

# Hedge funds, credit risk transfer and financial stability

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*Over the past decade, central bankers and financial institution supervisors have sharpened their focus on the increasingly important role that private pools of investment funds play in global financial markets. The growth in these pools has contributed significantly to market efficiency and financial stability by expanding liquidity in many financial markets, improving price discovery, and, ultimately, lowering the costs of capital. Private investment pools and the alternative investment strategies they pursue have contributed to a significant expansion of the global markets and have helped accelerate the evolution in traded credit products such as credit derivatives, collateralized debt obligations, and the securitization of an increasing array of traditionally illiquid assets. However, because of the lack of transparency and an established regime of supervision of these investment vehicles, policymakers and supervisors have become concerned about customer protection and the potential for systemic risk. This paper discusses some of the key issues confronting supervisors in light of the recent growth of private investment pools and the rapid developments in the area of credit risk transfer, with a particular focus on the implications of these trends regarding systemic risk and financial stability.*

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Private investment pools pursue a diverse set of investment strategies, and it would be useful at the outset to broadly differentiate between those that specialize in privately held investments (private equity funds) and those that focus primarily on traded instruments (hedge funds). While the lines between the two are increasingly blurring, such distinctions permit supervisors and policymakers to better target issues that may be of concern. Hedge funds, the primary focus of this symposium, can be defined as private pools of funds that invest in traded instruments (both cash securities and derivatives); can employ leverage through various means, including the use of short positions; and are generally not regulated. Their increasingly important role as counterparties to established investment and universal bank dealers, combined with the fact that they pursue many of the same strategies as regulated dealers, has given rise to increasing concerns about their potential for contributing to systemic risk. The concern is that in the event of a major financial shock, the complex web of exposures among highly leveraged hedge funds and dealer institutions may increase the risk that problems at one financial institution would spread to other institutions. Given the difficulties that would be involved in creating a global supervisory framework for hedge funds, significant responsibility falls upon dealer banks that extend leverage to hedge funds and their supervisors. The risk-management processes employed by dealer banks are critical elements in preventing a financial shock from spreading.

## 1 | THE GROWING IMPORTANCE OF HEDGE FUNDS

Over the past decade, hedge funds have grown rapidly in both size and importance. At the end of 2006, they managed an estimated USD 1.426 trillion in assets, over 700 percent more than in 1995 (chart 1<sup>1</sup>). Hedge funds now account for a significant share of the trading in many markets.

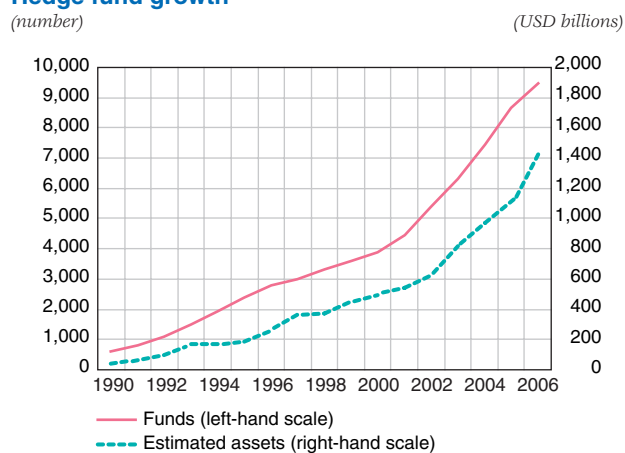
With that growth has come some measure of maturity. Hedge funds were once typically small groups

of entrepreneurs; today many are large financial institutions employing hundreds of people. In 1990, "macro" strategies accounted for over 70% of hedge fund assets; today, hedge funds invest in diverse asset classes and strategies, with no single strategy accounting for more than a third of hedge fund assets (chart 2<sup>2</sup>).<sup>3</sup> Even within a strategy class, hedge funds now use more diverse methods to select and manage positions. Although hedge funds can still take concentrated positions in a single market, this diversity may reduce the potential that hedge funds may act in concert and disrupt markets by pursuing similar trades, which has been one of supervisors' major concerns. Academic studies have found little evidence that hedge funds have systematically caused market prices to deviate from economic fundamentals during major market events.<sup>4</sup>

## 2 | CREDIT RISK TRANSFER MARKETS

The growth in assets managed by hedge funds and the increasing diversity of hedge funds' strategies reflect the growing importance of hedge funds in a wide range of financial markets. Of particular interest is the role hedge funds play as providers of liquidity and the ultimate holders of risk in the dynamic and growing credit risk transfer markets, which include such products as credit derivatives, secondary loans, securitizations such as mortgage-backed securities,

