

# Monitoring hedge funds: a financial stability perspective

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*Investor inflows into hedge funds have been significant in recent years and they have continued unabated. As a result, the presence and role of these investment funds in global capital markets have become increasingly important, and to a much greater extent than the amount of capital they manage would suggest. This is because hedge funds can, and often do, leverage their investment positions. Indeed, their leveraged assets are sometimes comparable with the assets of large banks. The growing and active participation of hedge funds in a large number of financial markets implies that the functioning of these markets could be seriously affected if the hedge fund sector came under stress.*

*The positive contribution of hedge funds to the efficiency and liquidity of global financial markets is widely recognised, but there are also concerns that in times of stress their activities may create risks to financial stability. The lack of transparency and limited publicly available information about their balance sheets and activities poses significant challenges for financial stability analysis. While it is possible to base such an analysis on a multitude of information sources on hedge fund activities – including dedicated financial media, commercial hedge fund databases, quarterly industry reports, hedge fund return indices, academic studies, some supervisory data and market surveillance – these sources are not sufficient for an adequate monitoring and robust evaluation of hedge fund activities from a financial stability perspective.*

*Three groups of indicators could be important for financial stability analysis, namely those which shed light on banks' exposures to hedge funds, provide yardsticks of the crowding of hedge fund trades, and facilitate the gauging of endogenous hedge fund vulnerabilities. The latter group would include the measures of funding liquidity risk, leverage and exposures to market risk factors. The construction of all these indicators would be greatly facilitated if basic information on hedge fund balance sheets were available. Since this is not the case, various indirect estimation methods have to be relied upon.*

*A “desirable vs. available” analysis reveals the most important information gaps, but it does not aim at providing recommendations on how to enhance hedge fund transparency in practice. Instead, it proposes three elements which a transparency framework would ideally include: first, more aggregate information to all market participants; second, a highly standardised reporting template that would make disclosures more effective; finally, adequate information for a joint analysis of the aggregate activities of banks, hedge funds and other highly leveraged institutions in order to have a comprehensive picture of risks to the smooth functioning of financial markets.*

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In the public mind, hedge funds are often linked with three things: extraordinary investment returns (associated with sophisticated and potentially highly leveraged investment strategies exploiting market inefficiencies), non-transparent offshore investment activities, and spectacular occasional incidents such as the near-collapse of LTCM in September 1998. In other words, they are often described as investment funds which take on high risk but offer the potential for commensurately high returns, and achieve this in highly opaque ways. There is little doubt that they have grown in importance in recent years, not least because as a group they have become one of the largest alternative investment vehicles and an increasingly dominant force in many financial markets..

There is a broad consensus that hedge funds, as highly active and flexible financial market participants, contribute significantly to the efficiency and liquidity of the various financial markets in which they trade. At the same time, there are also concerns that their activities may, under certain circumstances, create risks to the stability of financial systems. These concerns are further compounded by the fact that there is little transparency about the activities of hedge funds. This makes the monitoring and assessment of their activities a difficult task and leaves public authorities and market participants in an uncomfortable position. Against this background, this article aims at shedding more light on how potential risks to financial stability posed by hedge funds could be monitored given the public information which is currently available, and it also attempts to identify the main information gaps hindering such efforts.

The article is structured as follows. Section 1| describes the main characteristics of hedge funds and compares the total amount of capital under management within the industry with the size of other groups of financial intermediaries. Section 2| considers the positive and possible negative effects of hedge fund activities on the financial system, while Section 3| reviews the main information sources that are publicly available and can be used to monitor the emergence and evolution of potential risks to financial system stability, and explains the most important features, advantages and limitations of these sources. Section 4| proposes three main groups of indicators

which could be useful for financial stability monitoring and discusses practical challenges that can arise in constructing these indicators, including the availability of relevant information and possible indirect estimation methods. Section 5| summarises the outcome of a "desirable vs. available" analysis by highlighting the main information gaps, which complicate the effective conduct of a more robust surveillance and evaluation of hedge fund activities from a financial stability perspective, and it also considers several possible ways to address them.

## 1| THE SIZE OF THE HEDGE FUND INDUSTRY

A starting point for gauging the size of any industry is usually a fairly precise definition of the activities of the firms comprising that industry. In the case of hedge funds this is not a straightforward task. There is no generally accepted and reasonably accurate definition of what a hedge fund is. Broadly speaking, hedge funds represent a relatively unconstrained form of active investment management and a versatile business model.<sup>1</sup> Indeed, hedge funds have flexible investment mandates, usually with relatively few, if any, constraints on leverage, short-selling and traded assets, and they enjoy or are structured to benefit from tax advantages and minimum regulatory intervention. The uncertainty about the precise defining features of a hedge fund is further magnified by the self-declaration principle: essentially any fund would be considered a hedge fund if its managers were to market it as such, although it would be very unusual if the fund managers were not to charge performance fees in addition to management fees. Moreover, some hedge fund managers have additional capital under management in private managed accounts<sup>2</sup> that are run in parallel with their hedge funds, and there are plenty of other investors, including the proprietary desks of large banks, which pursue strategies substantially similar to hedge funds. Thus, the pool of hedge fund-like capital available that can be leveraged and quickly deployed is far larger than the amounts managed in legal hedge fund structures would indicate.

