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Hedge Funds and Financial Stability: The State of the Debate

by Michael R. King and Philipp Maier

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Michael R. King and Philipp Maier

International Department
Bank of Canada
Ottawa, Ontario, Canada K1A 0G9
mking@bankofcanada.ca
pmaier@bankofcanada.ca

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Abstract

The authors review the state of the debate on hedge funds and the potential threat that hedge funds pose to financial stability. The collapse of a hedge fund or a group of hedge funds might pose a systemic risk directly by damaging systematically important financial institutions, or indirectly by increasing market volatility and generating a liquidity shock in key markets. Both the hedge fund sector and the prime brokerage industry supporting them are highly concentrated, with a small number of dominant players that have a complex business relationship. Therefore, while the potential for a systemic risk from the hedge fund sector is considered small, the potential for *damage* from such shocks may have increased due to the increased spread, complexity, and tighter linkages of the global financial system. Going forward, the relationship between large complex financial institutions and hedge funds must be monitored closely. In terms of policy, direct regulation that increases transparency – whether of counterparty exposures or trading positions – does not appear feasible, may create a moral-hazard problem, and may reduce overall market efficiency. Indirect regulation via prime brokers, market discipline, and improved risk-management practices are the most promising approaches for addressing potential risks from the hedge fund sector.

JEL classification: G15, G18, G2
Bank classification: Financial stability; Financial institutions; Financial system regulation and policies

Résumé

Les auteurs brossent un tableau du débat qui entoure les fonds de couverture et leur potentiel de menace pour la stabilité du système financier. L'effondrement d'un ou de plusieurs fonds de couverture peut constituer un risque systémique, de façon soit directe, en mettant en péril des institutions financières d'importance systémique, ou indirecte, en accentuant la volatilité des marchés et en produisant un choc de liquidité sur les marchés clés. Les fonds de couverture et l'industrie du courtage privilégié, qui fournit des services à l'appui de leurs activités, sont des secteurs très concentrés, dominés par une poignée d'acteurs aux relations d'affaires complexes. Même si l'on estime peu probable que le risque systémique représenté par les fonds de couverture se concrétise, le potentiel des dommages que peuvent causer de tels chocs a peut-être augmenté par suite de la ramification, de la complexité et de l'intégration accrues du système financier mondial. Dans l'avenir, il faudra surveiller de près la relation entre les grandes institutions financières complexes et les fonds de couverture. Une réglementation directe ayant pour effet d'accroître la transparence autour des risques de contrepartie ou des positions ne semble pas

applicable et est susceptible de créer un aléa moral et de nuire à l'efficience globale des marchés. Une réglementation indirecte de l'activité de courtage privilégié, la discipline de marché et l'amélioration des pratiques de gestion des risques offrent en revanche les voies les plus prometteuses pour contenir les risques associés aux fonds de couverture.

Classification JEL : G15, G18, G2
Classification de la Banque : Stabilité financière; Institutions financières; Réglementation et politiques relatives au système financier

1 Introduction

The rapid growth of hedge funds provides important benefits in the form of improved price discovery, liquidity, risk sharing, and diversification. At the same time, policy-makers are concerned that hedge funds and highly leveraged institutions (HLIs) represent a source of financial instability. Germany has used its 2007 presidency of the G-8 to push for greater regulation of hedge funds, with G-8 finance ministers requesting an update of the Financial Stability Forum's 2000 report on HLIs. In this note, we take the benefits of hedge funds as given, and focus on the debate about hedge funds and systemic risk.[1] We define systemic risk as a failure of financial markets to clear in an orderly manner, bringing with it severe distress of the financial system, due to insolvencies leading to a domino effect in defaults (Daníelsson, Taylor, and Zigrand 2005).

While the potential for a systemic risk from the hedge fund sector is considered small, the potential for damage from such shocks may have increased due to the increased spread, complexity, and tighter linkages of the global financial system (Corrigan 2007). We argue that market discipline, indirect regulation via prime brokers, and improved risk-management practices have reduced, but have not completely eliminated, the risks that might arise from a disorderly unwinding of a distressed hedge fund. For example, the Office of the Superintendent of Financial Institutions Canada (OSFI) recently concluded that the exposure of the major Canadian banks to hedge funds is relatively small and that risk management practices are adequate (Dickson 2007).

This paper is organized as follows. Section 2 provides a brief overview of the hedge fund sector. Section 3 outlines the channels through which a hedge fund collapse might lead to systemic risk, and summarizes the debate about the contributing factors. Section 4 looks at the arguments for and against indirect versus direct regulation. Section 5 concludes.

2 The Hedge Fund Sector

This section reviews the hedge fund industry from a perspective relevant to discussions of systemic risk. We focus on the relative size of hedge funds in the financial system, the rate at

1. We use the generic term "hedge funds" to refer both to private investment companies and highly leveraged institutions, such as the proprietary trading desks of commercial and investment banks.

which hedge funds fail, details on the biggest hedge funds, the relationship with large complex financial institutions, and the degree of regulatory oversight.[2]

2.1 Relative size of hedge funds

The International Monetary Fund (IMF) estimates that there were over 9,000 hedge funds by year-end 2006, managing assets of $1.34 trillion, for an average size of around $150 million. This aggregate figure, while seemingly large, is small in comparison with the funds under the management of institutional investors, or the assets of the largest 1,000 banks. Table 1 shows that hedge funds represent less than 1 per cent of the total funds and assets of other financial institutions. International Financial Services, London (IFSL) estimates that the gross market exposure was 160 per cent of assets under management in hedge funds in 2006. Even taking into account that hedge funds typically use leverage, this figure implies that the market exposure of hedge funds is still below 2 per cent of the total funds and assets of other financial institutions.

