

FINANCIAL STABILITY FORUM

**Report of the Working Group on
Highly Leveraged Institutions**

5 April 2000

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Preface

At its inaugural meeting on 14 April 1999, the Financial Stability Forum (FSF) established an ad hoc Working Group on Highly Leveraged Institutions. Mr. Howard Davies, Chairman, Financial Services Authority, United Kingdom, chaired the Group.

The Group's report was submitted to the Financial Stability Forum for discussion at its meeting in Singapore on 25-26 March 2000. The Financial Stability Forum welcomed the report and endorsed its recommendations.

As Chairman of the Forum, I have transmitted the report to the G-7 Ministers and Governors. I have also forwarded it to the G-20 Ministers and Governors, and to the heads of the IMF and the World Bank, with the request that the reports be forwarded through Executive Directors to Ministers and Governors in anticipation of the April meetings of the International Monetary and Financial Committee and the Development Committee.

The Forum urged national authorities, international financial institutions, and the international groupings and other agents referred to in this report to consider promptly the Group's recommendations and to take the necessary actions to implement them.

Andrew Crockett
Chairman

Report of the Working Group on Highly Leveraged Institutions

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I. Executive Summary

1. The Working Group was asked to assess the challenges posed by highly leveraged institutions (HLIs) to financial stability and to achieve consensus on the supervisory and regulatory actions which would minimise their destabilising potential. Its creation followed two main episodes. First, the near-collapse of Long Term Capital Management (LTCM), which raised concerns about the potential systemic risks posed by a HLI. Second, the spillover effects from the 1997/8 crises in Asia and Russia, when the authorities in some small and medium-sized open economies were concerned that HLIs had exerted a destabilising impact on their markets.
2. The Working Group's main focus has been on firms categorised by the Basel Committee on Banking Supervision (Basel Committee) and International Organisation of Securities Commissions (IOSCO) as large, unregulated and opaque institutions employing a high degree of leverage in financial markets – primarily 'hedge funds'. But regulated firms and their affiliates also played important roles in both episodes. In the case of LTCM, they provided the credit that allowed the accumulation of the fund's leverage. And, in the episodes affecting market dynamics in small and medium-sized open economies, the proprietary trading desks of banks and securities firms were active market participants alongside hedge funds.
3. The key issues arising from the LTCM episode are twofold. First, how best to address the systemic risks arising from the accumulation of high levels of leverage in financial markets. Second, how to reduce the potential market and economic impact of the sudden and disorderly collapse of an unregulated HLI. In the market conditions of late 1998, the disorderly liquidation of a hedge fund as large and as leveraged as LTCM could also have imposed substantial direct losses on its counterparties. Significant secondary losses could have been imposed on other firms, through the rapid liquidation and closing out of LTCM's positions and the collateral supporting its funding. The potential widespread disruption in financial markets and possible collapse of some major firms would have posed grave dangers to the stability of the financial system and the health of the global economy. The Report stresses the importance of leverage, particularly in the context of large players with complex market and credit exposures. Although leverage itself is neither strictly synonymous with risk nor straightforward to define, high leverage - and its interaction with other elements of risk – can nevertheless produce significant concerns from the perspective of the financial system as a whole.
4. The market dynamics issues relating to HLI activities in small and medium-sized open economies are: the potential for large and concentrated positions seriously to amplify market pressures, and the risk that market integrity may be compromised by aggressive trading practices. The Working Group examined the experiences of six economies in whose markets HLIs were active during 1998. Even in the absence of HLI activity, there would certainly have been considerable market pressure in these economies at the time because of vulnerabilities in their economic structures or financial systems or the size of

external shocks they faced. In unsettled and fragile conditions, large and concentrated HLI positions have the potential materially to influence market dynamics. Although the Working Group was concerned about some of the practices of HLIs identified in the six case studies, it was not able to reach a firm conclusion on their scale and the implications for market integrity.

5. These issues merit a concerted international policy response, involving actions by HLIs themselves, regulated firms, industry groups, supervisors and regulators, and national and international bodies. The Working Group recommends a package of responses, which it considers to be consistent, complementary and commensurate to the problems identified. A strong theme uniting most of these measures is the critical importance of promoting and sustaining adjustments in firm behaviour and enhancing market discipline. The first eight recommendations set forth below relate predominantly to systemic risk issues, while the last two have particular relevance to market dynamics issues.
 - ⇒ ***Stronger counterparty risk management.*** Improved counterparty risk management is critical to addressing concerns about the accumulation of excessive leverage in the financial system. All financial institutions acting as counterparties to HLIs should review their counterparty risk management arrangements against the recommendations promulgated by the Basel Committee, IOSCO and Counterparty Risk Management Policy Group (CRMPG). These cover: firms' overall risk management framework; systems for counterparty credit assessment and on-going risk monitoring; exposure measurement methodologies; limit setting procedures; collateral, documentation and valuation policies and procedures; legal risks; and systems for reporting to senior management. Where those arrangements are inadequate, firms should not operate in highly risky and volatile instruments and markets, or with counterparties offering positions in such markets. Regulators and supervisors should reinforce this message.
 - ⇒ ***Stronger risk management by hedge funds.*** Some hedge funds have prepared sound practices for risk management, internal controls, disclosure/transparency and documentation and have promoted increased informal dialogue with market authorities. That is encouraging. It is crucial that such practices permeate throughout the hedge fund community.
 - ⇒ ***Enhanced regulatory oversight of HLI credit providers.*** Enhanced regulatory and supervisory oversight of credit providers is needed to ensure that sound practices are pursued and recent improvements in practices are locked in. Supervisors and regulators in all countries should take appropriate steps to determine the extent of institutions' compliance with the Sound Practices promulgated by the Basel Committee and IOSCO (in conjunction with the recommendations of the CRMPG) and take action where they identify deficiencies. That may involve: greater intensity of supervisory and regulatory oversight of regulated institutions which fall short of sound practices; requiring regulated institutions to provide periodic affirmations of their compliance with sound practices; greater use of the supervisory review process following 'Pillar II' of the Basel

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proposals¹ and restricting the ability of firms to carry on business with HLIs where they consider that firm's counterparty risk management practices to be deficient.

- ⇒ ***Greater risk sensitivity in bank capital adequacy regulation.*** The Working Group supports the objective of the Basel Committee consultative document to revise the Capital Accord. This should increase the degree of risk sensitivity in bank capital adequacy regulations.
- ⇒ ***Sustaining industry progress.*** There are important areas of counterparty risk management where further work is required, both at the industry level and in individual firms. These include refining measurements of potential future exposure, developing better stress testing, the development of liquidity risk measures, collateral management techniques and use of external valuation. The Working Group has encouraged the formation of a small group consisting of representatives of the Basel Committee and IOSCO to assess industry progress in these areas.
- ⇒ ***Building a firmer market infrastructure.*** The Working Group strongly commends further steps to improve documentation harmonisation across different products, collateral practices and valuation practices. National authorities should work to ensure that their bankruptcy laws allow certainty to market participants that positions can be closed and collateral realised in such an eventuality.
- ⇒ ***Enhanced public disclosure by HLIs.*** The Working Group firmly supports the objective of enhancing public disclosure by HLIs and endorses US efforts to achieve this through both regulation and legislation. It calls on all jurisdictions to consider the adequacy of their own disclosure requirements and introduce, where necessary, appropriate changes to legislation or regulations to ensure that major funds located in their jurisdictions are subject to complementary disclosure requirements. This recommendation should also apply to offshore centres, particularly those which currently host large unregulated hedge funds.
- ⇒ ***Enhanced public disclosure practices generally.*** The Multidisciplinary Working Group on Enhanced Disclosure endorsed by the Financial Stability Forum (FSF) provides an important opportunity for movement towards improved and more comparable risk-based public disclosure among all types of financial institutions, including hedge funds. The Working Group urges firms taking part in the study to take full advantage of the opportunity to engage in a forward-looking and practical discussion of how disclosure practices should be improved.
- ⇒ ***Enhanced national surveillance of financial market activity.*** Authorities should consider strengthening market surveillance at the national level with a view to identifying rising leverage and concerns relating to market dynamics and, where necessary, taking appropriate preventive measures. There are also improvements to

¹ "A New Capital Adequacy Framework". Consultative paper by the Basel Committee (June 1999).

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market transparency which might be of value to market participants and the official sector alike. Particular areas that could be explored include enhancing existing foreign exchange and over the counter (OTC) derivatives markets data, for example by broadening currency breakdowns.

- ⇒ ***Good practice guidelines for foreign exchange trading.*** Leading foreign exchange market participants should review and, as necessary, revise existing market codes and guidelines and take the responsibility of articulating model guidelines of good trading practices in the light of concerns expressed about trading behaviour in foreign exchange and related markets. These could serve as a starting point for local adaptation in individual emerging market economies.
6. The Working Group also considered, but did not recommend, a further range of potential policy options including an international credit register specifically directed at HLIs and direct regulation of currently unregulated HLIs. However, it notes that reconsideration of these proposals may be appropriate in the future. While it is difficult to be precise about the circumstances that might lead to this, the failure to carry through properly the recommended measures within this Report is likely to prompt such a reconsideration.
 7. In many of the above areas, considerable work has already been done, or is under way, by private and public sector organisations. In particular, the reports of the Basel Committee's Working Group on HLIs², the US President's Working Group (PWG)³, the International Swaps and Derivatives Association (ISDA) 1999 Collateral Review⁴, the CRMPG⁵, the IOSCO Hedge Fund Task Force⁶ and a group of five large hedge fund managers⁷ (together with a separate report by Tiger LLC) contain useful analysis and recommendations on issues relating to HLIs.
 8. Taking forward the full range of these initiatives, and in particular ensuring that the changes required to strengthen market discipline are sustained, will require considerable effort. It is critical that these measures are carried forward with high priority by all the agents identified in this Report. This work becomes more pressing given the pace of financial market development, the degree of financial market inter-relationships and the complexity inherent in many new products.

² Banks Interactions with Highly Leveraged Institutions and the accompanying Sound Practices for Banks Interactions with Highly Leveraged Institutions (both January 1999). See also the follow up report on the Implementation of the Committee's Sound Practice Guidelines relating to Banks' Interactions with Highly Leveraged Institutions (January 2000).

³ Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management (April 1999).

⁴ ISDA 1999 Collateral Review.

⁵ Improving Counterparty Risk Management Practices (June 1999).

⁶ Hedge Funds and Other Highly Leveraged Institutions (November 1999).

⁷ Sound Practices for Hedge Fund Managers (February 2000).

II. Introduction

9. The HLI Working Group, set up at the first meeting of the Financial Stability Forum (FSF) in April last year, was asked to assess the challenges posed by highly leveraged institutions (HLIs) to financial stability (both in major international markets and in smaller economies) and to achieve consensus as to the supervisory and regulatory actions which would minimise their destabilising potential. Besides being asked to take stock of other initiatives, to consider the need for further impetus on recommendations already made and to improve co-ordination between work already under way, the Working Group was also asked to identify issues which had not been covered by the existing work. The full terms of reference, and group membership, are attached as Annexes A and B respectively.
10. The Working Group held six meetings, including a full day of consultation with private sector representatives from the Counterparty Risk Management Policy Group (CRMPG), International Swaps and Derivatives Association (ISDA), the Institute of International Finance and several large hedge funds.
11. The creation of the Working Group followed two episodes which brought the potential impact of HLIs' activities on financial stability to the attention of public authorities.
12. The near-collapse of Long Term Capital Management (LTCM), during the market turmoil in the early autumn of 1998, raised serious concerns about the potential systemic risks posed by an HLI, which had built up very large and concentrated positions in a number of markets and products. These positions and their size made LTCM, and some of its counterparties, particularly vulnerable to the turbulent financial market conditions that followed the devaluation of the rouble and the unilateral declaration of a debt moratorium by Russia in August 1998. There was subsequently a risk that LTCM's financial problems (exacerbated by high degree of leverage) could be transmitted to other institutions through their exposures to LTCM or positions in affected markets. This could possibly have led to serious systemic consequences for financial markets and the global economy. This could have been exacerbated by legal and practical problems involved in securing an orderly liquidation of a fund as large and as complex as LTCM. Despite the unique aspects of LTCM's position, its high leverage and the lack of adequate safeguards by counterparties were symptomatic of a more fundamental problem of loose credit practices.
13. The second episode of concern related to the possible spillover effects from the 1997 Asian crisis to a number of countries during the course of 1998. The authorities in the affected economies have for some time raised the concern that the activities of HLIs in their markets during that period had a destabilising impact, had implications for market integrity and could have potentially damaged their economies. To look specifically at these market dynamics issues, the Working Group set up a study group (referred to as the 'Market Dynamics Study Group') under Charles Adams of the International Monetary Fund (IMF), to consider the impact of HLIs on small and medium-sized open

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economies. Market Dynamics Study Group members visited six economies which suffered foreign exchange pressures during 1998, speaking to both the authorities and private sector market participants, and met a number of internationally active financial institutions and large macro hedge funds. The outcome of the Market Dynamics Study Group's work, based in large part on country case studies, was reported back to the Working Group earlier this year. The Market Dynamics Study Group's report is attached as Annex E.

14. The Working Group's interim report, which described the work in progress and pointed to the areas in which recommendations were likely, was endorsed by the FSF in September 1999. This final Report presents the Working Group's conclusions and policy recommendations. The Report is structured as follows:
 - **Section III** defines the institutions which can be characterised as HLIs and explains their market functions and strategies;
 - **Section IV** describes the problems which may be associated with the activities of HLIs both in the area of systemic risk and in relation to their potential effects on the dynamics of small and medium-sized open economies;
 - **Section V** explores a range of proposed solutions to these problems, considering the potential benefits and costs of each in turn; and
 - **Section VI** briefly draws some conclusions.

III. HLIs: What they are and what they do

15. In our consideration of the issues of systemic risk that arose from the LTCM episode, we have focused on the type of firms categorised by the Basel Committee and IOSCO as unregulated, opaque and large institutions employing a high degree of leverage in financial markets. Most of the institutions falling into this category of HLIs are large, highly leveraged hedge funds. As all the reports on this episode have concluded, LTCM became a source of potential systemic risk through leveraged investments in a range of financial instruments. The funding for those positions was willingly provided by financial firms⁸, most of whom were regulated. In turn, some of these regulated firms and their unregulated affiliates engaged in activities very similar to, if not on the same scale as, those of LTCM (that is, they employed leveraged position-taking strategies), at times in the same instruments and in the same markets.
16. In assessing the impact on market dynamics of the activities of HLIs in small and medium-sized open economies, our initial focus was also on the activities of certain very large ‘macro’ hedge funds known to deploy leverage in their position taking. But, as our analysis in this area developed, it became clear that we needed to broaden the investigation to bring in regulated firms as well, including the proprietary trading desks of banks and securities firms, which sometimes play similar roles. It is nevertheless useful to note both common elements and differences between them. Despite these differences, which relate in large part to the two issues of systemic risk and market dynamics covered in this Report, we use the general term ‘HLI’.
17. A characteristic common to all the types of firms considered in this Report, whether acting as principal or counterparty credit provider, is their use of leverage. Measuring leverage⁹ is neither straightforward nor synonymous with measuring risk. But, as we explain in Section IV, we remain firmly of the view that, from the perspective of the stability of the financial system, high leverage (and the means through which it interacts with credit, market and liquidity risk) can give rise to significant concern.
18. A second element relates to transparency, both to market participants and to counterparties. Hedge funds face limited public disclosure requirements as they do not usually list securities on exchanges and tend to raise much of their capital from high net worth individuals and institutional investors. In the case of other HLIs, such as publicly quoted banks and securities firms, considerable information is often widely available through audited accounts and other disclosures made by the institutions themselves or by the parent companies. However, the information provided through such accounting disclosures on the leverage employed and the degree of risk undertaken by a firm, may sometimes benefit from including additional risk-based information.

⁸ And, to some extent, through organised exchanges.

19. A third element relates to regulatory or supervisory oversight. Here there are significant differences between hedge funds and other leveraged trading entities. Hedge funds are subject to little or no regulatory or supervisory oversight and are therefore not constrained by regulatory capital requirements, limits on credit concentrations, standards for sound risk management and the controls on market, credit and liquidity risk that apply to many regulated firms. It is arguable that the unregulated affiliates of large investment banks share some of these characteristics, though they are part of larger public companies and their activities are better known to supervisors and regulators. Some large, unregulated non-financial firms also share many of these characteristics.