**Chart 1**  
Hedge fund growth



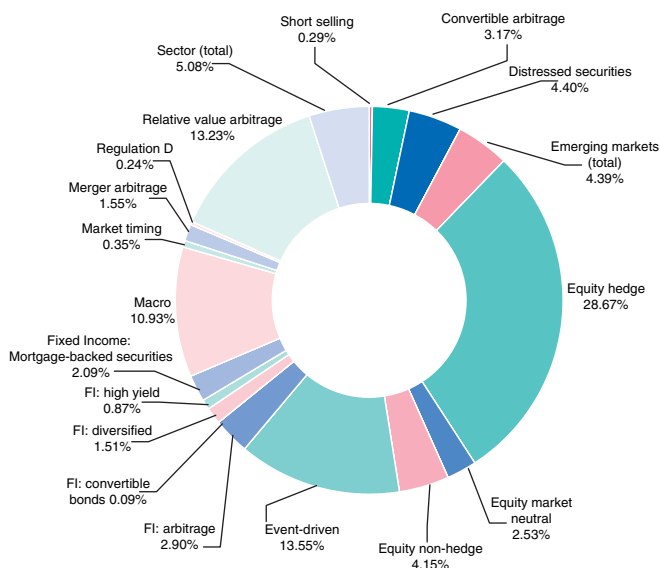
1 Hedge Fund Research, Inc., © HFR, Inc., January 2007, www.hedgefundresearch.com.

2 Hedge Fund Research, *Ibid.*

3 Macro funds attempt to identify inefficient pricing in stock markets, interest rates, foreign exchange rates, and physical commodities. Their top-down approach concentrates on understanding how global macroeconomic and political events affect the valuations of financial instruments; they tend to have broad investment mandates that allow them to hold positions in practically any financial instrument in any market.

4 Fung (W.) and Hsieh (D. A.) (2000): "Measuring the market impact of hedge funds", *Journal of Empirical Finance*, vol. 7, pp. 1-36.

**Chart 2**  
Estimated strategy composition by assets under management



and other structured credit products. As an indication of the increased role of hedge funds in credit risk transfer markets, the percentage of hedge fund assets categorized in strategies that usually invest in credit-linked assets increased from 6 percent in 1990 to 16 percent in 2006. Hedge funds are now investing in assets once widely held by banks through lending activities.<sup>5</sup>

While commercial banks traditionally used their deposit base and other funding sources to finance, originate, and hold loans to maturity, today they can remove these loans, or the credit risk underlying these loans, from their balance sheets through securitization, the bond markets, the issuance of derivatives products, or outright sale on secondary loan markets. In 2006, a total of USD 4.6 trillion was issued in US credit market instruments;<sup>6</sup> by comparison, all insured US commercial banks had USD 9.6 trillion in assets as of September 2006.<sup>7</sup> Many banks have found a successful business model as originators and distributors of credit risk, and hedge funds have stepped in as key buyers and holders of that credit risk. Hedge funds thus provide a double benefit to banks. They reduce banks' credit risks by taking assets off of their balance sheets, and they improve banks' liquidity by providing a market for their securitizations and other financing

strategies. At the same time, of course, for banks that do business with them, hedge funds pose a number of new challenges in managing credit, market, and operational risk, as discussed in greater detail below.

Banks now participate in credit risk transfer markets in several ways. They use syndications, securitizations, and credit derivatives to transfer credit risk to other banks, allowing them to reduce credit concentrations and diversify their exposures. Banks also use these techniques to distribute credit risk to other investors, reducing both their own credit exposure and the banking system's. As the investment base for these credit products has grown, banks have become dealers in the credit risk transfer markets, serving as intermediaries between investors who are adjusting their exposures to various credit risks. The last category comprises the dealer banks, that is, investment banks, and universal banks that make markets in traded credit instruments.

It is difficult to quantify the role hedge funds have played in the disintermediation of commercial banks' traditional lending role, since hedge funds are not required to report their investment holdings. However, US banking supervisors have some understanding of hedge fund activities through the Shared National Credit (SNC) program, an annual joint examination of major syndicated credits in the United States. According to SNC data, nonbank lenders (including hedge funds) have increased their holdings of syndicated loans in the United States from USD 178 billion in 2002 to USD 267 billion, or 14 percent of total credits, in 2006 (Table 1). The SNC data also suggest that hedge funds (along with mutual funds, pension funds, and insurance companies) have become significant holders of some of the riskiest assets in the financial system: between 2002 and 2006, nonbank lenders

**Table 1**  
Share of total commitments

(%)	2001	2002	2003	2004	2005	2006
US banking organizations	46.2	45.2	45.4	46.4	44.8	44.3
Foreign banking organizations	45.6	45.2	43.8	41.6	42.0	41.5
Nonbanks	8.2	9.5	10.9	12.0	13.2	14.3

<sup>5</sup> Basel Committee on Banking Supervision (2005): "Credit risk transfer", March, provides an overview of the trading of credit risk.