Table 1
Relative Size of Hedge Funds (U.S. dollars in trillions)

Year	Hedge funds[1]	Pension funds[1]	Mutual funds[1]	Insurance comps.[1]	Global assets of the largest 1,000 banks	Hedge funds as % of total[2]
1998	0.22	13.57	9.40	10.40	35.5	0.3
1999	0.32	17.26	11.40	11.50	36.7	0.4
2000	0.41	16.07	11.90	10.10	37.9	0.5
2001	0.56	15.24	11.70	11.50	39.6	0.7
2002	0.59	13.79	11.30	10.40	43.9	0.7
2003	0.80	18.30	14.00	13.90	52.4	0.8
2004	0.93	18.80	16.20	15.00	60.5	0.8
2005	1.13	20.55	17.77	16.70	63.8	0.9

1. Global funds under management
2. This figure does not take account of leverage, which represented 120–160 per cent of assets under management.
Source: International Financial Services (2007)

Although their relative size is small, hedge funds may dominate in markets with broader economic importance. Various sources report that hedge funds represent 25 per cent of volumes in high-yield debt, 60 per cent of credit derivatives, 45 per cent of distressed debt and emerging-

2. Appendix A provides a definition of a hedge fund, stylized facts on the industry, and a description of investment strategies. See also Garbaravicius and Dierick (2005), Cole, Feldberg, and Lynch (2007), and IFSL (2007).

market bonds, and 32 per cent of leveraged loans. Size alone is thus not enough to dismiss the potential for hedge funds as a source of systemic risk, since they are large players in these markets.

2.2 Are any hedge funds too big to fail?

The hedge fund industry is relatively concentrated, with the largest 100 hedge funds accounting for 65 per cent of total industry assets in 2006 (*Alpha* magazine 2007). There are 36 hedge funds managing assets greater than $10 billion. Given that the average hedge fund is small, there are only a few hedge funds that are large enough to pose a systemic risk. Table 2 shows the five largest hedge funds in 2006, with JPMorgan Asset Management being the largest, followed by Goldman Sachs Asset Management. Other investment banks have exposure to hedge funds through minority stakes (e.g., Lehman Brothers owns 20 per cent of number-four-ranked D. E. Shaw).

Table 2
Largest Hedge Funds (as of year-end 2006)

Rank	Hedge fund	Firm capital (US$ billions)	Strategy
1	JPMorgan Asset Management	33.1	Multi-strategy
2	Goldman Sachs Asset Management	32.5	Multi-strategy
3	Bridgewater Associates	30.2	Directional
4	D. E. Shaw Group	27.3	Directional
5	Farallon Capital Management	26.2	Event driven

Source: *Alpha* magazine; authors' estimates.

The largest hedge funds are multi-strategy, directional, event driven, and fixed-income arbitrage (see Appendix A for more details on these strategies), with each category featuring 30 per cent or more of their assets under management in $1 billion+ hedge funds (Garbaravicius and Dierick 2005). Based on size and attrition rates, these large funds appear to represent the greatest potential for systemic risk.

2.3 How often do hedge funds fail?

Lacking accurate data on the failure rate of hedge funds, most studies use the number of funds that stop reporting to the Lipper TASS database.[3] According to this proxy, the average lifespan

3. This proxy may be a noisy indicator, since hedge funds may stop reporting for reasons unrelated to bankruptcy, such as when they close to new investors.

of a hedge fund is 40 months, with a median life of 31 months. Fewer than 15 per cent of hedge funds last longer than six years, while 60 per cent disappear within three years. Between 1999 and 2005, 2,187 hedge funds stopped reporting data, with none of those hedge funds resulting in a financial crisis (Cole, Feldberg, and Lynch 2007). Table 3 reports attrition rates of hedge funds by investment strategy. Directional hedge funds have the highest attrition rates, consistent with their aggressive trading strategy.

Table 3
Average Annual Attrition Rates, 1994–2003

Strategy	Category	Rate (%)
Directional	Managed futures	14.40
	Global macro	12.60
	Emerging markets	9.20
	Dedicated short bias	8.00
	Long/short equity	7.60
Market neutral	Fixed-income arbitrage	10.60
	Equity-market neutral	8.00
	Convertible arbitrage	5.20
Event driven		5.40
Multi-strategy		8.20
Funds of funds		6.90

Source: Chan et al. (2005)

2.4 Hedge funds and large complex financial institutions

The relationship between hedge funds and large complex financial institutions (LCFIs) is a potential transmission channel in the event of a shock.[4] Hedge funds and LCFIs have two main relationships: through prime brokerage, and as trading counterparties. Prime brokerage refers to services offered by investment banks to hedge funds, including financial, administrative, and

4. The Bank of England uses the term "large complex financial institutions" (LCFI) to refer to the largest global commercial and investment banks. We adopt this usage.

operational services.[5] From a risk-management perspective, prime brokers provide a centralized securities-clearing facility, and handle a hedge fund's collateral. Prime brokers therefore have relatively good knowledge of a hedge fund's positions. This raises three issues:

- First, the prime brokerage industry is very concentrated, with the top three dealers capturing close to 60 per cent of hedge fund assets under management (Table 4). To gain market share, newcomers might offer more favourable terms to hedge funds, such as lower haircuts. Reducing this "buffer" against financial disturbances could imply that the potential exposure of prime brokers to a hedge fund collapse is greater.