<sup>1</sup> Alfred Winslow Jones, a sociologist and journalist, is often credited with being a founder of one of the first hedge funds in 1949. Jones's fund used leverage and short-selling to hedge its stock portfolio against broader market movements.

<sup>2</sup> According to Tremont Capital Management, hedge fund managers ran about USD 325 billion in private managed accounts at the end of June 2005.

Notwithstanding these conceptual challenges, statisticians around the world have been discussing how to define hedge funds for statistical reporting purposes and are expected to come up with some workable definitions. Currently, there are at least two such initiatives: one by the ECB and the other by the IMF. However, it cannot be excluded that the rapid convergence of hedge funds and traditional investment funds, which are increasingly adopting flexible hedge fund-like strategies, may render such definitions obsolete sooner than expected.

A consequence of these difficulties, together with the relative opaqueness of the hedge fund sector, is that estimates of the size of the industry vary considerably. Most estimates are based on information collected by commercial hedge fund databases, although these are often supplemented by data on funds tracked internally by database managers. By early 2007, several data providers indicated that, on the basis of joint internal and commercially distributed hedge fund data samples, the total capital under management by single-manager hedge funds globally was rapidly

approaching the USD 1.5 trillion mark.<sup>3</sup> Moreover, in addition to numbers derived from these sources, some other reported figures include estimates of additional amounts for which reliable information is difficult to come by. Other approaches which are used to gauge the size of the sector combine information from several commercial databases<sup>4</sup> or information derived from surveys of hedge fund administrators.<sup>5</sup> Given the range of estimates, it is always useful to cross-check them and bear in mind the different methods used to construct them.

A comparison of capital under management of single-manager hedge funds with equivalent measures for other institutional investors would suggest that the global hedge fund industry still appears rather small (see Table 1). However, the lack of information on hedge fund leveraged assets makes it impossible to compare the overall asset size of hedge funds with that of other highly leveraged institutions, such as banks. The total leveraged assets of an individual hedge fund can sometimes be quite significant and comparable with the size of some systemically important banks,

**Table 1**  
**Size of selected institutional investors and financial asset markets globally**  
December 2005

	USD billions	% of world GDP	Indicator	Source
Hedge funds <sup>a)</sup>	1,350	3	Capital under management	Strategic Financial Solutions
Open-end investment funds	17,771	40	Net assets	European Funds and Asset Management Association
Pension funds	18,569	42	Investments	International Financial Services, London
Banks (OECD) <sup>b)</sup>	2,906	7	Shareholders' equity	Bureau Van Dijk (Bankscope)
<b>Total of the above</b>	<b>40,596</b>	<b>91</b>		
Insurance companies <sup>c)</sup>	14,500	33	Invested assets	International Financial Services, London
Banks (OECD) <sup>b)</sup>	53,552	120	Assets	Bureau Van Dijk (Bankscope)
Stock market capitalisation	37,168	84		International Monetary Fund
Debt securities	58,949	133		International Monetary Fund
Bank deposits	38,000	85		McKinsey Global Institute
<b>World GDP</b>	<b>44,446</b>	<b>100</b>	Nominal GDP	International Monetary Fund

Notes: The terms capital under management, net assets and assets under management are usually used interchangeably and they are equivalent to shareholders' equity, whereas the term (gross) assets or investments include investments that may have been financed by debt. Open-end investment funds and pension funds have restrictions on the use of leverage and, therefore, their assets/investments should be close to net assets.

a) Single-manager.

b) OECD commercial banks and holding companies, consolidated. The IMF estimated that the assets of all banks worldwide were equal to USD 55,673 billion in 2005.

c) 2004 data, life and non-life.

3 According to Lipper TASS and Hedge Fund Research estimates, at the end of 2006 the total capital under management globally by hedge funds was respectively USD 1.05 trillion and USD 1.43 trillion.

4 See Strategic Financial Solutions (2006). This study, which is conducted annually, is based on data from 12 commercial hedge fund databases. At the end of 2005, it identified 6,900 single-manager hedge funds (excluding commodity trading advisers and managed futures funds) and roughly 3,600 funds of hedge funds worldwide, managing in total nearly USD 1.35 trillion and around USD 0.7 trillion respectively.

5 See Hedge Fund Manager Week (2006). According to the hedge fund administrators surveyed, the total value of single-manager hedge fund assets under administration was almost USD 2.1 trillion at the end of October 2006, up from USD 1.37 trillion at the end of October 2005. However, it has not been precisely defined whether the assets held by administrators are equal to the hedge funds' net asset value, or whether they also include debt-funded assets.

as was exemplified by the size of LTCM positions at the time of its near-failure.<sup>6</sup> The total single-manager hedge fund capital under management, however, is close to half of bank shareholders' equity worldwide, although it is dwarfed by the capital entrusted to traditional investment funds.

