of the past two years. Financial institutions like banks, insurance companies, mutual funds, pension funds, trusts, and so on are accredited investors if their assets exceed $5 million.

Second, under Section 3(c)(7), HFs are limited to *qualified purchasers*. The 40-Act doesn’t limit the number of qualified purchasers, but in practice HFs have no more than 499 qualified purchasers to avoid registration under the Securities Exchange Act of 1934. The bar to be a qualified purchaser is higher than an accredited investor. Qualified purchasers must have at least $5 million in investments. Qualified institutional investors own and invest at least $100 million, or they are pension funds and trusts with at least $25 million in assets.

In the United States, HFs are usually structured as limited partnerships. The *general partner* is responsible for day-to-day management of the fund. The *limited partner* is the asset owner, liable only for the sum she invests.

**Minimums Are High**

Because they have only a limited number of investors, HFs require high minimum investments, typically $1 million or more. *Funds-of-funds*, which are funds that invest in HFs, generally have lower minimums. A few HF firms have
introduced investment company registrations, like mutual funds, where minimums may be as low as $10,000 or less, but these vehicles fall under the 40-Act.

**Often Levered and Use Derivatives**
This is a key feature of many HFs. Jones’s first HF took short positions—unusual for funds at the time. He used the term “hedged” to describe how the fund eliminated broad market exposure. Today, HFs employ a wide range of investment strategies and, as we shall see, generate risk factor exposures not usually available in other investment vehicles.

**(p.562) Limited Access to Capital**
Jones imposed restrictions on capital in his first HF. As some of his investment strategies involved short positions requiring the posting of collateral, he imposed restrictions so that investors would not be withdrawing capital when he needed it to post margin. Many, but not all, modern HFs follow Jones and do not allow investors to redeem their money immediately (unlike 40-Act funds, from which investors can get their money back at least daily).

**Limited Disclosure**
Whereas 40-Act funds have to report what they hold (at least quarterly for mutual funds and at least daily in the case of exchange-traded funds), HFs are secretive. Most HFs provide only coarse breakdowns of their investments and fuzzy details of their investment strategies. Since March 30, 2012, however, HFs with assets exceeding $150 million have been required to register and report information on assets, certain trades, their brokers, leverage, counterparty exposures, and how they value illiquid assets. But they must make these disclosures only to the Securities and Exchange Commission (SEC), not to the limited partner asset owners.

**Manager Fees (Are High and) Involve Significant Performance Components**
Whereas mutual fund regulations do not permit nonlinear manager compensation (see chapter 15), HFs are free to do what they want. A large component of how they are paid is through nonlinear *incentive payments*. 
2.3. Hedge Fund Flows

At the end of 2012, investors allocated over $2.25 trillion to HFs as measured by HFR, a HF database. This is a conservative lower bound. Since HFs are not subject to the strict reporting requirements of 40-Act funds, the full size of the industry is unknown. (Remember, only large HFs must report to the SEC, and at the time of writing in 2013 the SEC had not yet released any tabulation of the information it receives.) Bear in mind that HFR is a single data vendor, and different funds report to different data vendors—if they report at all.18

Figure 17.1, Panel A plots assets under management in HFs since 2000 as reported by HFR.19 From 1990 to 2012, the growth in HF assets was roughly 14% per year. It would have been even greater except for a hiatus during the financial crisis year of 2008. The average HF lost 19% that year. Investors responded by yanking their money. Investors have since returned to HFs, and since 2009 HF assets have resumed their inexorable path upward.
Investors allocate money to HFs pro-cyclically, just like ordinary investors with mutual funds (see chapter 16). When HFs have done well in the past, money pours in as investors chase returns. But as assets grow, competition among HFs increase as HFs need to deploy more capital. Consequently, performance after high inflows tends to be low, and the increased competition raises the probability of the HF liquidating. As Asness says in his definition of HFs, “They are supposed to make money all the time, and when they fail at this, their investors redeem and go to someone else who has recently been making money.”

Panel B of Figure 17.1 plots the change in assets under management each year, or the net inflow into HFs in dollars, together with the excess HF return in that year. The latter is defined as the HF index return minus the S&P 500. Panel B shows that the two series tend to move in opposite directions: the correlation between the growth of HF assets and HF returns in excess of equities is –47%. Thus, just as investors pile into HFs, they tend to have lower excess returns.
While HFs lost 19.0% in 2008, they did better than the S&P 500, which declined by 37.0%. Yet investors pulled out of HFs at this time. They started to come back in 2009, but since then HFs have underperformed the S&P 500 by 6.5% in 2009, 4.8% in 2010, 7.4% in 2011, and 9.8% in 2012. After investors pile into HFs, they tend to offer relatively poor returns.  

2.4. Summary

Exemption from the 40-Act allows HFs to use investment strategies that mutual funds find difficult to implement under the act’s chafing limitations. The disadvantage is that since HFs are not 40-Act funds, their investors have limited protection. The advantage of HFs is that investors potentially have access to a world of new investment strategies. Do they?

3. Risk and Return

“Hedge funds are not a new asset class,” states John Cochrane, a well-known finance professor at the University of Chicago.  

“They trade in exactly the same securities you already own.” But the way they trade—dynamically churning securities, employing leverage and short positions, and trading derivatives—allows HFs to emphasize some risk factors that play minor roles in long-only, passive positions of “securities you already own.” Before we measure their risk exposures (or betas), a note of caution is in order about what constitutes HF returns.

3.1. Data Biases

Dead men tell no tales. Survivorship bias arises because HFs voluntarily report to public databases. HFs don’t like to report if their returns are bad—so they stop reporting when they are in distress. Therefore, we tend not to see bankrupt or liquidated funds in the databases because they remove themselves before they die. This causes an upward bias in reported HF returns. Another type of survivorship bias is caused by successful funds retroactively reporting past returns to the databases (a process called backfilling)—again you tend to provide this information only if the fund is doing well and past returns are good.

However, HFs report to databases to advertise themselves. (HFs can’t solicit money through public offerings). If you don’t need to attract investors, why report? It’s better to remain
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secretive. As the best HFs often are not found in the databases, there is also a downward bias in reported returns.

Thus, HF databases miss the extreme left- and right-hand tails. Which effect dominates? Researchers have concluded that there are many more bad HFs that stop reporting than good HFs that never report. (Technically, the databases truncate the left-hand tail.) HF databases, therefore, reflect returns that are too good.

How large is the survivorship bias? At least 2%, and most researchers peg the bias at 3% to 4% or more.\(^{23}\) Malkiel and Saha (2005) estimate the return of HFs that backfill is 14.7% compared to 7.3% for funds that do not backfill. This is a very large backfill bias of 7.3%. They estimate the survivorship bias to be 4.4%, which is the difference in the average return of live HFs compared to the returns of HFs that stop reporting or die. Fung, Xu, and Yau (2004) argue that the survivorship bias is large enough to completely wipe out any outperformance of HFs in reported data compared to boring stocks and bonds, if outperformance even exists in the first place.