- Second, LCFIs are the major trading counterparties for hedge funds across the full range of financial instruments, including over-the-counter (OTC) and exchange-traded derivatives. Hedge funds are also active participants in primary and secondary markets for securities underwritten by LCFIs, such as syndicated loans, high-yield bonds, convertible bonds, emerging-market debt, and credit derivatives. Hence, hedge funds and LCFIs are often exposed to similar types of risk.

- Third, to the extent that LCFIs and hedge funds are active in similar markets, "Chinese walls" should prevent information flowing from the prime broker's risk-management unit to its proprietary trading desk. Still, hedge funds may have incentives to use more than one prime broker, in order to conceal their trading strategy. Since prime brokers see only a portion of the hedge fund's trading activity, correctly assessing the riskiness of the hedge fund may not be straightforward.

In light of these considerations, financial distress in securities markets could possibly affect both hedge funds and LCFIs negatively. Few hedge funds are large enough to substantially affect the liquidity of key financial markets if they collapse. This benign assessment could change, however, if a hedge fund collapse led to financial distress at its prime broker. The prime broker might suffer losses on its direct trades with the hedge fund, or through similar positions held by the LCFI's trading desks that are negatively affected by the hedge fund liquidation. Thus, the prime brokerage and trading relationships between a hedge fund and an LCFI could lead to the collapse of the LCFI itself, providing a channel that amplifies the losses of the hedge fund to the financial system.

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5. A prime broker typically offers the following "core services": global custody, securities lending, financing (to facilitate leverage of client assets), portfolio reporting, and operational support. In 2005, the Bank of England estimates that hedge funds generated $25.8 billion in revenue for major investment banks.

Table 4
Prime Brokerage Market Shares (as of year-end 2006)

Rank	Prime broker	Total client assets (%)
1	Morgan Stanley	22
2	Bear Stearns	19
3	Goldman Sachs	17
4	UBS	7
5	Credit Suisse	5
	Market share of top 3 (top 10)	58 (84)

Source: Institutional Investor

3 Channels and Contributing Factors

3.1 Channels of systemic risk

The key question from a financial stability perspective is whether hedge funds could potentially pose a systemic risk, and, if so, under which conditions. Policy-makers and regulators have been examining both direct and indirect channels, through which risk could be propagated.[6] We distinguish between direct and indirect channels as follows:

- A **direct channel** occurs when a collapse of a hedge fund (or group of hedge funds) holding large positions leads to forced liquidations of those positions at fire-sale prices. The impact on asset prices may be amplified through the use of leverage – whether created directly through the use of margin or indirectly through the embedded leverage of derivative positions. Such a disorderly unwinding, it is feared, could generate heavy losses to counterparties and ultimately contribute to severe financial distress at one or more systematically important financial institutions.

- In the **indirect channel**, a forced hedge fund liquidation exacerbates market volatility and reduces liquidity in key markets. Systemic risk can occur when correlations in asset classes increase during times of stress, or when the potential for herding amplifies market movements.

6. The issue of hedge funds and systemic risk has been studied by the Bank of England, the Financial Services Authority, the Banque de France, the European Central Bank, the Sveriges Riksbank, the Reserve Bank of Australia, the Financial Stability Forum (2000), the Basel Committee on Banking Supervision (1999), the President's Working Group (1999), and the Counterparty Risk Management Policy Group (1999, 2005), among others.

On the basis of these channels, policy-makers and academics have identified the following factors that might contribute to, or mitigate, systemic risk: excessive leverage, liquidity shocks, crowded trades and herding behaviour, counterparty risk, and the state of the economy and financial balance sheets. We examine each issue in turn.

3.2 Excessive leverage

Leverage relates equity capital to trading exposures. Hedge funds obtain leverage in a number of ways, such as margin accounts, derivatives, repurchase agreements, and short sales. Leverage by itself does not lead a hedge fund to collapse, but it is a factor that accentuates other risks (liquidity risk, market risk, and asset risk). When leverage is excessive, even a moderate price swing could force hedge funds to liquidate positions to meet margin calls. As hedge funds seek to sell their most liquid assets first, shocks in one market might lead to ripple effects across markets (Garbaravicius and Dierick 2005). All else being equal, highly leveraged investments are more vulnerable to shocks.

The 1998 collapse of Long-Term Capital Management (LTCM) provides a striking example of the impact of excessive leverage. The report of the President's Working Group on Financial Markets (PWG) identified excessive leverage as the key factor contributing to the collapse of LTCM (PWG 1999). Edwards (1999) reports that LTCM used its $5 billion in equity capital to borrow more than $125 billion, implying a 25-to-1 leverage ratio. When off-balance-sheet positions in derivative contracts are included, the leverage ratio was increased to 30 to 40 times.

