



**Deloitte.**

---

Financial Services

---

# Precautions that Pay Off

Risk Management and  
Valuation Practices in the  
Global Hedge Fund Industry

A Deloitte Research Study

## **About Deloitte Research**

The Deloitte Research initiative of certain member firms of Deloitte Touche Tohmatsu develops and delivers ideas, fact driven insights and innovations designed to improve organizational performance. Operating through the contributions of research and practice professionals from those member firms and the contributions of academic and technology contributors, Deloitte Research initiatives undertake industry, functional and cross-industry studies to bring ideas that matter to executives, boards, government officials, leading media outlets and business journals. To access the latest research and learn more about the Deloitte Research initiative, please visit [www.deloitte.com/research](http://www.deloitte.com/research) or contact Ajit Kambil of Deloitte Services LP at 1.617.437.3636 or via e-mail: [akambil@deloitte.com](mailto:akambil@deloitte.com)

# Table of Contents

- Forward ..... 1**
- Executive Summary ..... 2**
- An Industry in Transition ..... 4**
- Risk Management ..... 6**
  - Market, Credit, and Liquidity Risk ..... 7
  - Risk Governance ..... 10
  - Operational Risk ..... 10
- Valuation ..... 12**
  - Independence ..... 13
  - Policies and Procedures ..... 14
  - Valuation of Hard-to-Value Assets ..... 15
- Looking Ahead ..... 17**

# Forward

The hedge fund industry is at a crossroads. It has undergone tremendous growth, but with growth has come growing pains. Competition has become more intense; an increasing percentage of new investments is coming from funds of hedge funds and institutional investors, which monitor the practices of the funds in which they invest; regulators are paying greater attention. The hedge fund industry is certainly not a mature industry, but it is an industry entering middle age—an age where alpha will be harder to generate and where risk management and valuation practices will be of greater importance.

However, there are only limited data on the actual risk management and valuation practices of hedge fund advisers. To help fill this gap, Deloitte Research conducted a survey of the valuation and risk management practices of hedge fund advisers from across the globe. The survey could not have been completed without the assistance of Hedge Fund Research, Inc. (HFR), and we would like to thank them for their help in gathering the data.

The results of the survey provide benchmarks for a variety of valuation and risk management metrics. The data show a disparity of practices, with some firms following best practices in most areas and others much further behind. On average however, we found that while the industry is approaching middle age, the risk management practices of many hedge funds can be characterized as being in their adolescence. Many of the basics are in place, but improvement still needs to be made in order to reach a level suitable for the strategies being followed and assets being held.

We hope you find this report thought provoking and valuable.



Garry L. Moody  
Global Asset Management Leader

# Executive Summary

As hedge funds grow in size and complexity, risk management and valuation practices are becoming increasingly important for hedge fund advisers, investors, and regulators. Yet, there are very little data on the actual risk management practices of hedge fund advisers. What are prevailing hedge fund adviser valuation and risk management practices? How do they compare with best practices? What should investors be wary of? What steps can hedge fund advisers take to better meet, and anticipate, the expectations of investors in the marketplace?

To help answer these questions, Deloitte Research conducted a survey of the valuation and risk management practices of 60 hedge fund advisers from across the globe (See *About the Survey*). Our key conclusions are as follows:

- The competitive landscape facing the hedge fund industry is changing. Competition is becoming more intense, institutional investors—who are more demanding—are growing in importance, and regulators are paying greater attention. Firms that will thrive in this new competitive environment will be those that pay particular attention to risk management and valuation so that they can attract institutional funds and so that they understand the risks they are taking and can make informed risk-return trade offs.
- Some hedge fund advisers appear to be following risk management practices that are appropriate for their strategies and investments. However, other advisers may be falling short—the sophistication of their risk management may not be keeping pace with the complexities of their strategies and investments—raising the risk that they are exposing themselves and their investors to risks that they do not fully understand. We have identified nine “red flags,” where a sizable number of hedge funds are not following hedge fund industry risk management best practices. Investors need to watch for these flags; hedge fund advisers triggering one or more of these flags need to determine whether their risk management policies and procedures are appropriate for the risks they are taking and then take steps to improve risk management as needed.
- Some valuation best practices have been widely adopted by the hedge fund industry, and while not universal, have become “standard” industry practice. Others have yet to be widely adopted. For example, while 78 percent of survey respondents reported using a third party administrator or other third party to provide their official net asset valuation, only 47 percent reported that they engaged a third party to provide independent pricing validation. For investors, this means they need to carefully review valuation practices before investing—and continue to monitor those practices once an investment has been made. Hedge fund advisers that have not yet adopted some best practices need to evaluate if they should adopt these practices in order to continue to attract investors and satisfy regulators.
- There is very little uniformity in the valuation of various complex or illiquid assets. The lack of uniform accepted pricing methodologies reinforces the need for independent pricing validation.

## About the Survey

There are limited data available on the risk management practices of hedge fund advisers. To help fill this gap, Deloitte Research conducted an electronic survey of the risk management and valuation practice of hedge fund advisers during the summer of 2006. Nearly 2,000 hedge fund advisers who regularly report data to Hedge Fund Research, Inc, as well as others, were invited to participate. All told, 60 hedge fund advisers participated in the survey. The majority were from the United States, although the UK and other financial centers around the globe were also represented.

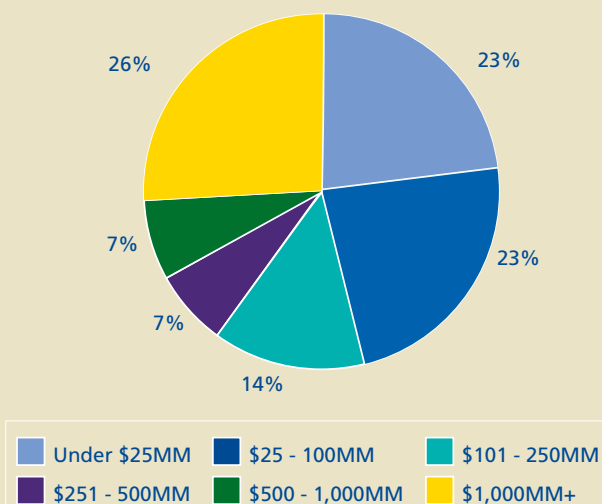
Collectively, the 60 respondents managed 244 hedge funds, engaged in a wide array of strategies (Exhibit 1).

**Exhibit 1:** Distribution of respondents by strategy

Strategy	Percentage	Strategy	Percentage
Convertible Arbitrage	1.24%	Fixed Income: High Yield	5.59%
Distressed Securities	6.21%	Fixed Income: Mortgage Backed	0.62%
Emerging Markets	5.59%	Global Macro	3.73%
Equity Hedge	14.29%	Market Timing	1.86%
Equity Market Neutral	8.70%	Merger Arbitrage	3.11%
Equity Non-Hedge	2.48%	Relative Value Arbitrage	6.83%
Event Driven	8.70%	Sector Long/Short	6.83%
Fixed Income: Arbitrage	2.48%	Short Selling/Short Bias	2.48%
Fixed Income: Convertible Bonds	2.48%	Statistical Arbitrage	4.35%
Fixed Income: Diversified	4.97%	Other	7.45%

Assets under management ranged from under \$25 million to over \$10 billion (see Exhibit 2), and totaled over \$75 billion, or over 6 percent of global hedge fund assets.