Aiken, Clifford, and Ellis (2013) cleverly estimate the survivorship bias by finding a sample of HFs that do not report to the main hedge fund databases. They can see what happens to HFs that originally report and then stop. They conclude that “commercial databases are missing the worst performers in the hedge fund universe.” The difference in risk-adjusted returns between reporting HFs and nonreporting HFs is 3.5% using size, value-growth, and momentum factors (see \((p.566)\) chapters 7 and 10). The difference increases to 5.3% employing nonlinear, dynamic factors, which we consider below. These are large biases—**HF returns report returns that are too good to be true.**

Asset owners should also be wary of HF indexes. The average investor cannot obtain the returns reported in these indexes because HF indexes generally are *not investable*. There is no equivalent to a S&P 500 index fund that can cheaply replicate the aggregate stock market. Nor can asset owners invest in every HF in most HF indexes—some are closed, some have minimums that are too high, and in any case there are just too many of them. And when you try to get your money out, you can’t (see below), making it impossible to bail when a fund has dropped out of the index. Since investors cannot hold all the
funds in a HF index, they face more idiosyncratic risk investing in HFs than is measured by the HF index, which diversifies away much more risk than an investor can. I use HF index returns in this chapter, but you’ve been warned: they generally give too rosy a picture of returns.

Since HFs voluntarily report returns, there are other biases. Agarwal, Daniel, and Naik (2011) find that Santa Claus is kind to HFs: returns are higher in December than between January and November by 1.3%, on average. HFs do this by underreporting their returns earlier in the year and by borrowing from January returns. Why do HFs inflate their December returns? Because HFs levy fees on their December numbers. Bollen and Pool (2009) show that there are more returns just above zero than below zero at the monthly frequency. (The zero level is especially important because HFs market themselves as absolute return strategies.) This kink disappears measuring returns in two-month intervals, indicating that some monthly returns are inflated to avoid reporting losses. These overstatements are subsequently reversed when HFs have stored up a bank of good returns.

Revisions of past data by HFs are pervasive. Patton, Ramadorai, and Streatfield (2013) claim that half of the 12,128 HFs in their sample over 2007–2011 revised their previously reported returns. One-fifth of HFs modified their returns by at least 1.0%—enormous revisions compared to the average monthly HF return of 0.6%. The best way (large) asset owners can avoid data revisions is to use separately managed accounts, where the asset owner directly holds the assets and the HF manager trades the securities in the account. This doesn’t help asset owners in analyzing past, reported data to ascertain whether they should invest in a HF in the first place. For that decision, the asset owner must realize that reported HF returns are too good to be true.

(h.567) 3.2. Hedge Fund Failures
HFs are the fly-by-night funds of the investment world.

Each year, 10% to 15% of HFs vanish from the databases, so most HFs don’t last very long. Together with Nicolas Bollen, a professor of finance at Vanderbilt University, I estimate a model of HF survivorship. Figure 17.2 reports fitted durations of HFs from Ang and Bollen (2010a, 2010b) in Panel A and the probabilities of HF failure in Panel B. Figure 17.2 shows that a
great many HFs fail around years 2 through 5, but some HFs last twenty years or more—so the survivorship distribution is very skewed. This is consistent with Brown, Goetzmann, and Park (2001), (p. 568) who report that 50% of HFs managers disappear within thirty months and fewer than 5% last more than ten years. Gregoriou (2002) also finds the median survival time of HFs to be around five years. Panel B of Figure 17.2 shows that the probability of a HF failing rises steeply from the fund’s inception and peaks at around three years. HFR reports that 60% of the HFs that underperformed the stock market during the financial crisis in 2008 shut down.\footnote{27}

3.3. Performance

Hedge Fund Performance Has Declined over Time

Many studies have looked at whether HFs outperform on a risk-adjusted basis.\footnote{28} The conclusions are mixed, but I believe HFs probably did add value in the 1980s, 1990s, and even possibly in the early years of 2000. But it is unlikely that HFs add value today, on average, after adjusting for risk.

In Figure 17.3, I take the hedge fund index constructed by HFR. Panel A plots the alpha of the HF index from January 1995 to December 2012, which is computed by rolling five-year regressions on the S&P 500 at the monthly frequency. (See chapter 10 for details on alpha.) During the mid-1990s, HFs returned more than 10% on a risk-adjusted basis. This dipped to 5% in 1998—the year Russia defaulted and LTCM...
failed. HF alphas shot back up to around 10% from 2000–2004. Since then, the value-added by HFs has been on a downward trajectory. In the post-2008 sample, HF alphas have been returning only 1% to 2% after adjusting for market risk. In the last two years of the sample, 2011 and 2012, HF alphas were negative.

Panel B of Figure 17.3 shows that while HF alphas have been falling, the correlation of HF returns with the S&P 500 has been rising. During the late 1990s, the correlation was only 50%, meaning that HFs could add large diversification benefits to an investor’s portfolio (see Chapter 3). Since then, the correlation has gradually increased and in 2012 and 2013 was above 85%. With such high correlations to the S&P 500, combined with negative alphas, HFs are certainly not a separate asset class; today they are probably subtracting value from investors on a risk-adjusted basis.

**Larger Hedge Funds Do Worse**
Dichev and Yu (2011) compute dollar-weighted returns for the whole HF industry and uncover a sorry picture of HF performance. From 1980 to 2007, the HF industry underperformed the S&P 500, with returns of 9.7% compared to 13.1% for the stock index. Including the following year, 2008, takes things from bad to (p.569) (p.570) atrocious. HF returns from 1980 to 2008 were 6.0% compared to 10.9% returns for the S&P 500 over the same time period. The 6.0% HF return barely beats the T-bill return of 5.6%. Not surprisingly, Dichev and Yu title their paper “Higher Risk, Lower Returns.”

Some studies find positive outperformance for HFs of around 3% to 5% compared to standard market indexes.29 (Some of these numbers are even statistically significant, especially for the top HFs.) A notable feature of HFs is that they exhibit decreasing returns to scale (just like mutual funds and private equity, which are covered in chapters 16 and 18, respectively).30 This fact means that as HF's grow, they tend to have lower returns. Many of the outperforming funds are concentrated in the early years of the HF industry when they were small (see Figure 17.3). Zhong (2008) shows that the drop in HF alphas, especially in the post-2000 period, is the result of fewer funds capable of producing large, positive alphas as the industry has grown.

When the average return is computed for the whole HF industry, as Dichev and Yu (2011) do, large funds are given larger weights commensurate with their larger assets. When these large funds underperform, the losses to the overall HF industry are much larger. The aggregate losses of the HF industry led Simon Lack (2012), an ex-hedge fund manager, to begin his book with the taunting sentence: “If all the money that’s ever been invested in hedge funds had been put in treasury bills instead, the results would have been twice as good.”

Lack shows that in 2008, the HF industry lost investors more money than it made them over the previous decade.

Many investors are drawn to HFs by the record of returns (sketchy as it is), which was produced largely when the industry was nascent and many HFs were small. Risks in the early years were high, but early investors prospered—they obtained high rewards ex post for bearing very large ex-ante
risk. The HF industry has since matured, and true outperformers are harder to find. Often the best HFs are small. But many asset owners are reluctant to select small, unproven HFs. They gravitate instead toward large HFs with long track records, vast assets under management, high-quality infrastructure, and better reporting and risk management. Of course the returns on these large funds aren’t as high, on average, as small ones: they’re less risky.

**Persistence**

Knowing that some HFs do well is useless unless we can predict which HFs do well. Academics are divided on whether persistence exists in HF returns. Malkiel and Saha (2005) report that the fraction of the top half of HFs that end up in the top half a year later is 52%—essentially the same as flipping a coin. Agarwal and Naik (2000) document stronger evidence of persistence, but unfortunately it comes from losers persisting in being losers, rather than winners repeating. On the other hand, Jagannathan, Malakhov, and Novikov (2010) argue that there is significant persistence. Boyson (2008) shows that if persistence of winning HFs does exist, it is concentrated among small and young funds.