While leverage can yield important information about the vulnerability of hedge funds, the monitoring of leverage is far from straightforward (Daníelsson, Taylor, and Zigrand 2005; McGuire, Remolona, and Tsatsaronis 2005; Bank of England 2006). Leverage may be direct through borrowing, or indirect through off-balance-sheet positions (such as derivative instruments whose values fluctuate by a multiple of the change in the underlying asset). Also, measures of leverage may be deceiving. First, they do not capture the effective leverage under stressed and illiquid market conditions. Second, leverage by itself need not signal risk; in fact, some lower-risk trading strategies based on arbitrage require the use of leverage to generate profits from small pricing discrepancies.[7] As Daníelsson, Taylor, and Zigrand (2005) conclude, on balance it is therefore very difficult to measure the contribution of leverage to systemic risk.

7. Trading strategies such as arbitrage promote market efficiency, since they force prices for similar assets to converge. While assuming greater leverage increases an institution's vulnerability to shocks, this activity also yields important economic benefits by improving the efficiency of the financial system as a whole.

3.3 Funding versus market liquidity

Liquidity is a key concept in the debate about systemic risk. We distinguish between market liquidity and funding liquidity as follows:

- Market (or asset) liquidity refers to the ability to sell or unwind positions quickly without affecting their price. Market liquidity is systemic, and may be reduced during a financial disturbance or a financial shock.[8]

- Funding liquidity refers to the ability of an investor to raise cash to meet its financial obligations. Funding liquidity is firm specific and idiosyncratic. A hedge fund may have liquidity problems even though the financial markets themselves are liquid.

Financial institutions without access to the central banks' discount lending facilities typically go bankrupt because of funding illiquidity, not insolvency (CRMPG 1999). Insolvency occurs when a financial institution's value of equity is negative. Funding illiquidity occurs when an institution runs out of cash and it cannot raise additional financing, even though it may have positive equity. LTCM and Amaranth were brought down by funding illiquidity: their positions had a positive mark-to-market value, but they were unable to meet margin calls.

LTCM was the victim of a market-wide liquidity shock with systemic effects. The devaluation of the Russian rouble and Russia's default in August 1998 caused a sharp reduction in market-wide liquidity, an increase in risk aversion, and a flight to quality. Bond-trading desks and investors sold high-risk, illiquid securities and bought low-risk, liquid securities. The high degree of leverage employed by LTCM amplified its losses. Amaranth Advisors LLC was the victim of funding illiquidity that was specific to its trading strategy. An unexpected fall in the price of natural gas futures for delivery over the winter caused Amaranth to lose more than $2 billion. When Amaranth could not meet its margin requirements, its positions were sold at fire-sale prices. While volatility in the natural gas market increased, other markets were relatively unaffected. These events demonstrate that market-wide liquidity shocks, combined with

8. It is helpful to distinguish between "financial disturbances" and "financial shocks." In general, financial shocks are severe. The Counterparty Risk Management Policy Group (2005) notes that financial markets have seen many financial disturbances over the past 25 years, but only three financial shocks – the LDC debt crisis of the 1980s, the 1987 stock market crash, and the Asian and Russian crises in 1997–98. These events were characterized by reduced market liquidity, high volatility, risk aversion, and contagion across asset classes. Financial disturbances, by contrast, affect isolated markets, without the rapid contagion effects of financial shocks.

excessive leverage, can have systemic implications. But causation does not run the other direction, since firm-specific funding illiquidity does not imply market-wide illiquidity.

3.4 Crowded trades and herding

Reductions in market liquidity and increased volatility can transform a financial disturbance to a financial shock, if many participants hold similar or closely correlated positions. This is referred to as "crowded trades," and can generate contagion effects if investors sell at the same time (herding). Crowded trades and herding are related. While it is natural for hedge funds with similar investment strategies to have similar positions, this situation does not constitute herding. Herding occurs when hedge funds mimic other funds, and buy or sell when they perceive other hedge funds to be doing the same.

Evidence on hedge fund herding is mixed (Daníelsson, Taylor, and Zigrand 2005). Studies suggest that herding occurred during the 1992 exchange rate mechanism crisis, while studies of the 1997 Asian crisis indicate that hedge funds provided liquidity and took opposing positions in many markets, reducing volatility and mitigating the fall in asset prices. The 2006 collapse of Amaranth shows that other hedge funds may also view distressed sales as a buying opportunity and provide liquidity when it is most needed.

3.5 Counterparty risk management

One way to prevent a financial disturbance from becoming a financial shock is through adequate counterparty risk-management practices, which reduce the exposure of a financial intermediary in the event of default of its counterparties. The Counterparty Risk Management Policy Group (CRMPG) reports of 1999 and 2005 recommend the use of collateral, the requirement to post margin based on actual or projected mark-to-market, the use of netting, counterparty exposure limits, and stress testing of counterparty exposures.[9] These steps, together with greater disclosure of hedge fund positions, are seen as the primary mechanism for preventing a hedge fund collapse from having systemic consequences.

3.6 State of the economy and financial balance sheets

Lastly, the ability of counterparties and other market participants to weather a financial disturbance or shock depends on the state of the economy and their balance sheets. The collapse

9. The CRMPG consists of 12 major, internationally active commercial and investment banks. It was formed in January 1999 to promote enhanced practices in counterparty credit and market risk practices.

of LTCM in 1998 followed a prolonged period of difficult economic and financial conditions, due to the Asian crisis and the Russian default. This period witnessed declining profits and a reduction of credit as lenders became more risk averse. By contrast, the collapse of Amaranth in 2006 occurred during benign economic and financial conditions. The risk of a systemic shock from the hedge fund sector is therefore greater when economic and financial conditions are worse.