**Exhibit 2:** Distribution of respondents by assets under management



# An Industry in Transition

The hedge fund industry has undergone explosive growth in recent years. According to Hedge Fund Research, Inc. (HFR) there were approximately 6900 hedge funds, excluding funds of hedge funds, at the end of June 2006, almost three and a half times the number that existed at year-end 1995.<sup>1</sup> Over the same time period, hedge fund industry assets under management—a measure of the equity of hedge fund investors—grew at an impressive average annual growth rate of almost 20 percent a year, reaching \$1.2 trillion at mid-year 2006.<sup>2</sup> To put the magnitude of funds currently invested in hedge funds into perspective, as of June 30, 2006, \$1.2 trillion was approximately 25 percent more than the combined book equity of all 7,480 United States commercial banks.<sup>3</sup>

For hedge funds, the rapid growth of the industry has meant increased competition. Competition has made markets more efficient, which is good for investors and the economy at large, but for hedge fund managers it has made finding “excess returns” more difficult. As Steven A. Cohen, the founder and CEO of SAC Capital Advisors, one of the largest hedge fund managers in the world, recently noted, “It’s hard to find ideas that aren’t picked over, and harder to get real returns and differentiate yourself. We’re entering a new environment. The days of big returns are gone.”<sup>4</sup>

Some hedge fund advisers, and their investors, have decided to live with this new, more competitive, environment by accepting lower returns. Others have sought to maintain returns—or at least keep them from falling further—by increasing leverage, either explicitly or through the use of the various derivative contracts, or by shifting strategies in search of new profit opportunities. Under any circumstance, firms that will thrive in this new competitive environment will be those that pay particular attention to risk management, so that they understand the risks they are taking and can make informed risk-return trade offs.

---

*“Hedge funds are no longer the preserve of high net worth individuals. Pension funds, life insurance companies, and other institutional investors are increasingly looking to hedge funds to deliver attractive returns and portfolio diversification.”*

*Report of the Alternative Investment Expert Group  
to the European Commission*

---

Another change in the hedge fund landscape has been the rise of the institutional investor. As a recent report prepared for the European Commission by a group of hedge fund practitioners noted, “hedge funds are no longer the preserve of high net worth individuals. Pension funds, life insurance companies, and other institutional investors are increasingly looking to hedge funds to deliver attractive returns and portfolio diversification.”<sup>5</sup> At year-end 1996, fund of funds and institutional investors—pension funds, foundations, endowments, and corporations—accounted for approximately 38 percent of the capital invested in hedge funds. By year-end 2004, this figure had jumped to 56 percent.<sup>6</sup> The fastest growing portion of this segment is defined contribution pension funds, which invest both directly in hedge funds and indirectly through fund of funds.<sup>7</sup> Moreover, pension fund investments in hedge funds can be expected to grow, as pension reform legislation enacted in the United States in September 2006 eased some restrictions on the amount of pension fund investments US hedge funds can accept.

What matters most to these institutional investors? According to a survey by the Bank of New York and Casey, Quirk & Acito, when institutional investors were asked “apart from perceived investment skill, what makes for an attractive hedge fund firm,” the two most popular answers were outstanding risk management and operational and infrastructure excellence. Included in operational excellence were independent checks and balances on asset valuations.<sup>8</sup>

The growth of the hedge fund industry has also caught the attention of regulators. In the United States, the Securities and Exchange Commission (SEC) promulgated a regulation that would have required many hedge fund advisers to register with the SEC. That regulation was thrown out by the courts in June 2006, although many hedge fund advisers were already registered with the SEC and many others that registered in response to the registration requirement have maintained their registration. In addition, the SEC retains enforcement authority against any hedge fund adviser that engages in fraud or unfair dealings. In the wake of the invalidation of its hedge fund advisor registration rule, the SEC recently issued a proposed rule for comment that would raise the suitability requirement for investing in a hedge from \$1.0 million in net worth to \$2.5 million in net worth, excluding the value of the investor’s primary residence.<sup>9</sup> The SEC is also reviewing whether to seek additional powers from Congress, but regardless it—and other US regulators—can be expected to keep a close watch on the hedge fund industry.<sup>10</sup>

In the United Kingdom, hedge fund advisers are regulated by the Financial Services Authority (FSA). As in the US, hedge fund advisers are not required to register and the funds themselves are not regulated. Nonetheless, the FSA has taken a very active role in studying hedge funds over the last few years. It published a discussion paper entitled *Hedge funds: A discussion of risk and regulatory engagement* in June 2005 and “Feedback” on the discussion paper in March 2006.<sup>11</sup> Among other things, as a result of this study and feedback the FSA created a Hedge Fund Managers Supervisors Team to serve as a center of hedge fund expertise and to oversee the supervision of large impact hedge fund managers.

Reflecting the interest in hedge fund regulation around the globe, the International Organization of Securities Commissions (IOSCO) recently released for comment a “Consultation Report” on hedge fund regulation,<sup>12</sup> and Germany, which takes over the presidency of the G-8 in 2007, is putting hedge fund transparency on the agenda for the 2007 meeting of G-8 finance ministers.<sup>13</sup>

Why all the regulatory concern? First, it is important to note that regulators recognize that on balance hedge funds have had a positive effect on financial markets by improving market efficiency, liquidity, and risk distribution. However, they are concerned that the use of leverage—especially through complex derivatives and other structured products—could lead to systemic risk that would envelop not only hedge funds but prime brokers and other market participants. Closely related to leverage, they are also concerned that liquidity may be impaired if a large number of hedge fund advisers all pursuing similar investment strategies, a phenomenon known as “herding” or “crowded trades,” seek to liquidate their positions at the same time in a period of market stress. Here too the concern is that a liquidity crisis will exacerbate a market disruption possibly leading to a systemic event. Given their concern with systemic risk, regulators are keeping a watchful eye on the risk management practices of hedge funds, if not directly then through broker/dealers who serve as prime brokers and hedge fund counterparties.<sup>14</sup> Indeed, the FSA has implemented a regular “hedge funds as counterparties” survey.

---

*“Valuation concerns are exacerbated in the hedge fund industry because hedge fund advisers’ compensation is tied to period returns which, of course, requires periodic asset valuations.”*

*Randall Quarles, US Under Secretary of the Treasury*

---

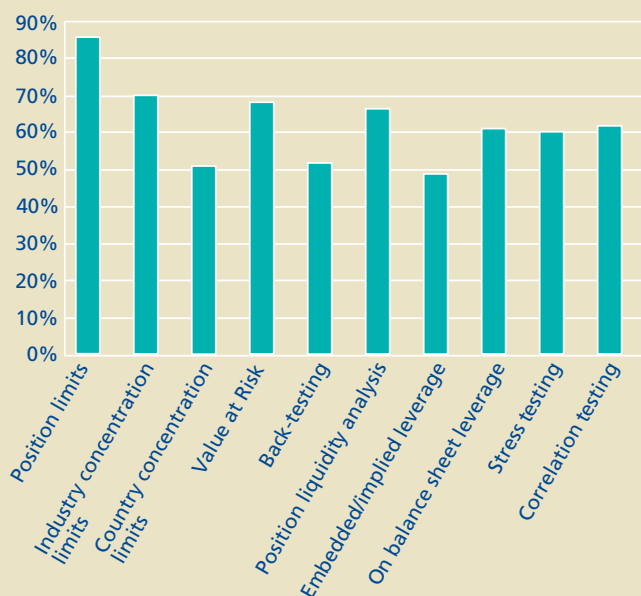
Regulators have also expressed concern over the valuation policies and procedures of hedge funds. Part of this concern stems from the difficulty of valuing complex or illiquid assets. Many of these valuations are dependent on models that rely on correlations that can change in unexpected ways, once again raising the specter of systemic risk. But, both US and UK regulators have also noted the potential conflict of interest in valuing hedge fund assets, between hedge fund advisers and investors in the funds. To use the words of US Under Secretary of the Treasury Randall Quarles, “valuation concerns are exacerbated in the hedge fund industry because hedge fund advisers’ compensation is tied to period returns which, of course, requires periodic asset valuations.”<sup>15</sup> The FSA has identified asset valuation as one of the initial areas of immediate supervisory focus for its new Hedge Fund Managers Supervisors Team, and has undertaken a program of themed visits to a sample of firms to review valuation practices.<sup>16</sup> Largely at the urging of the FSA, IOSCO is preparing a consultation report on hedge fund valuation.