Hedge Funds – a closer look at types, investment styles, and industry trends

20. Although there is no universally-accepted definition, the term ‘hedge fund’ is frequently used to refer to “any pooled investment vehicle that is privately organised, administered by professional investment managers, and not widely available to the public” (report of the PWG, 1999). The term ‘hedge fund’ was coined in the 1950s to describe any investment fund that used incentive fees, short-selling and leverage. Typically, hedge funds employ dynamic (and sometimes opportunistic) trading strategies which involve taking positions in several different markets and adjusting their investment portfolios frequently, to benefit either from an anticipated asset price movement or from an anticipated change in the price differential between related securities. An important characteristic of the hedge fund industry is its diversity in terms of firm size, trading strategies and use of leverage. A more detailed discussion of the industry (including an analysis of the different types of funds), and its recent evolution, is included at Annex D in a paper prepared for the Working Group by the IMF.
21. Many hedge funds are registered in offshore financial centres, though the fund managers for offshore funds are typically located in major financial jurisdictions such as New York, London, or other large European or Asian financial centres. There is little direct regulation of hedge funds in the US or other countries. Those hedge fund managers who are registered as US Commodity Pool Operators (CPOs), and those advisors who are registered as Commodity Trading Advisors (CTAs), must comply with the relevant provisions of the Commodity Exchange Act. Hedge funds that carry out their transactions through organised exchanges are subject to the rules of those exchanges.
22. Because hedge funds are under few obligations to disclose information, either publicly or to regulators, it is difficult to estimate the size of the industry accurately. Estimates of the number of funds and total capital under management of hedge funds are based on

⁹ Leverage is discussed in more detail in Section IV.

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information voluntarily provided by hedge funds to commercial data vendors and vary enormously. The wide range of estimates reflects not only the opacity of the industry, but also conceptual ambiguity over how to define hedge funds. The US PWG report (1999) estimated that, as of mid-1998, there were between 2,500 and 3,500 hedge funds managing between \$200 and \$300 billion in capital, with approximately \$800 billion to \$1 trillion in total assets.

23. According to industry observers, hedge funds have experienced rapid growth over the past ten years. Most hedge funds (probably more than 80 percent of them) are small, with capital under management below \$100 million. The PWG noted that according to CPO filings with the Commodity Futures Trading Commission (CFTC), there were only a few dozen funds with a capital base larger than \$1 billion, at end-1998.
24. The risk-return profiles of hedge funds are shaped by their trading strategies. There is a wide variety of 'investment styles' in the hedge fund industry (for example, global macro funds, market neutral funds, event driven funds, short sellers) and a large diversity of trading strategies employed by funds in the same investment category. Based on the available data, the average US dollar returns on hedge funds over the last decade are comparable with the returns on benchmark US equity indices. The return volatility of hedge funds generally depends on their investment styles and there is no conclusive evidence that the returns across the various types of hedge funds are less (or more) volatile than the returns on mutual funds or market indices.
25. The amount of leverage used by hedge funds largely depends on their trading strategies, which are generally determined by their investors' preferences and attitudes towards risk. Leverage typically arises because hedge funds use financial instruments (such as repos, futures and forward contracts and other derivative products) where positions can be established by posting margins rather than the full face value of the position. This leverage is established from relationships with financial institutions, either through counterparty transactions or through use of prime brokerage services, which often involves the additional provision of a number of custodial, record-keeping, clearing, financing and risk management facilities. Hedge funds only infrequently obtain conventional loans from financial institutions.
26. The estimates of leverage reported by different data vendors vary, sometimes reflect different definitions (although these are usually confined to on-balance-sheet leverage) and are based on information voluntarily provided to them by hedge fund managers. While there are many problems with these data, the estimates derived from these sources would suggest that most hedge funds use modest on-balance sheet leverage, with an average ratio of 2:1. 'Market neutral' funds have the highest on-balance-sheet leverage ratio with an average of around 4:1.
27. Other entities with similar trading strategies include CTAs and the proprietary trading desks of commercial and investment banks. Because the measures of leverage reported by hedge funds to commercial data vendors differ from those reported by investment

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banks both in terms of quality and coverage, it is difficult to determine whether hedge funds on average employ more (or less) leverage than these other institutions¹⁰.

28. Evaluating the risk-adjusted performance of hedge funds is difficult because of their dynamic trading strategies. Further, because of the relatively short available history of hedge funds' returns, conclusions about their past (and, by some accounts, 'superior') risk-adjusted performance have to be treated with caution¹¹. The Working Group recognises that hedge funds' ability and willingness to take positions can sometimes make them important providers of liquidity to financial markets. Some wealthy individual investors (and some financial institutions acting in the collective interest of other investors) believe that hedge funds can provide substantial diversification benefits, because their returns typically have relatively low correlation with standard asset classes. Some hedge funds may also be used for 'downside' risk management.
29. While, traditionally, hedge funds have been popular with high net worth individuals and endowments, many have recently experienced increased interest from a broad range of institutional investors. This trend appears likely to continue, especially as institutional investors seek to diversify their portfolios further and seek methods of enhancing risk-adjusted returns. Increased private pension provision in a large number of both developed and developing countries is also likely to increase the demand for alternative investment vehicles.
30. It also seems clear that, in response to increased investor interest, some financial intermediaries have been setting up hedge funds within their asset management groups. Greater demand for 'market neutral' products¹² will almost certainly lead to increased involvement in provision of alternative investment products by 'mainstream' financial intermediaries. Such firms are expected to ensure that clients used to more traditional investment products are fully aware of the risks of the more complex products they are being offered.
31. There have also been reports that other financial intermediaries have scaled back their proprietary trading activities since the autumn of 1998. Some have outsourced their proprietary trading risk to hedge funds. The firms in question argue that this allows them better to control the risk that they are prepared to run, as the downside would be limited to the extent of their equity investment. Although there may well be merit in this

¹⁰ It should be noted that many large, non-financial firms have also been active in taking large positions in both exchange-traded and OTC derivatives markets. These include a cross-spectrum of international industry and, in some cases, governmental entities.

¹¹ One concern about measuring performance is that the incentive structure for hedge fund managers may lead to a particularly strong survivor bias. The typical combination of a high performance fee along with a high watermark (that means no performance fees are payable until losses have been recouped) gives managers a strong incentive to close down a fund with high losses.

¹² A 'market neutral' hedge strategy takes long and short positions in such a way that aims to minimise the impact of overall market movements.

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argument, reputational risks and conflicts of interest may arise if a firm is both an equity investor in a fund and a counterparty/provider of credit to it.

32. It is likely that investors will try to diversify their holdings across more hedge funds, which will probably further stimulate the growth of funds of funds. This could weaken the incentives of underlying investors to perform due diligence, although managers of funds of funds could assume an important role in enhancing market discipline.
33. As our analysis shows, there are considerable uncertainties about the size, characteristics and performance of the hedge fund sector. The IMF paper at Annex D shows that there are gaps and unexplained inconsistencies between the various data sources. Given the sector's growing significance, both public authorities and market participants would benefit from better and more consistent data. We understand that the IMF will refresh its helpful analysis as part of its ongoing surveillance of international capital markets.

IV. The problems and potential problems for financial stability

34. With hindsight, 1998 may well come to be recognised as something of a watershed year. Various economic and financial events created a potential deflationary process and challenged long-established beliefs about the behaviour of economies and financial markets. This inspired calls for reform of a financial architecture that had been in place since the creation of the Bretton Woods institutions in 1944. As part of this process, the G-7 finance ministers and central bank governors created the FSF, and it quickly focussed on HLIs as one of its tasks. Two related episodes in 1998 highlighted the potential impact of HLI activities. The first was the build-up in leverage in key financial markets in the summer of 1998 and the potential knock-on effects of the near-collapse of LTCM amidst the extraordinary unsettled market conditions that accompanied Russia's unilateral debt moratorium and devaluation in August. The second was the spillover effect of the Asian crisis to other economies the Asia-Pacific region. A number of authorities in affected economies raised concerns that large and concentrated positions by HLIs in their markets - together with various aggressive practices - were helping to fuel these spillovers, with adverse implications for market stability and integrity.
35. Both episodes have been the subject of a number of studies which have been reviewed by the Working Group. As noted in paragraph 13, the Working Group also carried out a study of its own of the impact of HLI activities on market dynamics in a number of small and medium-sized open economies. In this section, we set out our characterisation of the issues, or potential problems, for financial stability raised by these episodes. We first examine the potential systemic effects arising from the build-up of leverage and the collapse of a large HLI. We then look at the potential impact of HLIs on market dynamics and market integrity in small and medium-sized open economies.

Potential systemic effects arising from the build-up of leverage and the collapse of a large HLI

36. In the Working Group's view, the key systemic risk issues for policy makers arising from the events in financial markets of the summer and autumn of 1998 are two-fold, but closely related. First, how best to address and reduce risks arising from the accumulation of leverage – and its interaction with other risks – to levels that pose systemic threats. Secondly, how to lessen the potential market and economy wide impact of the sudden and disorderly collapse of an unregulated HLI. Even though the Working Group is seeking to encourage improved risk management practices in HLIs, it is quite clear that its aim is not to prevent poorly managed HLIs from facing the consequences of their actions – which might include insolvency. We seek rather to minimise the risk of situations where the failure of an HLI would pose systemic risks. In the market turbulence of late 1998, the disorderly liquidation of a fund as large as LTCM could have imposed substantial direct losses on LTCM's counterparties, and

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significant secondary losses on other firms through the rapid liquidation and closing out of its positions and the collateral supporting its funding. In addition, it is unclear that an orderly liquidation of the fund would have been possible due to uncertainties surrounding bankruptcy law and consistency of legal documentation of financial contracts¹³.

37. The disruptions in financial markets in late 1998 were considerable and could have had far-reaching and severe effects. The securities and derivatives markets in which many leveraged players are active have become increasingly important vehicles for intermediating credit through the securitisation of debt. So sudden de-leveraging, or a crisis at an HLI, could negatively affect the financial system, on top of any direct effects imposed on creditors and trading counterparties. This indirect effect operates through sharp price fluctuations and/or drains on liquidity, which may cause severe losses to all major market participants and multiple failures and, in turn, damage financial stability and the economy.
38. In searching for the appropriate remedies to constrain excessive leverage and to counter the risk of knock-on effects from the collapse of an HLI, we need to be clear about the weaknesses that led to LTCM's near failure and the circumstances that made its potential disorderly collapse a serious systemic concern.
39. The near-collapse of LTCM¹⁴ arose from a combination of risk exposures – both at LTCM itself and at other market participants – and unexpected events. LTCM's size, leverage, and concentrated risk taking in a number of markets and products were not typical of most other hedge funds and HLIs. The fund was especially vulnerable to the extraordinary market conditions that arose following Russia's devaluation and unilateral debt moratorium in August 1998. These conditions, in which investors and financial institutions sought to scale back risk and generate liquidity at virtually any price, caused risk spreads and liquidity premiums to rise sharply. The size, persistence and pervasiveness of the widening of spreads confounded the risk management models employed by LTCM as well as many other participants, producing losses that greatly exceeded those their risk models suggested were probable. Further substantial losses arose as the simultaneity of shocks and identical liquidation strategies undermined expected low correlations between markets, revealing some global portfolios to be less well diversified than assumed.
40. In LTCM's case, the sharply diminished market liquidity exacerbated its difficulties in reducing its very large positions. By mid-September mounting liquidity pressures, together with the decline in LTCM's capital, gave rise to serious concern among the fund's principals and counterparties alike that it could collapse abruptly, with adverse

¹³ These issues are covered in the report of the US President's Working Group.

¹⁴ The circumstances surrounding the near collapse of LTCM are described in detail in the report of the US President's Working Group (pp. 10-17).

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consequences for what were already extremely fragile markets. This risk was averted by the voluntary refinancing of LTCM by its major counterparties in late September 1998 and as markets settled in the wake of various other policy measures and announcements in the months that followed. As noted in the US PWG report, the Federal Reserve Bank of New York provided the facilities for these discussions and encouraged the firms involved to pursue the least disruptive solution that they believed was in their collective self interest.

41. Weaknesses in LTCM's risk management systems, and the inadequacy of its capital resources for the scale and risk of its activities were clearly critical to the fund's near failure. LTCM's risk management capacity was not commensurate with the scale and complexity of its operations.
42. The problems at LTCM could not have occurred had the fund's counterparties not allowed it to build positions and assume leverage on a massive scale. A critical issue raised by the LTCM episode was therefore the breakdown in counterparty credit and trading discipline (which went undetected) that should have constrained the amount of leverage and the size and riskiness of the positions it built. In particular, if LTCM's counterparties had applied more appropriate haircuts, initial margin and clean thresholds¹⁵ on exposures to it, a greater check would have been applied to the fund's total leverage.
43. Although LTCM's leverage and large positions may have been highly unusual, it was not the only firm pursuing highly leveraged trading strategies in the summer of 1998. Other institutions – hedge funds and some regulated firms – did so too, if on a lesser scale. Many of these firms had positions in the same markets as LTCM and were similarly exposed. It is questionable whether leverage and positioning on the scale that prevailed in markets in this period could have built-up without a fairly generalised looseness of credit practices and market risk management practices among key participants.
44. As noted in Section III, measuring leverage is not straightforward. The reports of the CRMPG and the Hedge Fund Managers provide helpful characterisations of the elements of leverage in modern financial markets. Each offers several¹⁶ possible

¹⁵ A haircut is the valuation discount applied to collateral placed by a counterparty. Initial margin is a requirement for a sum of collateral to be posted at the time of the transaction. A clean threshold is a requirement for this level of margin to be maintained at all times during the transaction.

¹⁶ These are:

- Gross On-Balance-Sheet Leverage - total on balance sheet assets divided by equity;
- Net On-Balance-Sheet Leverage - (total on balance sheet assets minus matched book assets) divided by equity;
- Gross Economic Leverage - (risky assets plus risky liabilities plus gross off-balance sheet notional) divided by equity;
- Net Economic Leverage - (risky assets minus matched book assets plus risky liabilities minus matched book liabilities plus gross off-balance sheet notional minus hedges) divided by equity;
- VaR Leverage - correlated VaR divided by equity;

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measures of leverage and notes that no one method can be taken as appropriate for all purposes. The CRMPG also notes that leverage is not an independent risk factor but is best assessed by its effects which can be observed in the possible amplification of funding risk, asset liquidity risk and market risk. The report advocates the use of an integrated risk management framework which evaluates the linkages between these factors. The Hedge Fund Managers advocate improvements to the risk management systems of HLIs and increased dialogues with investors, creditors and counterparties. The Working Group broadly agrees with these assessments.

45. But high leverage - and the way in which it interacts with other elements of risk – can produce significant concerns from the perspective of the financial system. First, where leverage increases the risk exposures in a firm, it is left more exposed to positions which turn against it. Second, where a leveraged firm defaults, the effects of unwinding leveraged positions can fall on its creditors, potentially affecting their solvency. Third, leveraged institutions are, all other things being equal, more exposed in the event of losses arising from credit, market or other risks in their portfolios as there is inherently less capital available to absorb the losses. This might mean that they need to close out positions rapidly, with potentially greater effects on market prices. Leverage also enables firms to take larger positions than would otherwise be the case in a given asset or market. Unwinding large positions can further amplify price movements and raise market volatility. This in turn can have unpredictable consequences for the behaviour of prices in other markets and hence for a firm's own positions, and those of counterparties. Arguably, some of these risks can be increased when leverage is provided through more complex instruments. As revealed by the events of the autumn of 1998, the complexity of risk exposures and their interactions can make it extremely difficult for a firm to assess the consequences of a price shock for counterparties' creditworthiness and the firm's own credit exposures.
46. Various reasons have been advanced to explain why counterparty firms failed to constrain LTCM's positions and leverage. One is that neither the balance sheet nor income statements that LTCM provided to counterparties contained enough information about the fund's overall risk profile and concentrations of exposures in certain markets. This minimal disclosure appears to have been tolerated because of the stature of its principals, its impressive track record, an over-reliance on collateral and the perceived business opportunity for the fund's investors and counterparties to profit from a significant relationship with the fund. The consequence, however, was that the main limitation on LTCM's leverage and risk exposures was that provided by its managers and principals. This proved inadequate.

• Asset Liquidity Adjusted VaR Leverage - correlated VaR with liquidation horizon scaled volatilities divided by equity.

47. Due diligence in individual credit decisions is the constraint on leverage, both at any one firm and in the economy as a whole, in a market economy. If a counterparty of an individual lender provides insufficient information for this judgement to be made, as was the case with LTCM, that credit provider should limit exposures accordingly. But that did not happen.
48. Another possible reason for LTCM's high leverage is that its principal counterparties believed that their own current exposures to the fund were adequately collateralised. In retrospect, however, it is clear that collateral practices failed appropriately to assess and provide for potential future credit exposures (PFEs), partly through underestimation of the interaction of market risk, market liquidity risk and credit exposures. In an environment in which the complexity of risk exposures and their interaction is growing, it is worrying that even the most sophisticated firms should have been unable to assess this potential and limit exposures accordingly.
49. Even with better information on LTCM's risk profile, participants might have been unaware of the scale of positions that had been put on in relation to size of markets – both by LTCM and by other market participants. Clearly the build up of the large, concentrated and parallel positions was predicated on illusions about the resilience of market liquidity. The remarkable correlation between previously uncorrelated markets during the market turbulence in August and September 1998, in addition to being a common reaction to negative shocks, reflected simultaneous attempts at liquidating these positions. Given the erosion of liquidity, the assumed liquidation strategies were in practice unachievable without generating large price movements. This made those strategies prohibitively costly. While it is possible that improved information on market depth might have helped participants make more realistic assessments of market liquidity risk, the absence of such information should have been reflected in more circumspect position building and more appropriate pricing.
50. Finally, the episode pointed to a number of weaknesses in market infrastructure that stood in the way of allowing a rapid liquidation of LTCM. These include bankruptcy laws; documentation policies, practices and content; weaknesses in collateral practices; and shortcomings in the sources and availability of external valuations of positions and collateral. These are discussed in more detail in Section V (D) below.