What is more important, however, is that such comparisons, even if they were possible on a leveraged basis, do not capture the true influence of hedge funds on trading volumes and market liquidity. This is because hedge funds tend to change their portfolio composition much more frequently than other market participants. According to some market surveys, hedge funds increasingly account for significant shares of trading volumes in various cash and derivatives markets and their presence is crucial for the burgeoning market for credit derivatives, where they account for more than 55% of the total credit derivatives trading volume.<sup>7</sup>

## 2 | IMPACT ON FINANCIAL STABILITY

The magnitude of systemic risk, both in absolute and relative terms, posed by hedge fund activities is difficult to assess owing to the lack of sufficient publicly available information about their balance sheets and trading activities. Moreover, any systemic risk assessment is further complicated by the diversity of hedge funds and the multitude of factors that may affect individual and collective hedge fund behaviour under different market conditions. It is very likely that under normal market conditions the balance between positive and possible negative effects on financial system stability would prove to be positive. Nonetheless, it cannot be excluded that active risk-taking by hedge fund managers may have prolonged recent benign market conditions and contributed to the build-up of so far invisible vulnerabilities within the financial system, which could unravel in unexpected ways in the event of an adverse market shock.

Positive effects of active hedge fund investment strategies are widely acknowledged. They include

improved market liquidity,<sup>8</sup> enhanced price discovery processes and an increased flow of financial innovations, which may all contribute to the stability of financial markets. In addition, hedge funds presumably provide more diversification opportunities for investors and thereby foster more complete markets. There is some evidence, however, of a high correlation between the returns of at least some hedge fund strategies and the substantial negative price movements in major equity and bond markets, which reduces potential diversification benefits.<sup>9</sup>

In their quest for higher returns, hedge funds also tend to assume risks which more regulated financial institutions are usually reluctant to be exposed to and, more importantly, they may be willing to provide risk capital in volatile market conditions or when there is a risk of looming stressed conditions, as evidenced by the acquisition of substantial parts of the Amaranth Advisors investment portfolio in September 2006. However, this very valuable stabilising influence is conditional upon the availability of sufficient liquidity buffers when needed and the absence of highly-leveraged crowded or concentrated one-way bets across the hedge fund sector.

The possible simultaneous exit of hedge funds from concentrated investment positions is probably the main way through which hedge funds could adversely impact on the liquidity and price volatility of affected financial markets, particularly of small and illiquid ones. Nevertheless, the risk of crowded trades is a more general risk to smooth market functioning, which can also be associated with the activities of other market participants, and, therefore, it is not confined to hedge funds.

Other possible negative effects on financial stability could materialise through banks' exposures to hedge funds. Banks' direct exposures comprise credit (financing and trading) and investment exposures, and it is very important that banks, as key counterparties, prudently manage them. Several reports have noted significant improvements in the way banks manage their exposures to hedge fund clients, but, nevertheless, important challenges

6 As another example, at the end of August 2006 the total gross assets of Citadel, a large multi-strategy hedge fund that was the first to issue a hedge fund bond in December 2006, were reported to be USD 166 billion, or more than 12 times larger than its net assets of USD 13 billion.

7 See, for example, Greenwich Associates (2006).

8 Researchers from the US Commodity Futures Trading Commission (CFTC) using micro trading data found that managed futures hedge funds can dampen rather than increase volatility in energy markets by providing market liquidity to other market participants. See Haigh, Hranaiova and Overdahl (2005).

9 See Brown and Spitzer (2006).



remain.<sup>10</sup> Furthermore, the progress made in the management of such exposures may be uneven across prime broker banks. The same applies to hedge fund managers, as one recent survey of hedge funds' risk management practices highlighted quite a few important shortcomings.<sup>11</sup>

There are also some indications that intense competition among banks for the lucrative hedge fund servicing business could have led to some dilution of the credit standards applied, particularly with respect to margin terms, thereby diminishing the effectiveness of the counterparty discipline exercised by banks. Moreover, investor demand for some of the better hedge funds remains strong and, therefore, investors may not always be in a position to demand and obtain adequate disclosures.

### 3 | INFORMATION SOURCES: FEATURES, ADVANTAGES AND SHORTCOMINGS

The ECB, as well as other central banks, is unable to monitor the activities of hedge funds through its own regular statistical data collection activities, not least because hedge funds are predominantly domiciled offshore. More generally, the statistical information collected by public institutions is increasingly inadequate and a greater reliance on commercial information sources is becoming more common and even inevitable. However, commercially available information is based on voluntary reporting by contributors and this can lead to deficient and non-uniform coverage, and can impair the timeliness and quality of such information. Nevertheless, there is a range of available information sources on hedge fund activities, including dedicated financial media, commercial hedge fund databases, quarterly industry reports, hedge fund return indices, academic papers, some supervisory data and market surveillance.

The rapid expansion of the hedge fund sector has spurred the development of a wide spectrum of *dedicated financial media*, which includes magazines, websites and newsletters covering the latest news as well as more analytical reports about the industry. These sources of information are complemented by conferences and other specialised events, the main purpose of which, besides discussing broader and specific hedge fund-related issues, is to provide networking opportunities that bring hedge fund managers and investors together. There are also plenty of market surveys of investors, hedge fund managers, and prime brokers focusing on their preferences, expectations,<sup>12</sup> risk management practices<sup>13</sup> and other topical issues. All of these pieces of public information provide glimpses of the bigger mosaic and are useful for improving our understanding of the hedge fund sector and of the conjunctural developments associated with it, but they do not provide a sufficient information basis for financial stability analysis.