<sup>6</sup> Securities Industry and Financial Markets Association (2007): "US market outlook", January.

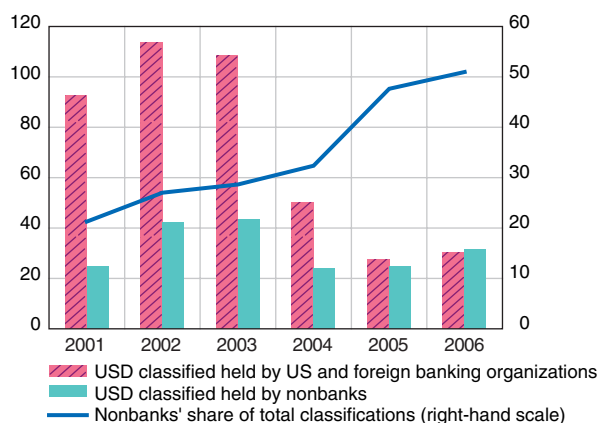
<sup>7</sup> Call Report data.

**Chart 3**  
**Nonbanks hold a rising share of classified credits**

Total classifications: US & foreign banks vs nonbanks

(USD billions)

(%)



increased their holdings of classified credits from 27 percent to 51 percent of total classified credits (chart 3).<sup>8</sup> In 2006, USD 10 billion of these credits would have been on nonaccrual status had they been held by banks. Hedge funds' willingness to hold high-yielding assets has clearly provided banks with a new way to exit risky credits.

## 2|1 Supervisory concerns about credit risk transfer

Although the transfer of risk from banks to hedge funds allows banks to better manage their credit risks, some supervisory issues surround this transfer. One concern is that this risk hasn't been transferred so much as transformed into counterparty credit exposure to the hedge fund. For example, in the purchase of credit protection on a loan via a credit default swap with a hedge fund, a bank would no longer bear direct credit risk to the original borrower but would instead have counterparty credit risk to the hedge fund. Another concern is that banks that provide financing to hedge funds may find securitized assets coming back onto their balance sheets at inopportune times if losses on the securitized assets cause hedge fund failures.

Dealer banks in credit risk markets must adapt traditional market risk management tools to these markets. New credit risk instruments create additional challenges: for example, many credit

derivatives require the delivery of senior debt instruments in the event of a default. The amount of senior debt that must be delivered to fulfill the credit derivatives contracts can be more than the amount of senior debt that has been issued by a company. Market participants have worked diligently to develop an orderly process for fulfilling credit derivatives contracts, but the process remains largely untested. Dealer banks may also find new credit instruments difficult to price. Without liquid markets to provide price discovery, different dealer banks may value these transactions quite differently. As liquidity improves, banks will have to adjust and calibrate their pricing in these markets.

Another concern is how hedge funds will interact with commercial banks when it is time to restructure a loan with a borrower. In the past, banks that held loans on their balance sheets had a substantial financial incentive to come to an amicable workout with borrowers. When banks securitize loans, however, that incentive may be diminished because they don't bear as much of the risk of default. It is unclear whether the hedge funds that now bear those risks will monitor the condition of the borrower or seek to work out a loan with the same diligence. The advent of derivative technology takes this concern one step further: for example, hedge funds and even banks may profit from a default if they have bought protection through a credit default swap in excess of the amount of the loans they hold. This concern must be weighed against the potential for hedge funds to force needed restructurings or speed up the decision to work out or close out the loan. The role of hedge funds in these situations remains unclear. Hedge funds may even begin to specialize in holding assets where workouts are anticipated.

Credit risk transfer illustrates some of the tradeoffs faced by supervisors. Hedge funds' participation in credit risk transfer markets reduces the risks faced by supervised financial institutions and provides liquidity for the transfer of this risk. However, their participation can also affect the ability of borrowers near default to work out their problems. In this way, hedge funds, through the use of derivatives, could ultimately contribute to either an increase or a decrease in defaults. The relative importance of these effects and other determinants of defaults is unclear, as is the appropriate supervisory response.