4 The Policy Debate

There are two views on how to deal with hedge funds. Regulators and policy-makers in the United States and the United Kingdom feel that the best way to monitor hedge funds is through an ***indirect*** approach based on market discipline, with supervisors focusing on exposures of prime brokers to hedge funds. This approach has the advantage of being focused on the core institutions and channels through which systemic risk would be likely to propagate (Bank of England 2007). It is also practical from a regulatory perspective, since it focuses on financial institutions that are already under the supervision of banking regulators. On the other side of the debate, policy-makers in Germany and elsewhere feel that ***direct*** regulation of hedge funds is warranted, since market failures and a lack of transparency might prevent market discipline from being effective.

4.1 Regulation of hedge funds

Given that most hedge funds are based in either the United States or the United Kingdom, they are supervised by regulators in those jurisdictions. Box 1 provides details on regulation in Canada. The U.S. and U.K. hedge funds are covered by securities regulations at three levels of their business: the fund manager, the fund itself, and the distribution of the fund. The primary regulator for each area depends on where the hedge fund is domiciled. In 2006, 55 per cent of hedge funds were incorporated offshore, taking advantage of minimum regulation and favourable tax treatments. Fund managers, however, are typically based in major financial centres, such as London or New York, and may or may not be registered with local supervisory authorities. Distributors of hedge fund products must be registered in Canada and Europe, but not in the United States.

Hedge funds trading on U.S.-regulated futures and options markets are supervised by the Commodities Futures Trading Commission (CFTC), acting through the National Futures Association. In 2003, the CFTC reported that 65 of the largest 100 hedge funds were registered as Commodity Pool Operators, and 50 out of the 100 largest were registered as Commodity Trading Advisors. Thus, a significant proportion of hedge funds are registered with the CFTC

(the same is true for jurisdictions such as the United Kingdom and Japan). Still, CFTC Chairman Reuben Jeffery stated in July 2006 that many hedge funds are exempt from registration due to the net worth and sophistication of their investor base (Jeffery 2006).

Box 1
Canadian Regulation of Hedge Funds

According to the Alternative Investment Management Association (AIMA) of Canada, Canadian-based hedge funds must meet the following registration, disclosure, and reporting regulations.

- Registration: Anyone engaged in trading securities or advising with respect to investing in securities in Canada is subject to the registration requirements of Canadian securities law. For a hedge fund, this means that the portfolio manager(s) must be appropriately registered as an adviser, or be able to rely on a registration exemption.
- Disclosure: Hedge funds in Canada are sold primarily in the exempt market without a prospectus. There are three commonly used prospectus exemptions: the minimum investment exemption (which ranges from $97,000 to $150,000), the "accredited investor" exemption for high net worth individuals, and the offering memorandum exemption that substitutes for the prospectus requirement.
- Reporting: Once a hedge fund in Canada completes the sale of securities pursuant to a prospectus exemption, a report of trades must be completed and filed with appropriate regulators. The hedge fund may also be required to file interim and annual financial statements.

Source: AIMA Canada Hedge Fund Primer

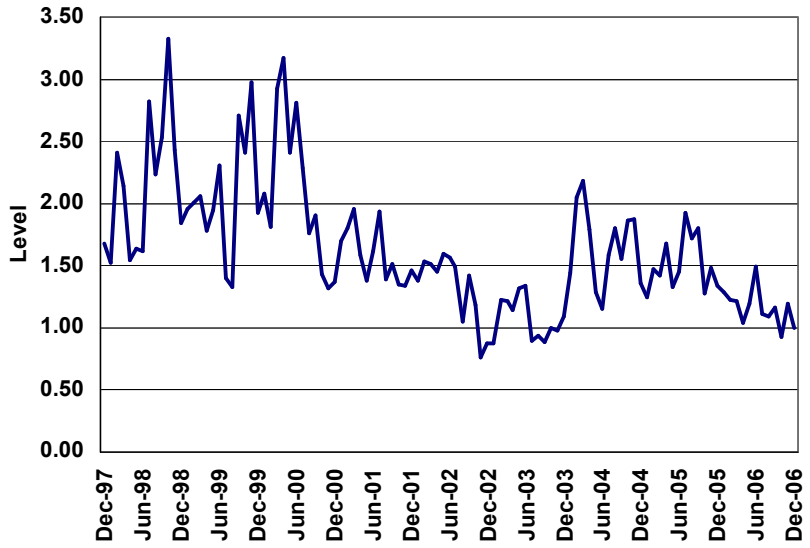
4.2 The indirect approach

The indirect approach to monitoring hedge funds relies on market discipline. Effective market discipline requires that creditors, counterparties, and investors obtain sufficient information to assess clients' risk profiles. These agents can potentially limit excessive leverage, increase disclosure, and mitigate the potential systemic risk through effective counterparty risk management. The limited impact on financial markets of the liquidation of numerous hedge

funds over the past eight years is offered in support of this view (Bernanke 2006; Gieve 2006). If the indirect approach via market discipline has been effective in reducing the potential systemic risk from the hedge fund sector, this should result in reduced leverage, increased disclosure, improved counterparty risk-management practices, improved funding liquidity, and closer monitoring and supervision of prime brokers. Each of these issues is discussed in turn.