The *commercially available hedge fund databases* are one of the most important sources of quantitative and qualitative information about hedge funds. Currently there are at least 12 databases with partially overlapping samples. Hedge fund managers report information to databases mainly for marketing purposes and this voluntary reporting leads to various data biases, of which the most obvious are survivorship, incubation (backfill or instant history), self-selection and liquidation biases.<sup>14</sup> In these databases, only monthly returns on investors' capital and capital under management are reported as time series.<sup>15</sup> All other information is static either by its nature (e.g. on redemption frequency, inception date) or due to infrequent updating without tracking of changes made (e.g. on average and maximum leverage). Both the time series data on capital under management and hedge fund returns are available with time lags, and the first time series are also less complete than return data. This is illustrated in Chart 1, where the lines indicating the number of funds reporting data for capital under management

<sup>10</sup> See, for example, ECB (2005).

<sup>11</sup> See Deloitte (2007).

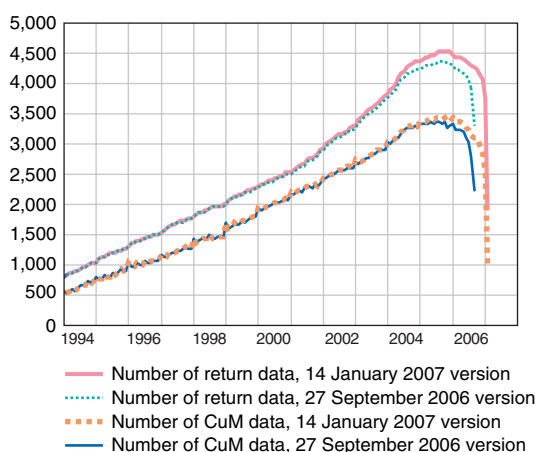
<sup>12</sup> See, for example, Deutsche Bank (2007).

<sup>13</sup> See, for example, Mercer Oliver Wyman (2006) or Deloitte (2007).

<sup>14</sup> Survivorship bias arises if defunct funds are excluded from an analysis. Incubation bias refers to the fact that only funds that experience good historical returns and survive the incubation period are likely to join databases and to backfill the whole or part of their instant history of returns. Self-selection bias arises due to the voluntary nature of hedge fund reporting, which makes the sample of hedge funds in a database unrepresentative of the universe of hedge funds. Liquidation bias occurs because disappearing funds may not report the final periods leading up to and including their liquidation.

<sup>15</sup> Time series of investor net flows can be derived from the time series of hedge fund returns and capital under management.

**Chart 1**  
**Number of funds with return and capital**  
**under management data at various points**  
**in time in two different versions of the database**  
 December 1993 – January 2007



Source: Lipper TASS database (27 September 2006 and 14 January 2007 versions).  
 Note: CuM stands for capital under management. Single-manager hedge funds and funds of hedge funds. Only funds which reported monthly net of all fees returns.

at any given point in time in two different versions of the database are always below the lines showing the number of funds reporting return data. The lines taper off at the end of the sample because of lagged reporting, the impact of which however disappears after several months. Chart 1 also indicates that the aggregate historical information obtained from a database will vary depending on the version used, since historical and contemporaneous fund-specific information is added, deleted or modified in the database continuously.

Combining information from all available hedge fund databases is possible in principle, but quite complicated in practice. Moreover, even if such work were to be initiated, it would not be possible to distribute results to a wider audience of outside users on a frequent basis due to non-competition clauses in database user licence agreements.

There might be several ways to overcome the fact that most information in commercial databases is static and thus to obtain some insight into the evolution of a chosen indicator over time. First, one could aggregate hedge fund information by the year when a fund joined the database or by the fund's inception year and then compare whether older or younger funds

tend to have different properties, in order to interpret differences as a weak sign of possible changes of an indicator over time, particularly if hedge funds tend to provide their static information only at the time of joining the database. Second, if static information is modified infrequently or should be invariable by its nature, then its evolution over time could be estimated by aggregating information on funds which reported their return or capital under management data at various points in time. However, if hedge funds tend to update relevant information relatively frequently, time series of particular static indicators could be created by analysing differences in various versions of a database, and this could be the third way of tackling the static nature of most data in hedge fund databases.

As mentioned above, many database managers track internally more funds than those that are included in the commercial versions of their databases. This broader set of joint commercially available and internal information is often presented in their *quarterly industry reports*,<sup>16</sup> which contain aggregate quarterly data on capital under management and investor net flows by strategy. Given the larger underlying samples used to produce these reports, data in such reports are preferred to a simple aggregation of the information available in any one database and are generally used by market participants as a primary source of basic information on broad developments in the hedge fund sector.