<sup>8</sup> Federal Reserve Board, *Shared National Credit Examinations*.

### 3 | MARKET DISCIPLINE AND THE INDIRECT APPROACH

Policy makers have subscribed to an indirect approach in dealing with many of the issues surrounding hedge funds. A key element of the indirect approach is the reliance upon market discipline –that is, relying on hedge fund investors, creditors, and counterparties to reward well-managed hedge funds and to reduce their exposure to risky, poorly managed hedge funds. To provide proper discipline, of course, market participants need to understand the activities of the hedge funds with which they do business, in order to assess their creditworthiness and risk-adjusted returns. While hedge funds are very reticent about sharing that kind of information, and are not usually required to do so by law or regulation, it is the responsibility of investors and counterparties to pressure funds to improve their disclosures. Well-managed funds should find that it is to their advantage to be more open about their activities. Lack of transparency should come at a great price, measured by fewer investors and less favorable treatment by banks. Although basic information about hedge fund activities has begun to flow, investors and counterparties still too often obtain very limited disclosure from hedge funds.

Institutional investors should play a key role in promoting hedge fund transparency. A significant portion of the growth in hedge funds over the past several years can be attributed to institutional investors' demand for investment alternatives to standard long-only equity and fixed-income investments. In 2006, investments in hedge funds by defined benefit pension plans, a portion of the pension management business, grew 69 percent to USD 50.5 billion.<sup>9</sup>

Institutional investors have a fiduciary responsibility to perform appropriate due diligence when investing in hedge funds. On their own and through investment advisors, they should conduct initial reviews and ongoing monitoring of hedge funds' adherence to stated strategies, risk-management policies and processes, and internal operating

controls. They should look particularly closely at funds' internal policies and operating controls surrounding the use of leverage. Moreover, they need to increasingly require that the funds in which they invest meet various industry standards, such as valuation, reporting, and ethics standards issued by the Chartered Financial Analyst Institute and risk-management standards issued by the Managed Funds Association.<sup>10</sup> To be sure, the extent of oversight by institutional investors varies. Larger investors may be able to devote more resources to the due-diligence process than smaller investors, and they may have more negotiating power in demanding transparency. Some observers have questioned the quality of due-diligence assessments conducted by advisors employed by smaller institutional funds and smaller public pension funds, particularly with regard to investments in funds of funds.<sup>11</sup>

Banks and other financial institutions are also sources of market discipline because they must perform credit assessments before providing financing or entering into derivatives transactions with hedge funds. These credit assessments usually follow a scorecard approach, in which the bank rates a fund for its management, leverage, risk measurement, liquidity, and strategy. Transparency can also play a role in a fund's credit assessment. These credit assessments should determine the amount of risk a bank will take when financing a hedge fund and are based on the information provided by hedge funds. Since this information is usually limited to basic financial information, banks' ability to determine the creditworthiness of hedge funds is also limited.

The evidence is mixed, but there do appear to be some areas where market discipline exerts itself. As sophisticated investors have poured money into the hedge fund industry, well-managed funds tend to grow, as good performance attracts new investors, while poorly managed funds tend to reduce in size or exit the market. Performance is thus one of the key determinants of turnover in the industry. As Table 2 illustrates, 2,187 hedge funds stopped reporting to a widely used database between 1999 and 2005.<sup>12</sup> Meanwhile, none of

9 Williamson (C.) (2007): "Solid growth pushes assets above USD 50 billion", Pensions & Investments, January 22.

10 See CFA Institute: "Code of ethics and professional standards", "CFA global investment performance standards", "CFA asset manager code of professional conduct"; Managed Funds Association: "2005 Sound practices for hedge fund managers"; Government Financial Officers Association: "Standards and practices for selection of asset managers"; Greenwich Roundtable: "Best practices in hedge fund investing: due diligence."

11 Funds of funds are investment managers or hedge funds that aggregate investment funds from multiple investors and invest the proceeds with multiple hedge fund managers or managed accounts. The fund of funds manager may allocate investments to several hedge funds that pursue the same strategy or multiple strategies. The goal of the initial investor is to achieve a diversified portfolio of investments in the hedge fund sector or strategy.

12 Data reflect funds reporting to the Lipper TASS® Database. This source can be considered a proxy for the number of funds that begin operation or shut down in a given year. However, it is imprecise, as there could be other reasons for a fund to change its reporting status.