# Risk Management

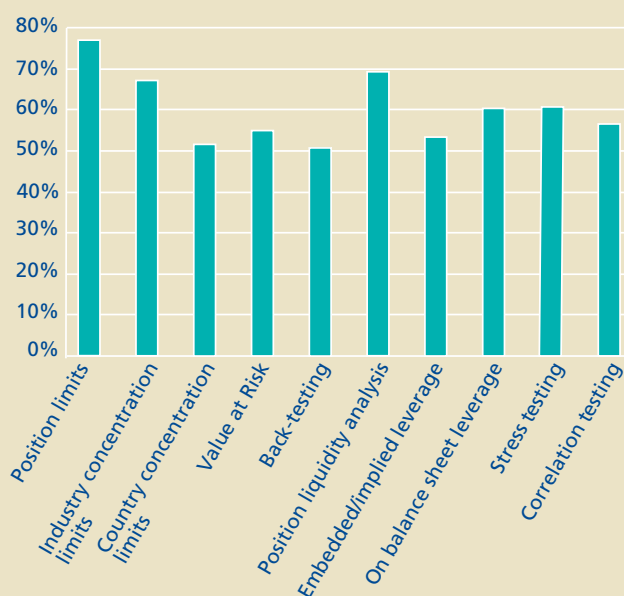
Many hedge funds are small operations with relatively few employees. Yet, they are increasingly investing in complex and illiquid assets and follow complex trading strategies that are the focus of much larger financial institutions with sophisticated risk management systems. The question for hedge fund advisers and investors alike is whether the risk management practices employed by the hedge fund industry are appropriate for the risks being incurred.

To help answer this question, the survey queried respondents on their use of 10 risk metrics for both position risk and portfolio risk (Exhibits 3 and 4), as well as risk governance. The results show quite a bit of variation: some funds appear to have in place a risk management structure that is appropriate for their strategies and investments. On the other hand, other funds may be falling short—the sophistication of their risk management policies and procedures may not be keeping pace with the complexities of their strategies and investments—raising the concern that they are exposing themselves and their investors to risks that they do not fully understand.

**Exhibit 3: Portfolio Risk: Percentage of respondents using each metric**



**Exhibit 4: Position Risk: Percentage of respondents using each metric**



## Market, Credit, and Liquidity Risk

Based on an in depth analysis of the survey results, Deloitte Research has identified nine “red flags” where a sizable number of hedge fund advisers are not following industry risk management best practices (Exhibit 5).<sup>17</sup> These red flags involve trading limits, stress testing, liquidity analysis, backtesting, and an understanding of leverage. Hedge fund advisers that raise one or more of these flags need to examine whether their risk management is appropriate for the risks they are taking and take steps to improve risk management as needed. Hedge fund investors need to watch out for these red flags, and if they encounter a hedge fund that raises one or more of these flags perform extra due diligence to make sure that they are really comfortable with the risk management practices of the fund before investing.

### Trading Limits

A beginning point in measuring risk is measuring the degree to which the portfolio is diversified amongst positions. Position limits serve to limit exposure to a given position and industry concentration limits serve to limit exposure to a given industry. As shown in Exhibits 3 and 4, most firms use position limits and industry concentration limits to track and ensure diversification. But, these figures are not at 100 percent (industry concentration limits are not applicable to a sector fund, but even with sector funds factored out, only about 70 percent of respondents use industry concentration limits).

---

*Not using position and industry concentration limits is a disaster waiting to happen.*

---

Not using position and industry concentration limits is a disaster waiting to happen. There have been a number of large hedge funds that were forced into liquidation due, at least in part, to large investments in a single position or industry. Long Term Capital Management in 1998 (Russian government bonds) and Marin Capital in 2004 (General Motors debt) are two notable examples.

**Exhibit 5:** Risk management red flags

	Percentage of respondents raising flag*
No position limits	14
Tracking liquidity without stress testing and correlation testing	21
Measuring off balance sheet leverage without stress testing and correlation testing	26
No industry concentration limits (except sector funds)	30
Not tracking liquidity	33
Use of VaR without backtesting	36
Using leverage without tracking on-balance sheet leverage	39**
Use of VaR (or other models) without stress testing and correlation testing	40
Holding assets with embedded leverage (i.e., forwards, futures, swaps, derivatives, etc.) without measuring off balance sheet leverage	50

\* Data are for portfolio risk

\*\* Percentage of respondents not tracking leverage, the survey does not provide data on the number using leverage

### Value at Risk

While concentration limits are a starting point for tracking diversification, they do not take in to account the correlation between positions that cross different concentration buckets. One model that does attempt to take account of such correlations is value at risk (VaR). Estimating VaR can be quite complex, and there are various approaches. Nonetheless, it can be a good starting point for measuring market risk and credit risk embedded in a firm's investments. Overall, 55 percent of respondents reported using VaR to analyze the risk of individual positions while 69 percent reported using VaR to analyze portfolio risk.

VaR is not an appropriate risk measure for all strategies—for example it would not be appropriate for a distressed debt portfolio—thus it is not surprising that not all respondents are using VaR. Given the complexity of some stochastic or parametric VaR models, the use of VaR is correlated with firm size, with larger firms more likely to use VaR than smaller ones. When smaller firms do use VaR, the analysis is often done by the fund’s prime broker or an external third party provider.

### Value at Risk

VaR estimates the maximum change in the value of a portfolio (and relevant positions in the portfolio) that would be expected over a specified confidence level over a specific time period. For example, if the one day VaR of a portfolio at the 99 percent confident interval is \$1 million dollars, one would expect the portfolio to gain or lose more than \$1 million once every 100 days.

## Stress Testing, Correlation Testing, and Back Testing

VaR provides a snapshot of risk, based on “normal” market conditions. It does not provide information on how a position or portfolio will behave under extreme market conditions such as increased price volatility, decreased liquidity, or changes in asset correlations. In order to capture these low probability, but potentially high impact “tail events,” it is important to supplement VaR by conducting stress testing and correlation testing.

Stress testing should include shocks to market prices, volatility, the holding period to liquidate assets, leverage, and interests/credit spreads (e.g., flight to quality). In order to enable a firm to be more proactive in monitoring and mitigating risks in the portfolio, stress testing should include not only extreme movements but also changes that are only slightly greater than the norm in order to determine where thresholds or trigger points may be that would signal an adjustment in the portfolio.

In addition, stress testing should also include scenario analysis where multiple factors are stressed at once. Traditionally, scenario analysis is often done by simulating past market events such as the October 1987 stock market decline, the

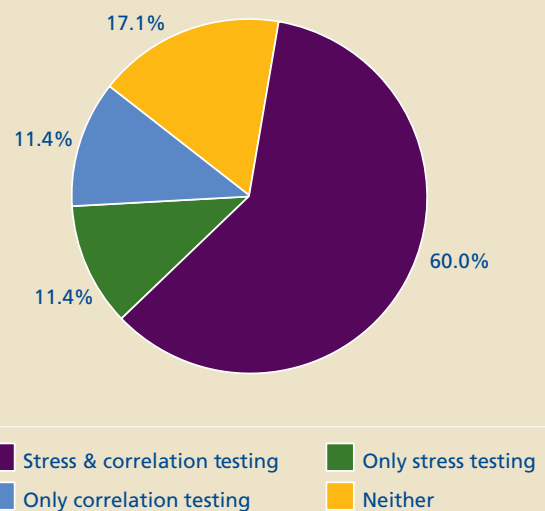
1997 Asian financial crisis, and the bursting of the dot com bubble in 2000. However, when reviewing these events it is important to note that the markets were different than they are today and that these events occurred only once and were not repeated. In other words, the past is not necessarily prologue. Therefore, scenario analyses should also include events that are relevant to the firm’s strategy and may occur given today’s market environment.