The same broader datasets are used to create various monthly non-investable *hedge fund indices*, intended to track the overall sector performance and the average returns of specific hedge fund investment strategies. However, various index providers use different samples, investment strategy categories, eligibility rules and weighting schemes. As a result, even for the same (or very similar) investment strategy there are significant coverage and performance differences, which complicate the choice of an index for analysis purposes.<sup>17</sup> Some non-investable indices have investable versions, some of which report hedge fund returns more frequently than monthly, but these investable indices tend to underperform non-investable ones due to stricter eligibility rules and looser investor redemption terms, which prevent funds included in the investable index from investing in less liquid assets.

<sup>16</sup> See, for example, Lipper TASS (2007) or Hedge Fund Research (2007).

<sup>17</sup> Owing to this, the EDHEC Risk and Asset Management Research Centre has suggested using the first principal component of various competing indices for the same investment strategy. See EDHEC Risk and Asset Management Research Centre (2004).

During this decade, the number of *academic papers* on hedge funds has been increasing exponentially and they could provide useful indicators for monitoring and analysing hedge fund activities from a financial stability perspective. However, the bulk of academic research has tended to focus on an analysis of hedge fund returns,<sup>18</sup> capital under management and investor net flows, since only these data are available as time series in hedge fund databases. There have been relatively few publications concentrating on financial stability issues, but their number is growing. The authors of such papers analyse hedge fund liquidations,<sup>19</sup> activities during various crisis episodes,<sup>20</sup> the co-movement of hedge fund returns during periods of stress<sup>21</sup> or they attempt to measure hedge fund leverage<sup>22</sup> and illiquidity exposure.<sup>23</sup>

There is also some information collected by supervisors, as some of them have launched *regular data collection on prime brokers' exposures* to hedge funds (e.g. the UK FSA's semi-annual surveys of selected prime brokers on their largest exposures to hedge funds). Supervisors may opt to disclose their findings in an aggregate form, but the bank-level information collected would remain available only to supervisors, as is the usual practice for all firm-specific supervisory data. Public reporting by banks of their direct exposures to hedge funds is essentially non-existent, although enhanced transparency was seen as one of the main measures to improve counterparty discipline after the near-default of LTCM.<sup>24</sup>

Besides regular information-gathering from banks, public authorities may also initiate *thematic surveys* on banks' dealings with hedge fund clients. In 2005, for example, the Banking Supervision Committee of the European System of Central Banks conducted a survey on large EU banks' exposures to hedge funds, which provided encouraging as well as some worrisome information on banks' risk management practices. Similar one-off projects provide snapshot quantitative information, but gleaned qualitative knowledge of prevailing market practices is very useful for guiding future analytical and policy work.

Finally, given the lack of frequent (daily or weekly) up-to-date information on hedge fund activities, *market surveillance* by the authorities responsible for the safeguarding of financial stability is indispensable for monitoring, understanding and analysing hedge fund activities. It includes keeping a watchful eye on price developments in financial markets, regular dialogues with market participants and, in particular, contacts with prime brokers and hedge fund managers. Market surveillance is also the key way to learn about hedge fund-related stressed conditions in financial markets.

## 4 | INDICATORS FOR MONITORING HEDGE FUND RISKS TO FINANCIAL STABILITY

After reviewing the various information sources available for analysing hedge fund activities, the next logical step is to identify a set of pertinent indicators which could be useful for financial stability analysis. Taking into account the channels through which possible negative effects of hedge fund activities on financial stability could materialise, three groups of indicators could be suggested to measure and monitor:

- *endogenous hedge fund vulnerabilities*, which could lead to difficulties or a failure of a large hedge fund or a group of hedge funds with far-reaching repercussions for exposed banks and affected financial markets. These internal vulnerabilities include funding liquidity risk, exposures to certain market risk factors and excessive leverage;
- *banks' exposures to hedge funds*; and
- *crowding (concentration) of hedge fund trades*, when the number and size of one-way hedge fund positions are large relative to the amounts outstanding of underlying instruments and thereby markets

18 The issues which are explored in such papers include biases in hedge fund data, hedge fund performance measurement, non-normality of return distributions, persistence, serial correlation, micro (fund-specific), market risk and macroeconomic factors of returns, diversification properties, etc. See, for example, an overview of papers on hedge fund performance by Géhin (2006).

19 See, for example, Kundro and Feffer (2004); and Baba and Goko (2006).

20 See, for example, Eichengreen, Mathieson, Chadha, Jansen, Kodres and Sharma (1998).

21 See, for example, Chan, Getmansky, Haas and Lo (2005) and Garbaravičius and Dierick (2005) pp. 46-49 sub-section on the issue of crowded trades.

22 See McGuire, Remolona and Tsatsaronis (2005).

23 See Getmansky, Lo and Makarov (2004).

24 See The US President's Working Group on Financial Markets (1999) and Financial Stability Forum (2000).

become vulnerable to a possible simultaneous unwinding of such concentrated investments by a group of relatively homogenous investors.