Table 2

Year	Funds that reported at some point during the year	Funds in TASS at year end	Funds that started reporting during the year	Funds that stopped reporting during the year
1998	1,069	907	356	179
1999	1,187	1,005	297	199
2000	1,253	1,021	263	247
2001	1,960	1,705	956	272
2002	2,250	2,006	562	261
2003	2,682	2,415	693	284
2004	3,307	2,974	909	350
2005	4,248	3,691	1,291	574
2006*	4,621	3,900	947	738

\* Data for 2006 reflect information available from TASS as of January 12, 2007.

these hedge fund closures to date has resulted in a systemic crisis.

The evidence suggests that the indirect approach has been sufficient. In the ten years since hedge funds emerged as major market participants, markets have demonstrated surprising resilience in the face of significant disturbances, including the bursting of the technology bubble, the 2001-2002 recession, the events of 9/11, two wars, and a wave of corporate scandals. But the most recent period has been remarkable for its stable economic growth, low market volatility, and low risk premiums. Considerable uncertainty remains about the ability of today's financial system to weather more pervasive macroeconomic or financial shocks, and a lively debate continues over whether supervisors should oversee hedge fund activities more closely.

While investors, banks, and other financial institutions now receive basic financial information from hedge funds, transparency remains an issue. Hedge funds have a legitimate interest in protecting proprietary trading strategies, and a balance between the interests of investors, counterparties, and the hedge fund managers must be struck. Banks should see both quantitative and qualitative indicators of a hedge fund's net asset value, risk exposures, and liquidity. Where this information is not forthcoming from a particular hedge fund, counterparties should tighten margin collateral and other credit terms. One size does not fit all hedge funds: those that provide more information about their strategies may expand the investors who will do business with them and receive better credit terms; others may provide less information, protect their strategies

from competitors, but limit their investor base and receive less favorable credit terms.

## 4 | HEDGE FUNDS AND BANKS' RISK MANAGEMENT

Banking supervisors expect banking organizations to understand and properly manage the full gamut of credit, liquidity, and operational risks that hedge funds pose to their businesses. Supervisors expect banks and other financial institutions to continually update their risk-management and business processes to keep pace with the activities of hedge funds and financial innovation more generally. Underestimating the growth of a new product could mean lost profit opportunities for a bank or, worse, substantial losses, if the bank has not put in place sufficient controls or invested in the appropriate infrastructure. In some cases, banks may collectively underestimate the growth of a business or product, or may not have a firm grasp on the risks of and appropriate controls for a new business or product, thereby creating risks to the integrity of the broader financial system.

### 4|1 Counterparty credit risk

Counterparty credit risk<sup>13</sup> is the single most important risk for financial institutions in their interaction with hedge funds. Calculating counterparty credit risk is complicated by its two-way nature; in other words, the net exposure between two institutions can change as

<sup>13</sup> Counterparty exposures arise from over-the-counter derivatives trading and financing transactions such as equity margin lending, repurchase agreements, and securities lending. Hedge funds can also expose banks to traditional credit risk, in that banks can, but rarely do, extend loans directly to hedge funds. Banks may also be exposed to market risk by investing in the equity of hedge funds.

markets prices rise and fall. With some instruments, either party may become the net debtor. A simple, but important, measure of counterparty credit risk is current exposure, which is the net exposure at current market values. This measure shows what the bank would lose if a hedge fund were to fail today. A more comprehensive measure is potential future exposure, which is the maximum amount to which an exposure could grow over a future time period with a high degree of statistical confidence, if markets move against the hedge fund. Banks also "stress" potential exposures to estimate how they may grow under adverse market conditions.

Financial institutions limit their counterparty credit risk exposures through the use of collateral agreements, which require hedge funds to post collateral to financial institutions daily to cover increases in current exposure resulting from market movements. These agreements often require the hedge fund to post additional collateral above the market value of the transaction at the inception of a trade to cover potential future exposure. This collateral is often known as initial margin. As a result of daily margining, counterparty credit risk to hedge funds is usually fully secured by collateral, enabling financial institutions to offset losses in the event of a hedge fund default.

Still, systemic concerns remain. In particular, in a crisis, interlocking credit exposures would be the key mechanism by which risks would be transmitted from one institution to another, potentially transforming a run-of-the-mill disturbance into a systemic situation. The near failure in 1998 of Long-Term Capital Management (LTCM), a hedge fund that had taken large, highly leveraged, and illiquid market positions, galvanized supervisory interest in these issues. Industry and financial supervisors agreed that excessive leverage and poor counterparty credit risk management as practiced by banks and other creditors raised concerns that market players seeking to sell at once could have negatively affected asset prices across markets, indirectly affecting other market participants such as mutual and pension funds.