Excessive persistence is a sign that something is wrong. In fact, Getmansky, Lo, and Makarov (2004) and Bollen and Pool (2008) develop tests of HF fraud based on fund returns that are “too smooth.” Figure 17.4 graphs monthly returns of one HF in the solid line and overlays S&P 500 returns. The HF in Figure 4 looks terrific, with very smooth and highly mean-reverting returns to a steady mean, especially compared to the volatility of the S&P 500. What’s the fund? Fairfield Sentry, which was a feeder fund to Bernard L. Madoff Investment Securities—the largest Ponzi scheme in history.31
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3.4. Hedge Fund Factors

HFs take two main approaches to making money: (i) HFs that attempt *market timing* seek to capture market trends—directional trades—and take net long or short (p.572) positions, while (ii) *nondirectional* or *market-neutral* HFs try to extract value from “arbitrage” opportunities. Although the term is widely used in industry, these funds usually do not find pure arbitrages, which are rare. Rather, this type of HF seeks to neutralize market movements and attempts to profit from securities that are misvalued relative to each other.

Within these two approaches, there are two main styles of investing: (i) *discretionary* styles rely mostly on a trader’s judgment (or lack thereof), and (ii) *systematic* styles are more rules-based and rely on quantitative models. The quant funds that melted down in August 2007 fall into the latter category.

Lo (2007) suggests the quant fund losses reflect an underlying source of systematic risk. That most HFs did not deliver absolute returns over the financial crisis of 2008–2009 and instead posted large losses—whether they were market timers or nondirectional traders and whether they had discretionary or systematic styles—also suggests that all HFs, not just quant HFs, are exposed to common risk factors. In fact, *HFs are bundles of standard risk factors.*

The two most important factors are plain old. . . .

**Equity Market and Volatility Risk**

Table 17.5 reports partial correlations of the HF index and various HF strategies (from HFR) to the S&P 500 and a volatility factor. The latter is compiled by Merrill Lynch and is
a return series from a short volatility strategy (see chapters 2 and 7). Short volatility strategies sell volatility insurance and make money during stable times but lose money when volatility spikes. I take monthly data from January 2000 to September 2012 and construct excess returns for the HF returns and the S&P 500 using U.S. T-bills as the risk-free rate. The partial correlation of the HF excess returns with the equity factor controls for the effect of the volatility factor and vice versa.

### Table 17.5

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<th>Hedge Fund Partial Correlations</th>
<th>Equity</th>
<th>Volatility</th>
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<tbody>
<tr>
<td>HF Index</td>
<td>0.664</td>
<td>0.262</td>
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<td><em>p</em>-value</td>
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<td>Equity Long/Short</td>
<td>0.106</td>
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</tr>
<tr>
<td><em>p</em>-value</td>
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</tr>
<tr>
<td><em>p</em>-value</td>
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<td>0.00</td>
</tr>
<tr>
<td>Event Driven</td>
<td>0.624</td>
<td>0.384</td>
</tr>
<tr>
<td><em>p</em>-value</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Macro</td>
<td>0.399</td>
<td>−0.340</td>
</tr>
<tr>
<td><em>p</em>-value</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Relative Value</td>
<td>0.330</td>
<td>0.646</td>
</tr>
<tr>
<td><em>p</em>-value</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Convertible Arbitrage</td>
<td>0.180</td>
<td>0.657</td>
</tr>
<tr>
<td><em>p</em>-value</td>
<td>0.03</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 17.5 shows very high correlations of all HF strategies with the market factor. The partial correlation of the HF index with respect to equity risk is a very high 0.67. HFIs with emerging markets and event-driven strategies also have
partial correlations above 0.6. Event-driven HFs take advantage of corporate transactions like mergers, restructurings, buybacks, security issuance, and so on. The distress, or restructuring, strategy invests in corporate bonds of companies that are in or close to bankruptcy. The partial correlation of distress with equities is 0.41. Only for the long-short equity funds, of which a large number are quant funds, is the partial correlation with equity market risk low at 0.11 and statistically insignificant. (It does seem that, on average, market-neutral HFs are market neutral. 32)

The partial correlations of HF returns with the volatility risk factor are somewhat smaller than the market, but Table 17.5 reports that they are still quite large. (p.573) The HF index has a partial correlation of 0.26 with volatility risk. Distress, event-driven, relative value, and convertible arbitrage have partial correlations with volatility of approximately 0.4 or higher. Relative value HFs take offsetting positions, often in fixed income, of securities they perceive to be mispriced relative to each other. Convertible arbitrage HFs invest in convertible fixed income securities and hedge out the equity exposure, generally by shorting common stock but also by using options. All the HF strategies have highly statistically significant exposure to volatility risk. All the volatility risk exposures are also positive with the exception of macro HFs, which trade securities in many asset classes at a global level. (This style classification includes many trend followers, which tend to be long volatility.)

Figure 17.6 graphs year-on-year HF returns with the S&P 500 and volatility risk factors for several HF strategies. Since we are interested in correlations, I have normalized all returns to have the same standard deviation, which is the (p.574) (p.575) (p.576) standard deviation of the S&P 500 excess return. I have also de-meaned all series. The panels in Figure 17.6 represent very different HF styles: the HF index in Panel A, long/short equity in Panel B, merger arbitrage in Panel C, and relative value in Panel D. Remarkably, they all show a general pattern of steady and relatively high returns during the early 2000s, a substantial drawdown during 2008, and a recovery after 2009. There is an amazingly close correspondence of these HF returns with the S&P 500 and
volatility factors in all the panels. HFs *repackage equity and volatility risk*.

Table 17.5 and Figure 17.6 take HF returns aggregated to the whole industry or the sector level. At the individual HF level, the literature also finds that volatility risk factors explain a very large part of HF returns. Often any outperformance of HFs, if it exists, can be partly and sometimes wholly attributed to volatility risk exposure. Fung and Hsieh (2001), the first to recognize the importance of volatility risk factors in HF returns, find no outperformance of HFs once volatility risk factors are included. Fung et al. (2008) find an average HF alpha of just 6 basis points (effectively zero) with a risk benchmark that includes equity, bond and volatility risk factors.
Other Factors
There are other important factors that drive HF returns besides the equity market and volatility factors, but they tend to be sector-specific. Commodities and currency risk, for example, are reflected in macro HF returns. (Commodities and currencies themselves also reflect volatility risk.) Term spreads (the difference between long and short maturity Treasury bonds) and credit spreads (the difference between risky and safe corporate debt) are also significant risk factors for relative value strategies. Quant funds are highly exposed to value-growth and momentum risk (covered in chapter 7), and not surprisingly these factors didn’t do well during August 7 to 9, 2007.

Sadka (2010) finds that many HFs are exposed to illiquidity risk. HFs with the highest illiquidity risk exposures outperform their more liquid counterparts by 6%. Interestingly, this illiquidity risk premium is not related to how easily investors can withdraw money from the HFs themselves (i.e., the illiquidity characteristics of the HFs; see below). But the most
important risk factors are regular market risk and volatility risk.

In 2004, Asness foretold:

In today’s world, these strategies are not only linked by a common risk-taking/liquidity-providing element, but are also more and more pursued by the exact same investors. It is easy to imagine considerably greater potential co-movement in a crisis because of this commonality.