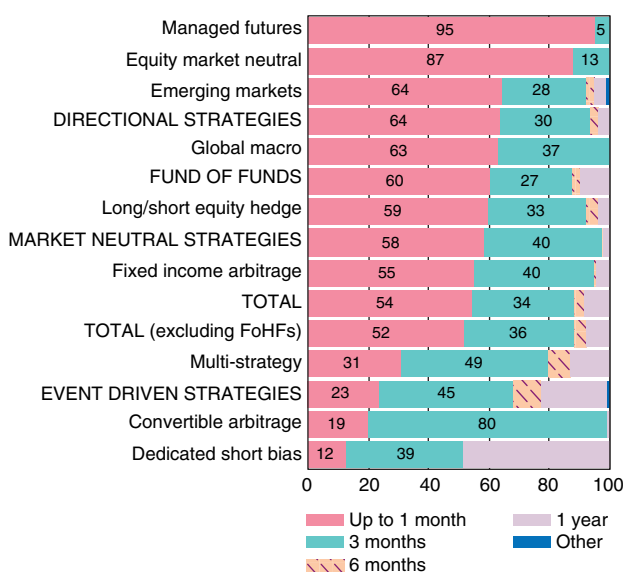
## 4|1 Indicators of endogenous hedge fund vulnerabilities

Indicators within this group would largely be based on information on the size and structure of hedge fund balance sheets. Since such information is not readily available from any publicly available information source, indirect methods would have to be devised to measure and monitor endogenous hedge fund vulnerabilities.

*Funding liquidity risk* is associated with the risk that a fund will not have sufficient liquidity buffers to meet various liquidity requests and this, in turn, may force the hedge fund manager to resort to forced asset liquidations in possibly already frail financial markets. Liquidity pressures may arise either from asset/liability mismatches related to short-term financing provided by prime brokers or from investor redemptions. Information on financing mismatches requires hedge fund balance sheet data, which, however, is not available.

**Chart 2**  
Hedge fund redemption frequency by strategy

(December 2005; % of capital under management)



Source: Lipper TASS database (27 September 2006 version).

Note: The directional group includes long/short equity hedge, global macro, emerging markets, dedicated short bias and managed futures strategies. The market-neutral group consists of convertible arbitrage, fixed income arbitrage and equity market-neutral strategies. FoHFs stands for funds of hedge funds.

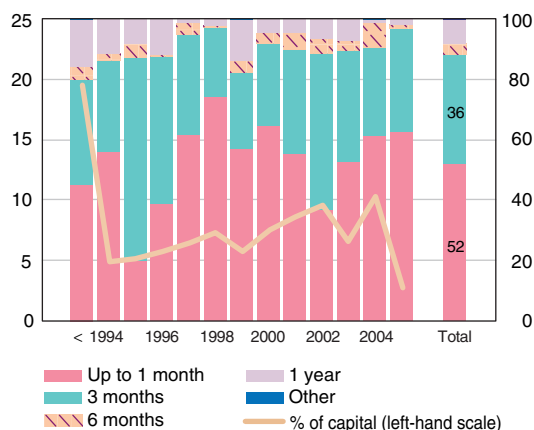
By contrast, the structural vulnerability of the hedge fund sector to investor redemptions could be estimated by exploring the profiles of hedge fund redemption restrictions based on individual fund-level data in hedge fund databases. Hedge funds apply various combinations of investor redemption restrictions, including initial lock-ups, penalties for early redemption, redemption frequency, redemption notice and payout periods that ideally should match the liquidity of the underlying investment portfolio. All of these redemption characteristics could be analysed by aggregating and comparing them by strategy (in order to evaluate whether redemption restrictions are adequate given strategy's risk profile, see Chart 2), by fund vintage year (see Chart 3) or in some other way (see Chart 4) in order to obtain some idea of the prevailing trends.

Information on hedge fund investor structure is also not available, although estimates of the share of capital provided by funds of hedge funds (FoHFs) could be constructed by comparing estimates of their capital under management to the capital of single-manager funds. Like banks, FoHFs perform a maturity transformation function when they offer their investors more favourable redemption terms than underlying single-manager funds, and this feature should be taken into account when analysing the funding liquidity risk faced by FoHFs.

Since information on investor gross flows is not available, historical aggregate investor activity by

**Chart 3**  
Single-manager hedge fund redemption frequency and capital by vintage year

(December 2005; % of capital under management; distribution of redemption frequency and total capital)

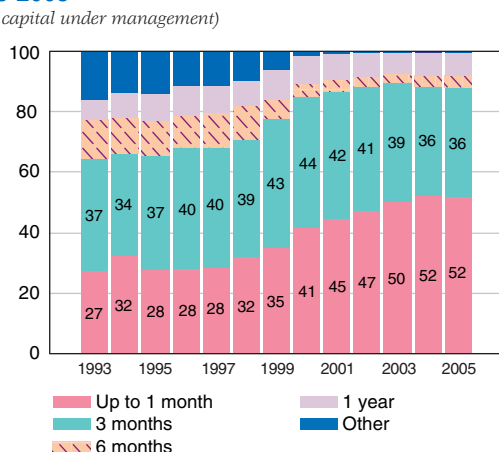


Source: Lipper TASS database (27 September 2006 version).

Note: Only funds launched before 2006.