Most banking supervisors incorporated sound practices promulgated by the Basel Committee on Banking Supervision (BCBS) into guidance and examination procedures applicable to capital market activities within a year of the LTCM incident.<sup>14</sup> Today, supervisors in countries where banks have significant dealings with hedge funds review banks' risk-management policies and practices regarding hedge funds in regular onsite examinations.<sup>15</sup> The Federal Reserve also periodically performs targeted reviews of specific credit risk management practices of banks that are major hedge fund counterparties. These targeted reviews examine in depth the banks' practices against the BCBS and Federal Reserve sound practices guidance and note areas where practices should be strengthened. Supervisors continue to press for needed improvements in counterparty credit-risk management practices. Banks have made many improvements but are not yet at the point where they can become complacent.

## 4|2 Progress since 1998

By most accounts, banks and other dealers have substantially improved their management of counterparty credit risk since 1998. When conducting due diligence, it is now common practice for dealers to conduct onsite visits and maintain regular contact with hedge funds to monitor their activities and evaluate their risk-management capabilities. As a result, hedge funds generally provide more information about their activities to counterparties than they did in 1998, and banks today are less likely to be surprised by an LTCM-type incident. Dealer banks have also improved their measurement of counterparty credit risk. Techniques to estimate potential exposure are more sophisticated and model-driven.

The use of collateral for over-the-counter (OTC) derivative exposures has greatly increased; the International Swaps and Derivatives Association<sup>16</sup> reports that 63 percent of OTC derivative exposures were collateralized in 2005, up from 29 percent

<sup>14</sup> Basel Committee on Banking Supervision (1999): "Sound practices for banks' interactions with highly leveraged institutions", January.

<sup>15</sup> The Federal Reserve, for example, routinely examines counterparty-risk management practices to ensure that banks:

- perform appropriate due diligence and gather sufficient information to assess the business, risk exposures, and credit standing of their counterparties;
- establish, monitor, and enforce appropriate quantitative risk exposure limits for each of their counterparties;
- use appropriate systems to measure and manage counterparty credit risk;
- and deploy appropriate internal controls to ensure the integrity of their processes for managing counterparty credit risk.

<sup>16</sup> International Swaps and Derivatives Association: "ISDA margin survey 2006."

in 2002. Dealers today generally require hedge funds to post collateral daily to cover current credit exposures and to post additional collateral, or initial margin, to cover potential exposures. Current and potential future exposures to counterparties are often calculated by product for each hedge fund and for each hedge fund family.

Information technology (IT) systems for managing counterparty credit risk have improved substantially since 1998. Banks have made significant investments to comprehensively monitor and control counterparty exposures. These investments allow more sophisticated risk analyses on the part of banks.

Supervisory reviews suggest that banks' counterparty credit exposures to hedge funds remain small relative to total assets or capital. In a recent supervisory survey, they represented only a small fraction of total current counterparty exposures at those banks for which data were available; potential exposures for banks' entire hedge fund counterparty portfolios were within the range of exposures banks have to individual large nonfinancial corporate borrowers. The use of collateral agreements has kept the credit exposure to hedge funds small, even as assets under management by hedge funds have experienced substantial growth.

### 4|3 Need for further improvement

While these improvements indicate progress on the part of banks, their work is not yet done. In fact, because of the dynamic nature of hedge funds and innovations in the financial markets, banks must continuously improve their counterparty credit risk management, and supervisors have identified several areas where the need for improvement is most compelling.

While management information systems have improved, the systems requirements for managing counterparty credit risk to hedge funds are demanding and complex.<sup>17</sup> In the case of market-risk exposure, there is a single calculation of value-at-risk for all of a firm's positions. In contrast, counterparty credit risk calculations must be made for many different

counterparties,<sup>18</sup> often for many different time horizons. Measurements of counterparty credit risk also require complex computer simulations. The management of counterparty credit risk is also complicated by hedge funds' complex organizational structures, legal rights, collateral agreements, and frequent trading. It is important that banks develop the systems capability to regularly gather and analyze data across diverse internal systems to manage their counterparty credit risk to hedge funds. An ongoing concern is that banks may take inappropriate shortcuts or omit important elements of the IT system because it is so demanding. Therefore, supervisors must monitor the IT systems of supervised institutions to make sure they are up to date and capable of measuring and monitoring risk.