Impact of HLIs¹⁷ on Market Dynamics and Market Integrity

51. The second set of issues addressed by the Working Group was those arising from HLI activities in small and medium-sized open economies.

¹⁷ As noted in paragraph 16, in this section the term HLI includes the proprietary trading desks of banks and securities firms as well as hedge funds.

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52. There are two key public policy concerns. The first relates to the potential for large and concentrated positions seriously to amplify market pressures and spillover effects. The second relates to the potential for market integrity to be compromised by various aggressive practices reportedly used from time to time by some macro hedge funds and the proprietary trading desks of commercial and investment banks. Drawing in large part on case studies of the experiences of six economies¹⁸ in whose markets HLIs were especially active during 1998, the Working Group has sought to assess this potential and to identify the policy issues that arise.
53. In view of the dearth of information about HLI activities and positions in these markets, and the conceptual difficulties in identifying the role played by particular market players, the Working Group's assessment is necessarily judgmental. The six case studies do not cover the full range of experiences with such players in small and medium-sized open economies in recent years. And, given the global and regional situation and some national vulnerabilities, considerable market pressure would clearly have occurred in the six economies during 1998 even if HLIs had not been active in their markets.
54. That said, however, the Working Group is of the view that, in the unsettled and fragile conditions during much of 1998, large and concentrated positions of HLIs and others materially influenced market dynamics in several small and medium-sized open economies. Impacts on market integrity are less easy to identify, in large measure on account of the difficulties in assessing the implications of the various practices that may have been used by HLIs in these markets. From a market participant and policy viewpoint, however, some of these practices raise concerns from the perspective of the orderly functioning of markets.
55. One of the ways HLIs may influence market dynamics is through the establishment of large and concentrated positions relative to the market and other market participants. Such positions can be established as part of their overall strategy. But they can also arise inadvertently if inadequate account is taken of other market participants' positions or of the overall size of the market, or if there is an unexpected contraction in liquidity after positions have been established. The positions may, if known or rumoured, especially in conditions of fragile sentiment, have a chilling effect on other market participants, leading them to move to the sidelines and thereby raise the size required for remaining contrary positions by market players with different expectations. Large positions can also provide HLIs with significant information asymmetries vis-à-vis other market players that could be used at critical times to try to move markets, though they may also make it difficult for the HLI to benefit from such moves, as the act of unwinding a large position could move the market price against the HLI. Of course, and as revealed in other markets by the near-collapse of LTCM, large HLI positions can

¹⁸ Case studies were conducted in Australia, Hong Kong, Malaysia, New Zealand, Singapore and South Africa.

make markets susceptible to sharp reversals when HLIs have to liquidate positions in response to changes in their financial condition.

56. HLI investment styles can also be an important factor in determining how they can influence markets. A common approach of many HLIs — especially macro hedge funds — is strategic position taking ahead of perceived weaknesses in economic performance. Such positioning implies that HLIs may be ‘on the scene’ at time of financial turmoil, but their presence should not necessarily be seen as causing the pressures or destabilising: it may contribute to market efficiency. HLIs may add further to other sources of market momentum if they employ positive feedback trading¹⁹. The Working Group has considered the concern that strategic HLI positioning and positive feedback might under some circumstances become self-fulfilling, a concern frequently cast in terms of the possibility of multiple equilibria. The Working Group believes the risk of self-fulfilling pressures exists but is relatively low when the fundamentals are strong, but the risk of large asset price movements is likely to be higher where there are some fundamental macroeconomic vulnerabilities and sentiment is fragile.
57. The Working Group has also considered whether HLIs may at times also influence market momentum through their practices. The following practices have been cited: heavy selling of currencies at illiquid times to move prices; dissemination of rumours about impending changes in economic policy that seem to correspond to positions already in place (‘talking the book’); correlated HLI position taking, either by coincidence or design, across markets either within single domestic systems (e.g. the Hong Kong ‘double play’) or across international markets with the intention to move prices in the illiquid market and induce spillover effects. These practices and the anecdotal evidence are discussed in more detail in the Market Dynamics Study Group report.
58. Many of these practices are capable of different interpretations. By way of illustration, trading during illiquid times might occur because market participants desire to quickly establish or liquidate positions rather than to move prices. Correlated positions can reflect common strategies based on similar information or the possibility of copy-cat trading. And position taking across correlated liquid and illiquid markets might reflect portfolio diversification rather than strategies such as the double play. The Working Group has found it difficult to determine the scale and impact of these practices; and whether lines of ‘acceptable’ behaviour might have been crossed.
59. Against the background of these considerations, the Working Group’s overall conclusions are as follows:

¹⁹ This refers to buying ‘winners’ (assets that have recently shown high returns) and selling ‘losers’ (assets with poor recent returns). It is also sometimes referred to as ‘momentum-trading’ or ‘trend-chasing’.

60. Under normal market conditions, HLIs do not pose risks for the stability of small and medium-sized markets. Together with other market participants, HLIs can play an important role translating views about the fundamentals into prices and face the same incentives as other market participants to avoid outsized positions. Because of their ability and willingness to take leveraged positions, HLIs can in normal circumstances be an important source of market liquidity and can contribute positively over time to market development.
- From time to time, large and concentrated positions may be established in small and medium-sized markets by HLIs. When this is the case, HLIs have the potential materially to influence market dynamics. The size and duration of the effects can be amplified through herding or other market participants moving to the sidelines and depend critically on the strength of the fundamentals and the behaviour of ‘ongoing’ transactors in the domestic currency.
 - The judgement as to whether HLI positions are destabilising has to be made on a case-by-case basis. Several members of the Working Group believe that large HLI positions exacerbated the macroeconomic situations in several economies in 1998 and contributed to potentially unstable market dynamics. They consider that HLI positions and tactics at times can represent a significant independent source of pressure. Some other members, however, do not think there is sufficient evidence to advance such judgements on the basis of the 1998 experience, given the uncertainty prevailing in markets at that time, some national macroeconomic vulnerabilities and the risks of spillover from the Asian crisis. They believe that the impact of HLIs on markets is likely to be very short-lived and that, provided the economic fundamentals are strong, HLI positions and strategies are unlikely to present a threat to stability.
 - The Working Group is concerned about some of the aggressive practices cited in the case study economies during 1998. Some Working Group members believe that some practices constitute market manipulation and should be a serious source of concern for policymakers. The Working Group as a whole was not, however, able to reach a firm conclusion on the scale of these practices and the implications for market integrity.

V. Policy Options

61. The Working Group considered a wide spectrum of possible policy responses. These included:
- responses by HLI credit providers (both at individual firm level and industry wide initiatives), in particular to upgrade their own risk management systems and to strengthen their understanding of their HLI counterparties;
 - enhancements to HLIs' own risk management systems;
 - enhanced supervisory and regulatory oversight of HLI credit providers, including possible revisions to capital charges;
 - improvement in the financial market infrastructure;
 - more extensive aggregate information on financial market activity;
 - enhancements in HLI transparency, whether through confidential reporting to regulators, Credit Registers accessible to credit providers or public disclosure of on- and off-balance sheet financial information;
 - greater transparency by HLI credit providers;
 - guidelines for the behaviour of market participants, especially in FX markets;
 - improvements to international financial market surveillance;
 - a system of direct HLI regulation.
62. In many of these areas, considerable work has already been done, or is under way, by private and public sector organisations. A summary of recommendations made so far by official sector and industry groups relating to HLIs is attached at Annex C. We hope this summary is in itself a useful contribution to understanding, both in the official sector and in the financial industry. The summary paper considers the reports of the Basel Committee's Working Group on HLIs²⁰, the US President's Working Group (PWG)²¹, the International Swaps and Derivatives Association (ISDA) 1999 Collateral Review²², the CRMPG²³, the IOSCO Hedge Fund Task Force²⁴ and a group of five large hedge fund managers²⁵ (together with a separate report by Tiger LLC). These reports contain useful analysis and recommendations on issues relating to HLIs. In each

²⁰ Banks Interactions with Highly Leveraged Institutions and the accompanying Sound Practices for Banks Interactions with Highly Leveraged Institutions (both January 1999). See also the follow up report on the Implementation of the Committee's Sound Practice Guidelines relating to Banks' Interactions with Highly Leveraged Institutions (January 2000).

²¹ Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management (April 1999).

²² ISDA 1999 Collateral Review.

²³ Improving Counterparty Risk Management Practices (June 1999).

²⁴ Hedge Funds and Other Highly Leveraged Institutions (November 1999).

²⁵ Sound Practices for Hedge Fund Managers (February 2000).

case, the Working Group has reviewed the material produced and, as appropriate, made recommendations for the continuation and co-ordination of that work. In other areas, further work, including new initiatives, is recommended.

63. Out of this menu of policy options, the Working Group has settled on a package of responses, which it considers to be consistent and complementary. In a number of areas they go beyond work currently underway. The strong themes which unite the measures supported by the Working Group are the critical importance of (i) enhancing market discipline and (ii) promoting and sustaining adjustments in firm behaviour.
64. Market discipline is the principal means through which risk and leverage are controlled in non-command economies. Such discipline acts through investors and credit providers fully assessing the risks involved in their decisions to allocate capital and behaving in a way commensurate with those risks. This involves having a clear understanding of the risks attached to a particular counterparty and transaction; seeking appropriate and robust means of mitigating those risks; pricing the risk appropriately; allocating capital in quantities which are commensurate with the risk and pricing; and then continuing to monitor, and respond to, changes in the counterparty risk profile. A number of conditions are necessary for market discipline to operate effectively: capital markets must be open; information on the counterparties' liabilities and risk must be readily available (including its exposure to system-wide risks); no bailout of the counterparty should be anticipated; and corporate governance procedures must be in place to ensure better that the managements of borrowers and creditors respond to market signals. Nevertheless, the measures advocated do not rely solely on market discipline but also seek to support it by improved supervision and regulation of HLI credit providers (including revised bank regulatory capital charges); a firmer market infrastructure; increased HLI disclosure; and enhanced national market surveillance. Such actions should complement market forces.
65. In relation to market dynamics issues, one of the critical issues is the importance of adjustments in individual firm behaviour in small and medium-sized open economies. As well as ensuring that their market practices conform to acceptable behavioural norms, firms must appreciate that the limited liquidity and depth of these markets can cause troublesome market dynamics and that it will usually be in their collective interest to adhere to agreed norms of behaviour which reflect the particular features of those markets.

1. Policy Measures Designed to Mitigate Systemic Risks

A. Stronger counterparty risk management

66. Improved counterparty risk management is a core response to the issues identified in the preceding section. As noted earlier, HLIs accumulate leverage and undertake positions in financial instruments through credit providers and intermediaries – principally banks

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and securities firms. It is fundamental to the efficient functioning of the market mechanism, and the discipline markets exert on private sector agents, that it is in the self-interest of each credit provider to obtain sufficient information to assess the risk profile of each of its counterparties – whether they are HLIs or not. It should also be in its self-interest to assess and price appropriately the credit it extends to its counterparties, and then to monitor the risk associated with that exposure. Market discipline should limit the extension of credit from the financial system and thus provide a constraint on any HLI's ability to accumulate excessive leverage.

67. If, as was the case with LTCM, this market discipline breaks down, then institutions must respond by adjusting their policies for dealing with HLIs. This should include assessing the adequacy of: their own due diligence process; bilateral information flows; margining policies and procedures; exposure measurement and monitoring systems; stress testing arrangements; limit setting; collateral policy; documentation and valuation procedures; legal arrangements; and senior management reporting. Having identified weaknesses, they should make appropriate adjustments to the way they conduct business with HLIs. This might include improved due diligence (including better bilateral information flows), tighter risk management arrangements, adjustments to pricing structures to reflect better the risk of particular transactions, limits on levels of business with individual counterparties or HLIs as a group and reviewing the appropriateness of doing business with highly leveraged, opaque counterparties. Firms with risk management arrangements inadequate to address large or complex transactions or particular counterparties would be expected to stop doing business with them or take other steps to compensate for the higher degree of risk involved in such transactions.
68. Industry initiatives, such as the CRMPG, can also play an important role in building on improvements at the level of the individual firm by raising market standards for dealing with complex risk management issues. Leading industry representatives have an important role through collectively assessing the deficiencies in institutions' due diligence, information flows, general risk management processes and broader market practices. They can also identify practical steps for addressing the weaknesses, and propose sound practices that should be adopted by firms that do business with HLIs. Creditors and counterparties can collectively discuss appropriate methods for improving information flows without raising concerns about the inappropriate dissemination of proprietary information. Industry counterparty risk management standards can be raised by spreading 'best practice' from the leading firms in the industry to other firms.
69. Changes at individual firms – supported by 'best practice' recommendations by leading industry practitioners – are essential adjustments and fundamental to containing the risks presented by HLIs. It is critical that any additional policy responses do not damage firms' incentives to strengthen their counterparty risk management standards and to price risk appropriately. Instead they should complement these adjustments and reinforce market discipline.

70. This is a recurrent theme in reports produced by the both the public sector (Basel Committee, IOSCO and the US PWG) and the private sector (most notably the CRMPG). The Working Group has considered these reports and synthesised their key recommendations for enhancements to counterparty risk management policies. These recommendations are summarised in Annex C under the heading Risk Management of HLI Exposures in Regulated Firms. *The Working Group commends these measures strongly to financial institutions and recommends that these practices be followed diligently by both regulated and unregulated credit providers to HLIs. Financial institutions providing custodial, record keeping, clearing, financing and risk management facilities to HLIs through prime brokerage arrangements should also consider the adequacy of these arrangements.*
71. This recommendation should not be seen as a ritual exhortation. While firms have made progress overall, we do not believe that the progress made so far is sufficient to remedy all of the weaknesses in risk management practices that became evident in 1998. Even firms at the leading edge of risk management still have challenges to address in improving their risk management and control systems. As noted in the Basel Committee's HLI follow-up review, there remain important areas where further work is required, both at the industry level and in individual firms. These include refining potential future exposure measurement, developing better stress testing methods, measurement of liquidity risk (and factoring illiquidity into stress tests and value at risk (VaR) models), collateral management techniques and consistency in valuation methodologies. As always, firms' risk management systems should be commensurate with the level of risk they are assuming.
72. Perhaps more importantly, the systems and controls necessary to assess, price and monitor the risks posed by HLIs do not appear to be spreading swiftly enough from leading edge institutions to other credit providers. The CRMPG recommendations, in particular, represent demanding standards, which go beyond those currently in place in many banks, broker dealers and insurance firms. Some firms do not recognise the extent of the challenge they face if they are to bring their own techniques and senior management involvement up to these levels. Since adequate risk management standards are constantly developing, this bifurcation represents a real challenge to the management of credit providers, and to their regulators and supervisors. The Working Group thinks it critical for senior management at credit providers to address on a continuing basis the adequacy of their own risk assessment and management systems for the products and markets with which they deal. Where those systems are inadequate, they should not operate in highly risky and volatile instruments and markets, or with counterparties holding significant positions in such markets. Regulators and supervisors should reinforce that message.
73. Reliance on this approach alone would assume that individual firms' practices can overcome information asymmetries and that firms can obtain adequate information to make full risk assessments of their dealings with HLIs. But even with better information

and risk management, market participants' motivation is to protect themselves and not the financial system as a whole. Even if firms were to implement fully all recommendations there would still therefore be a role for the official sector in assessing threats to overall financial stability.

74. Finally, this approach assumes that credit providers will not forget the lessons learned when market conditions improve and competitive pressures grow. Prudent and thorough counterparty appraisal can prove short-lived, particularly when commercial pressures, coupled with apparently benign economic and financial conditions, intervene. The Working Group therefore stresses the importance of continuing efforts to promote measures which enhance the incentives for HLI counterparties to maintain prudent risk management practices in such circumstances. Such measures are discussed below in the sections covering enhanced regulatory oversight of HLI credit providers, building a firmer market infrastructure and enhancing information on HLIs.

B. Stronger risk management within the hedge fund sector²⁶

75. The need for enhancements to risk management practices is not confined to credit providers to the hedge fund sector. The LTCM episode underlined the importance for hedge funds themselves to operate appropriate risk management systems. LTCM's risk management systems contained several weaknesses given the scale and complexity of its business. This is particularly true of its flawed assumptions of the correlations between its positions and its lack of focus on the liquidity risk inherent in its larger positions. But there are broader issues. Unlike unleveraged funds, leveraged hedge funds will impose losses on credit providers if they exhaust their investors' funds. Moreover the scale, leverage and complexity of certain business conducted by HLIs adds an additional element of risk. Therefore, not only hedge funds themselves but also counterparty firms and authorities with a responsibility for financial system stability benefit from strong risk management standards in the hedge fund sector.
76. There are encouraging signs that hedge funds have recognised the need to respond to these issues. In particular, a group of funds has recently published a set of sound practices for their risk management and internal controls. These recommendations encourage hedge fund managers to adopt a broad range of risk management practices that are used by major financial institutions. However, they also recognise the diversity within the hedge fund industry and acknowledge the need to apply different methods where a hedge fund manager's business and risk profile differs from other market participants. The key recommendations are summarised in Section 2 of the summary of recommendations in Annex C. In addition, another large hedge fund, Tiger Management LLC, issued a report that provided detailed information with respect to the

²⁶ The recommendations in this section refer to Sound Practices for Hedge Fund Managers (February 2000) but might have broader applications for other HLIs.

management tools that firm uses to monitor aggregate portfolio risk and other types of risk.