(p.577) This is exactly what happened in 2007 in the quant meltdown, and a year later for almost all HFIs during the financial crisis.

3.5. A Deeper Look at Volatility Risk
Given the myriad of HF investment styles, it might be surprising that many are economically identical in terms of selling volatility. The commonality is that many HFs choose strategies that most of the time deliver steady returns. But the cost of these steady returns during normal times is that when the bad times come, there are pronounced losses. Selling volatility is like selling hurricane insurance. You collect the premium most of the time. Then the hurricane hits and you are wiped out. The last financial hurricane occurred during 2008–2009.

A picture of a short volatility payoff is shown in Figure 17.7.

Figure 17.7 is the payoff of a short, out-of-the-money put. Most of the time, the HF collects small and steady premiums equal to the price of the put. These profits look like “alpha” and HFs refer to this by various guises: “skill,” “arbitrage,” “mispricing,” “market dislocation,” “providing liquidity,” “alternative beta,” or just plain “short volatility.” This premium does not come for free: there are occasional large losses when the assets fall sharply in price. In practice, the losses are higher than just simple put-selling because HFs use leverage. These losses do not show up in standard alpha calculations (see chapter 10), so often it appears that HFs make money relative to long-only positions in plain-vanilla fixed income and equities.

Many HF strategies have short put payoffs. Let’s take the HF styles in Figure 17.6:

**Long-Short Equity**

A common quant HF strategy is short-term reversal, which takes advantage of the fact that if a stock has gone up in price today, it is likely to mean-revert back down tomorrow. (This effect is observed in horizons less than a minute to one
month.) The predictability of this pattern is weak (like all predictability in stock returns, see chapter 8), but quants use this strategy on thousands of stocks. Lo (2007) reports that returns to this strategy have been declining over time. To maintain the overall average of their returns, quant funds juiced up this strategy with more leverage through the 2000s. This is partly what made the August 2007 losses so severe.

Nagel (2012) argues that short-term reversal strategies are a form of liquidity provision—prices decline because other market participants wish to sell, and quant HF s provide liquidity by picking up the slack. Liquidity provision is a short put—you make profits most of the time, but you take a drubbing when prices fall. The profitability of liquidity provision strategies, including short-term reversal, is highly dependent on volatility risk. As volatility jumps, liquidity evaporates merger, saddling long-short equity HFs with losses.

**Merger Arb**

Merger arbitrage (merger arb or risk arb) is a strategy that buys stock in companies being acquired (and shorts the acquirer). When a merger is announced, prices of the company being acquired jump, but they don’t jump all the way up to the offer price. They jump on the announcement and then continue to drift upward, reaching the offer price when the merger is completed.

Mitchell and Pulvino (2001) show that merger arb is equivalent to a naked short put. In most cases, merger arb makes money because the stock of the acquired company rises to the offer price predictably. The reason prices don’t jump upward immediately on announcement of the merger is that sometimes mergers are derailed—the Justice Department blocks the merger on antitrust grounds, due diligence uncovers skeletons in the acquired company’s closet, or the deal is scuttled at the last minute by an argument over who gets to be the new boss, and so on. When mergers fail, prices plummet. Thus, merger arb ekes out small returns most of the time, and then with a small probability it loses big—exactly the pattern we see in Figure 17.7. Mitchell and Pulvino also demonstrate that the rare, large losses arising when mergers fail are correlated with the market (so merger arb has systematic risk): in a market-wide crash, many mergers fail and merger activity dries up.
Relative Value

A comprehensive study of fixed income relative value strategies was done by Duarte, Longstaff, and Yu (2005). They examine several “arbitrages,” including swap spread arbitrage, yield curve arbitrage, mortgage arbitrage, volatility arbitrage (the differential pricing of risk in different securities markets), and capital structure arbitrage (trading different securities issued by the same firm). All these strategies generate high returns most of the time and then the occasional large loss. Convertible arbitrage also falls under the relative value category as it profits from differential pricing of risk across two securities markets: convertible bonds and equities. This strategy is also vulnerable to extreme market events.  

Losses in relative value strategies can be nasty because fixed income HFs usually employ high leverage. Sometimes HFs are blind to the possibility of large losses—as was the case at LTCM when credit spreads widened on news of Russia’s default in 1998. Most of the time housing prices are fairly stable and increase over time. But sometimes they don’t, like in 2007, when mortgage spreads (over U.S. Treasuries) shot up, causing painful losses for mortgage arb strategies.

Fung and Hsieh (2002) were prescient in their study of fixed income hedge fund returns using data up to 2001. They back-tested the effects of Great Depression-scale shocks to credit spreads and forecast large potential declines saying that “there exists cyclical exposure to risk factors inherent in most Fixed-Income Arbitrage funds that may be masked by the short existence of the funds themselves.” That is, a positive and significant historical alpha resulted from the risk of rare events. They were spot on as that rare event arrived toward the end of the 2000s. As Asness said in his definition of HFs, “Every three or four years they deliver a one-in-a-hundred year flood.”

HF Industry

Not surprisingly, if most individual HF styles are short volatility, then the entire HF industry is just a short put as well. Jurek and Stafford (2012) show that a simple strategy of selling out-of-the-money puts accurately matches the risk profile of (p.580) the HF index and actually does better. Over their sample period of 1996 to 2010, HFs returned 6.3% in
excess of T-bills while the derivative strategy had excess returns of 10.2%.

Since HFs are short volatility, it is ironic that many asset owners, especially pension funds, purchase volatility protection while they own HFs that have the exact opposite exposure. They pay twice (handsomely, usually) to get back to the market portfolio.

3.6. Leverage

One of the defining characteristics of HFs is that they use leverage, and, within the asset management industry, HFs make the most use of leverage. HFs use leverage to target a level of return volatility desired by investors, particularly for fixed income HFs where the underlying securities are (usually) not very volatile. HFs adjust their leverage in response to time-varying investment opportunities. And finally, HFs lever to enhance returns (or, unfortunately, losses) on strategies that aren’t sufficiently profitable on an unlevered basis.

Ang, Gorovyy, and van Inwegen (2011) examine HF leverage. When we wrote that paper, HFs did not publicly report their leverage, and ours was the first study to analyze HF leverage using actual leverage ratios. Now that the SEC gets reports on HF leverage, regulators will have a better picture of HF borrowing (even if investors might not).

We found that HF leverage is not that high—on average. There are some HFs (in fixed income) with leverage ratios above 30, but the overall HF industry has a leverage ratio around 2 or 3, as shown in Figure 17.8 (the solid line with the right-hand axis). This is because half the HF industry concentrates on equities, and leverage of equity HFs is, on average, modest. A more amazing fact is that HF leverage is counter-cyclical to the leverage of investment banks. I found this surprising because, prior to writing the paper, I thought HFs would be mini versions of investment banks in terms of leverage policies.
Hedge Funds

Figure 17.8 overlays the leverage of commercial banks, investment banks (the largest of which turned into commercial banks during the financial crisis), and the finance sector (plotted on the left-hand axis). Prior to 2007, HF leverage was around 2.3. HF leverage started to come down in 2007, a year before the financial crisis, and bottomed out below 1.5 in the last quarter of 2008 and the first quarter of 2009—the worst months of the crisis. Investment bank leverage has exactly the opposite pattern: as equity prices start to fall in 2008, leverage increases and peaks at over 40 right when HF leverage was lowest.