Another important element of managing counterparty credit risk is holding adequate capital for counterparty credit risk. International supervisors have updated the minimum capital to be held for this risk in the Basel II capital requirements.<sup>19</sup> The new accord has provided a menu of approaches to the capital requirements for counterparty credit risk, made these capital requirements more sensitive to counterparties' risk profiles, and added important incentives to mitigate counterparty credit risk through the use of collateral, collateral agreements, and netting agreements.

Banks also need to monitor the concentration of their counterparties' positions in various markets. In September 2006, Amaranth Advisors LLC ran into difficulties because it was not sufficiently diversified and because it dominated some of the markets in which it traded. Dealer banks often monitor the size of their own positions relative to the markets in which they trade; this practice should be extended to the positions of their counterparties as well.

Other supervisory concerns about counterparty credit risk management practices remain. First, supervisors are concerned about evidence that competition for hedge fund business among banks has led to diminished initial margin levels. They are particularly concerned when the reduction in initial margin does not seem to be justified by a reduction in risk. Second, they are concerned about whether banks are measuring their counterparty exposures accurately, given the complexity of

17 Basel Committee on Banking Supervision (2005): "The application of Basel II to trading activities and the treatment of double default effects", July, describes the operational practices regarding the management of counterparty credit risk that supervisors expect banks to follow.

18 A single counterparty may have many different exposures associated with it, for example, if netting rights across some products are not secured. For this reason there are usually more exposures than counterparties.

19 Basel Committee on Banking Supervision (2005): "The application of Basel II to trading activities and the treatment of double default effects", July.



transactions in which hedge funds participate. Third, they are concerned about the amount and quality of stress testing. The discipline of stress testing is critical because it requires firms to imagine and prepare for low-probability scenarios with which they may have no recent experience. Supervisors would like to see broader use of stress-testing at the level of each hedge fund counterparty and aggregated across hedge fund customers. Lastly, the amount of credit exposure to a hedge fund should reflect the quantity and quality of information about the fund, the extent to which exposure is mitigated through margin and other credit terms, and the capital the bank has allocated to support the exposure. Recent targeted supervisory reviews by the Federal Reserve, in conjunction with other national and international supervisors, have focused particular emphasis on these issues.

#### 4|4 Market-liquidity risk

In addition to the *direct* counterparty and other credit risks hedge funds may pose to the supervised institutions at the core of the financial system, supervisors are also concerned about the *indirect* risks associated with a decline in asset-market liquidity resulting from the failure or winding down of one or more major hedge funds. In many markets, hedge funds are key liquidity providers and are generally considered to help disperse risk more widely.

A particular concern is that, in illiquid markets, hedge funds may be forced to sell positions to meet margin requirements, driving down market prices. In severe cases, the hedge fund may drive down the value of existing positions by more than they receive from the original sale, forcing further sales.<sup>20</sup> These "liquidity black holes" have diverse causes, and they have generated considerable academic interest.<sup>21</sup> When counterparties have concentrated positions, losses on these positions are more likely to lead to substantial losses in liquidity. Meanwhile, the size and dominance of hedge funds in some markets raise concerns about disorderly exits.

Because of such risks, supervisors focus on banks' ability to identify and mitigate the risks associated with a sharp decline in market liquidity. Banks and other

dealers need to deepen their understanding of their own sensitivity to market shocks by strengthening their stress-testing and scenario-analysis capabilities, particularly with respect to scenarios that could generate simultaneous losses for their counterparties and their own market positions. Banks should be able to aggregate and stress-test by key risk factor across their portfolio of direct and counterparty exposures. They also need to develop a deeper understanding of the controls and practices that other leveraged counterparties utilize to manage market-liquidity risk and funding-liquidity risk.

#### 4|5 Operational risk

Supervisors have also been concerned about systemic risks that may arise from weaknesses in the clearing and settlement infrastructure that supports hedge fund trading activities. As often happens in fast-growing markets, trading in a number of markets has exceeded firms' abilities to appropriately update their infrastructure and processes. In particular, the Federal Reserve Bank of New York (FRBNY) and the Financial Services Authority in the United Kingdom became aware of a number of problems in the clearing and settlement infrastructure for over-the-counter derivatives, particularly for credit derivatives, following routine horizontal counterparty credit risk management reviews. Subsequently, in July 2005 a private-sector group, the Counterparty Risk Management Policy Group II, issued a report noting (1) a growing backlog of unsigned trade confirmations and (2) an increasingly common practice among dealers of accepting assignments of trades by one counterparty without the prior consent of the other, despite requirements to document trades and to obtain prior consent.<sup>22</sup>

In September 2005, fourteen major US and foreign derivatives dealers met at the instigation of FRBNY and agreed to address these issues. The dealer group quickly recorded substantial progress. By September 2006, the fourteen dealers had nearly eliminated unauthorized assignments, reduced by 85 percent total credit derivative confirmations outstanding for more than 30 days, and raised the portion of credit derivative trades confirmed electronically from 47 percent to 82 percent. The

20 Managed Funds Association: "MFA's 2005 sound practices for hedge fund managers", see pp. AI-13: "The liquidity crisis cycle".