77. These reports are helpful and encouraging. The Working Group welcomes the steps taken by the hedge fund community to meet some of the concerns raised and the increased informal dialogue between some hedge funds and financial authorities. However, as with enhanced risk management by counterparties, it is crucial that the improvements continue to permeate throughout the hedge fund community and become part of standard business practice. Investors, prime brokers, counterparties and hedge fund auditors might also consider the extent to which these documents help inform their own perspective of risks to which funds they are involved with are exposed.

C. *Enhanced oversight of HLI credit providers*

78. Supervisors and regulators play a critical role in identifying common deficiencies in firms' approaches to risk management arrangements and – drawing on industry initiatives and their own regulatory information – in promoting suitable 'sound practices'. Regular supervisory or regulatory oversight of institutions should be used to monitor firms' adherence to such sound practices as market memories of the lessons of LTCM fade and to take supervisory or regulatory action if standards slip. Supervisors and regulators also have a role in ensuring that standards continue to evolve to take into account the introduction of new financial instruments and changed market conditions and practices.
79. The most notable examples of recommendations for enhanced oversight are the reports of the Basel Committee and the IOSCO Technical Committee. More detail is provided in Section 3 of the summary of recommendations in Annex C.
80. Supervisors and regulators should use the various tools at their disposal to determine the extent of institutions' compliance with sound practices and then take appropriate actions where they identify deficiencies. Supervisors and regulators in all countries should consider the options set out in the following menu:
- Greater intensity of supervisory and regulatory oversight on regulated institutions which fall short of expected sound practices. This could include more frequent and detailed on or off-site examinations, or alternatively more frequent or demanding external reports on institutions' systems and controls which would raise the institutions' cost of doing business and encourage them to move towards sound practice.
 - Requiring regulated institutions to provide periodic affirmations of their compliance with sound practices. Such affirmations could either be publicly disclosed or confidential. Periodic independent tests could be carried out on the accuracy of such affirmations.

- Greater use of the supervisory review process – in the case of banks proposed revisions to the Basel Accord²⁷ contain recommendations on the supervisory review process (the Pillar II²⁸). This would include an assessment of the adequacy of capital – above the regulatory minimum – in relation to the quality of risk management and controls vis-à-vis HLI counterparties.
 - Supervisors and regulators might also restrict the ability of firms to carry on business with HLIs. In the extreme, where they consider that a firm’s counterparty risk management measures are wholly inadequate, they might consider closing the firm down.
81. *The Working Group believes that improved supervisory and regulatory oversight of credit providers of all kinds is an important ingredient in helping to ensure that sound practices are pursued and maintained. Improvements in counterparty risk management practices vis-à-vis HLIs are part of an ongoing process that will require sustained further attention not only by market participants but also by supervisors and regulators. These further efforts are essential to lock-in recent advances in risk management and to maintain the momentum towards further improvements in this field. The Working Group has already encouraged the formation of a small group consisting of representatives of the Basel Committee and IOSCO. The work will include assessing industry progress on both technical issues (such as measurement of potential future credit exposure, liquidity valuation, and stress testing) and in improving risk management processes more generally. The group, which will shortly start work, is likely to establish a dialogue with the financial industry and to explore areas that would be suitable for collaboration.*
82. *The Working Group also recommends that all jurisdictions consider the breadth of coverage of their supervisory and regulatory regimes and ensure that authorities have the appropriate remit to encompass entities which are material credit providers to HLIs. For example, in the US the PWG called for statutory changes to grant the Securities and Exchange Commission (SEC), CFTC and the Treasury expanded risk assessment authority over the unregulated affiliates of broker dealers and futures commission merchants.*
83. The Working Group also examined the extent to which changes to regulatory capital weightings could strengthen the incentives of regulated institutions to take an appropriately prudent approach towards leverage. The Basel Committee’s consultative document to revise the Capital Accord contains a number of elements that would promote enhanced counterparty risk measurement and management practices by the

²⁷ “A New Capital Adequacy Framework”. Consultative paper by the Basel Committee (June 1999).

²⁸ ‘Pillar II’ (the Supervisory Review Pillar of the Basel Review) encompasses four principles: banks should have a process for assessing their overall capital adequacy and a strategy for maintaining their capital; supervisors should review this assessment and strategy; supervisors should expect banks to operate above the minimum regulatory capital requirement and should have the ability to require banks to hold more than the minimum capital; and that supervisors should seek to intervene at an early stage to prevent capital falling below prudent levels.

banking sector, which also would cover exposures to HLIs – without explicitly singling them out as a distinct class of counterparty, thus avoiding many of the definitional challenges associated with such an approach. In particular, the document proposes more risk sensitive minimum capital requirements for counterparty credit risk (either through an external or internal ratings approach). The document proposes more refined treatments for OTC derivatives (by removing the current maximum 50% weight) and discusses the treatment of repurchase agreements (to reflect better the volatility of the underlying securities), the major source of bank exposure to the HLI sector. Recognising that minimum capital requirements will always be a relatively blunt instrument, the consultative document also places significant emphasis on the supervisory review process of a banks' risk measurement and economic capital allocation methodology. Through this process, supervisors would be able to assess whether banks are holding enough capital in relation to their risk measurement and management vis-à-vis HLI sector exposures. They will wish to pay particular attention to unsecured loan exposures to HLIs – not least because they will often be deeply subordinated to other claims on the HLI.

84. *Implementation of this approach in a revised Basel Capital Accord should significantly strengthen the incentives for better risk management by banks. The Working Group supports the objective of the Basel Committee to strengthen the linkage between risk and capital requirements. Securities regulators are also considering the revised Accord. The Working Group encourages ways to induce securities firms to take a commensurately prudent approach towards the interaction of risk and leverage.*

D. Building a firmer market infrastructure

85. These enhancements in counterparty risk management practices need to be complemented by a series of measures to upgrade market practices and conventions. The near-collapse of LTCM showed the importance of ensuring that the market and legal infrastructures are able to support the task of completing the orderly wind-up of a large leveraged fund without causing undesirable and unnecessary risk, financial loss or uncertainty for financial market participants.
86. **Implementing** improvements in market and legal infrastructures is a critical step in providing counterparties with a timely and effective way of dealing with failing HLIs and improving financial markets' ability to contain the risks of large leveraged players.
87. Such improvements should include enhancements to:
- Bankruptcy law. Market participants need the capacity to close out their positions in an orderly fashion in the event of a termination or counterparty default. National authorities should work to ensure that their bankruptcy laws allow certainty to market participants that positions can be closed and collateral realised in such an eventuality.

In addition, the relevant provisions of the UN Commission on International Trade Law (UNCITRAL) Model Law on Cross-Border Insolvency should be enacted to establish clear conventions to differentiate between a “main” and “non-main” insolvency. This would make it more likely that the jurisdiction of the main insolvency proceedings for an offshore fund would be determined by an HLI’s principal place of business rather than the jurisdiction in which it is organised. This, in turn, could facilitate the bankruptcy proceedings for large complex funds whose main creditors were domiciled outside the jurisdiction where it was organised.

- Documentation policies, practices and content. Earlier reports have identified a number of steps that should be taken to improve industry standards, automation and consistency in documentation (both within and across jurisdictions). The CRMPG, for example, recommended attention to three broad areas: improvements in documentation policies and practices, improvements in documentation content, and improvements in collateral management practices. These recommendations are detailed in Section 4 of Annex C.
88. The Working Group is aware that this is the subject of a considerable amount of work from industry groupings. For example, ISDA has set up four working groups to work on improvements to credit support supplements and master agreements²⁹. If the orderly closeout of a leveraged fund is to be made possible, market participants need a high degree of confidence in the robustness of documentation to legal challenge. Greater consistency and coherence in documentation is hence a critical part of a response to the systemic issues raised by HLIs.
89. It must remain a high priority for the industry, supervisors, regulators and market authorities to ensure that regulation and legal frameworks support rather than hinder change. The Basel/IOSCO working group could also usefully consider progress in this area. *The Working Group strongly endorses further steps to improve documentation harmonisation across different products in respect of collateral practices, close-out procedures, events of default, and valuation procedures. We note the formation of a new private sector group with representatives from trade associations that sponsor industry documentation to address these issues. The group includes representatives from ISDA, The Bond Market Association (TBMA), the Emerging Markets Traders Association, the Financial Markets Lawyers Group, as well as several dealers and end-users (it is known as the “Global Documentation Steering Committee”). We look forward to the progress that this group will make in harmonising industry documentation initiatives.*
- *Improvements in collateral practices.* Annex C also contains details of the recommendations that have been made relating to collateral practices. Many of these recommendations are taken from the ISDA 1999 Collateral Review. It is essential that firms take account of these recommendations, both in terms of their internal processes and relations with counterparties. Supervisors and regulators should play a role in encouraging firms to implement best practice in these areas. Again, this is an issue that

²⁹ The groups are considering issues relating to collateral; termination & quotation issues; force majeure & impossibility; and multi-product netting & master/master agreements.

could usefully be considered by the Basel/IOSCO working group. It is useful to note that there is a growing desire by HLIs for counterparties to provide them with the ability formally to cross-collateralise between products. This poses challenges to implement, though it has the potential to consolidate exposures, make positions an HLI has with a particular firm more transparent and make the collateral easily transferable within the firm.

- **Valuation.** As the CRMPG report highlighted, ISDA’s “Market Quotation” valuation methodology (which is commonly used in swaps documentation) proved difficult, and sometimes impossible, to implement when certain markets became illiquid in the summer of 1998. Market participants became concerned that use of alternative, more flexible methods (‘the Loss method’) to effect close-out might leave them vulnerable to litigation. Inconsistencies between valuation approaches in swap transactions using ISDA documentation and repos on the same asset (using TBMA documentation) created additional uncertainty. The CRMPG therefore recommended that a non-defaulting party should have the flexibility to value transactions in a good faith and commercially reasonable manner. ISDA is working on making such improvements. The Working Group agrees that this is a key area in which progress is required.
90. *As noted above, progress is evident in several of these areas. But in a number of areas further attention is required and it is crucial that the momentum behind current initiatives is not lost. In addition, bankruptcy reform will require all jurisdictions to consider the adequacy of their legal structures and to enact legislative changes where deficiencies are found.*

E. Better information on HLIs

91. A defining characteristic of unregulated HLIs is their opacity. Because of the nature of their investors they are generally subject to limited public disclosure requirements, few regulatory reporting requirements and are not subject to regulatory oversight. Obtaining clear information on the exposures of HLIs is difficult.
92. Greater transparency should help provide counterparties, other market participants and regulators with early warning signals about the risk profile and extent of leverage accumulated by HLIs. If mechanisms for enhanced transparency are properly designed they will also enhance the effectiveness of market discipline. Enhanced information in itself would not be a substitute for the firm-level improvements in risk management or enhanced supervision of credit providers, but would complement them by providing additional information which would enhance the operation of credit and market discipline.
93. The Working Group considered a number of ways of improving the information available on HLIs.
- (i) *Enhanced reporting to supervisors and regulators by HLI counterparties*
94. One method is through supervisors and regulators obtaining better information on counterparty firms’ exposures to HLIs. The CRMPG, for example, suggested that

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financial intermediaries could provide regulators with improved information about the key risks faced by financial intermediaries on a consolidated basis based on management information, including potentially in a large counterparty exposure report³⁰. Importantly, they also suggested that financial intermediaries should meet informally with their primary regulator to discuss principal risks as well as market conditions with potential systemic effects. The Hedge Fund Managers advocated a coordinated effort by hedge fund counterparties and regulators to develop a broad consensus approach to public disclosure.

95. Supervisors and regulators generally receive regular information from the firms they supervise, as an essential part of the supervisory or regulatory process. They should be able to access any relevant information on the exposures of authorised firms to any of their counterparties as part of their on-going supervision. Nevertheless, the Working Group sees the CRMPG suggestions as a helpful set of recommendations, particularly in improving market intelligence for the official sector. Regular dialogue with supervisors and regulators is an important part of putting that information into context. But the focus of such reporting and information exchange should be primarily directed at improving the supervision of the credit provider. Since such information would also only be available to regulators, it would not strengthen the market discipline applied to HLIs by their counterparties, which is critical to a reduction in systemic risk in this area.

(ii) *Confidential reporting by HLIs to authorities*

96. The Working Group has also considered the option of enhancing confidential reporting to authorities by HLIs themselves - without public disclosure of that information. HLIs might report key risk information to a designated regulator, supervisor or financial authority, which could then share that information with other regulators or supervisors with which they have information-sharing gateways. This approach might be more attractive to HLIs than public disclosure, as sensitive or proprietary information would not become publicly available.
97. Reporting requirements are, of course, a critical tool used by all supervisors and regulators. But the Working Group is not convinced that reporting requirements on otherwise unregulated firms are adequate to address the concerns identified in Section IV. Supervisors and regulators may not have the same level of resources available to analyse such information as some financial market participants. And since other market participants would be aware that supervisors and regulators were receiving this information, and might believe the authorities were able to use the information to prevent undesirable market outcomes, regulatory 'moral hazard' could be increased. This might reduce firms' incentives to carry out their own due diligence effectively and

³⁰ Appendix C of the CRMPG report gives a possible template but the CRMPG also notes a number of practical difficulties and suggests further work would be needed before it could be used.

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weaken market discipline. The IOSCO report argued that public disclosure would have wider benefits for the market than regulatory reporting and should therefore be explored first. The Working Group agrees.

98. Two further options for increasing HLI transparency are more promising:

(iii) *Public disclosure by HLIs*

99. Public disclosure by unregulated hedge funds is recommended in the reports of the US PWG³¹ and the IOSCO Technical Committee. The Working Group agrees that enhanced public disclosure by HLIs would be desirable for several reasons:

- The discipline imposed by creditors, counterparties and investors can only be exercised effectively when meaningful information is available for risk assessment.
- Bilateral information flows between an HLI and its counterparties can sometimes give a misleading view of risk, particularly when they are not adequately set in the context of the rest of the HLI's activities.
- Large HLIs may on occasion have sufficient market power to limit the information they disclose bilaterally to credit providers.
- The scale of large HLI activity may be such that all market participants may have a legitimate interest in key information with respect to the HLI's size and leverage, regardless of whether they are a counterparty.
- The potential for an HLI to impose systemic risks means that public authorities also have an interest in enhanced information.

100. But enhancing public disclosure raises challenges of its own. They include the risk of disclosed data becoming dated especially in fast-changing markets; the need for investors and creditors to be able to understand and respond to disclosed information; and the need for disclosure policy to be capable of providing meaningful information without compromising legitimate proprietary interests. These issues are being investigated as part of the current international efforts exploring enhanced disclosure.

101. The recommendations of the PWG have been carried forward by proposed regulation. The CFTC is working on a notice of proposed rulemaking that would be published in the Federal Register requesting public comment on a proposed rule that would require CPOs of some of the largest commodity pools to provide to the CFTC specified aggregate financial and risk information, including VaR or a similar market risk measurement, on a quarterly basis. These reports would be publicly disclosed. In addition, the PWG's recommendations are incorporated into bills recently introduced

³¹ This report suggested that current reporting regulations for CPOs should be amended, and new legislation for non-CPO funds introduced, to ensure that hedge funds provide meaningful and comprehensive measures of risk. It recommended that CPOs above a certain size that manage hedge funds file quarterly rather than annual reports, and that such reports, which should be made public, include more comprehensive measures of market risk, such as value-at-risk or stress test results. It also recommended that for hedge funds that are not currently managed by a registered CPO, a means for disclosure should be developed to ensure that similar information is provided to the public.

into the Banking and Commerce Committees of the US House of Representatives³². Both of these bills seek to impose disclosure requirements only on large funds which could have systemic importance. Neither measure seeks the disclosure of proprietary information³³.

102. *The Working Group supports the objective of enhancing public disclosure and endorses efforts within the US to achieve this goal.* The two proposals before Congress would capture different numbers of funds. The Working Group believes that it is important that such legislation captures all those with the capacity to have a systemic impact on financial markets. Setting a precise threshold to determine where this line should be drawn is clearly difficult, not least because of the lack of clear data on the hedge fund industry. We note that the reach of the proposed US legislation is broad and would capture most large hedge funds provided that they had US investors or counterparties. But some funds might restructure their activities to try to evade these requirements. *To address this risk the Working Group calls on all jurisdictions to consider the adequacy of their own disclosure requirements and introduce, where necessary, appropriate changes to legislation or regulations to ensure that major hedge funds located in their jurisdictions are subject to complementary disclosure requirements. This recommendation should also apply to offshore centres, particularly those which currently host large unregulated hedge funds.*
103. As noted in Section IV, the build up of leverage and significant positioning in 1998 was not confined to hedge funds. In the Working Group's view, this underscores the need for enhanced disclosure of risk exposures by all material participants in financial markets. An initiative is underway to identify improvements in disclosure practices that would enhance understanding of the risks borne by all financial intermediaries, both regulated and unregulated, including HLIs. The Multidisciplinary Working Group on

³² HR2924 introduced by Congressman Baker to the Banking Committee and HR3483 introduced by Congressman Markey to the Commerce Committee, respectively.