3.7. Summary
HFs are a hodgepodge of factor risks—especially equity and volatility risk. Most HFs are short volatility and generate returns that are dependable most of the time but subject to occasional terrible losses. Thus, using mean-variance optimizers to calculate allocations to HFs is dangerous—unless you are a special investor who cares only about means and variances (I’ve yet to meet any). If you care about occasional catastrophic losses, then you need asset allocation tools to handle strategies that “pick up nickels and dimes in front of a steamroller,” as chapter 2 describes.

4. Agency Issues
Since HFs do not fall under the 40-Act, they can employ nonlinear performance contracts that can mitigate agency problems and better align the interests of agents (the HF managers) with the principals (the asset owners).

4.1. Contracts
HFs charge a management fee, also called an expense ratio. A typical fee is 2%, which is levied on the (unlevered) assets in the fund, which is the net asset value (NAV).

HFs also charge a performance fee, or an incentive fee. The performance fee, typically 20%, is calculated net of a benchmark. Popular benchmarks are a cash benchmark, like LIBOR, the S&P 500, or some general market index, or a constant like zero.

(p.582) Performance fees can get complicated. If the HF has a high-water mark, then performance fees are levied only when the NAV exceeds the highest NAV previously achieved. For example, suppose the NAVs of a HF are:
<table>
<thead>
<tr>
<th>Time</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAV</td>
<td>100</td>
<td>120</td>
<td>110</td>
<td>145</td>
</tr>
</tbody>
</table>
Hedge Funds

There is no performance fee payable at time 3 because the NAV is below its high-water mark of 120. At time 4, the HF recoups its losses and has a NAV of 145. A performance fee is paid at time 4 and the fund’s water-mark is now 145. If there is a hurdle rate, say 4%, the performance fee is paid only when returns are above 4%. With both a high-water mark and a hurdle rate, the incentive fee is paid only when both conditions are met.

While the typical combination of management and performance fees is “2 and 20” (2/20), there is some variation. The Medallion Fund of Renaissance Technologies, founded by James Simons, is one of the best performing HFs and may be the best HF in history. It charges 5/44. (No, you can't invest; it is closed.) The mean management and performance fees are 1.4/16.0 across all funds. Smaller firms generally have lower expense ratios and higher incentive fees (and remember, small HFs also tend to have better performance). 39

Finally, HFs sometimes charge withdrawal fees when funds are redeemed.

Incentive Alignments

Do performance fees lead to better performance? Yes. Ackermann, McEnally, and Ravenscraft (1999) report that moving from a HF with no incentive fee to a HF with a 20% incentive fee increases the Sharpe ratio of a fund by 0.15, all else equal. Agarwal, Daniel, and Naik (2009) find that, consistent with agency theory, funds with better managerial incentives have better performance. In particular, the more the HF manager gets paid when the HF does well (the performance sensitivity of the incentive fee, in technical jargon), the better the performance of the HF. HFs with high-water marks and whose managers have larger equity stakes also tend to perform better.

On the other hand, asset owners should be wary of HFs increasing their fees due to past success. Agarwal and Ray (2012) show that HFs change their fees quite often, but fee increases are followed by worse performance. Agarwal and Ray find no change in (often subpar) performance when HFs lower their fees.
The lack of disclosure and the lack of control hurt investors. Lack (2012) tells colorful stories of how hedge fund returns are gamed (see Section 3.1) and how the lack of investor control encourages managers to prolong losing investments to maximize fees. Fraud thrives on opacity, and asset owners have to be careful. (p.583) Many HFs suffer from operational problems, including falling afoul of legal and regulatory requirements. Brown et al. (2012) show that operational risk increases the likelihood of poor performance. Unfortunately, operational risk does not seem to influence the choices asset owners make in selecting HFs, as many investors simply chase the HFs with the best past returns.

4.2. Fees

HF fees are high.

**Top-Earning Hedge Fund Managers**

Table 17.9 lists the top-earning HF managers in 2011 compiled by *Alpha* magazine. The highest earning HF manager in 2011 was Ray Dalio, who heads Bridgewater Associates. He earned $3.9 billion. Dalio appeared on the top-earning HF manager list in 2010, where he earned $3.1 billion. Bridgewater also generated enormous wealth for the two men tied for number 7 on the list, Greg Jensen and Robert Prince. The number 3 manager, James Simons, earned $2.1 billion in 2011. Simons also appeared on the 2010 and 2009 lists, earning and $2.5 billion in both years.
Table 17.9
Top-Earning Hedge Fund Managers 2011

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Earnings</th>
<th>Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ray Dalio</td>
<td>3.9 billion</td>
<td>Bridgewater Associates</td>
</tr>
<tr>
<td>2</td>
<td>Carl Icahn</td>
<td>2.5 billion</td>
<td>Icahn Capital Management</td>
</tr>
<tr>
<td>3</td>
<td>James Simons</td>
<td>2.1 billion</td>
<td>Renaissance Technologies</td>
</tr>
<tr>
<td>4</td>
<td>Kenneth Griffin</td>
<td>700 million</td>
<td>Citadel</td>
</tr>
<tr>
<td>5</td>
<td>Steven Cohen</td>
<td>585 million</td>
<td>SAC Capital Advisors</td>
</tr>
<tr>
<td>6</td>
<td>Chase Coleman</td>
<td>550 million</td>
<td>Tiger Global Management</td>
</tr>
<tr>
<td>7</td>
<td>Greg Jensen</td>
<td>425 million</td>
<td>Bridgewater Associates</td>
</tr>
<tr>
<td>8</td>
<td>Robert Prince</td>
<td>425 million</td>
<td>Bridgewater Associates</td>
</tr>
<tr>
<td>9</td>
<td>Israel Englander</td>
<td>357 million</td>
<td>Millenium Management</td>
</tr>
<tr>
<td>10</td>
<td>Alan Howard</td>
<td>350 million</td>
<td>Brevan Howard</td>
</tr>
</tbody>
</table>

Top-Earning CEOs in 2011

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Earnings</th>
<th>Firm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>John Hammergren</td>
<td>132 million</td>
<td>McKesson</td>
</tr>
<tr>
<td>2</td>
<td>Ralph Lauren</td>
<td>67 million</td>
<td>Ralph Lauren</td>
</tr>
<tr>
<td>3</td>
<td>Michael Fascitelli</td>
<td>64 million</td>
<td>Vornado Realty</td>
</tr>
<tr>
<td>4</td>
<td>Richard Kinder</td>
<td>61 million</td>
<td>Kinder Morgan</td>
</tr>
<tr>
<td>5</td>
<td>David Cote</td>
<td>56 million</td>
<td>Honeywell</td>
</tr>
<tr>
<td>6</td>
<td>George Paz</td>
<td>51 million</td>
<td>Express Scripts</td>
</tr>
<tr>
<td>7</td>
<td>Jeffrey Boyd</td>
<td>50 million</td>
<td>Priceline.com</td>
</tr>
<tr>
<td>8</td>
<td>Stephen Hemsley</td>
<td>48 million</td>
<td>UnitedHealth Group</td>
</tr>
<tr>
<td>9</td>
<td>Clarence Cazalot</td>
<td>44 million</td>
<td>Marathon Oil</td>
</tr>
<tr>
<td>10</td>
<td>John Martin</td>
<td>43 million</td>
<td>Gilead Sciences</td>
</tr>
</tbody>
</table>
You thought the top CEOs were well paid? The right-hand side of Table 17.9 lists compensation of the top-earning CEOs in 2011 compiled by Forbes. There is an order of magnitude difference in the compensation of the top CEOs and the top HF managers; we need to multiply the compensation numbers of the top CEOs by at least 10 to make them comparable. Yes, the top-earning HF managers do extremely well, but before immediately rushing out to become a HF manager, remember that these managers are exceptional—the typical HF lifecycle is short, most HFs die after a few years, and you never hear of the worst-paid HF managers.