Correlations between market instruments are often not stable, and often tend towards 1 or -1 in times of stress. Correlation testing should include changes in correlations that occur in normal times as well as extreme movements to 1 or -1, similar to the stress testing approach.

*... only 60 percent of respondents that used VaR for portfolio risk did both stress and correlation testing.*

As shown in Exhibit 6, only 60 percent of respondents that used VaR for portfolio risk did both stress and correlation testing. Using VaR without doing both stress and correlation

**Exhibit 6: Stress testing and correlation testing in conjunction with VaR**



testing definitely raises a red flag, since without them VaR does not give a complete picture of risk—only a starting point.

Just as important is back testing the predictions of any model— whether risk measurements or valuation. Without back testing firms run a greater risk of using flawed models to monitor and mitigate risk. For example, when back testing VaR one would expect occasional changes in the value of the portfolio that exceed VaR. However, in back testing VaR, if there are discrepancies that exceed the statistical nature of the model, the sources of the discrepancies need to be identified and adjustments made to the model or its inputs. Of those firms that used VaR for portfolio risk, 36 percent did not engage in back testing, running the risk that they are making decisions based on flawed models.

## Liquidity and Leverage

Adequate liquidity is critical to a hedge fund being able to continue trading in times of stress. It depends not only on cash on hand and the availability of credit, but on the ability to liquidate assets rapidly without incurring significant loss. As shown previously in Exhibits 3 and 4, close to 70 percent of respondents track the liquidity of their positions.

Leverage is not an independent risk, but can greatly magnify market, credit, and liquidity risk. The degree to which leverage magnifies risk is highly dependent on the liquidity of the fund's investments. To take an extreme example, a fund with a high leverage ratio that invested solely in US government bonds would be less risky than a fund with a low leverage ratio that invested in distressed debt. Thus, liquidity analysis is an important component of understanding leverage.

Leverage can be accessed in a number of ways. There is explicit leverage, such as margin, short selling, and repurchase agreements, that shows up on the fund's balance sheet; there is also off-balance sheet leverage, such as futures, forwards, swaps, and other derivative contracts, where either all or part of the notional value of the contract is off-balance sheet. The survey shows that approximately 60 percent of respondents

monitor balance sheet leverage and approximately 50 percent of respondents monitor off-balance sheet leverage for both portfolio and position risk. These numbers seem low relative to what they should be, as most hedge funds use at least some leverage.

One group of respondents that should certainly track off-balance sheet risk are those that hold off-balance sheet derivatives with embedded risk, such as forwards, futures, swaps, and other derivatives. Yet, of those respondents that reported holding some type of derivative contract, the percentage measuring off-balance sheet leverage for portfolio risk was no different than for the sample as a whole, only 50 percent.

As is the case with VaR, firms should do stress testing and correlation testing of their liquidity and leverage measures. How do minor market movements affect liquidity? Will credit still be available? Will there be margin calls and will the fund be able to meet them? In times of stress many market participants may seek to liquidate a position at once, and this scenario should be tested when conducting liquidity and leverage analyses. Again, tests for minor movements and general trend analyses should also be conducted so that thresholds or trigger points can be established and related courses of action determined.

While the data are somewhat better than for VaR, there are still a sizable number of firms that are tracking liquidity and leverage without stress testing and correlation testing. In particular, 21 percent of respondents that reported tracking liquidity and 26 percent of respondents that reported measuring off-balance sheet leverage are not conducting both stress testing and correlation testing.

## Risk Governance

Aside from using risk metrics, all funds should have a written risk management policy that is shared with investors. A written risk management policy reinforces the firm's market views and risk tolerance levels. For the fund, a written risk management policy is a crucial tool in communicating to all employees how risk is going to be managed. For investors, reviewing a firm's risk management policy is a first step in identifying red flags and knowing what questions to ask. Not having a written risk management policy is itself a red flag.

The survey revealed that approximately 80 percent of respondents had a written risk management policy, but that only about 60 percent of respondents shared their risk management policy with investors. Moreover, our experience is that such policies often lack sufficient breadth and detail. At a minimum, a written risk management policy should include acceptable levels of risk, how risk exposures will be identified, and how risks will be mitigated.

The risk management policy should be reviewed by the firm's general partner or board of directors. Here the industry is falling short. Of funds with boards of directors, 43 percent had no input into the formulation of risk management policy, and 20 percent received no information on the policy whatsoever.

While risk management is a firm wide responsibility, not just the responsibility of risk management professionals, firms should have an independent risk management function reporting directly to senior management. As a practical matter, in smaller hedge funds where there is often no senior management apart from the portfolio management, complete independence is difficult to achieve, but, to the extent practicable, a segregation of duties should be maintained.

An increasingly common position in the financial services industry is that of chief risk officer (CRO). Hedge funds are much less likely to have a CRO than most other financial services firms. Deloitte's 2004 Global Risk Management Survey, which surveyed a broad array of financial institutions of all sizes, found that 81 percent had CROs.<sup>18</sup> By contrast, just 47 percent of hedge fund survey respondents had CROs, and for firms with CROs, it was the individual's full time or primary duty just about half of the time.

Interestingly, a hedge fund is much more likely to have a chief compliance officer (CCO) than a CRO. Fully 88 percent of respondents reported having a CCO, and for firms with CCOs, the position constituted the individual's full time or primary duty about two-thirds of the time. One possible explanation for the high percentage of CCOs is that registered hedge fund advisers in the United States are required to have CCOs. While, as discussed above, the courts have invalidated mandatory registration, almost half of respondents were registered.

## Operational Risk

Also of paramount importance to investors, regulators, and hedge funds themselves is controlling operational risk. Indeed, a study published in 2003 found that half of all hedge fund failures could be attributed to operational risk.<sup>19</sup>

Key to any control environment is a segregation of duties. This includes senior professionals independent of the investment team, who are able to take ownership of the operations of the fund. Approximately two thirds of respondents had a chief operating officer (COO) and over three quarters had a chief financial officer (CFO). Over 85 percent of the time, these were full time or primary duties. Only 14 percent of respondents had neither a COO nor a CFO.

Of course, simply having senior professionals to oversee the operational aspects of running a hedge fund is not sufficient. Policies need to be established and controls need to be in place to make sure that the policies are being followed. Over 85 percent of respondents had written policies that covered record retention, third-party service level agreements, business continuity plans, and administration functions. While this is an impressive percentage, best practice would be to review and update these plans at least annually. There is some variation by policy, but in all cases these policies are being updated at least annually less than half the time.

As with all policies, policies designed to control and mitigate operational risk should be reviewed by the fund’s general partner or board of directors. Here, as was the case for other risk management policies, the industry is falling short. Of respondents with boards of directors, over 45 percent of boards played no role in setting internal controls or setting policies to monitor those controls and over one-third of boards of directors did not receive any information on internal control policies or monitoring.

---

*Of respondents with boards of directors, over 45 percent of boards played no role in setting internal controls or setting policies to monitor those controls...*

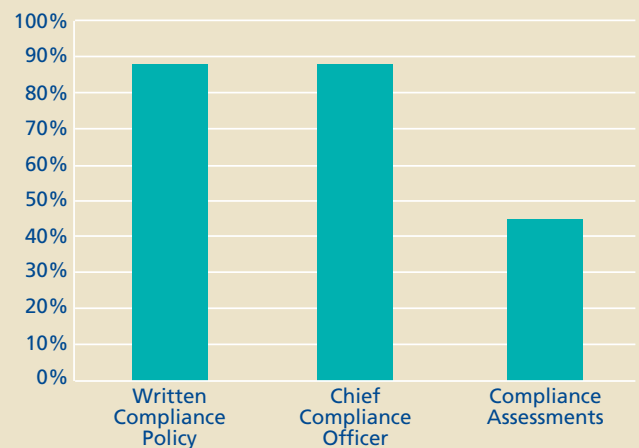
---

Of course, simply having operational control policies is not sufficient; they need to be followed. A leading practice is to have an operational oversight committee to review and update operational risk policies, ensure that policies are being adhered to, and ensure that any exceptions are discussed and resolved. The survey found that 42 percent of respondents had operational oversight committees. However, 20 percent of these committees have only one member. Only 25 percent of respondents had an operational oversight committee with three or more members.