Has hedge fund leverage decreased? Anecdotal evidence suggests that the degree of leverage at hedge funds has declined, but, given data deficiencies, the picture is not clear. Data on balance-sheet leverage collected by the Hennessee Group LLC (2007), a specialist consulting group covering the hedge fund industry, show that gross market exposures as a percentage of assets under management are similar to the levels witnessed in 1998. By contrast, Bank for International Settlements (BIS) estimates of effective total leverage – taking into account the embedded leverage in hedge fund positions – show a decline over time (Chart 1). A 2004 survey suggests that approximately 20 per cent of hedge funds used no leverage at the end of 2004, and that a further 50 per cent used leverage of less than one times their equity (Bank of England 2005). As a consequence, these authors argue that worries about systemic stability due to excessive hedge fund leverage are not supported by the facts.

Chart 1
BIS Estimates of Hedge Fund Leverage



Source: McGuire, Remolona, and Tsatsaronis (2005)

Has hedge fund disclosure and transparency increased? Although hedge fund disclosure and transparency are difficult to measure, anecdotal evidence suggests that improvements have been made. For instance, Standard & Poor's and Moody's announced plans to publish operational risk ratings for hedge funds, in addition to existing credit ratings in 2006.[10] And in March 2007 the industry association for hedge funds, AIMA, released recommendations on sound practices for hedge fund transparency, especially the valuation of hedge fund portfolios (AIMA 2007). As more institutional investors invest in this asset class, market pressure for more transparency has increased.

How effective is hedge fund counterparty risk management? Counterparty risk management aims to ensure that the financial distress of an investor does not damage the financial health of its counterparty. Private sector participants working through the CRMPG have taken steps to protect against the risk of default of a counterparty. The CRMPG reports of 1999 and 2005 discuss the use of collateral, improvements in back-office settlement of OTC derivatives, and other steps that have been taken to reduce operational risks arising from exposure to other financial counterparties. In May 2007, the Chairman of the CRMPG, Gerald Corrigan, stated that G-7 policy-makers and supervisors support the progress made, but remain concerned that these steps may not be sufficient to mitigate financial stability risks (Corrigan 2007).

Has funding liquidity improved? Hedge funds are reducing potential liquidity pressures by seeking more stable sources of funding, such as longer investor lock-in periods, longer redemption notice periods, and debt issues (Bank of England 2007; Garbaravicius and Dierick 2005). Some hedge funds are also negotiating credit lines for liquidity purposes. Although these steps may be available only to the largest hedge funds, these are also the most systematically important. The increased participation of institutional investors and funds of funds in the hedge fund sector may also be expected to improve liquidity, since these investors have longer time horizons and a better understanding of hedge fund operations.

Are prime brokers and LCFIs monitored more closely? Domestic supervisors are monitoring and conducting reviews of prime brokers and other financial counterparties. The Financial Services Authority (FSA) has begun to conduct regular semi-annual surveys of the main investment banks' prime brokerage operations and OTC derivative exposures to hedge funds. There is also increasing international co-operation, as shown by the work of the Basel

10. This echoes suggestions by the Bundesbank (2006) that hedge funds should open up their books for public grading by rating agencies.

Committee on Banking Supervision (1999) and the Financial Stability Forum (2000). Bilateral meetings between the FSA, the Securities and Exchange Commission (SEC), and the Federal Reserve Bank of New York were held in December 2006, and such international co-operation to monitor the global activities of hedge funds is set to continue.

4.3 Criticisms of the indirect approach

Policy-makers are concerned that competitive pressures amongst prime brokers for the lucrative hedge fund business have eroded market discipline. Owing to the importance of this source of revenue, new entrants may be willing to offer generous credit terms to win business (Gieve 2006; Garbaravicius and Dierick 2005). In some cases, prime brokers are providing seed capital to a hedge fund in exchange for establishing a business relationship. For example, the SEC is investigating two hedge funds owned and operated by Bear Stearns – the second largest prime broker – that announced significant losses in June 2007 due to their exposure to the subprime mortgage market via collateralized debt obligations. Finally, hedge funds appear to be able to negotiate more favourable collateral terms.

Herding might be an issue, too. The low interest rate environment, compressed credit spreads, and high levels of market liquidity that has characterized markets until this summer has encouraged a search for yield. As investors take on greater risks, they might engage in similar (or closely correlated) trades. The implications of crowded trades are especially difficult to anticipate or quantify with any precision. Many regulators would like to see more transparency on position and risk profiles. While prime brokers have one part of the picture, they may not know all of their clients' positions, since many hedge funds use several prime brokers to protect the proprietary nature of their investment strategies.