There are many ways to make the enormous amounts in Table 17.9. Bridgewater, the home of Dalio, Jensen, and Prince, is a macro fund with a quant bent. Renaissance Technologies is a quant firm, with very secretive and technical algorithms. Carl Icahn’s fund fits in the event-driven style category and employs many shareholder activist techniques, aggressive enough that the market talks of an “Icahn Lift.” Brevan Howard is a macro fund, but it runs mostly discretionary (as opposed to quant systematic) portfolios.

Oh, there are no women in Table 17.9.

**Hedge Fund Compensation is a Call Option**

The top-earning HF managers earn so much because of large management and performance fees. The performance fee is an option—the HF manager gets paid 2% if nothing happens and then 2% plus 20% when the performance fee kicks in. This payoff is highly convex—essentially the mirror image of most HF strategies, which are concave. That is, HF compensation contracts are long call options and long volatility, while the strategies employed by HF managers are short put options and short volatility.

The performance fees, as a sequence of call options, encourage the HF manager to take risks. If they pay off, you can hit the big leagues and sit beside Dalio and Simons. If your bet doesn’t work out, you don’t lose anything and still get the 2% management fee. Your investors, of course, lose. In the worst case, you perform so badly you have to close up shop. After you fail, you open up a new HF (this is a restart option and is a form of implicit contract, see chapter 15). The former partners of the failed LTCM did just that. A year after LTCM failed in 1998, Myron Scholes set up Platinum Grove Asset
Hedge Funds

Management, which suffered like many other HFs during 2008 and gated its investors. Scholes retired from Platinum Grove in 2011. John Meriwether, another partner at LTCM, started JWM Partners with other ex-LTCM colleagues. It closed in 2009 after losses during the financial crisis. Like the phoenix, new HFs also arose from the implosion of Goldman’s quant funds after the quant meltdown and financial crisis. Mark Carhart, who co-headed Global Alpha, set up Kepos Capital, and Raymond Iwanowski, the other co-manager, opened Secor Asset Management.

The value of the option performance fee is roughly 3% to 4%, as first shown by Goetzmann, Ingersoll, and Ross (2003). In his PhD dissertation, my former student Sergiy Gorovyv (2012) estimated equivalent flat management fees (that gave the manager the same total compensation) for various performance structures. He found a straight 2/20 contract equivalent to a 6.4% management fee. Adding a high-water mark brought this down to 5.8%. A 2/20 contract with a high-water mark and a 4% hurdle rate was equivalent to a 5.3% management fee. The average active mutual fund fee is below 1%. These are high fees.

Asset owners shouldn’t mind paying high fees but only when there is outperformance. Sadly, this is not the case in current HF contracts. Lan, Wang, and Yang (2012) build a model of HF leverage and valuation. They find that for the standard 2/20 contract, the HF manager needs to create a whopping 20% increase on assets under management to justify his compensation. Lan, Wang, and Yang also find that incentive fees constitute a minority—only one quarter—of the HF manager’s compensation. This result doesn’t change when adding other effects, like managerial ownership, new money flows, and restart options. HF management fees severely dominate incentive fees.

HF contracts are not bound by the 40-Act, so there is large scope to experiment with the best compensation structures. I would prefer to see management fees as a small fraction, 1% to 2%, of total HF manager compensation. That is, a better contract might be 0.25% in management fees and 50% or more in incentive fees. Asset owners might consider paying fixed, rather than proportional, fees to small funds to cover overheads and expenses. Any proportional cost should be very small, which reflects the fact that the opportunity cost for
most investors is a low-cost index portfolio. Renaissance Medallion is right in charging high incentive fees—I believe they should be even higher than today’s contracts, but the management fees should be an order of magnitude lower. The benchmark should also be changed. The most appropriate benchmark is a factor benchmark, especially incorporating volatility risk, since HFs are largely plays on volatility and other dynamic, or investment, factors (see below and also chapter 7).

4.3. Cost of Illiquidity

HFs restrict liquidity by a number of ways. They employ lockups, during which investors cannot withdraw money. Typical lockups are around three to six months but can be as long as two years or more. LTCM originally had a lock-up of three years, which explained why the fund’s name included the words “long term.” ESL Investments, run by Edward “Eddie” Lampert, has a five-year lockup. PDT Partners, headed by Peter Mueller and spun out of Morgan Stanley in 2012, set up shop with a seven-year lockup. There are even funds with ten-year lockups. Many HFs also trade-off illiquidity and fees: they offer investors lower fees for a longer lockup and vice versa.

If the HF has a notice period, investors wanting to redeem have to give notice by a certain date (say the beginning of the quarter) and then wait until the end of the notice period (say the end of the quarter) before getting money. Some HFs extend this pain over multiple quarters. SAC Capital Advisors used to permit investors to withdraw only 25% of their requested funds every quarter, so it took one year to get back your money. (In November 2013, SAC pled guilty to securities and (p.587) wire fraud, paid $1.8 billion in fines, and stopped managing money for outside investors.)

Finally, HFs can impose gates, which allow the HFs to limit redemptions, and sometimes redemptions can be suspended altogether.

Lockups allow HF managers to pursue strategies that would be difficult if investors withdrew at the wrong time. That is, selling volatility will earn a long-run risk premium but only if you stick through the times when volatility spikes and prices crash. Lockups allow funds to hold more illiquid assets and
Hedge Funds

earn an illiquidity risk premium (see chapter 13). Aragon (2007) shows that HFs with lockup restrictions earn 4% to 7% higher returns than HFs without lockups.

Gates and suspensions cause HFs to be like the “Hotel California” in the song by the Eagles. Investors may request their funds (“you can check out anytime you like”) but HFs won’t give your money back (“but you can never leave”). During the financial crisis, many investors wanted to check out of badly performing HFs, but they were stuck. This was not just a problem for 2008–2009; HFs get in trouble all the time and gate. In October 2012, the Endowment Fund, a multibillion HF run by Mark Yusko, the former chief of the endowment of the University of North Carolina at Chapel Hill, imposed gates after lousy performance over the prior two years.48

Illiquidity is costly to the asset owner. In Ang and Bollen (2010a, 2010b), I compute the cost of lockup and redemption restrictions using a real option approach.49 An investor gives up an option—the right to get out of the fund when she wants, and she most wants to exercise the option when the manager is destroying value. This is precisely the time that the HF doesn’t allow you to leave. I estimate the cost of a three- to six-month lockup at around 2%. The cost of a two-year lockup is 4%. The cost of illiquidity increases to 15% if the HF suspends all redemptions during bad times and rescinds the liquidity option when the investor desires it most.

4.4. The Future

HFs are not going away, and some generate sizeable returns. But most HFs are just conduits of risk factors, in opaque, illiquid, and expensive wrappers. Many of these risk factors—like volatility, credit, small-large, value-growth, and momentum—are especially attractive for long-term investors. Is there a better way of accessing these risk premiums?