The survey also queried respondents on specific aspects of operational risk management. The data revealed that 58 percent of respondents included operation of due diligence, 55 percent of respondents included a full account reconciliation, and 40 percent included a review of third party providers in-line with service level agreements as part of their operational risk management.

Finally, another key component of operational risk management is compliance. Funds should have a written compliance policy that lays out firm policies necessary to comply with all applicable laws and regulations (including, for offshore funds, applicable offshore laws) such as anti-money laundering, insider trading, personal trading, privacy, and soft dollar commissions, among others. As shown in Exhibit 7, the survey showed that 88 percent of respondents had a written compliance policy. It also showed that 88 percent of respondents had a chief compliance officer. But, despite these impressive numbers, only about half as many, 45 percent of respondents, conducted a compliance assessment as part of their regular operational risk management.

**Exhibit 7: Compliance activities of respondents**



# Valuation

As noted above, both investors and regulators are concerned with the valuation of hedge fund assets. This concern stems from both the inherent difficulty of valuing complex or illiquid assets, and from the potential conflict of interest between the adviser and the investors in the fund. In fact these two issues are interrelated, as it is in valuing hard-to-value assets that hedge fund advisers have the greatest leeway, and the greatest input, into the valuation process.

As a result, there has been increasing pressure to ensure that valuation methodologies are reasonable and consistently applied. On the regulatory side this is reflected by the UK's supervisory review of valuation, a suggestion by US regulators that they work with the industry on valuation issues,<sup>20</sup> and the forthcoming IOSCO consultation paper.

On the investor side of the equation, investors are increasingly asking to review documented valuation methodologies, policies, and procedures, as well as to assess valuation

governance and control functions, and have independent third parties review methodologies, valuations and controls.

All this has not been lost on the hedge fund industry and both the Alternative Investment Management Association and the Managed Funds Association, the two largest hedge fund trade associations, have issued valuation guidelines.<sup>21</sup> Some valuation best practices have been widely adopted by the hedge fund industry and, while not universal, have become "standard" industry practice. Others, which can be considered "leading" practices, have yet to be widely adopted, although they are becoming more common.

The survey queried respondents on a number of best practices designed to ensure the integrity of the valuation process. Not surprisingly, a majority—although by no means all—respondents are following some practices, while far fewer are following others (Exhibit 8). For investors, this means that they need to carefully review valuation practices before

**Exhibit 8:** Valuation best practices

	Percentage of respondents following practice
NAV calculated by administrator or other third party	78
Independent third-party pricing verification	47
Written valuation policy	86
Written valuation policy reviewed at least annually	38
Valuation policy shared with all investors	68
Valuation policy shared with all investors at least annually and when any material changes made	50
Valuation committee review part of regular due diligence	25

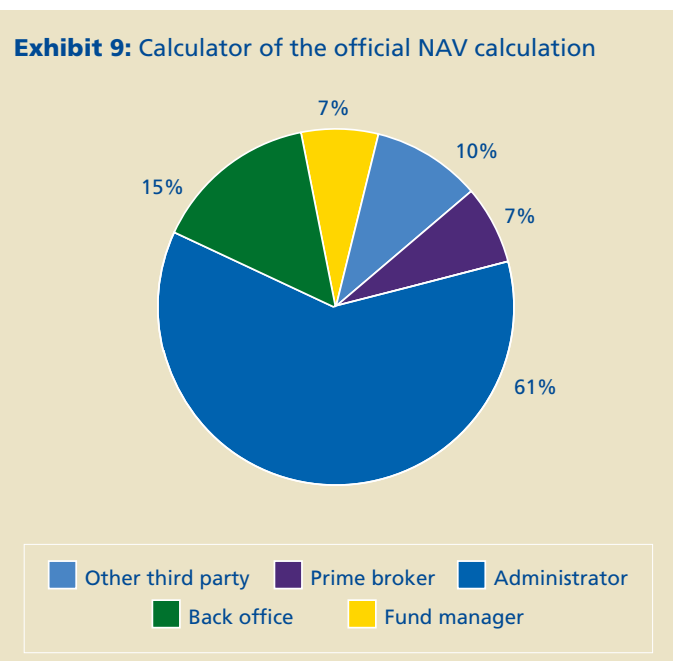
investing—and continue to monitor those practices once an investment has been made. Hedge fund advisers that have not yet adopted standard or leading practices need to evaluate if they should adopt these practices in order to continue to attract investors and satisfy regulators.

## Independence

One of the issues in the valuation of hedge fund assets is that these valuations are used as inputs to the net asset value (NAV) calculation. This NAV calculation forms the basis by which performance fees are calculated, and if the hedge fund adviser is performing the valuation there is, as noted above, a potential conflict of interest between the adviser and the investors in the fund.

In order to address this potential conflict of interest, it has become standard industry practice for NAV assessments to be carried out by independent administrators or other independent third parties.

As shown in Exhibit 9, 61 percent of respondents used administrators to calculate their official NAV, and another 17 percent use other third parties. Only 22 percent of respondents calculate NAV in house.



As a practical matter, the use of independent administrators does not completely resolve the problem. The roles of administrators differ, and in many cases hedge fund advisers provide valuations to the administrators who then re-value the portfolio to assess the reasonableness of the valuations. However, for complex or illiquid assets, discerning value is difficult and portfolio managers may have the best insights into the valuation of these assets—especially since not all administrators have the expertise to do complex valuations internally. Discrepancies may be noted which are then worked out between the administrator and fund manager. Since the FSA has suggested that administrators may sometimes have difficulty effectively challenging the valuations of fund advisers, it is leading practice to have the outcome of these discussions documented.<sup>22</sup>

---

*... the best check against potential conflicts of interest is independent third-party pricing verification.*

---

Despite the potential shortcomings, the best check against potential conflicts of interest is independent third-party pricing verification. While 78 percent of respondents reported using an administrator or other outsider to calculate NAV, only 47 percent reported that they engaged a third-party to provide independent pricing validations.

Ultimately though, regardless of who does the actual valuations, NAV is the responsibility of the board of directors, trustees, or general partner of the fund, and it is up to the fund to establish policies and procedures that result in a reasonable and fair valuation.

## Policies and Procedures

In that regard, the survey revealed that 86 percent of respondents had a written valuation policy. However, 54 percent of those with written policies noted that they review those policies only on an “as needed” basis; there is no definite timeframe indicated for review. A leading practice would be to ensure that policies are monitored frequently so that any revisions to the valuation methodology are incorporated.

The valuation policy should also be reviewed by the fund’s general partner, trustees, or board of directors. Here the industry is falling short. Of the 28 respondents with boards of directors, 36 percent of the boards had no involvement with establishing their fund’s valuation policy, and 8 percent received no information about the valuation policy at all.

### Valuation Policies

As a general rule, written valuation policies should:

- 1) to the extent practicable, establish a pricing function that is independent of the portfolio management function;
- 2) describe current valuation methodologies and the process for revisions and sign-offs;
- 3) establish when exceptions to the pricing policy are appropriate, how such exceptions should be authorized, and ensure that exceptions are documented;
- 4) provide for backtesting and checking the accuracy of the pricing data that are being captured;
- 5) establish roles and responsibilities of the valuation committee;
- 6) establish clear governance and control structure; and
- 7) be clear to all parties responsible for its application.