Moreover, given the increasing volume of complex transactions, policy-makers are concerned whether counterparty exposures are being monitored appropriately (Bernanke 2006). While there have been improvements in counterparty risk-management practices, the CRMPG reports (1999, 2005) remain recommendations with no requirement for market participants to adopt them. Risk management also has well-documented weaknesses. For example, value-at-risk (VaR) models remain widely used for quantifying credit risk, but these models are dependent on historical data. The recent period of historically low volatility may lead counterparties to hold too little capital against risky positions, particularly if portfolio diversification declines during stressed scenarios. VaR calculations also do not say anything about the potential size of losses beyond the VaR threshold. Finally, supervisors note that counterparties appear to rely too much on bilateral stress

tests of their counterparty credit exposures, as opposed to aggregate stress tests that consider a prime broker's exposure to all its hedge fund counterparties.[11]

4.4 Other regulatory approaches

Although the criticisms of the indirect approach have some validity, few alternatives exist other than direct regulation. In this view, hedge funds should be held to the same standard as mutual funds, since their investments are increasingly becoming available to lower net worth individuals. Also, hedge funds may dominate key asset markets, have the ability to manipulate or disrupt markets for gain, or may trade on insider information.

Proponents of direct regulation have made a number of concrete proposals. The first is to require mandatory registration of hedge fund managers or the distributors of their products. The SEC attempted to require hedge fund managers with 15 or more individual customers and $25 million or greater under management to register as investment advisers in 2006, but this requirement was overturned by the U.S. Court of Appeals. The SEC is pursuing regulation of the supply of funds, such as raising the net worth requirement for U.S. investors and requiring investment advisers to register. Japan has made it more difficult to sell sophisticated financial products in the retail market. In much of Europe and Canada, registration of hedge fund advisers is compulsory, although hedge fund managers need not register. While this approach to regulation addresses issues related to investor protection, it does not appear to address systemic issues.

A second approach to regulation is to require more transparency on investments. For example, Germany is working on a law that would force hedge fund managers (and private equity) to be more transparent about their intentions when they take stakes in companies. This law responds to concerns from Germany's trade unions that hostile investors buy companies in order to restructure and flip them for short-term profits, creating unemployment and more highly levered firms in the process.

To improve transparency, the European Central Bank has proposed a global credit register containing centralized information on the exposures of hedge funds. This register would be available to supervisors to identify concentrations of counterparty credit risk that cannot be identified through prime brokers. The FSA has taken a "lighter touch" and has developed relationships with the top 25 hedge funds based in the United Kingdom, collecting confidential

11. It has been noted that some stress-testing methodologies do not take into account the (potential) response of other financial actors to financial disturbances. For instance, it may not be appropriate to assume that market liquidity is high during periods of severe stress.

information without jeopardizing the industry. A more aggressive FSA effort to provide more transparency on the use of side letters, which offer differential treatment to key investors, was rejected after the AIMA coordinated industry opposition to the idea.

Also, there have been proposals to create a centralized global directory of all trading positions of hedge funds to identify concentrations in trading strategies that might lead to herding and contagion. Daníelsson, Taylor, and Zigrand (2005) argue that this approach is infeasible because by the time supervisors have received and analyzed this large amount of complex information, it might have no value. Also, hedge funds that did not wish to comply could relocate their trading operations to a lower-regulated, off-shore domicile.

A general concern about increased hedge fund transparency is that it might reduce market efficiency. Hedge funds rely on proprietary strategies, depending on confidentiality of trading positions. Daníelsson, Taylor, and Zigrand (2005) argue that making these positions public increases the risk of front running and erodes the private benefits from research. If these trades are no longer profitable, then the quality of price discovery and the level of market liquidity might decline.

Another concern, raised by U.S. and U.K. authorities, is the issue of moral hazard. Hedge funds might take on positions in the false belief that supervisors will alert them if different strategies become crowded or hazardous. This situation could increase risks, since hedge funds invest less effort in counterparty risk management. Moral hazard of this type could have systemic consequences, because counterparties rely on supervisors to manage systemic risks.

5 Conclusion

In this paper, we have reviewed the state of the debate on hedge funds and their potential threat to financial stability. We have shown that hedge fund failures are not uncommon, but that, in general, failures do not have systemic implications. Failures are important because they remind investors of the risks they are taking through these high-return investment strategies. From a financial stability perspective, concerns arise if a large hedge fund fails in an "important" market – i.e., in a market to which financial institutions are heavily exposed – since the potential liquidity shock could disrupt the real economy working through the financial accelerator channel. Failures in more "exotic markets," such as the market for natural gas where Amaranth's losses occurred, are less problematic because the exposures of large financial institutions to exotic markets are limited.

We have also reviewed the debate over hedge fund regulation. It is not clear that more transparency – in the extreme, hedge funds reporting on their positions in a timely fashion – would substantially limit systemic risks, since processing this information is difficult and time-consuming. Also, high transparency might limit hedge funds' trading strategies, reduce overall market efficiency, and create moral hazard problems.

In light of these concerns, indirect regulation through counterparty risk management seems the more promising way to proceed. So far, this approach has made the international financial system more resilient. Better market discipline, indirect regulation via prime brokers, and improved counterparty risk-management practices have reduced the risks that a disorderly unwinding of a large hedge fund might have systemic effects, as occured in the $6.2 billion collapse of Amaranth.[12] A key element going forward is that the relationship between prime brokers and hedge funds is very complex and must be monitored closely. When prime brokers also operate hedge funds, the risks to the financial system increase. How this tension will be resolved in the future remains to be seen.