³³ The two pieces of legislation are, of course, subject to amendment as they are considered by Congress. However, the provisions of the bills as they have been introduced are:

- **Definition of entity to which it would be applied** – Both bills would apply to any investment vehicle which is exempted from the definition of an investment company under the Investment Company Act of 1940. HR2924 adds that it should be privately organised and not widely available to the public.
- **Threshold** – HR2924 would apply to any fund with \$3bn in capital or any group of funds with \$20bn in assets under management. HR3483 is set much lower at any group with \$1bn in assets.
- **Information required from funds** – HR2924 requires US proposals cover information on asset size, notional value of derivatives positions, leverage, summary risk measures and such other information as may be required by the Fed. HR3483 requires statements of financial condition, income, cash flows, changes in equity, models and methodologies used to assess market risk and such other information as the SEC requires.
- **Method of disclosure** – Under both bills, hedge funds would be required to file reports with regulators who would then make them publicly available, although regulators would withhold any proprietary information contained in the report.
- **Enforcement** – HR2924 states that the Fed may apply to the district court in which the hedge fund is located or, in the case of foreign funds, the District of Columbia District Court, to seek enforcement of against a hedge fund that does not comply with an order to disclose information. HR3483 does not state how the regime would be enforced.

Enhanced Disclosure, jointly sponsored by the Basel Committee, IOSCO, International Association of Insurance Supervisors (IAIS), and Committee on the Global Financial System (CGFS), is organising a voluntary study of disclosure enhancements by a cross section of financial institutions including banks, insurance companies, securities firms, mutual funds, and hedge funds. The objective is to encourage a more productive dialogue between public and private sectors on concrete steps which could be taken to improve the state of financial disclosures and to promote a level playing field in disclosure for all financial intermediaries, regardless of corporate form or charter. On the basis of data collected during the second quarter of this year, the Multidisciplinary Working Group on Enhanced Disclosure will interview participating firms on the efficacy of various risk-based disclosures. By the end of the year a final report will be prepared, for the four sponsoring organisations, on appropriate steps that should be taken by the public sector—which in some jurisdictions may require changes in supervisory or regulatory practices, regulations or in law—to improve the state of disclosures by all financial intermediaries.

104. The Working Group views movement towards greater and more comparable disclosure to be an important means of strengthening market discipline and the stability of the financial system. This approach addresses the broad problem of evaluating leverage and risk in the financial system because it does not focus exclusively on any one set of financial actors. It thereby also avoids the need precisely to define HLIs. Towards this end, the Working Group:

- *believes that the study of enhanced disclosure provides an important opportunity for movement towards a level playing field in disclosure among financial intermediaries;*
- *commends participating firms for taking part in the study and urges them to take full advantage of the opportunity to engage in a forward-looking and practical discussion of how disclosure practices will be improved; and*
- *recommends that, upon the completion of the study and receipt of the final report, the four sponsoring organisations work closely together to pursue any recommended changes in disclosure practices on a level playing field basis so that appropriate risk-based disclosures are made by all financial intermediaries, regardless of corporate form.*

(iv) *An HLI credit Register*

105. An alternative approach to direct public disclosure could involve the creation of an international Credit Register, specifically directed at HLIs. The register, to which firms (perhaps initially in the major financial centres) with material exposures to HLIs should contribute, would contain centralised information on the exposure of all significant regulated financial firms to systemically relevant HLIs. The data collected would cover all instruments which create credit exposures, including both on and off-balance sheet instruments. Aggregated data on the credit extended to any HLI counterparty would

then be available to those counterparties, to supervisors and regulators and to other interested authorities on a confidential basis.

106. Evaluating the capacity for a Credit Register to enhance transparency is complex. National Credit Registers enable authorities to have a clearer understanding on the degree of leverage in an economy. Several other benefits of an international Credit Register should also be noted. In contrast to the information generated by public disclosure requirements imposed on unregulated HLIs, the correctness of the data reported to a Credit Register is subject to periodic review by the authorities. In the case of an impending or actual failure of a large HLI, regulators and supervisors would, in principle, be able to identify those regulated institutions with large exposures to the respective HLIs and react in a timely fashion to avoid disruptive effects of the failure.
107. But several difficult practical issues would need to be tackled. Information would need to be comprehensive. Specifically, it would need to include all material credit providers and holders of financial instruments (which may not necessarily be financial institutions); clearly identify the borrower/issuer of those instruments; and properly capture securitised assets. It is much more difficult to assess credit risk in the case of derivative products than it is in the case of simple loans. This implies that it would be very difficult to transplant the idea of a credit register to HLI exposures. Data would ideally have to be provided and aggregated quickly and frequently, given that changes in positions or the valuation of those positions can be substantial from day to day. This might be particularly difficult for meaningful measurements of derivative exposures. And a mandatory scheme would also need to tackle difficult legal issues surrounding the provision, compilation and sharing of data (particularly on a cross-border basis). Three further aspects are relevant:-
- ***Comprehensiveness of data.*** A Credit Register would be limited to data on HLI indebtedness and would not include data on other financial aspects of an HLI (risk profile, assets and comprehensive measurement of leverage).
 - ***Availability of data.*** Publicly disclosed data would by definition provide enhanced information to all market participants, including actual and potential counterparties to an HLI. A Credit Register would usually be open only to counterparties who participate – and thus provide information to a much narrower range of institutions³⁴.
 - ***Aggregation of data.*** The simple addition of measures of potential future exposure would not take into account potentially offsetting positions. Meaningful aggregation would therefore require reporting of the actual positions giving rise to the exposures, which involves collection of large amounts of data on proprietary positions.
108. ***If these difficulties could be successfully tackled, a Credit Register could provide useful information on the credit provided to HLIs. The Working Group is of the view that, while generalised Credit Registers have operated successfully in some countries***

³⁴ Although it may be possible to open them up to potential counterparties.

for many years, a Credit Register designed for the purpose of monitoring exposures to HLIs is likely to be a more costly and less robust approach to monitoring the leverage of large HLIs than a régime of mandated disclosure which targeted the HLIs directly, or a voluntary scheme that succeeded in capturing all relevant institutions. The Working Group acknowledges, however, that if the recommendations in this Report fail to achieve their objectives, it could be appropriate to re-examine the case for introducing a Credit Register.

F. Using bank capital rules to enhance HLI disclosure

109. The Working Group also considered the extent to which enhanced transparency could be encouraged by tying recommended improvements in transparency to bank regulatory capital weightings. Two routes were considered:

(i) Incentives for improved bilateral information provision by HLIs to individual counterparties

110. This would entail introducing a higher risk weight for exposures to specific HLIs that do not provide sufficient bilateral information to their counterparties. This route might initially appear to be an attractive way of incentivising credit providers to seek, and HLIs to provide, enhanced information. Capital weights might also help by locking in those improvements. But there are difficulties. The importance of ‘insufficient’ information can only accurately be assessed in combination with other elements of the counterparty’s risk profile and risk mitigation techniques. They would also have to be assessed on a case-by-case basis which could prove very difficult in practice. So it may also be inconsistent with the stated aim of using the revision to the Basel Capital Accord better to equate capital weightings to risk.

(ii) Incentives for improved public disclosure by HLIs

111. Another route would be to link the quality of public disclosures by individual HLIs to capital requirements on their counterparties exposures to them.

112. This would enable supervisors and regulators to ‘reward’ financial institutions for public disclosure which complied with standards such as might be recommended by the Multidisciplinary Working Group on Enhanced Disclosure. Individual HLIs that did not meet public disclosure requirements would be given a higher risk weighting.

113. It should be noted that the risk profile of HLIs can change significantly from day to day, so it could become necessary to have a regular flow of information. The Multidisciplinary Working Group on Enhanced Disclosure is working with global financial institutions, including HLIs, to address this and other challenges in the context of public disclosure more generally. A more fundamental issue relating to the use of capital charges, however, is that there is not necessarily any relation between public disclosures and the risk to which the bank is exposed. It is therefore difficult to apply a high risk weight to an exposure of a bank to a HLI on which the bank has adequate

bilateral information available, regardless of the quality and quantity of public disclosures.

114. *The Working Group does not therefore recommend a capital requirement in the revised Accord specifically tailored to the circumstances of lending to opaque HLIs. But it is strongly of the view that the judgmental elements of the proposed new accord (Pillar II) should take full account of a bank's awareness of the risk profiles of its customers so that, in practice, lending to institutions about which banks hold inadequate information would result in the bank holding an appropriate level of economic capital above the regulatory minimum.*

G. Enhanced information on, and surveillance of, financial market activity

115. The Working Group agrees that there is a continued need to improve the official sector's capabilities in monitoring and assessing developments in financial markets and their impact on systemic risk. This could include:

- **Enhancing National Market Surveillance.** *National authorities should consider strengthening official market surveillance with a view to identifying rising leverage and, where necessary, taking appropriate preventive measures.* As well as peer group and sectoral analysis of major financial institutions, surveillance activities could extend to the informal monitoring of trends in regulated exchanges and OTC markets and their implications for systemic risk. Strengthened market surveillance by national authorities could enhance the existing mechanisms for sharing information between national authorities. In addition, it could generate a better understanding of the relationship between levels of leverage and systemic risk. The Working Group recognised that such activity could not, by itself, be expected to prevent systemic risks or necessarily identify preventative action. There is also a risk that official sector action might, in some circumstances, precipitate the type of market reaction the action was designed to avoid. But it could help if domestic authorities took appropriate steps to inform themselves of market developments in order to reduce the risk of unwelcome surprises.
- **Improvements in market transparency.** Central banks and national authorities have long recognised the importance of ensuring that data on aggregate financial market activity are sufficient for firms and market authorities to gain a clear understanding of critical developments and risks in financial markets. Considerable progress has been made in recent years in improving information flows, most notably through the Bank for International Settlement's (BIS) data on international banking and securities flows and its regular statistics and surveys of derivatives and foreign exchange market activity. The FSF Working Group on Capital Flows also helpfully draws attention to a number of other areas where data sources could be enhanced.

H. Direct regulation of currently unregulated HLIs

116. The Working Group also considered the case for subjecting unregulated HLIs to a formal system of direct regulation, including a régime for their authorisation and on-going supervision and regulation. A régime analogous to that which most countries currently apply to financial intermediaries would include a system of licensing,

minimum capital and liquidity standards, large exposure limits, minimum standards for risk management arrangements and other systems and controls, together with ‘fit and proper’ tests for senior management. Other measures could also be applied, including an enforcement régime with fines for transgressions. This might reduce the likelihood of disruptive market events like those described in Section IV. Direct regulation would address the question of leverage, through capital requirements, and could give regulators regular oversight over the activities of HLIs. It therefore offers attractions to some public authorities concerned to minimise the risk of repetition of the market turbulence of 1998.

117. On the other hand implementing such a régime would raise practical and philosophical problems. Direct regulation has not been advocated on investor protection grounds. Equity investments in HLIs may be subject to risks which demand careful assessment and analysis³⁵, but investors in HLIs are generally high net worth individuals or institutional investors. Such investors are expected to be sufficiently wealthy and sophisticated³⁶ to conduct their own due diligence and not to rely on investor protection régimes to the same degree as retail investors – and they have not demanded such protections. The focus of direct regulation would therefore be on the mitigation of systemic risk. Such a régime could, in some jurisdictions, create a form of moral hazard in which investors and counterparties, knowing that an HLI is regulated and supervised for systemic reasons, might reduce their normal due diligence and relax their risk management standards. Were a regulated institution of this kind to fail, pressures could arise for lender of last resort support.
118. From a practical perspective, difficulties would be faced in establishing a precise definition of the HLI which is robust to changes in the entity’s legal form. The régime would essentially be targeted at constraining the institution’s borrowing, so it might be argued that other, non-financial corporations with large borrowings and capital market activities should be included. This would create awkward jurisdictional and enforcement problems, including how to avoid ‘leakage’ through offshore centres. There are also questions about the appropriate capital, liquidity and large exposure structures, and the nature of the other controls that should be imposed. It is not clear that capital standards which are currently in place for regulated financial institutions would necessarily be appropriate for HLIs, not least because they are often significantly less diversified and do not have long-term capital in the same sense as banks and securities firms. Therefore a supervisory approach with capital adequacy and large exposure rules adapted to the specific risk profile of HLIs would have to be developed. It would be

³⁵ These include issues such as opacity, incorporation in jurisdictions which may lack rigorous accounting, auditing or legal standards and complex forms of leverage.

³⁶ Or employ professional advisers with the necessary degree of sophistication.

important to ensure that any regulatory capital requirement did not adversely affect the efficiency and liquidity of markets in which HLIs are significant participants.

119. *The Working Group is therefore not recommending applying a system of direct regulation to currently unregulated HLIs at this stage, though the possibility of establishing such a régime cannot be definitively rejected.*

2. Measures Directed at Market Dynamics Issues³⁷

120. The report of the Market Dynamics Study Group attached to this Report raises complex issues about the interaction between economic fundamentals, market participants, liquidity and market behaviours. A key message from the report was that the risk of self-fulfilling crises was generally low when fundamentals are strong but might be higher when there are some vulnerabilities and sentiments are fragile. The most effective defence that any economy has to discourage or deal with large speculative pressures against its exchange rate is the establishment and maintenance of credible macroeconomic, financial, supervisory and structural policies³⁸. Authorities also need to focus on maintaining an appropriate exchange rate régime and avoid circumstances where market participants perceive “one-way” bets with large potential payoffs. Nevertheless the Working Group believes that the following measures will, to varying degrees, help alleviate some of the key features identified by the Market Dynamics Study Group.

A. Stronger counterparty risk management

121. Counterparty risk management has a role, albeit a limited one, to play in addressing the issues raised by HLIs in small and medium-sized open economies. The Market Dynamics Study Group report drew attention to the ease with which an HLI can establish a large position in the currency of a small or medium-sized open economy. This is particularly important given the substantial leverage that can result from low margining requirements which are applied to HLI transactions in foreign exchange forwards (the principal means for establishing short positions in these markets). *The Working Group believes that leverage achievable by HLIs could be somewhat constrained by enhanced counterparty credit risk assessment by firms as recommended here, particularly if firms focus on the risks of financing large potentially illiquid positions in smaller financial markets.* The generally loose credit practices such as existed in early 1998 make it somewhat easier for large positions to be built up in small and medium-sized open economies. But in practice, these proposals

³⁷ As noted in Section III the range of HLIs active in these episodes included both hedge funds and proprietary trading desks of banks and securities firms.

³⁸ In addition, the FSF Working Group on Capital Flows has outlined a series of important measures which countries could adopt to improve public and financial sector risk monitoring and management.

may not be sufficient fully to address all the concerns expressed by authorities in some small and medium-sized open economies. Even with reduced overall leverage, HLIs could still build large foreign exchange positions relative to these markets.

B. Stronger risk management in the HLI sector

122. *Likewise, enhanced risk management in the HLI sector may play a role in limiting some of the concerns raised by small and medium-sized open economies insofar as HLIs may reassess the size and concentration of positions they are prepared to take.* However, it might be possible for HLIs to build up potentially destabilising positions in smaller markets while remaining inside internal limits on leverage and/or liquidity risk. This could therefore not be relied upon, in isolation, to alleviate these concerns.

C. Enhancements to market infrastructure

123. *Regulatory infrastructure enhancements could also play a role in addressing certain concerns raised by small and medium-sized open economies.* Where activity takes place on organised exchanges, some of the pressures potentially caused by large and concentrated positions may be mitigated by regulations requiring market participants to report to market authorities or disclose publicly short or long positions which exceed specified thresholds. These might be supplemented where appropriate by exchange position limits, which could prevent market participants from taking positions above a certain share of the net open interest. Such requirements could help reduce the ability of any leveraged or large player to take substantial or concentrated positions in organised markets. Even in the absence of position limits, timely disclosure requirements might also, in certain conditions, help reduce the risk of players taking large, concentrated positions or engaging in aggressive practices since others would be aware of the positions that they need to close. *But the Working Group also drew attention to the limitations of these measures.* If the position disclosure requirements or limits are set too low, they may restrict activity within an exchange. This could contribute to a reduction in market liquidity or a shift in business towards OTC products or organised exchanges in other jurisdictions, where such requirements do not apply. Furthermore, these requirements are only applicable to regulated exchanges and may not be applied more generally to OTC markets. Accordingly, exchanges may wish to weigh the costs and benefits of large position reporting based on activity in their particular markets.

D. Promoting enhanced aggregate disclosure of key market information

124. Enhanced aggregate data on positions in key markets (e.g. foreign exchange positions) could, in theory, be a helpful addition to the range of data available to public authorities and/or market participants. Such data could provide the official sector and market participants with enhanced information on both the size and concentration of position taking and the type of counterparty taking those positions.