---

*... only 25 percent of respondents include a valuation committee review as part of their regular operational risk management.*

---

The firm’s valuation procedures should also be shared with investors. This too is often not the case. Over 30 percent of all respondents did not disclose valuation procedures to all investors. Of those that did, almost three-quarters provide this information at least annually, but the others do not provide it on a regular schedule. Best practices would be to provide investors with the firm’s valuation procedures at least annually—and when any material changes are made.

Beyond sharing valuation procedures, best practices suggest having a valuation committee with a documented charter.

Responsibilities of the valuation committee would include:

- 1) review of the asset valuations;
- 2) review backtesting of asset valuations;
- 3) review of the valuation methodology and approval of revisions;
- 4) review and approval of updates to the valuation policy, ensuring that policies are being adhered to; and
- 5) ensuring that any exception has been discussed and resolved.

Fifty-seven percent of respondents reported having a valuation committee. However, far fewer than 57 percent of respondents have valuation committees with broad enough participation to provide “true” oversight. Almost one-third of these committees have only one member. Only 31 percent of respondents had a valuation committee with three members or more, and only 25 percent of respondents include a valuation committee review as part of their regular operational risk management.

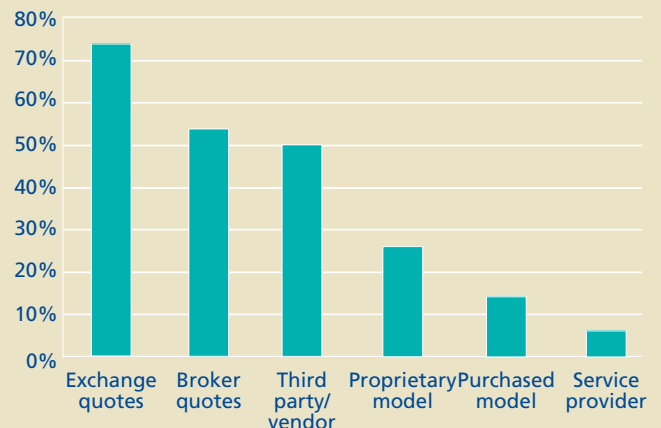
## Valuation of Hard-to-Value Assets

As many valuation issues and pressures center on complex, illiquid or thinly traded assets, the survey queried the respondents as to how they valued 16 types of these hard-to-value assets (see Exhibit 10). This was in order to identify the pricing sources that hedge funds actually use and to give some insight as to how hedge funds are dealing with the challenges of valuing complex or thinly traded assets. All told, 50 of the 60 respondents held at least one of these asset types.

The data show that most hedge funds rely on exchange quotes, broker quotes, and third-party/vendor pricing services to value these complex or illiquid assets. Relatively few use either proprietary or purchased pricing models. (See Exhibit 11.)

Of course, the particular pricing source used should depend on asset type, but the survey found that 24 percent of respondents relied solely on exchange quotes to value assets. Using exchange quotes is appropriate when an asset is actively traded. However, for the thinly traded assets covered by the survey, relying on exchange quotes alone is problematic. The bid-ask spread may be substantial, and there may be few if any actual trades reflected. The prices for thinly traded assets may not be indicative of prices one would receive in a real transaction.

**Exhibit 11: Percentage of respondents using each pricing source**



**Exhibit 10: Assets covered by survey**

Equity	Fixed Income	Forwards	Swaps	Other
<ul style="list-style-type: none"> <li>Private Investment in Public Securities (PIPE)</li> <li>Other Non-Exchange Trade Equities</li> </ul>	<ul style="list-style-type: none"> <li>Non-US Governments</li> <li>Collateralized Mortgage Obligations (CMO)</li> <li>Collateralized Debt Obligations (CDO)</li> <li>Non-Exchange Traded Corporate Bonds (Investment Grade)</li> <li>Distressed Debt (Bonds or Bank Debt)</li> </ul>	<ul style="list-style-type: none"> <li>Currency Forwards</li> <li>Forward Rate Agreements</li> </ul>	<ul style="list-style-type: none"> <li>Credit Default Swaps (CDS)</li> <li>Interest Rate Swaps</li> <li>Foreign Exchange Swaps</li> <li>Indexed Swaps</li> <li>Other Swaps</li> <li>Swaptions</li> </ul>	<ul style="list-style-type: none"> <li>Other Derivatives</li> </ul>

Most other respondents used a variety of methods, with the specific method used varying by asset type. In general, no one method emerged as a dominant methodology for any asset class. The heterogeneity of pricing methodologies revealed by the survey reinforces the need for independent pricing validation.

An example of the different valuation methodologies used to value a single asset class is shown in Exhibit 12. It shows the valuation methods survey respondents used to value credit default swaps; 40 percent relied solely on broker quotes, but another 40 percent relied on broker quotes in combination with one or more other valuation methodologies, and 20 percent did not use broker quotes at all but relied on third-party vendors, either alone or in combination with a model.

While broker quotes are often necessary to value certain types of assets, using broker quotes alone poses some issues. Is the broker the counterparty to the transaction? Has the fund performed due diligence on the broker? Is the broker being used a market maker? Would the broker be ready to close the position at the quoted value? Does the firm solicit multiple broker quotes—as it should? Is a broker rotation followed, so the fund gets a variety of views? Finally, since broker quotes do not represent actual trades, are the broker's prices back-tested against actual transactions to check for reasonableness and systematic bias?

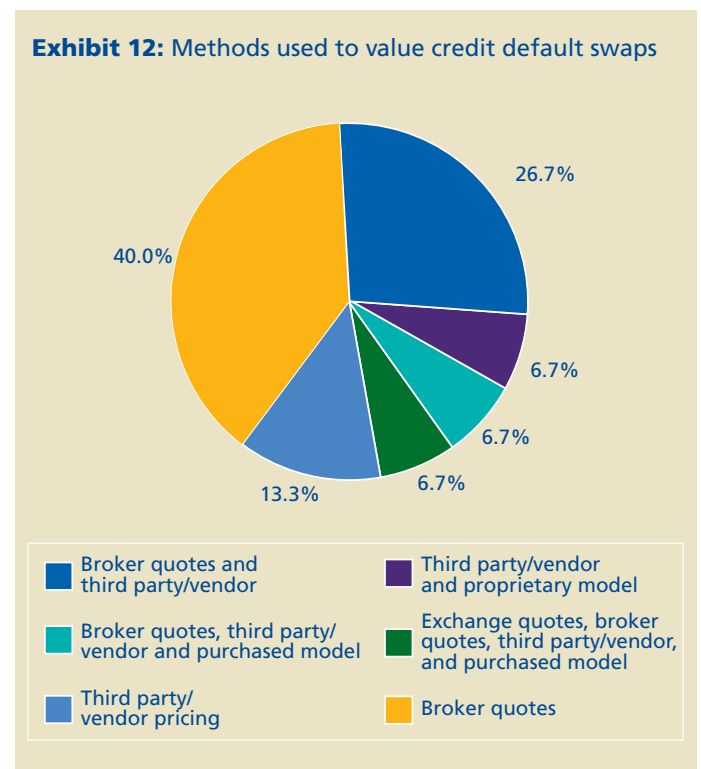
A preferable practice is to combine broker quotes with another source, such as prices from a third party pricing vendor. There are in fact many pricing vendors soliciting broker quotes for valuations. However, the use of a third party vendor does not mitigate the need for due diligence by the fund both on the brokers it receives pricing information from or on the pricing services.

Where a security can be modeled, such as a swap, it should also be modeled. However, unlike commercial banks and investment banks, hedge funds rarely use models to value assets. For many of the swap categories, which can be complicated instruments, most major commercial banks or investment banks would not enter into such a transaction without using a model to value its position. Yet, as shown in Exhibit 12, for example, only 20 percent of respondents who held credit default swaps used a model of any kind to value

their position. This is similar for the other categories as well; only 25 percent of respondents holding interest rate swaps, 13 percent of respondents holding foreign exchange swaps, and 29 percent of respondents holding swaptions used a model of any kind to value their position.