**Chart 4**  
**Evolution of single-manager hedge fund redemption frequency 1993-2005**  
 (% of capital under management)



Source: Lipper TASS database (27 September 2006 version).

strategy can be obtained by summing separately net flows of funds that have experienced net outflows or net inflows.<sup>25</sup> Moreover, it is quite likely that aggregate net flows into the hedge fund sector may be dependent on macro-financial factors.<sup>26</sup> Hence, econometric models could be used to obtain more timely estimates or even forecasts of expected aggregate net flows on the basis of observable and measurable contemporaneous macro-financial variables.

Little is known about *hedge fund balance sheets and exposures to market risks* and, therefore, it is difficult to foresee how vulnerable hedge funds would be under different market scenarios. However, hedge fund exposures to certain risk factors might be gauged indirectly by applying econometric techniques (e.g. regression methods) or by aggregating qualitative information in hedge fund databases for the markets and assets hedge funds tend to trade in.<sup>27</sup>

In the case of regression methods, moving time windows must contain a certain minimum amount of return observations in order to allow the estimation of market risk factor loadings. As a result, these estimates would represent moving time window averages rather than the desired end-of-period information. Nevertheless, the direction of coefficient changes could be used as an indication of portfolio shifts. Similar difficulties are experienced by the creators of synthetic hedge

fund return replication products aimed at providing hedge fund-like returns more cheaply by investing in traditional liquid assets. It remains to be seen what impact the recent wave of these products will have on hedge fund fees and the sector itself.

Another limitation of indirect approaches based on time series analysis of hedge fund returns is that hedge funds typically report their returns net of all fees, whereas an accurate regression-based estimation would require information on gross returns. Automated transformation of individual hedge funds' returns net of all fees to original gross returns would probably be very complicated due to complex hedge fund fee structures, involving management and performance fees, high watermarks, hurdle rates and possibly other hedge fund-specific arrangements.

*Leverage* represents the third endogenous vulnerability, since it amplifies the impact of price swings on investment return and, therefore, may lead to involuntary and swift closures of market positions or even to the depletion of investors' capital. As in the case of investor redemption restrictions, some indication of characteristic leverage levels and their possible changes over time could be obtained from hedge fund databases by examining distributions of provided static leverage measures by strategy and by vintage year.

Moreover, leverage might also be assessed indirectly by utilising the same econometric methods used for estimating hedge fund exposures to various market risk factors. In this case, the total elasticity of returns to market risk factors could be interpreted as an indicator of pertinent leverage,<sup>28</sup> although, here again, the same limitations encountered in estimating hedge fund exposures would apply too.

## 4|2 Indicators of banks' exposures to hedge funds

Except for supervisory data or one-off thematic surveys, information on banks' exposures to hedge fund clients is scarce, because banks disclose very little information about their prime brokerage

25 See ECB (2006b), pp. 43-44.

26 See ECB (2006a), pp. 139-142, Box 17 on global search for yield and funding liquidity risks for hedge funds.

27 See ECB (2006b), pp. 50-51.

28 For details, see McGuire, Remolona and Tsatsaronis (2005).

operations. Since a large proportion of hedge funds were and remain domiciled in offshore centres, the BIS data on consolidated bank claims on private non-bank borrowers in offshore centres could have been used for making some inferences on banks' exposures to hedge funds. However, these claims on non-banks may increasingly include claims on special purpose vehicles and other non-hedge fund entities domiciled offshore, which makes such information less relevant for the analysis of banks' links with hedge funds.

Another way of gauging banks' exposures could be to employ commercial hedge fund databases that provide information on prime brokers used by individual hedge funds. In order to estimate the risk profile of prime brokers' hedge fund clients, characteristics of connected hedge funds could be aggregated, for example, by their strategy, size, leverage or return volatilities.<sup>29</sup> Such mapping of the prime brokerage market could be used as a first step towards closer scrutiny of prime brokers' exposures to hedge funds and could allow the detection of possible prime brokers' concentrations on certain hedge fund strategies or other factors that could make them vulnerable to dislocations in certain financial markets.<sup>30</sup>

Banks' agreements on conducting business with hedge funds often include provisions for net asset value (NAV) decline triggers, which allow banks to terminate transactions with a particular hedge fund and seize the collateral held if a fund's NAV declines substantially<sup>31</sup> and the risk of a fund's failure or closure increases. The proportion of hedge funds in a database breaching such triggers may provide an indication of how widespread historically were risks for prime brokers owing to difficulties experienced by their hedge fund clients.

### 4|3 Indicators of risk posed to financial markets

A key risk posed by hedge fund activities to financial markets is related to the possibility of abrupt collective hedge fund exits from crowded trades,

which, however, is not confined only to hedge funds. Therefore, its monitoring would require detailed information gathering and reporting of large exposures by a broader range of market participants, including banks.

Nonetheless, there are some indirect ways of estimating this potential risk. For example, higher pairwise correlations of hedge fund returns within an investment strategy could be interpreted as a symptom of increasingly similar investment positions across hedge funds pursuing that strategy, although it could also be an indication of the strategy's capacity constraints.<sup>32</sup> However, such estimations would not be sufficiently timely and it would not be clear which markets are at risk given the lack of information on hedge fund exposures.