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125. Such aggregate information could provide market participants with enhanced information on general market liquidity and help them adjust their position sizes accordingly. As a result, it could have an effect on speculative behaviour. If market participants were aware that aggregate position data would be published, particularly if these data were to include a breakdown by type of counterparty, this might constrain them from taking large positions in what might be thin markets. Furthermore, it could help develop a clearer understanding of the complex dynamics of modern financial markets. The Market Dynamics Study Group report draws stark attention to the lack of information regarding activity in foreign exchange markets, which adds to the difficulty of understanding the dynamics of these markets. Increased aggregate data could help redress this balance.
126. Some of the possible limitations of such an approach include:
- Any indication of the accumulation of large concentrated positions would be unlikely to be especially timely;
 - Given the likely imprecision of the data, it may not add much to that provided by strong national systems for market surveillance;
 - Data providers would need to be sure that the information was carefully protected so that confidentiality of the position-takers was assured;
 - If the data were published, it could induce ‘herding’ of market participants in one particular direction;
 - Some market participants might consider that it would duplicate their own systems for monitoring foreign exchange flows and positions. A counter argument might be that the type of information suggested by some national authorities (monthly data with a lag of 2-4 weeks) would be unlikely significantly to threaten institutions’ competitive advantage and might instead provide them with a useful benchmark for their own information.
127. One specific proposal aimed at enhancing aggregate information about foreign exchange positions was considered by the CGFS last year. However, in November 1999, the G10 Governors decided not to proceed further with work in this area. In making this determination, the G10 Governors found that there were a number of limitations to any proposal, including the difficulty in obtaining compliance, the feasibility of producing the data in a timely manner, and the substantial costs involved. While this exercise identified limitations to reporting of aggregate foreign exchange information, there are other improvements to market transparency which might be of value to market participants and the official sector alike. Such information, if properly devised, might help firms in gauging market liquidity and valuation of outstanding contracts. Particular areas that could be explored include enhancing existing foreign exchange and OTC derivatives markets data, for example by broadening currency breakdowns.

E. Enhanced national market surveillance

128. *National monetary authorities, supervisors and regulators should consider proactive market surveillance as a means to help provide useful early warning signals about speculative activity in financial markets.* Such surveillance might include: liaising with key participants in both local and offshore markets, particularly large commercial banks who monitor foreign exchange stocks and flows as a client service; monitoring the volumes, prices, liquidity, spreads and volatility of financial assets; monitoring the major regular and occasional users of local markets and understanding their core strategies, and improving the liaison with market authorities and central banks in larger financial centres, where some of the foreign exchange positioning may take place. That liaison may provide useful intelligence on policy or other changes to help mitigate speculative pressures or help the authorities better understand market developments when the distinction between speculative pressures and market responses to uncertainty about the fundamentals is difficult to discern.
129. Surveillance might be extended by national currency position reporting requirements, as in the United States. The information, suitably aggregated, could cover major emerging market currencies and might also be made public³⁹. But more analysis is required to determine the cost and benefits, and in particular the extent of international participation required. If, as seems likely, a meaningful system would require the participation of all major financial centres where foreign exchange trading takes place, it could very quickly begin to resemble a global system for the compilation of aggregate information (discussed above) with many of the same requirements and drawbacks. If implemented on a national basis, then, given the global nature of foreign exchange markets, the information captured could be extremely limited and potentially misleading.
130. An alternative mechanism might be to enhance oversight of the provision of local currency. Entities taking speculative positions against a currency must, at some stage, settle them through the delivery of the local currency. Ultimately, the local currency is only available through the local banking system. Economies might therefore enhance their surveillance of the local banking system, the extent of its own currency position taking and the extent to which it provides domestic currency to non-resident entities. Some jurisdictions have chosen to extend such surveillance from informal dialogue and position monitoring to much more formal limits. These include Singapore and, more recently, Malaysia, which are described in the Market Dynamics Study Group report. However, these are effectively capital controls and raise issues about their cost and

³⁹ The United States requires that various bank entities and institutional investors file weekly, monthly or quarterly reports (depending on their existing position levels) on their outstanding positions in six major currencies. However, it should also be noted that there is considerable debate in the US as to whether these data provide useful information to the authorities.

effectiveness: some are discussed in the report of the FSF Working Group on Capital Flows.

F. Better individual firm disclosures

131. Measures to enhance HLI disclosure, such as the initiative by the Multidisciplinary Working Group on Enhanced Disclosure, would primarily be directed at mitigating the systemic risks posed by HLIs and do not envisage including information on the HLI's positions in particular markets or instruments. But to the extent that the aggressive position-taking activities of HLIs are currently facilitated by their opacity, enhanced disclosure and an increased appreciation of their risk profile might increase national authorities' understanding of the overall risk profile of HLIs and help reduce HLIs' propensity to take large or concentrated positions in particular markets.

G. Direct regulation

132. As noted in Section I(H), most proposals for direct regulation of currently unregulated HLIs focus on extending some form of prudential regulation to them. The Working Group noted that the concerns expressed by small and medium-sized open economies had been generated as much by entities which are currently subject to existing prudential regulatory régimes, as those by unregulated funds. Although these regimes include measures such as large exposure limits, such limits would rarely act as a constraint on the foreign exchange position taking of large banks in small and medium-sized open economies. The Working Group therefore considers that this form of regulation or supervision would do little to address concerns about market dynamics in small and medium-sized open economies.

H. Good practice guidelines for foreign exchange trading

133. An alternative to direct regulation by government authorities is for market participants themselves to articulate norms of behaviour in key financial markets, such as foreign exchange. The six case studies prepared by the Market Dynamics Study Group raise a number of concerns about the reasonableness of certain trading practices and behaviours, particularly those perceived to have triggered – or exacerbated existing – exchange market pressures in the currencies of small and medium-sized open economies. Concerns have been heightened when trading appears to have been conducted in a manner that is perceived as intended to move prices, rather than to execute trades at the best possible price. Concerns are particularly acute if it appears that there may have been concerted action by market participants. This raises questions about the disruptive impact 'aggressive trading' may have on price discovery and market dynamics.

134. These types of issues are currently addressed in some jurisdictions by guidelines and codes of conduct issued by trade associations, industry groups and committees of market participants. Typically, codes and guidelines prepared by market participants have little or no legal weight but do provide guidance on ‘good’ or ‘best’ practices both for traders and firm managements. When they effectively represent the consensus of leading market participants, such guidelines can serve as a reference point for reasonable market behaviour for all other market participants and supervisory authorities.
135. The Working Group believes that it would be helpful for private-sector industry groups to update existing guidelines of trading practices and codes of conduct for foreign exchange trading to reflect the lately expressed concerns about trading practices. However, while the currencies of many emerging market economies have been much more actively traded in recent years, few of these economies have yet developed their own responsible committees of market participants or their own norms of trading behaviour expressed in guidelines or codes. Given the global nature of foreign exchange trading, there would be a benefit to having trading guidelines of wide applicability. However, there is no global body in a position to speak to or for all market participants. Moreover, given differences in national monetary and exchange rate régimes, and in perceptions of what are reasonable market practices, it is unlikely that a single, global approach would be suited for, or accepted in, all markets. But, waiting for each country to develop its own standards would fail to take advantage of the state of knowledge that already exists and would ignore the global nature of foreign exchange activities.
136. This tension between ‘global’ and ‘local’ could be partially resolved if responsible market participants, who have participated in the preparation and revision of previously-established guidelines and codes, took the initiative to build upon their current knowledge and prepare a draft set of guidelines of good trading practices that might usefully serve as a model for foreign exchange trading communities in small and medium-sized open economies. Such guidelines could cover a range of topics that senior management of trading firms should be concerned with, focusing on all the different subjects that bear on risk management practices, broadly defined, as well as norms of prudent business and trading behaviour. Specific topics that might be covered include basic ethical issues such as conflicts of interest, rumours and false information, treatment of customer identity, order information and ‘front running’ as well as trading practices such as traders’ responsibility for quoted prices, dealing in less liquid times of day, use of off-market rates and historical rate rollovers and the appropriate treatment of stop-loss orders and the triggering of barrier options.

137. The Working Group recommends that the appropriate industry groups should review and, where necessary, revise existing guidelines and codes in light of the market dynamic issues raised. In addition, the Working Group believes that leading foreign exchange market participants should take the responsibility for articulating model guidelines of trading practices that could serve as a starting point for local adaptation in individual small and medium-sized open economies.

VI. Conclusion

138. HLIs raise important policy concerns through their capacity both to disrupt the financial system and affect the market dynamics of small and medium-sized open economies.
139. The Working Group consensus has settled on a package of responses which is based firmly on the premise that market discipline, supported by a series of additional measures, is the method through which systemic risks and market dynamic concerns posed by HLIs can be properly addressed. These additional measures include improved supervision and regulation of HLI credit providers, a firmer market infrastructure, increased HLI disclosure, enhanced national market surveillance and good practice guidelines for foreign exchange trading.
140. The Working Group believes that, together, these represent a consistent package of measures that are appropriate and commensurate to the issues identified in this Report. As has been noted, work is well underway in some of these areas. But taking forward the full range of these initiatives, and ensuring that pressure to sustain these changes is maintained, will require further action by a number of groups. Market discipline will only be effective if counterparties act appropriately to identify, measure and price risk and reflect this in the way they allocate resources. It is critical that these measures are carried forward with high priority by firms, industry groups, and national and international bodies.
141. The Working Group recommends that other options, including a credit register and direct regulation of HLIs, should not be pursued at this stage. However, it notes that reconsideration of these proposals may be appropriate in the future. While it is difficult to be precise about the circumstances that might lead to this, failure to carry through properly on the measures recommended within this Report would be likely to prompt such a reconsideration.

Working Group on Highly Leveraged Institutions

Terms of Reference

The working group on HLIs should help ensure a timely and co-ordinated response to the various concerns raised by institutions employing a high degree of leverage in financial markets. To this end, it should:

1. Assess the challenges posed by HLIs to financial stability in both developed and developing countries;
2. Take stock of work that has been completed or is underway in the groupings represented in the Forum or elsewhere on these issues;
3. Establish what is being done to implement recommendations already made and consider the need for further impetus to enhance implementation;
4. Make recommendations, where necessary, to improve co-ordination between existing organisations working in this area;
5. Identify issues that have not been covered in existing work and propose suitable procedures for dealing with them;
6. Foster a consensus on substantive supervisory or regulatory actions which would minimise the destabilising potential of HLIs.

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Summary of Recommendations made by Official Sector and Industry Groups with regard to Highly Leveraged Institutions

This is an area that has received considerable attention from international bodies during the past year. The following initiatives have been undertaken:

- The Basel Committee on Banking Supervision (Basel Committee) formed a working group to consider banks' interactions with HLIs. Its report was published by the Basel Committee in January 1999 in conjunction with a paper outlining Sound Practices for Banks' Interactions with HLIs. In January 2000 the Basel Committee published a follow-up assessment of the Implementation of the Basel Committee's Sound Practices Relating to Banks' Interactions with Highly Leveraged Institutions. References in this appendix are to the 1999 paper and accompanying Sound Practices unless stated otherwise.
- The International Organisation of Securities Commissions (IOSCO) Technical Committee formed a Task Force on Hedge Funds and other HLIs. The report was published in November 1999 and focuses on risk management issues relating to securities firms and the need for greater transparency in the HLI sector.
- The US President's Working Group (PWG) produced a report on hedge funds, leverage and LTCM in April 1999. This report urges banking, securities and futures regulators to monitor and encourage improvements in the risk management systems of regulated entities drawing on the analyses of the Basel Committee and IOSCO. The report also recommended increasing transparency through enhanced disclosure, stating that hedge funds should be required to disclose additional, and more timely, information to the public.
- The private sector Counterparty Risk Management Policy Group (CRMPG), produced a report on Improving Counterparty Risk Management Practices in June 1999. The report makes recommendations on improvements in financial intermediaries' (and sometimes their large trading counterparties') risk management practices; market improvements; and regulatory reporting relating to HLIs. On the latter, the report cautioned against mandatory reporting but recommended that financial intermediaries with significant counterparty credit and/or market exposure should be prepared to meet informally with their primary regulator on a periodic basis to discuss market conditions and trends with potential market disruption or systemic effects. It also suggested a possible format for disclosure of large exposures to regulators.
- The Multidisciplinary Working Group on Enhanced Disclosure (MWGED) is conducting a pilot study to test the efficacy of risk-based disclosures by financial firms (regulated and unregulated) as a follow up to the proposals made by the Committee on the Global Financial System (CGFS) Group on Disclosure. The results of the pilot study will be reported to the MWGED's four sponsoring organisations (Basel Committee, CGFS, International Association of Insurance Supervisors (IAIS) and IOSCO).

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- The International Swaps and Derivatives Association (ISDA) Collateral Review 1999 reviews the impact of market disruption in 1997 and 1998 on collateral arrangements and makes recommendations to reduce risks associated with collateralisation.
- One specific proposal aimed at enhancing aggregate information about foreign exchange positions was considered by the CGFS last year, but a decision was taken in November 1999 not to proceed further with that initiative.
- A group of five hedge fund managers published a report on Sound Practices for Hedge Fund Managers in February 2000. Recommendations are made on organisational structure and internal controls; risk monitoring; disclosure/transparency; and legal & compliance issues.
- One other major hedge fund, Tiger Management LLC, voluntarily issued a report that provided the PWG members with a very detailed description of its risk management practices.

The FSF HLI Group has reviewed the above work and the attached paper provides a short synthesis of the main recommendations. This synthesis neither supersedes nor is a substitute for the analytical detail of the original reports – it is not possible to gain a full understanding of the recommendations without referring to the original reports. Rather, this paper, and the attached table (which shows which report(s) made or endorsed the various statements), identifies the key recommendations made in these reports. In order to achieve this synthesis, some of the subtlety and differences of emphasis between the recommendations of individual reports has necessarily been sacrificed.

The paper is split into 5 topics:

1. ***Risk Management of HLI Exposures in Financial Intermediaries.*** This subject has been extensively covered by the existing work. It is the subject of detailed analysis in the Basel, IOSCO and CRMPG reports and is also addressed as an issue in PWG. There is generally a high degree of consensus in the recommendations of these bodies.
2. ***Risk Management in Hedge Funds.*** The PWG recommended that a group of hedge funds should draft and publish a set of sound practices for their risk management and internal controls. These issues are addressed in the report from a group of five hedge fund managers and also in the report by Tiger LLC.
3. ***Role of Regulators in Supporting Sound Practices.*** Again, this section is a synthesis of the recommendations of Basel, IOSCO, PWG and CRMPG.
4. ***Market Improvements.*** The IOSCO and Basel reports primarily focus on firm-level improvements. The CRMPG report, the PWG and the ISDA Collateral Review make a number of recommendations that will require concerted industry action as well as action by individual firms. These are detailed below.
5. ***Transparency: Reporting and Disclosure Recommendations.*** This issue is addressed by IOSCO, PWG and CRMPG. There is a certain degree of conflict between the public and private sector reports. The work being taken forward by the MWGED will result in a report to its four sponsoring organisations on possible steps to enhance the public disclosure of financial risks. This is discussed in Section 5. As mentioned above, a proposal aimed at enhancing aggregate information about foreign exchange positions was considered by the CGFS last year, but a decision was taken in November not to proceed further with that initiative.

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6. *Market Dynamics and Market Integrity.* None of the reports thus far produced specifically addresses market dynamics or market integrity issues in any detail. Nevertheless, a number of recommendations indirectly relate to these issues. The IOSCO report includes an examination of concerns posed by HLIs in the areas of systemic risk and market disruptions. The report identifies strong risk management as a first line of defence against these concerns but notes that this will not necessarily prove adequate. Both IOSCO and the PWG believe that enhanced public disclosure would help market participants make better judgements about market integrity issues. As specific recommendations have not generally been made in this area, this subject is not covered further in the remainder of this appendix.

Synthesis of recommendations

I. Risk management of HLI exposures in financial intermediaries

Overall Risk Management Framework:

- Financial intermediaries should have a clear credit risk strategy and credit risk management policy and process. Dealings with HLIs, and with all other counterparties, should follow this. The strategy, policy and processes should be specified by senior management and approved by the Board. This would include the expected contribution of individual business lines (including dealings with HLIs) to the institution's risk reward profile. As part of this process, senior management should set an overall tolerance for risk, including loss potential in adverse markets. This should also be approved by the Board.
- The risk management framework should integrate market risk and credit risk elements where appropriate.
- Financial intermediaries should have a credit department, independent of line management, to perform credit analysis and monitor compliance with approved credit limits. Senior management should ensure that this unit is adequately staffed with employees of appropriate skill and experience.
- Financial intermediaries should maintain documentary evidence of critical control processes and periodically assess their adherence to them.
- Policies on counterparty relations with HLIs should clearly indicate the circumstances in which exceptions may be granted and the procedure to be followed.
- Given the limitations of models, there should be established guidelines for how qualitative judgement should be exercised by the credit department and line management.
- Financial intermediaries should develop credit risk cost allocation and valuation practices that provide incentives for business line and risk managers to manage counterparty risk in a manner consistent with the firm's overall risk tolerance.
- Financial intermediaries should consider their approval procedures for new products capable of generating credit risk.
- Financial intermediaries should have contingency plans and procedures to be followed in the event of a dislocation to the operations of a HLI counterparty.
- Financial intermediaries should have a clear policy, which includes disclosure and monitoring provisions, on investments in counterparty HLIs by employees, directors, significant shareholders or the firm itself.
- Financial intermediaries should continuously review their risk management procedures.