21 Persaud (A.) (2003): "Liquidity black holes: understanding, quantifying and managing financial liquidity risk", London: Risk Books.

22 Counterparty Risk Management Policy Group II (2005): "Toward greater financial stability: a private sector perspective", July 27.

group of dealers also worked with the International Swaps and Derivatives Association to draft an off-the-shelf protocol for settlement of credit default swaps via an auction process in the event of default – a protocol that is now ready to be used during the next credit event.

Another result of these meetings was the Depository Trust and Clearing Corporation's creation, in 2006, of an industry trade information warehouse and support infrastructure to standardize and automate processing of credit derivatives. To make

the warehouse useful in a range of post-trade processes, such as payment calculations, portfolio reconciliations, collateral processing, and credit-event settlement, existing trades are being back-loaded into the warehouse database.

Much remains to be done. The dealer group, which is adding new members, met again in September 2006 at FRBNY and promised further work on automating processes and tackling backlogs in other derivative products, focusing especially on equity derivatives. Supervisors continue to monitor their progress.

Policy makers have addressed the systemic and financial stability concerns surrounding hedge funds by favoring an indirect approach. One key element of that approach focuses on ensuring the integrity of the risk management and capital adequacy of the regulated counterparties that extend financing to hedge funds. As hedge funds' largest creditors, these institutions, along with investors, are best positioned to monitor hedge fund risks given their clear financial incentives. Indeed, the President's Working Group on Financial Markets recently set forth some fundamental principles regarding private pools of capital. The philosophy behind these principles is to encourage and improve disclosure by pools and managers and to strengthen market and counterparty discipline, without discouraging innovation by requiring the disclosure of proprietary information.<sup>23</sup>

Although this approach has served us well, the globalization of the capital markets places even greater emphasis on the need for supervisors to coordinate on an international basis. The global reach of hedge funds under the current supervisory approach requires coordinated efforts to address various types of collective action issues. The FRBNY-led effort to clean up the processing of OTC derivatives is a case in which collective action has helped to resolve an industry-wide problem.

It can be difficult to determine when a supervisory collective-action problem exists. This is particularly true in the case of financial innovations that may or may not gain market acceptance. For this reason, supervisors have moved methodically in their approaches to credit-risk transfer and hedge funds. There is a strong desire to allow the benefits of these innovations to unfold but also to be vigilant in protecting against any potential systemic problems, either by taking action individually or collectively.<sup>24</sup> Innovations by financial institutions have contributed significantly to the development of the credit risk transfer markets. Supervision of these markets has largely followed their development; supervisors have addressed and will continue to address concerns in the securitization and derivatives markets as they develop.

The ability of institutional investors and banks to exercise effective market discipline requires that they obtain adequate information about the hedge funds with which they do business. The indirect approach to regulating hedge funds relies on these important players to seek information about a hedge fund's management, strategy, positions, and leverage while respecting the proprietary nature of the hedge fund's investment strategies. Where sufficient information is not forthcoming from a particular hedge fund, banks should tighten margin, collateral, and other credit terms. Investors need to ascertain whether the information provided is sufficient for them to make an investment allocation to that hedge fund.

The Amaranth incident illustrated the risks when counterparties do not sufficiently monitor the activities of a hedge fund with highly concentrated market positions. While the incident did not have systemic effects, it took place under benign market and economic conditions. Supervisors and market participants have no grounds for complacency. As the role of hedge funds continues to evolve, banking supervisors and central banks must continue to monitor counterparty credit risk management practices and systemic infrastructure issues and, periodically, to reevaluate the effectiveness of banks' management of counterparty credit risk.

23 Steel (R. K.) (2007): "Remarks of under secretary for domestic finance Robert K. Steel on private pools of capital," February 27.

24 Ferguson (R.) (2006): "Financial regulation: seeking the middle way," Fourth Joint Central Bank Research Conference on Risk Management and Systemic Risk, Frankfurt, Germany, November.