## 5| MAIN INFORMATION GAPS AND SOME POSSIBLE WAYS TO ADDRESS THEM

Comparisons of what is desirable for financial stability monitoring purposes and what is actually available highlight the existence of important information gaps which hinder reliable assessment. Given the information available, most indicators for financial stability analysis need to be developed "bottom-up" by using individual hedge fund data in commercial hedge fund databases, which makes such indicators susceptible to the widely known deficiencies of such databases. Furthermore, most quantitative information either in hedge fund databases or from other sources is available with considerable time lags relative to monitoring needs and it is not available as time series. Only hedge fund returns, capital under management and investor net flows, derived from the latter two, are available as monthly or quarterly time series.

All in all, there is no reliable and timely publicly available information on endogenous hedge fund vulnerabilities, banks' exposures to hedge funds

<sup>29</sup> However, aggregation is complicated by the fact that hedge fund managers indicate the names of different entities within the prime broker's group, and, therefore, the group's structure has to be taken into account. Moreover, future updates of such information have to consider mergers and acquisitions between prime brokers too.

<sup>30</sup> See Garbaravičius and Dierick (2005), pp. 38-41.

<sup>31</sup> NAV decline triggers are often calculated on a monthly, rolling 3-month and rolling 12-month basis with corresponding frequently used NAV decline triggers of 15%, 25% and 40%. See also ECB (2006b), pp. 102-103.

<sup>32</sup> See Garbaravičius and Dierick (2005), pp. 46-49 sub-section on the issue of crowded trades.

and crowded trades. The monitoring and evaluation of hedge fund activities for the financial stability assessment would benefit enormously from better aggregate information on hedge fund activities, particularly with respect to their off- and on-balance sheet positions. Even basic aggregate information on total balance sheets and their breakdowns would make a significant contribution to the construction of the indicators proposed.

However, after identifying desirable information and checking it against available data for remaining information gaps, it is still not obvious how this enhanced transparency could be achieved, i.e. who (banks or hedge funds) could be asked to provide more and better information, to whom it should be provided (to the public or confidentially to supervisors, who would then disclose aggregated information publicly) and the details of what exactly should be reported. The answers to these questions go beyond the scope of this article, but they presumably will emerge after the ongoing global discussions on hedge fund transparency address these practical issues.

Proposals should include input from the private sector, foremost hedge funds and prime brokers, and would preferably take the following three elements into account:

- First, any disclosure enhancements should aim at making more aggregate information available to all

market participants. The aggregation of individual hedge fund disclosures should alleviate hedge funds' concerns that too much transparency may adversely affect their trading strategies. In this context, it is useful to bear in mind that weekly public information on open positions in exchange-traded derivatives has not been harmful; on the contrary, has proven very useful for various market participants. Another notable example relates to mandatory and publicly available 13-F filings of long holdings of equity securities publicly traded in the US by managers of large equity portfolios (having an aggregate fair market value of at least USD 100 million) with the US Securities and Exchange Commission.

- Second, it is important that any reporting on hedge fund activities would be done by using a highly standardised template in order to ensure meaningful comparisons and easy aggregation across strategies and countries. Nevertheless, it may prove challenging to devise such a template, not least given the diversity of hedge fund strategies and risk profiles.

- Finally, in order to have a complete picture of risks to the smooth functioning of financial markets and ensure a level playing field, banks and other highly leveraged institutions (HLIs) would ideally report similar information (if not already available) together with hedge funds, and such information would also be included in regular (e.g. quarterly) publicly available aggregate statistics.

*Alternative investment vehicles may require alternative monitoring approaches for financial stability purposes. Hedge funds provide a typical example of this. Most quantitative information, which is usually obtained from hedge fund databases or quarterly industry reports, is available at time lags and frequencies which do not meet monitoring needs, and is unavailable as time series. Bilateral disclosures to investors on investment terms and to both banks and investors on risk profiles need to be timely and sufficient in order to effectively contribute to risk management and counterparty discipline. Such disclosures are reportedly improving, partly in response to demands from institutional investors. There is, however, insufficient public information on hedge fund risk profiles. Without sufficient publicly available information, the monitoring of hedge fund activities from the financial stability perspective by public authorities becomes a major challenge. Such monitoring is of importance given that prime brokers' and investors' risk appetite may vary substantially owing to competitive pressures and financial market conditions, and a weakening of counterparty discipline cannot be excluded. The aggregation of individual hedge fund data for public reporting purposes should alleviate hedge funds' concerns about the confidentiality of their proprietary trading strategies.*

*Most of the remaining information gaps could be addressed through better information on hedge fund balance sheets, which could significantly advance the monitoring of hedge fund activities for the assessment of financial stability by improving the quality of indicators relating to endogenous hedge fund vulnerabilities, to banks' exposures to hedge funds and to crowded trades. Such information would usefully complement the information obtained by public authorities through their market surveillance and would enhance the analysis of prevailing trends and the potential build-up of vulnerabilities.*



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