The barrier to entry for many factor strategies is low. There are now mutual funds that do HF-like strategies. Some of them are HFs in everything but name—but with the protections that the 40-Act confers to investors. A few of these (p.588) mutual funds have even been launched by HF firms, seeking to branch out to mom-and-pop investors. (This money also tends to be more sticky than institutional HF investors.) New exchange-traded funds are specializing in some of these factor risk
premiums. Many of the risk exposures that HFs bring to the table can be had more cheaply than 2/20, and many of these strategies are attracting more (and lower fee) copycats. More capital piling in brings its own risks, too, as more investors may be chasing the same strategies. That could lead to more events like the August 2007 quant meltdown. As Andrew Lo says, “The whole hedge-fund industry is a series of crowded trades.”

There is ample room for innovation. At the time of writing in 2013, there are no large-scale, off-the-shelf factor portfolios for volatility, liquidity, or momentum that are global, diversified across asset classes, designed with low enough turnover to be very cheap (20–30 basis points), and available to ordinary investors. S&P 500, Russell 2000, and similar index funds cost 5 to 10 basis points for ordinary investors and nothing (literally, because of stock lending) for institutions, but the fees on factor portfolios will be higher because they dynamically trade. Some large investors (with tens to hundreds of billions of dollars) have created their own factor portfolios, but small asset owners can’t. It is encouraging to see some asset management companies, including HF firms, pushing in this direction. Some HF firms have even introduced factor funds, but at prices much more expensive than 20 to 30 basis points. (However, the fees are generally much lower than the standard 2/20.) If factors can be commoditized, these HFs are at risk of being locked in a downward spiral of lower fees—good news for asset owners.

It’s taking a while, though. Why don’t we see dirt cheap factor funds now?

**The First Factor Fund**

We take low-cost, equity index funds for granted, but it wasn’t obvious they were going to succeed when they started in the 1970s. Traditional active managers, especially mutual fund families, didn’t want to introduce index funds for fear of cannibalizing their higher-fee active funds, especially since active mutual funds underperform the market (see chapter 16). Offering index funds must have felt like throwing in the towel—like admitting you have no skill, and what manager wants to think that? Oldrich Vasicek, one of the early developers of the index fund said, “They thought we were
crazy. . . ‘You just want to buy whatever garbage happens to be traded?’”

Clayton Christensen (1997), a guru of management at Harvard Business School, shows convincingly that it is outsiders (especially small firms) who innovate. This is true in finance too. The impertinent startup that introduced index funds was a bank—Wells Fargo—with few equity clients. Three people there led the charge: John McQuown, James Vertin, and William Fouse. “It was they who truly brought the gown to town,” in Bernstein’s (1992) words—appropriate because McQuown turned the asset management division into an academic powerhouse; the big guys in finance, Black, Fama, Jensen, Markowitz, Miller, and Sharpe (many going on to win Nobel Prizes), all worked for Wells Fargo at some point.

The first market index fund was a failure. In 1971, Wells Fargo created an equal-weighted index fund seeded by a pioneer, Samsonite’s pension fund. It was a nightmare to trade and was eventually shut down.

In 1973, Wells Fargo launched a second attempt, this time successful. It created the modern index fund with market capitalization weights—the model for all index funds since. To seed this new fund, Wells Fargo’s own pension fund put in money, along with Illinois Bell’s.

Two other initial adopters of index funds were also outsiders: American National Bank, led by Rex Sinquefield, who went on to found DFA, and Batterymarch Financial Management, headed by Dean LeBaron. Neither is a household name today.

Index funds would have remained niche investments were it not for the Vanguard Group—now one of the world’s largest asset managers. Vanguard was started in 1975 by John Bogle with an innovative structure: the firm was owned by mutual funds, and the mutual fund shareholders paid Vanguard only what was necessary to operate the firm (which wasn’t much). Vanguard is a “mutual” mutual fund company. Vanguard forsook financial advisors, sold directly to investors, and kept costs low. The firm introduced its first index fund in 1976, and index investing, thanks in large part to Vanguard’s efforts, reached the lexicon of most ordinary investors in the late 1980s and attracted substantial asset flows in the mid- to late 1990s. Although Vanguard is a behemoth today, the firm was
not initially successful, but it doggedly persisted: Vanguard’s assets only surpassed $1 billion—a key threshold for respectability in the funds management industry—in 1998.\textsuperscript{55}

Most of the traditional active management mutual fund companies were forced to introduce low-cost index funds. This was about thirty to forty years after the development of the theoretical Capital Asset Pricing Model by Sharpe (1964), explaining why investors should prefer market index funds, and the damning empirical work by Jensen (1968) and others showing that active mutual funds did not add value. Even today, however, index funds account for less than 15% of the mutual fund market.\textsuperscript{56}

Vanguard was a new \textit{industrial organization} (well, financial organization, but I use the term following the branch of economics specializing in firm structures). Rose-Ackerman (1996) argues that ideologues are drawn to nontraditional corporate structures (especially nonprofits, although Vanguard is not a nonprofit) to share a vision. That vision was more than an index fund; it was a new investment philosophy—aiming for the average, doing it cheaply, and offering it directly to investors. Not for nothing are the followers of Bogle and fans of Vanguard called “Bogleheads.”

**The Next Generation of Factor Funds**

Investors would be better off by gaining access to dynamic factor risk premiums much more cheaply. We need a new generation of factor (index) funds, which are low-cost versions of the factors in HFs. The factors can serve as benchmarks, to ensure that asset owners are getting better value and alleviating agency costs (see chapters 14 and 15). HFs will still exist, and the best HFs will deliver more than factor risk, but we will have upped the standards for HF performance. Given the large left-hand tail losses of these factor risks, greater transparency would greatly benefit investors in optimally allocating to these factor strategies.

The innovation in today’s industry and the growing acceptance of factor investing makes this a prime time for new, cheap factor funds. In 2013, we don’t see anything resembling a low-cost S&P 500 index fund for the dynamic factors considered in chapter 7. It took decades for cheap equity index funds to go mainstream from their academic beginnings (some findings in academia take a long time to become widely adopted in
industry). Professors invented multifactor models in the late
1970s (Ross 1976), but empirical work on factors didn’t
permeate journals until the 1990s, so the timeline is about
right for low-cost multifactor index funds to be introduced
today. We can draw some lessons from the introduction of the
first factor fund—the equity index fund:

1. The first versions could be failures, even if the idea is
right. We need to experiment, and anticipate failure.
2. It will likely be introduced and popularized by an
outsider. It takes a brave HF firm to introduce a new, cheap
product that makes old, expensive ones look bad. Or it
takes a HF firm that truly has the skill to do it, but
those funds are giving up high-margin businesses to
move into a low-margin one. Small and startup firms
will likely be the pioneers. It may not, however, be the
first mover that eventually makes factor portfolios go
mainstream.

(p.591) 3. Its widespread introduction might take a
new organizational design. HFs already practice dynamic factor investing now. But
they are unlikely vehicles to make factor investing low
cost and widely available. Even if HFs lowered their
fees, secretiveness and opacity are the antithesis of
simple, well-documented factor strategies.
4. The first investors will be taking risks.
The early investors in index funds, like the pension
funds of Samsonite and Illinois Bell, took risks by
investing in an unproven, nontraditional product that
faced hostility from traditional management firms. This
is hard for large, mainstream asset owners who like to
do what everyone else is doing for “fiduciary” reasons.
The giant asset owners—the sovereign wealth funds
and smart pension funds with hundreds of billions—
have the skills to implement, and many already trade,
factor portfolios in house. The small investor may not
even understand the concept of factor investing. So it
will likely be large, but not huge, sophisticated
institutional investors who will delegate to external
factor managers. These asset owners have the capital,
but not the expertise, to trade their own factor
portfolios. Family offices, large endowments, and innovative pension funds are prime candidates. But they need to be brave.