12. At the end of 2006, Amaranth was the 39th largest hedge fund, with $7.3 billion in assets under management.

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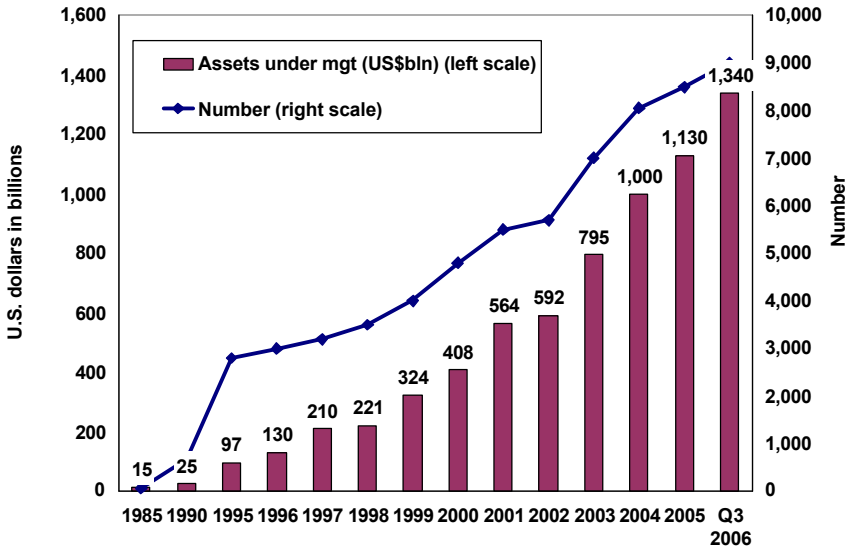
Appendix A: Overview of the Hedge Fund Sector

Hedge funds are, to a large extent, the creation of the legal restrictions imposed on mutual funds. A hedge fund is typically a private investment company that uses aggressive trading strategies unavailable to a mutual fund to earn positive returns in all market environments. These strategies include short sales, leverage, program trading, arbitrage, and the use of derivatives. A hedge fund is structured as a limited liability partnership that manages the funds of a limited number of wealthy individuals and institutional investors. The fees are typically a combination of a fixed management fee of 2 per cent of assets under management combined with a performance fee of 20 per cent or more of profits after fees. These performance fees may be subject to a high-watermark provision, where the hedge fund does not earn fees if the assets under management decline in value relative to their previous high. The requirements of a high minimum investment, restrictions on withdrawals, and a limited audience allow a hedge fund to remain unregistered while leaving the managers free to pursue proprietary investment strategies that would be imprudent for a mutual fund. The hedge fund typically has low transparency, with limited disclosure to its investors and prime brokers.

Chart A1 shows the dramatic growth of the hedge fund sector, where assets under management have increased by 28 per cent per year over the past 10 years.

Chart A1
Growth of Hedge Fund Sector



Source: International Monetary Fund

Hedge funds investment strategies fall under three broad categories – market neutral, event driven, or directional – with some funds adopting more than one strategy (multi-strategy).[1] Table A1 shows a breakdown of assets under management by investment strategy.

Market-neutral funds speculate on the relative prices of securities. These strategies have lower correlation with overall market movements and lower standard deviations, although they employ higher leverage to increase the returns from exploiting short-term mispricings in the market. Market-neutral funds represented 16 per cent of assets under management in 2004, and include convertible and fixed-income arbitrage, as well as equity market neutral strategies.

Event-driven funds invest in special situations designed to capture price movements generated by a significant corporate event such as a takeover, corporate restructuring, or bankruptcy. Event-driven funds have higher volatility of returns and intermediate levels of leverage. This category represented 13 per cent of assets under management in 2004.

Table A1
Assets under Management by Investment Strategy

Investment strategy	Number of hedge funds (% of total, 2004)	Assets under management (% of total, 2004)
Directional	47	40
Event driven	9	13
Market neutral	14	16
Other	3	6
Funds of funds	27	25
Total	100	100

Source: Lipper TASS database

Directional funds are the largest category of funds, with 40 per cent of assets under management in 2004. Directional funds try to anticipate broad market movements and generate the most volatile returns despite having the lowest leverage. This category of funds includes global macro, emerging markets, long/short equity, dedicated short bias, and managed futures.

1. A fourth category is funds of funds, which are funds that take positions in other hedge funds, similar to a mutual fund, allowing portfolio diversification and providing access to lower net worth investors.

- Global macro funds, which represent around 4 per cent of assets under management, take large, unhedged, directional positions in foreign exchange, fixed income, equities, and their related derivatives based on a top-down analysis of macroeconomic and financial conditions. This activity is largely confined to the most developed markets, where liquidity and credit risk are not a concern.

- Emerging market funds represent 5 per cent of assets under management, take positions worldwide, and employ a bottom-up analysis of individual companies or countries.

- Long/short equity hedge funds are the single biggest category, with 27 per cent of assets under management. Despite their name, they are not designed to be market neutral but rotate investments from value to growth, from small to large capitalization, from sector to sector, and from net long to net short.

These statistics on hedge funds do not capture the activities of highly leveraged institutions that mimic hedge fund trading strategies but are privately owned. Examples include the proprietary trading desks at commercial and investments banks, as well as some forms of private equity. While proprietary trading desks do not attract the media attention of hedge funds, they use the same investment strategies and represent a potential source of systemic risk. They also represent an important source of income for investment banks. According to Merrill Lynch, one-third of the investment banking industry's revenues in 2005 came from principal trading on debt and equity, and only 15 per cent from the commissions business (*The Economist* 2007).