All told, 16 respondents reported using proprietary or purchased models. But, the numbers are deceiving. Of the 16 firms that use models, seven use them only to value private investments in public equity (PIPES) or non-exchange traded equity. These are likely to be spreadsheets that are used to forecast earnings and cash flows. This leaves only nine firms using the type of purchased or proprietary pricing models that are common in much of the financial services industry and in many cases are considered industry standard in the valuation of particular assets. The lack of pricing models is an issue not only for valuation, but also for risk management, since it is very difficult to do stress testing and correlation testing, especially for liquidity and leverage, without models that predict how pricing changes as market conditions change.

**Exhibit 12: Methods used to value credit default swaps**



# Looking Ahead

Looking ahead, with increased competition and more sophisticated investors, risk management will become table stakes both to attract institutional investors and to survive in a more competitive environment. Of course, sophisticated risk management does not come cheap; investing in risk management at the same time returns are being squeezed by competition will be problematic for some firms. While we would expect there will continue to be rapid entry and exit of the hedge fund industry by small firms, pressure on revenues along with the need to invest in risk management may lead to consolidation among larger hedge funds as well as the consolidation of hedge funds with other financial institutions such as investment banks and asset managers that already have a sophisticated risk management infrastructure.

Valuation will also continue to be an area of intense interest both to investors and regulators. The leading practices of today will be the standard practices of tomorrow. In particular, given the inherent difficulty in valuing illiquid and complex assets, we would expect independent third party valuation methodology and pricing validation to become the industry norm.

## End Notes

- <sup>1</sup> Hedge Fund Research, *HFR Q2 2006 Industry Report*. In addition, as of June 30, 2006, there were approximately 2100 funds of hedge funds for a total of about 9000. There are fewer hedge fund advisers than hedge funds, since one adviser often operates more than one fund.
- <sup>2</sup> Hedge Fund Research, *HFR Q2 2006 Industry Report*.
- <sup>3</sup> Federal Deposit Insurance Corporation, *Quarterly Banking Profile*, Second Quarter 2006, Commercial Bank Section, Table IIA. ([www.fdic.gov](http://www.fdic.gov)). While the comparison illustrates the enormity of funds invested in hedge funds, hedge fund assets under management and commercial bank equity are not strictly comparable. With a few exceptions, assets under management is calculated on a mark-to-market basis while bank equity is calculated on a historical cost basis.
- <sup>4</sup> *The Wall Street Journal*, "The Hedge-Fund King is Getting Nervous," September 16, 2006, p. A1.
- <sup>5</sup> European Commission, *Report of the Alternative Investment Expert Group to the European Commission: Managing, Servicing, and Marketing Hedge Funds in Europe*, July 2006, p. 4. ([www.ec.europa.eu/internal\\_market/securities/docs/ucits/reports/hedgefunds\\_en.pdf](http://www.ec.europa.eu/internal_market/securities/docs/ucits/reports/hedgefunds_en.pdf))
- <sup>6</sup> Financial Services Authority, *Hedge Funds: A discussion of risk and regulatory engagement*, Discussion Paper 05/04, June 2005, p. 13. ([www.fsa.gov.uk](http://www.fsa.gov.uk)). Although fund of funds include investments from individuals as well as institutions, they demand the same high standards as institutional investors regardless of the source of their funds.
- <sup>7</sup> Bank of New York and Casey, Quirk & Acito, *Institutional Demand for Hedge Funds: New Opportunities and New Standards*, September 2004 p. 4. ([www.cqallc.com](http://www.cqallc.com))
- <sup>8</sup> *Ibid*, pp. 15-16.
- <sup>9</sup> *The New York Times*, "Barring the Hedge Fund Door to Mere Millionaires," December 15, 2006, p. 15.
- <sup>10</sup> See, for example, *Business Week*, "THE SEC ISN'T FINISHED WITH HEDGE FUNDS; It's closing in on shady practices despite a setback from a federal court," July 17, 2006. *The Wall Street Journal*, "Hedge Margins Draw the focus of Fed Official," September 15, 2006, p. C1.
- <sup>11</sup> Financial Services Authority, *Hedge Funds: A discussion of risk and regulatory engagement*, Discussion Paper 05/04, June 2005, and *Hedge Funds: A discussion of risk and regulatory engagement*, Feedback on DP05/04, March 2006. ([www.fsa.gov.uk](http://www.fsa.gov.uk))
- <sup>12</sup> Technical Committee of the International Organization of Securities Commissions, *Consultation Report: The Regulatory Environment for Hedge Funds a Survey and Comparison*, March 2006. ([www.iosco.org](http://www.iosco.org))
- <sup>13</sup> *Financial Times*, "Hedge Fund Transparency put on G8 Agenda," p. 9, October 18, 2006.
- <sup>14</sup> See, *The Wall Street Journal Online*, SEC to Use Brokers to help Keep Tabs on Hedge Funds," September 13, 2006. ([online.wsj.com/article/SB115818051243562193.html](http://online.wsj.com/article/SB115818051243562193.html))
- <sup>15</sup> Testimony of Randall K. Quarles, before the Senate Banking, Housing, and Urban Affairs Subcommittee on Securities and Investments of, May 16, 2006. ([www.banking.senate.gov/\\_files/ACF82C2.pdf](http://www.banking.senate.gov/_files/ACF82C2.pdf)) See this testimony as well as the FSA discussion paper and feedback discussed above for a general discussion of regulatory concerns about hedge funds.
- <sup>16</sup> Financial Services Authority, *Hedge Funds: A discussion of risk and regulatory engagement*, Feedback on DP05/04, March 2006, p. 6. ([www.fsa.gov.uk](http://www.fsa.gov.uk))
- <sup>17</sup> For industry best practices see, Managed Fund Association, *MFA's 2005 Sound Practices for Hedge Fund Managers*, August 2005. ([www.mfainfo.org](http://www.mfainfo.org))
- <sup>18</sup> Deloitte, *2004 Risk Management Survey*, p. 12. ([www.deloitte.com/dtt/cda/doc/content/dtt\\_financialservices\\_GlobalRiskManagementSurvey2005\\_061204-v2.pdf](http://www.deloitte.com/dtt/cda/doc/content/dtt_financialservices_GlobalRiskManagementSurvey2005_061204-v2.pdf))
- <sup>19</sup> Feffer, Stuart and Christopher Kundro, *Understanding and Mitigating Operational Risk in Hedge Funds*, The Capital Markets Company, Ltd, March 2003, Section 3.1.
- <sup>20</sup> Testimony of Randall K. Quarles, before the Senate Banking, Housing, and Urban Affairs Subcommittee on Securities and Investments of, May 16, 2006.
- <sup>21</sup> See, Alternative Investment Management Association, *Asset Pricing and Fund Valuation Practices in the Hedge Fund Industry*, April 2005, ([www.aima.org](http://www.aima.org)), and Managed Fund Association, *MFA's 2005 Sound Practices for Hedge Fund Managers*, August 2005. ([www.mfainfo.org](http://www.mfainfo.org))
- <sup>22</sup> Financial Services Authority, *Hedge Funds: A discussion of risk and regulatory engagement*, Feedback on DP05/04, March 2006, p. 25.