5. The Quant Meltdown Redux
The quant meltdown in August 2007 showed that a set of HFs had exposures to the same risk factors. The large losses of quant funds could have been caused by one quant fund needing to liquidate immediately at fire-sale prices. Quant funds were all doing the same trades, had exposure to the same factors, and so all went down together. What caused the rebound on August 10, 2007? It could have been that the large unwind by one quant fund ended. Or it could have been that prices had moved so far from fair value, quant funds simply stopped taking their strategies off. Perhaps new capital—like the $3 billion injected into Goldman’s quant funds—put the strategies back on. Whatever the reason, the quant meltdown showed that HFs are not absolute return strategies, and they are exposed to common factors.

HFs are not an asset class; they are bundles of factor risks. The most important factors are equity market risk and volatility risk. In particular, most HFs sell volatility and so generate steady returns most of the time, punctuated by the occasional frightful loss. In factor risk strategies, the regular returns during normal times compensate investors for suffering through infrequent catastrophes. HFs are at present the only large-scale organizational form to access many of these dynamic factors, but the hoped-for introduction of low-cost factor portfolios could change this.

HFs are not alternative beta. They are expensive beta.

Notes:
(1) This is based on “The Quant Meltdown: August 2007,” CaseWorks ID #080317. See also Khandali and Lo (2007) and Daniel (2009).

(2) “The Quant Meltdown: August 2007,” CaseWorks ID #080317 lists August 2007 performance for several quant HFs in Table 2, along with media sources.


(11) Good summaries of HFs are Stulz (2007) and Lo (2010). Do not be put off by its title: *Hedge Funds for Dummies* written by Logue (2007) is not just for dummies.

(12) While they are exempt from the 40-Act, HFs must comply with other laws and regulations, like the 1933 Securities Act and general fraud statutes. Commodity trading advisors and commodity pool operators are similar to HFs in that they have large exposure to dynamic factors: They trade futures, swaps, or options on futures or swaps and are registered with the Commodity Futures Trading Commission.


(15) Prior to the Jumpstart Our Business Startups Act of 2011, HFs were banned from soliciting or advertising; they were restricted to private offerings. This changed under the act. At the time of writing in 2013, the SEC is still to issue final rules. Even though HFs can advertise, HF investors must be accredited investors or qualified purchases.
(16) If a HF belongs to a HF family run by a large asset management firm with more than $100 million in assets, then the overall firm has to report security holdings every quarter (these are called 13(f) filings) but not holdings for a single HF. Short positions are not covered under 13(f) reports.

(17) This is under the Private Fund Investment Advisers Registration Act of 2010 in Title IV of the Dodd-Frank Act.

(18) The overlap of HFs reporting to even more than one of the standard databases is small. Fung and Hsieh (2006) report that fewer than 3% of HFs report to all of the five main databases used by researchers. See also Agarwal, Fos, and Jiang (2013).

(19) HFR starts earlier, but reported data tends to be sketchy for very early years. This is true for all HF databases.


(23) In addition to the references in the text, see also Fung and Hsieh (1997), Brown, Goetzmann, and Ibbotson (1999), Liang (2000), and Agarwal, Fos, and Jiang (2013).

(24) Some firms have designed investable HF indexes, but there is a large selection bias in the types of HFs willing to be included in such indexes. As Groucho Marx says, “I refuse to join any club that would have me as a member.”

(25) Aggarwal and Jorion (2012) find no evidence that more transparency is associated with lower returns. In fact, their results suggest the opposite: the more transparent the HF, the higher the returns.
(26) See Liang (2001) and Kouwenberg (2003). HFs can delist as a result of poor performance, usually resulting in termination, or spectacular performance when they close to new investments. Jorion and Schwarz (2013) report that the latter represents only 1% of cases.


(28) In addition to the references in the text, the “no, HFs don’t add value” camp also includes Ackerman, McEnally, and Ravenscroft (1999) and Hasanhodzic and Lo (2007).


(31) Fairfield Sentry data are from Bernard and Boyle (2009).

(32) Patton (2009) argues, however, that at the individual HF level, more than a quarter of long-short HFs exhibit statistically significant and economically large exposure to the market.

(33) See also Agarwal and Naik (2004), Fung and Hsieh (2004), and Lo and Hasanhodizic (2007).

(34) This is actually the payoff of a rebalancing strategy as well. Any counter-cyclical investment strategy is short volatility, as chapter 4 shows. HFs just take this to the extreme. Lo (2001) creates an example of a HF that uses precisely this strategy to generate “alpha” and cheekily names the HF in his example “Capital Decimation Partners.”

(35) Some HFs are put buyers, generating small losses most of the time but making a killing when markets tank. These funds lose money in the long run because you need to short volatility to earn the volatility risk premium. Nassim Taleb, the well-known pessimistic forecaster, is associated with one such fund, Universa Investments.
(36) This is different from momentum, which refers to the
tendency of groups of many stocks with past high returns to
exhibit high future returns compared to stocks with past low
returns. See chapter 7.

(37) In terms of Grinold’s (1989) “fundamental law” of active
management (see chapter 10), quants take lots of small bets
with positive but small chances of making money, rather than
making few bets that have a relatively high chance of
succeeding.

(38) See Choi, Getmansky, and Tookes (2009) and Agarwal et
al. (2011).

(39) See Deuskar et al. (2011).

(40) CEO compensation has risen significantly over the past
few decades. Gabaix and Landier (2008) argue this is optimal
and goes hand in hand with the large increases in market
capitalization of the largest companies over this period.

(41) See Goetzmann, Ingersoll, and Ross (2003), Hodder and
and Westerfield (2003) argue that the case when the HF has
an infinite horizon, but the fund has a probability of being
terminated exogenously each period, reduces these risk-taking
incentives.

(42) Kishan, S., “Scholes’s Platinum Grove Fund Halts
Withdrawals After Losses,” Bloomberg, Nov. 6, 2008.

(43) Comstock, C., 2011, “Founder Myron Scholes Retired
From His Hedge Fund,” Business Insider, Feb. 10, 2011.

(44) Burton, K., and S. Kishan, “Meriwether Said to Shut JWM

(45) For references behind the lockup numbers, see the
Harvard Business School case, “Long-Term Capital
Management, L.P.,” 1999, by Andre Perold; Economist, “All
Hedge Fund Spin-Off Wins $500M From Blackstone,” Oct. 10,
2012.

(46) See Lattman, P., “Blackstone To Keep Bulk of Its Stake in


(49) See also Derman (2007).

(50) This includes “hedge fund replication” strategies (see Kat and Palaro 2005), but also pure factor portfolios in the spirit of chapter 14.


(53) Cited by MacKenzie (2006). Vasicek also wrote one of the most highly cited papers in fixed income, putting forward the Vasicek (1977) term structure model.

(54) This material is drawn from Hubbard et al. (2010).

(55) As reported by Bernstein (2010).

(56) See Pástor and Stambaugh (2012b).