Credit assessment and ongoing monitoring of HLIs:

- Financial intermediaries should have effective counterparty risk rating systems.
- Credit standards applied to HLIs, and trading activities more generally, should be consistent with the overall credit standards of the financial intermediary.
- Before starting a relationship with an HLI, financial intermediaries should receive adequate information to inform their internal credit approval processes. This should include information on:
 - Aggregate financial information (covering both on and off-balance sheet positions).
 - Financial performance.
 - Details of risk management procedures and controls.
 - Results from (and methodology of) risk measurement tests (Value at Risk (VaR), stress tests).
 - General direction and scope of trading activities, including investment strategies.
 - Amount of leverage.
 - Liquidity and funding profile (including details of major counterparty relationships).
 - Details of large or concentrated positions.
 - Details of key personnel and organisational structure (including back office structure).
 - Where possible, third party information such as credit registers or references from known parties should be accessed. In all cases, financial intermediaries should be confident that they are dealing with institutions of sound reputation before starting counterparty relationships.
 - The legal status and investment authority of the HLI (see legal issues section below).
 - The connected entities of an HLI or group of HLIs. If there are connected entities: the relative size and activities of group members; the role that the lead member plays in the group as a whole and; the nature and size of any intra-group transactions.
 - The purpose and structure of the transaction should be identified and the repayment capacity analysed against several scenarios.
- Procedures should be in place to ensure that the information received above is updated on a timely basis. The Basel Committee recommends that updates should be received at least quarterly and more frequently when exposure increases significantly or there is high market volatility.
- HLIs that provide limited information should face tougher credit conditions. The IOSCO Task Force believes that, while firms may be able to compensate for risk created by less than complete information by taking other steps (such as additional contractual covenants), certain basic information may be too critical to do without. The CRMPG states that at some level of perfected interest in “excess” liquid collateral, there is an adequate level of protection to compensate for information shortcomings.

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- Specific portfolio information may sometimes be needed to manage more credit intensive activities, larger than normal exposures or higher risk counterparties.
- Financial intermediaries should adopt written policies governing use of proprietary information provided by counterparties.

Exposure Measurement:

- There is agreement that mark-to-market net of collateral figures do not represent a realistic measure of exposure and that firms should develop more useful measures of potential future credit exposure (PFE) to complement VaR figures and stress testing. The Basel Committee's 1999 report argues that peak exposure measures could be used if they serve as true loan equivalent measures. Further resources must, however, be devoted to developing such meaningful measures of PFE. The CRMPG stresses that the extreme size of stress market moves or the ability to receive collateral should be taken into account. It proposes the development and use of a liquidation-based replacement value for large or illiquid exposures.
- Financial intermediaries need more effective measurement of unsecured exposure inherent in over the counter (OTC) derivatives contracts subject to daily margining.
- Better stress testing/scenario analysis should also be used to test exposures. Tests should assess concentration risk (both to a single counterparty and to groups of counterparties); correlation risk amongst both market risk factors and credit risk factors; and risk that liquidation of positions could significantly move the market. Particular analytical focus should be given to the impact of stress events on large or illiquid sources of risk.
- Model validation processes, including backtesting, should be reviewed.
- Financial intermediaries should monitor their own exposures and the exposures of counterparties using an integrated framework that evaluates the linkages between market risk, liquidity and leverage.

Limit setting:

- Financial intermediaries should establish firm-wide credit limits for individual counterparties. Such limits should consider exposures arising from all transactions or services exposing the firm to credit risk and should be developed in line with the overall risk policy.
- Consideration should also be given to counterparty sub-limits for particular products.
- Financial intermediaries may wish to consider an aggregate credit limit for HLIs as a group based on PFE, liquidation-based replacement value and/or other factors.
- Given that all exposure measures have both strengths and weaknesses, it may be appropriate for financial intermediaries to set a number of limits using different exposure measures for the same counterparty.
- Limits should be monitored at least daily with a clear procedure for bringing down exposures as limits are breached.
- Collateral, contractual provisions and valuation policies:

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- These should each be the subject of a clear, written policy. This is the responsibility of senior management.
- Reliance on collateral cannot substitute for day-to-day risk management and monitoring.
- Collateral agreements with counterparties should be clearly documented.
- Collateral agreements and contractual provisions with HLI counterparties should be aligned with the financial intermediary's assessment of counterparty credit risk.
- Financial intermediaries should have guidelines to determine when initial margin should be requested. As a general practice, initial margin should be required from HLI counterparties.
- The amount of initial margin should be based on estimates of PFE and/or liquidation-based replacement values.
- Decisions on two way margining and rehypothecation should be a function of the credit quality of the counterparty.
- Appropriate haircuts should be determined (relevant factors include the creditworthiness of the counterparty and the liquidity and volatility of the collateral).
- Collateral should be valued at least daily and preferably on a more frequent basis.
- Stress testing should be conducted on the value of collateral held. Financial intermediaries should be aware of correlations between the value of collateral held and their own trading positions.
- Financial intermediaries should be alert to the possibility that collateral value is negatively correlated with the market value of contracts or the possibility of counterparty default.
- Financial intermediaries should consider the use of covenants permitting termination or other action if the counterparty undergoes significant changes in strategy, leverage, risk or other elements of credit quality.
- The use of "sudden death" termination provisions could have systemic implications. Covenants should be designed to allow financial intermediaries to adjust terms well before cessation of the relationship is appropriate.
- Financial intermediaries should develop and apply independent price verification procedures. External sources should be used whenever feasible.
- In order to provide realistic estimates of the realisable values of positions, valuations should include fair value adjustments to mid-market prices. These should reflect the bid-offer spread; illiquidity characteristics; credit valuation adjustments; operational or model risks; and servicing costs of hedging.
- Confirmations for OTC transactions should be sent out by the business day following the trade date. Firms should have written evidence of a binding agreement with the counterparty within five days.
- Financial intermediaries should track unexecuted masters, unsent confirmations and unconfirmed trades. They should develop incentives for business units to correct deficiencies in documentation. This might include trading restrictions, mandatory unwinds and reserves set aside against potential losses.

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- Financial intermediaries should implement the recommendations of the ISDA 1999 Collateral Review on best practices in the use of collateral. These include best practice on the structure of collateral functions in individual institutions, as well as guidance on market practices (discussed in more detail in section four below).

Legal Risk:

- Financial intermediaries need a full understanding of any counterparty HLI's legal form; legal authority to enter into transactions; legal limits on the way it may deal; legal relationships with any related entities; and which country's laws govern the entity and/or specific transaction.
- The legal basis of documentation will not necessarily have been tested in all jurisdictions. Financial intermediaries should pay particular attention to the legal status of netting and collateral terms and conditions; obligations at the end of the contract; events of default; covenants and close-out provisions.
- Financial intermediaries should ensure that all legal documentation supporting the transaction is clear and complete. IOSCO recommends that, where appropriate, signed master agreements should be required prior to initiation of first transactions. The CRMPG recommends that new master agreements should be executed within 90 days of a transaction. Pending execution, financial institutions should utilise a "long form" confirmation.
- Financial intermediaries should assess the extent to which the failure of an HLI might raise problematic bankruptcy issues that would complicate the orderly liquidation of positions.

Confidentiality of information within financial institutions:

- Financial intermediaries should have in place internal written procedures governing the use and access to proprietary information provided by trading counterparties as a basis for credit evaluations.
- Financial intermediaries should reach understandings with their counterparties regarding the use of counterparty proprietary information and on safeguards against its unauthorised use.

Reporting to Senior Management:

- The risk management function should design a flexible reporting framework to enable senior management to monitor risk profile relative to the stated tolerance.
- For large counterparty (potential) exposures, this should include aggregate exposure; position and collateral replacement costs at both market and estimated liquidation value; a measure of potential exposure; and quantitative and qualitative analysis of vulnerabilities to large moves in specific market risk factors.
- Senior management information should also highlight possible correlations between firms' own proprietary positions and counterparty positions and/or collateral pledged by counterparties.

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- Senior management should also receive contextual information to allow them to assess the degree of reliance on quantitative information and to highlight key assumptions used to develop such data.
- Senior management should be cognisant of and receive periodic updates on: model specification and limitations; data integrity questions; valuation methods and limitations; legal uncertainties; margining and collateral management policies; and status of counterparty documentation.

II. Risk management in hedge funds

- A group of hedge funds should draft and publish a set of sound practices for their risk management and internal controls⁴⁰.

Organisational Structure and Internal Controls:

- Hedge fund managers should clearly define the investment objectives and risk parameters for each fund and the trading policies and risk limits necessary to achieve these objectives.
- Hedge fund managers should adopt an organisational structure that ensures effective monitoring of compliance with investment and valuation policies by allocating defined supervisory responsibilities and maintaining clear reporting lines.
- Hedge fund managers should establish a risk monitoring function that operates independently of portfolio management functions.
- Suitably qualified personnel should be retained and adequate systems established to produce periodic reporting that permits senior management to monitor trading activities and operations effectively.
- Internal procedures and periodic independent review processes should seek to ensure the enforcement of policies and identify deviations from those policies. Independent reviews should take place at least annually.
- Appropriate controls, reporting and review processes should apply to all managers and traders, whether internal or external to the hedge fund manager.
- Senior management should formally approve the allocation of capital to all portfolio managers.
- Third-party service providers that perform key business functions (such as net asset value calculation) should also be subject to appropriate controls and review processes.

⁴⁰ This PWG recommendation has been implemented through the report from a group of five hedge fund managers mentioned above. The rest of the recommendations in this section come from that report and may have broader application to unregulated HLIs. In accordance with the terminology used in the report, the term “hedge fund” is used in this section.

Risk Management:

- Hedge fund managers should evaluate market risk for their portfolios both in aggregate and for relevant subcomponents of a portfolio. Models used should be subject to backtesting. In addition, stress testing should be used.
- Hedge fund managers should employ appropriate liquidity measures, evaluate the stability of sources of liquidity and have a contingency liquidity plan for periods of market stress.
- Hedge fund managers should establish policies and procedures to manage potential defaults by trading counterparties.
- Hedge fund managers should monitor both accounting-based measures of leverage and risk-based measures of leverage⁴¹ which reflect the relationship between the riskiness of a portfolio and the capacity of the hedge fund to absorb the impact of such risk. Managers should also recognise the interrelation between leverage and market, credit and liquidity risk factors.
- Hedge fund managers should establish procedures to limit exposure to possible operational risk.

Legal and compliance:

- The head of the legal function should be recognised as a member of senior management and granted sufficient authority to manage legal and compliance affairs independently and effectively.
- Hedge fund managers should establish clear transaction execution and documentation management procedures. Documentation should be standardised to the extent possible with all counterparties on a bilateral basis. Where efficient, master/master or umbrella agreements should be used.
- The status of all documentation should be tracked and documentation practices across Funds and counterparties should be standardised to the greatest extent possible.
- Risk monitoring, liquidity analysis and stress testing should take account of the effects of contractual provisions (such as termination clause or requirements to post additional margin).
- Hedge fund managers should identify all potential regulatory filings and clearly allocate responsibility to appropriate personnel.
- All employees should attest in writing to their acceptance of a “code of conduct” or compliance manual on an annual basis.

Disclosure to credit providers and counterparties:

- Hedge fund managers should provide credit providers and trading counterparties with information that gives a view of their funds’ risk and return profiles, including changes

⁴¹ Examples given include volatility of portfolio/equity, VaR/equity or VaR/(cash-plus-borrowing-capacity).

in net asset value, profit and loss volatility, changes in net capital, market risk measures, and liquidity measures.

III. Role of regulators in supporting sound practices

- Sound practices are vulnerable to erosion by competitive pressures. Regulators should monitor, and encourage improvements in, financial intermediaries with significant HLI business. This might include:
 - Assessing adequacy of risk management procedures.
 - Assessing compliance with both internal risk management procedures and the sound practices identified in the various reports.
 - Encouraging firms to conduct meaningful stress tests.
 - Applying an appropriate supervisory response to any shortcomings. This might include a greater intensity of supervisory oversight or the use of formal or informal regulatory sanctions against firms that do not comply. Alternatively, some supervisors make use of variable capital ratios and/or prohibitions or restrictions on certain activities.
 - Groupings of regulators should co-operate to minimise opportunities for regulatory arbitrage.
 - Regulators and supervisors should develop more risk-sensitive approaches to capital adequacy. The PWG recommends that, in particular, derivatives with similar risk characteristics to the underlying instruments should have the same capital charge for market risk. The Basel Committee's 1999 Report recommends that three issues might be considered in the review of the Basel Accord: the maximum risk weighting of 50% for non-bank OTC derivatives exposure; the absence of capital charges for possible unsecured exposures resulting from repo transactions; and the adequacy of 100% risk weighting for HLI counterparties.
 - All regulators, particularly those in offshore centres (OFCs), need to be encouraged to adopt internationally agreed standards. Incentives could include a higher risk weighting for counterparties from jurisdictions not applying the internationally recognised regulatory core principles; ability to join Basel/IOSCO/IAIS working groups being made contingent on implementation of international standards; and pressure from G7 countries with close links to OFCs.
 - In the US, there should be statutory changes to grant the SEC, the CFTC and the Treasury expanded risk assessment authority over broker-dealer and FCM unregulated affiliates.
 - Regulators should carefully monitor the use of "double leverage".
 - VaR and other risk models in financial intermediaries should be subject to validation procedures, including rigorous backtesting. This should be consistent with the Basel Committee's approach.
 - None of the reports support the introduction of direct regulation for unregulated HLIs. The PWG report states that if increased transparency, public disclosure and other measures of indirect regulation prove ineffective in improving credit risk

management and constraining leverage, then consolidated supervision of unregulated affiliates and direct regulation of hedge funds are matters that could be given further consideration. At the present time, IOSCO is not recommending that HLIs be subject to direct regulation. The Basel Committee's 1999 Report also states that further consideration would be necessary if indirect measures were shown to be insufficient and notes that introduction of a regulatory regime for all HLIs would require a major political initiative.

IV. Improvements in market practice at industry and firm level

The IOSCO and Basel reports primarily focus on firm-level improvements. The CRMPG report, the PWG and the ISDA 1999 Collateral Review make a number of recommendations that will require concerted industry action as well as action by individual firms. These are detailed below:

Bankruptcy Issues:

- Jurisdictions should enact into law any necessary improvements to the close-out netting regime to allow counterparties to net across different types of contracts.
- There should be clarification that a US Court would apply US bankruptcy law to ancillary proceedings taking place in the US. This would prevent an offshore hedge fund from filing for bankruptcy abroad and then petitioning a US Court to block the sale of collateral.
- The UN Commission on International Trade Law (UNCITRAL) should be codified to establish clear conventions to differentiate between a "main" and "non-main" insolvency. This would make it more likely that the jurisdiction of the main insolvency proceedings for an offshore fund would be determined by the fund's principal place of business rather than the jurisdiction in which it is incorporated.

Documentation policies, practices and content:

- New industry standards should be adopted for documentation practices.
- Firms, industry groupings, service providers and regulators should support efforts to introduce greater automation in the documentation process for OTC contracts.
- Documentation should be revised to ensure that a non-defaulting party has the flexibility to value transactions in good faith and in a commercially reasonable manner where circumstances warrant. Specific suggestions to aid this are given in the CRMPG report.
- Modification of existing law to improve close-out netting agreements for financial contracts, including netting across different types of contract, should be considered.
- Where possible, standard documentation should be harmonised across jurisdictions.

Collateral Practices:

- The ISDA recommendations on improvements that the industry should make to market practices in collateral management should be implemented. These include:
 - ISDA and members should establish guidelines for informal dispute resolution practices.
 - ISDA and members should consider revising credit support documents to include the option of a shorter time cycle for valuation, delivery and liquidation of collateral.
 - Institutions should consider drafting into their collateral agreements a provision that allows cash to be delivered in the event of a collateral delivery failure.
 - Greater consideration should be given to the use of cash as potential collateral.
 - ISDA and members should consider the simplification of the documentation structure and execution process of master agreements and credit support documents.

V. Transparency: reporting and disclosure recommendations

The key recommendations of the various reports are listed below. Areas where differences exist between the groups which have reported include the relative merits of reporting and disclosure and the mechanism by which either should be accomplished. The key recommendations of each of the papers are listed below.

BASEL:

- Notes that additional measures may be needed to enhance transparency of HLIs to the market.

IOSCO:

- Considers regular confidential reporting to regulators by HLIs, but favours enhanced public disclosure directly by the HLI.
- Reporting (either via financial intermediaries or direct from the HLI) should still be considered if public disclosure initiatives fail to achieve the specified objectives.
- Nevertheless, in all cases information at financial intermediaries should be accessible by its regulators. When crises occur, firms must be prepared and able to provide regulators with requested information in a timely way.

PWG:

- Public disclosure by hedge funds should be enhanced to allow other market participants to make better, more informed decisions. Commodity Pool Operators (CPOs) that exceed a de minimus threshold (including those that manage hedge funds) should file quarterly reports containing more meaningful and comprehensive risk information which the CFTC would publish. Congress should enact legislation to authorise disclosure mechanisms for funds not registered as CPOs.
- Public companies, including financial institutions, should publicly disclose a summary of material exposures to “significantly leveraged institutions” including hedge funds.