## Authors

### **Barry Kolatch**

Director  
Deloitte Research  
Deloitte Services LP  
+1 202 220 2875  
bkolatch@deloitte.com

### **Lynn Connolly**

Senior Manager  
Deloitte & Touche LLP  
+1 212 436 3533  
lconnolly@deloitte.com

## Contributors

### **Cary Stier**

Partner  
Deloitte & Touche LLP  
+1 312 486 3274  
cstier@deloitte.com

### **Nathan Stein**

Senior Consultant  
Deloitte & Touche LLP  
+1 312 486 4167  
nstein@deloitte.com

### **Sony Thomas**

Senior Analyst  
Deloitte Research  
Deloitte Support Services India Pvt. Ltd  
+1 615 738 2616  
sothomas@deloitte.com

## Industry Leadership

### **Jack Ribeiro**

Global Managing Partner  
Financial Services Industry  
Partner  
Deloitte & Touche LLP  
+1 212 436 2573  
jrribeiro@deloitte.com

### **Garry Moody**

Global Asset Management Leader  
Partner  
Deloitte & Touche LLP  
+1 617 437 2750  
gmoody@deloitte.com

## Acknowledgements

The authors would like to thank our colleagues of the respective Deloitte Touche Tohmatsu member firms who contributed to this study by sharing their perspectives, insights, analysis and comments. This study would not have been possible without Sheila Celata, Vikram Mahidhar Jean Paulsen, and Rekha Sampath all of Deloitte Services LP; Chris Gentle, Deloitte & Touche LLP (UK); Prasad Kantamneni, Deloitte Support Services India Pvt. Ltd; Edward Dougherty, Deloitte Tax LLP; Glen Wigney, Deloitte & Touche (Cayman Islands); and Thomas Ayers, Olivier Curet, Garry Moody, Cynthia O'Brien, Ariste Reno, and Kevin Ringel, all of Deloitte & Touche LLP.

### **Disclaimer**

This publication contains general information only and Deloitte Services LP is not, by means of this publication, rendering accounting, business, financial, investment, legal, tax, or other professional advice or services. This publication is not a substitute for such professional advice or services, nor should it be used as a basis for any decision or action that may affect your business. Before making any decision or taking any action that may affect your business, you should consult a qualified professional advisor. Deloitte Services LP, its affiliates and related entities shall not be responsible for any loss sustained by any person who relies on this publication.

---

ISBN 1-934025-00-3

## For More Information

### Americas

#### Bermuda

Bill Jack  
Partner  
Deloitte & Touche LLP  
+1 441 292 1500  
billjack@deloitte.com

#### Canada

Don Wilkinson  
Partner  
Deloitte & Touche LLP  
+1 416 601 6263  
dowilkinson@deloitte.ca

#### Cayman Islands

Dale Babiuk  
Partner  
Deloitte & Touche  
+1 345 814 2267  
dbabiuk@deloitte.com

Norm McGregor  
Partner  
Deloitte & Touche  
+1 345 814 2246  
nmcgregor@deloitte.com

Glen Wigney  
Partner  
Deloitte & Touche  
+1 345 814 2202  
gwigney@deloitte.com

#### United States

Garry Moody  
Partner  
Deloitte & Touche LLP  
+1 617 437 2750  
gmoody@deloitte.com

### Europe and Africa

#### Austria

Wolfgang Fritsch  
Partner  
Deloitte Wirtschaftsprüfungs  
GmbH  
+43 1 531330  
wfritsch@deloitte.at

Robert Pejhovský  
Partner  
Deloitte Wirtschaftsprüfungs  
GmbH  
+43 1 588540  
rpejhovsky@deloitte.at

#### Belgium

Frank De Jonghe  
Partner  
Deloitte Business Advisory  
CVBA/SCRL  
+32 3 800 88 89  
fdejonghe@deloitte.com

#### Denmark

Jens Hoeck  
Partner  
Deloitte Statsautoriseret  
Revisionsaktieselskab A/S  
+45 36 10 34 26  
jhoeck@deloitte.dk

#### France

Jean-Pierre Vercamer  
Partner  
Deloitte & Associés  
+33 1 40 88 22 03  
jvercamer@deloitte.fr

Gérard Vincent-Genod  
Partner  
Deloitte & Associés  
+33 1 40 88 22 98  
gvincentgenod@deloitte.fr

#### Germany

Norbert Bruehl  
Partner  
Deloitte & Touche GmbH  
+49 69 75695 6037  
nbruehl@deloitte.de

#### Ireland

Ronan Nolan  
Partner  
Deloitte & Touche  
+353 1 417 2250  
rnolan@deloitte.ie

#### Italy

Riccardo Motta  
Partner  
Deloitte & Touche S.p.A.  
+39 02 833 22 323  
rmotta@deloitte.it

#### Luxembourg

Yves Francis  
Partner  
Deloitte SA  
+352 451 452 248  
yfrancis@deloitte.lu

#### Mauritius

Chandra Gujadhur  
Partner  
Kemp Chatteris Deloitte  
+230 203 8000  
cgujadhur@deloitte.com

#### Netherlands

Frank Maertens  
Partner  
Deloitte Financial Advisory  
Services B.V.  
+316 125 80034  
fmaertens@deloitte.nl

#### South Africa

George Cavaleros  
Partner  
Deloitte & Touche  
+27 21 670 1608  
gcavaleros@deloitte.co.za

#### Spain

Rodrigo Diaz  
Partner  
Deloitte, S.L.  
+34 91 514 20 21  
rodiaz@deloitte.es

#### United Kingdom

Calum Thomson  
Partner  
Deloitte & Touche LLP  
+44 20 7303 5303  
cathomson@deloitte.co.uk

Stuart Opp  
Partner  
Deloitte & Touche LLP  
+44 20 7303 6397  
stopp@deloitte.co.uk

### Asia Pacific

#### Australia

Sarah Woodhouse  
Partner  
Deloitte Touche Tohmatsu  
+61 2 9322 7510  
sawoodhouse@deloitte.com.au

#### China (People's Republic of)

Wade Deffenbaugh  
Partner  
Deloitte Touche Tohmatsu  
+852 2852 6629  
wadeffenbaugh@deloitte.com.hk

#### Japan

Yoshihiko Suzuki  
Partner  
Deloitte Touche Tohmatsu  
+81 3 6213 3173  
yoshihiko.suzuki@tohmatsu.co.jp

#### Korea

Nak Sup Ko  
Partner  
Deloitte Anjin LLC  
+82 2 6676 1103  
nko@deloitte.com

#### Singapore

Kok Yong Ho  
Partner  
Deloitte & Touche  
+65 6216 3260  
kho@deloitte.com

#### Taiwan

Ray Chang  
Partner  
Deloitte & Touche  
+886 2 2545 9988 ext. 3029  
raychang@deloitte.com.tw

#### **About Deloitte**

Deloitte refers to one or more of Deloitte Touche Tohmatsu, a Swiss Verein, its member firms and their respective subsidiaries and affiliates. Deloitte Touche Tohmatsu is an organization of member firms around the world devoted to excellence in providing professional services and advice, focused on client service through a global strategy executed locally in nearly 150 countries. With access to the deep intellectual capital of 120,000 people worldwide, Deloitte delivers services in four professional areas, audit, tax, consulting and financial advisory services, and serves more than one-half of the world's largest companies, as well as large national enterprises, public institutions, locally important clients, and successful, fast-growing global growth companies. Services are not provided by the Deloitte Touche Tohmatsu Verein and, for regulatory and other reasons, certain member firms do not provide services in all four professional areas.

As a Swiss Verein (association), neither Deloitte Touche Tohmatsu nor any of its member firms has any liability for each other's acts or omissions. Each of the member firms is a separate and independent legal entity operating under the names "Deloitte", "Deloitte & Touche", "Deloitte Touche Tohmatsu" or other related names.

In the US, Deloitte & Touche USA LLP is the US member firm of Deloitte Touche Tohmatsu and services are provided by the subsidiaries of Deloitte & Touche USA LLP (Deloitte & Touche LLP, Deloitte Consulting LLP, Deloitte Financial Advisory Services LLP, Deloitte Tax LLP and their subsidiaries), and not by Deloitte & Touche USA LLP. The subsidiaries of the US member firm are among the nation's leading professional services firms, providing audit, tax, consulting and financial advisory services through nearly 30,000 people in more than 80 cities. Known as employers of choice for innovative human resources programs, they are dedicated to helping their clients and their people excel. For more information, please visit the US member firm's web site at [www.deloitte.com/us](http://www.deloitte.com/us).