CRMPG:

- Firms with significant credit/market risk should meet their primary regulator periodically to discuss principal risks, as well as market conditions and trends with potential market disruption or systemic effects
- If requested by its primary regulator, financial intermediaries should voluntarily provide reports detailing large exposure information on a consolidated basis.
- Regulatory agencies requesting such information should reach clear understandings with institutions on the permissible use of such information and safeguards against its misuse. Such a report should not be a blueprint for public disclosure.
- Financial intermediaries are encouraged to provide explanatory notes to the report, especially if there is a danger of misinterpretation of complex information.
- Questions the usefulness of PWG proposals on public disclosure by hedge funds and of disclosure by public companies of exposures to significantly leveraged financial institutions.

Hedge Fund Industry Group:

- Hedge fund managers should also work with regulators and counterparties to develop a consensus approach to public disclosure. Agreements and other safeguards should be established in order to protect against the unauthorised use of proprietary information furnished to outside parties.
- In terms of the specification of information that could be disclosed, the MWGED is currently conducting a pilot study on a suggested template. The CRMPG provides a possible template for regulatory reporting, although it notes that this would require further work to refine the nature of the information provided.
- A specific proposal aimed at enhancing aggregate information about foreign exchange positions was considered by the CGFS last year, but a decision was taken in November not to proceed further with that initiative.

Tabular presentation of key recommendations:

1. Financial intermediaries' risk management

	BASEL	IOSCO	PWG⁴²	CRMPG
Overall Risk Management Framework:				
Financial intermediaries should have a clear credit risk strategy and credit risk management policy and process. Dealings with HLIs, and with all other counterparties, should follow this. This strategy, policy and process should be specified by senior management and approved by the Board.	✓	✓		✓
As part of this, senior management should set an overall tolerance for risk, including loss potential in adverse markets. The Board of Directors should approve this.		✓	✓	✓
The expected contribution of individual business lines (including dealings with HLIs) to the risk reward profile should be specified by senior management.		✓		
The risk management framework should integrate market risk and credit risk elements where appropriate.	✓	✓	✓	
Financial intermediaries should have a credit department, independent of line management, to perform credit analysis and monitor compliance with approved credit limits.		✓	✓	✓
Senior management should ensure that this unit is adequately staffed with employees of appropriate skill and experience.				✓
Financial intermediaries should maintain documentary evidence of critical control processes and periodically assess the firm's adherence to them.		✓		
Policies on counterparty relations with HLIs should clearly indicate the circumstances in which exceptions may be granted and the procedure to be		✓		

⁴² Most PWG recommendations on this subject refer to themes that should be addressed by regulators or private sector initiatives rather than direct recommendations. This means a tabular presentation of recommendations makes it appear less comprehensive than the detailed analysis contained in the Report.

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	BASEL	IOSCO	PWG ⁴²	CRMPG
followed.				
Given the limitations of models, there should be established guidelines for how qualitative judgement should be exercised by the credit department and line management.			✓	
Financial intermediaries should develop credit risk cost allocation and valuation practices that provide incentives for business line and risk managers to manage counterparty risk in a manner consistent with the firm's overall risk tolerance.				✓
Financial intermediaries should consider their approval procedures for new products capable of generating credit risk.		✓		
Financial intermediaries should have contingency plans and procedures to be followed in the event of a dislocation to the operations of an HLI counterparty.		✓		
Financial intermediaries should have a clear policy, which includes disclosure and monitoring provisions, on investments in counterparty HLIs by employees, directors, significant shareholders or the firm itself.		✓		
Financial intermediaries should continuously review their risk management procedures.	✓		✓	
Credit assessment and ongoing monitoring of HLIs	Identified as needing further work in the January 2000 Review.			
Financial intermediaries should have effective counterparty risk rating systems.		✓		
Credit standards applied to HLIs, and trading activities more generally, should be consistent with the overall credit standards of the financial intermediary.	✓		✓	
Before starting a relationship with an HLI, financial intermediaries should receive adequate information to inform their internal credit approval processes. This should include information on:	✓	✓	✓ (not specified in detail)	
Aggregate financial information (covering both on and off-balance sheet positions).	✓	✓		
Financial performance.	✓	✓		✓

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	BASEL	IOSCO	PWG⁴²	CRMPG
Details of risk management procedures and controls.	✓	✓		✓
Results from (and methodology of) risk measurement tests (VAR, stress tests).	✓	✓		✓
General direction and scope of trading activities, including investment strategies.	✓	✓		✓
Amount of leverage.	✓	✓		
Liquidity and funding profile (including details of major counterparty relationships).	✓	✓		✓
Details of large or concentrated positions.		✓		
Details of key personnel and organisational structure (including back office structure).	✓	✓		
Where possible, third party information such as credit registers or references from known parties should be accessed. In all cases, financial intermediaries should be confident that they are dealing with institutions of sound reputation before starting counterparty relationships.	✓	✓		
The legal status and investment authority of the HLI (see section on legal status below).	✓	✓		
The connected entities of an HLI or group of HLIs. If there are connected entities: the relative size and activities of group members; the role that the lead member plays in the group as a whole and; the nature and size of any intra-group transactions.		✓		
The purpose and structure of the transaction should be identified and the repayment capacity analysed against several scenarios.	✓			
Procedures should be in place to ensure that the information received above is updated on a timely basis.	✓	✓	✓	✓
Updates should be received at least quarterly and more frequently when exposure increases significantly or there is high market volatility.	✓			
HLIs that provide limited information should face tougher credit conditions.	✓	✓		
Specific portfolio information may sometimes be needed to manage more credit intensive activities, larger than normal exposures or higher risk counterparties.				✓
Financial intermediaries should adopt written policies governing use of	✓			✓

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	BASEL	IOSCO	PWG ⁴²	CRMPG
proprietary information provided by counterparties.				
Exposure Measurement				
More useful measures of potential future credit exposure (PFE) need to be developed.	✓ - Identified as needing further work in the January 2000 Review.	✓	✓	
When exposures are large or illiquid, mark-to-market figures should be supplemented by an estimation of liquidation based replacement value.	Exposure measurement is an area in which further work needs to be undertaken.			✓ ⁴³
Use of peak exposure measurements could serve as loan equivalent measures.	✓			
Financial intermediaries need more effective measurement of unsecured exposure inherent in OTC derivatives contracts subject to daily margining.	✓			
Better stress testing/scenario analysis should also be used to test exposures. Tests should assess concentration risk (both to a single counterparty and to groups of counterparties); correlation risk amongst both market risk factors and credit risk factors; and risk that liquidation of positions could significantly move the market. Particular analytical focus should be given to the impact of stress events on large or illiquid sources of risk.	✓ - Identified as needing further work in the January 2000 Review.	✓	✓	✓ (detailed list of tests)
Model validation processes, including backtesting, should be reviewed.			✓	
Financial intermediaries should monitor their own exposures and the exposures of counterparties using an integrated framework that evaluates the linkages between market risk, liquidity and leverage.			✓	✓
Limit setting				

⁴³

In order to do this, firms must:

- Measure and set limits on the degree of reliance on collateral.
- Estimate replacement cost and collateral value at potential liquidation.
- Use liquidity-adjusted VaR estimates or judgmental stress test to reflect the potential for adverse price movement to take place before a liquidation can be conducted.
- Review collateral and margining terms in the light of the above.
- Establish limit structures relating to pre-collateral exposures; estimated liquidation exposures and potential exposures.

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	BASEL	IOSCO	PWG ⁴²	CRMPG
Financial intermediaries should establish firm-wide credit limits for individual counterparties. Such limits should consider exposures arising from all transactions or services exposing the firm to credit risk and should be developed in line with the overall risk policy.	✓	✓	✓	✓
Consideration should also be given to counterparty sub-limits for particular products.		✓		
Financial intermediaries may wish to consider an aggregate credit limit for HLIs as a group based on PFE, Liquidation-based replacement value and/or other factors.		✓	✓	✓ gives four possibilities and suggests firms may want to use more than one.
Limits should be monitored at least daily with a clear procedure for bringing down exposures if they are breached.	✓	✓		
Collateral, contractual provisions and valuation				
These should each be the subject of a clear, written policy. This is the responsibility of senior management.	✓	✓	✓	
Reliance on collateral cannot substitute for day-to-day risk management and monitoring.	✓			
Collateral agreements with counterparties should be clearly documented.		✓		
Collateral agreements and contractual provisions with HLI counterparties should be aligned with the financial intermediary's assessment of counterparty credit risk.	✓	✓		
Financial intermediaries should have guidelines to determine when initial margin should be requested. As a general practice, initial margin should be required from HLI counterparties.	✓	✓		✓
The amount of initial margin should be based on PFE and/or estimates of liquidation-based replacement values.	Identified as needing further work in the January 2000 Review.			✓
Decisions on two way margining and rehypothecation should be a function of the credit quality of the counterparty.	✓			
Appropriate haircuts should be applied (factors include the creditworthiness of the counterparty and the liquidity and volatility of the collateral).	✓	✓		

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	BASEL	IOSCO	PWG⁴²	CRMPG
Collateral should be valued at least daily and preferably on a more frequent basis.	✓	✓	✓	
Stress testing should be conducted on the value of collateral held. Financial intermediaries should be aware of correlations between the value of collateral held and their own trading positions.	✓	✓		
Financial intermediaries should be alert to the possibility that collateral value is negatively correlated with the market value of contracts or the possibility of counterparty default.	✓	✓		
Financial intermediaries should consider the use of covenants permitting termination or other action if the counterparty undergoes significant changes in strategy, leverage, risk or other elements of credit quality.	✓ - Identified as needing further work in the Jan 2000 Review.		✓	
The use of “sudden death” termination provisions could have systemic implications. Covenants should be designed to allow firms to adjust terms well before cessation of the relationship is appropriate.	✓			
Financial intermediaries should develop and apply independent price verification procedures. External sources should be used whenever feasible.				✓
In order to provide realistic estimates of the realisable values of positions, valuations should include fair value adjustments to mid-market prices. These should reflect the bid-offer spread; illiquidity characteristics; credit valuation adjustments; operational or model risks; and servicing costs of hedging.				✓
Confirmations for OTC transactions should be sent out by the business day following the trade date. Firms should have written evidence of a binding agreement with the counterparty within five days.				✓
Financial intermediaries should track unexecuted masters, unsent confirmations and unconfirmed trades. They should develop incentives for business units to correct deficiencies in documentation. This might include trading restrictions, mandatory unwinds and reserves set aside against potential losses.			✓	✓
Financial intermediaries should implement the recommendations of the ISDA 1999 Collateral Review on best practices in the use of collateral. These include best practice on the structure of collateral functions in individual institutions, as well as guidance on market practices (discussed in more detail in section four below).			✓ (notes the report but does not specifically endorse)	✓

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	BASEL	IOSCO	PWG ⁴²	CRMPG
Legal Risk				
Financial intermediaries need a full understanding of any counterparty HLI's: legal form; legal authority to enter into transactions; legal limits on the way it may deal; legal relationships with any related entities; and which country's laws govern the entity and/or specific transaction.		✓	✓	
The legal basis of documentation will not necessarily have been tested in all jurisdictions. Financial intermediaries should pay particular attention to: the legal status of netting and collateral terms and conditions; obligations at the end of the contract; events of default; covenants and close-out provisions.		✓	✓	
Financial intermediaries should ensure that all legal documentation supporting the transaction is clear and completed.		✓ - documentation, including master agreements where appropriate, should be executed prior to a transaction being initiated.		✓ - should be executed within 90 days of a transaction. Pending execution, firms should use long form confirmations.
Financial intermediaries should assess the extent to which the failure of an HLI might raise problematic bankruptcy issues that would complicate the orderly liquidation of positions.		✓		
Confidentiality of information within financial institutions				
Financial intermediaries should have in place internal written procedures governing the use and access to proprietary information provided by trading counterparties as a basis for credit evaluations.	✓			✓
Financial intermediaries should reach understandings with their counterparties regarding the use of counterparty proprietary information and on safeguards against its unauthorised use.	✓			✓
Reporting to Senior Management				
The risk management function should design a flexible reporting framework to enable senior management to monitor risk profile relative to the stated tolerance.				✓
For large counterparty (potential) exposures, this should include: aggregate exposure; position and collateral replacement costs at both market and	✓			✓

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	BASEL	IOSCO	PWG⁴²	CRMPG
estimated liquidation value; a measure of potential exposure; and quantitative and qualitative analysis of vulnerabilities to large moves in specific market risk factors.				
Senior management information should also highlight possible correlations between firms own proprietary positions and counterparty positions and/or collateral pledged by counterparties		✓		✓
Senior management should also receive contextual information to allow them to assess the degree of reliance on quantitative information and to highlight key assumptions used to develop such data.			✓(part)	✓
Senior management should be cognisant of and receive periodic updates on: model specification and limitations; data integrity questions; valuation methods and limitations; legal uncertainties; margining and collateral management policies; and status of counterparty documentation.			✓(part)	✓

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2. Risk management in hedge funds

	PWG	HF Industry Report
A group of hedge funds should draft and publish a set of sound practices for their risk management and internal controls ⁴⁴ .	✓	
Organisational Structure and Internal Controls:		
Hedge fund managers should clearly define the investment objectives and risk parameters for each fund and the trading policies and risk limits necessary to achieve these objectives.		✓
Hedge fund managers should adopt an organisational structure that ensures effective monitoring of compliance with investment and valuation policies by allocating defined supervisory responsibilities and maintaining clear reporting lines.		✓
Hedge fund managers should establish a risk monitoring function that operates independently of portfolio management functions.		✓
Suitably qualified personnel should be retained and adequate systems established to produce periodic reporting that permits senior management to monitor trading activities and operations effectively.		✓
Internal procedures and periodic independent review processes should seek to ensure the enforcement of policies and identify deviations from those policies. Independent reviews should take place at least annually.		✓
Appropriate controls, reporting and review processes should apply to all managers and traders, whether internal or external to the hedge fund manager.		✓
Senior management should formally approve the allocation of capital to all portfolio managers.		✓
Third-party service providers that perform key business functions (such as NAV calculation) should also be subject to appropriate controls and review processes.		✓
Risk Management:		
Hedge fund managers should evaluate market risk for their portfolios both in aggregate and for relevant subcomponents of a portfolio. Models used should be subject to backtesting. In addition, stress testing should be used.		✓
Hedge fund managers should employ appropriate liquidity measures, evaluate the stability of sources of liquidity and have a contingency liquidity plan for periods of market stress.		✓
Hedge fund managers should establish policies and procedures to manage potential defaults by trading counterparties.		✓

⁴⁴ This PWG recommendation has been implemented through the report from a group of five hedge fund managers mentioned above. The rest of the recommendations in this section come from that report and may have broader application to unregulated HLIs. In accordance with the terminology used in the report, the term “hedge fund” is used in this section.

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	PWG	HF Industry Report
Hedge fund managers should monitor both accounting-based measures of leverage and risk-based measures of leverage which reflect the relationship between the riskiness of a portfolio and the capacity of the hedge fund to absorb the impact of such risk. Managers should also recognise the interrelation between leverage and market, credit and liquidity risk factors.		✓
Hedge fund managers should establish procedures to limit exposure to possible operational risk.		✓
Legal and compliance:		
The head of the legal function should be recognised as a member of senior management and granted sufficient authority to manage legal and compliance affairs independently and effectively.		✓
Hedge fund managers should establish clear transaction execution and documentation management procedures. Documentation should be standardised to the extent possible with all counterparties on a bilateral basis. Where efficient, master/master or umbrella agreements should be used.		✓
The status of all documentation should be tracked and documentation practices across Funds and counterparties should be standardised to the greatest extent possible.		✓
Risk monitoring, liquidity analysis and stress testing should take account of the effects of contractual provisions (such as termination clause or requirements to post additional margin).		✓
Hedge fund managers should identify all potential regulatory filings and clearly allocate responsibility to appropriate personnel.		✓
All employees should attest in writing to their acceptance of a “code of conduct” or compliance manual on an annual basis.		✓
Disclosure to credit providers and counterparties:		
Hedge fund managers should provide credit providers and trading counterparties with information that gives a view of their funds’ risk and return profiles, including changes in net asset value, profit and loss volatility, changes in net capital, market risk measures, and liquidity measures.		✓

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3. Role of regulators in individual firms' risk management:

	BASEL	IOSCO	PWG	CRMPG
Sound practices are vulnerable to erosion by competitive pressures. Regulators should monitor, and encourage improvements in, financial intermediaries with significant HLI business. This might include:	✓	✓	✓	
Assessing adequacy of risk management procedures.	✓	✓	✓	
Assessing compliance with both internal risk management procedures and the sound practices identified in the various reports.	✓	✓	✓	
Encouraging firms to conduct meaningful stress tests.			✓	
Applying an appropriate supervisory response to any shortcomings. This might include a greater intensity of supervisory oversight or the use of formal or informal regulatory sanctions against firms that do not comply. Alternatively, some supervisors make use of variable capital ratios and/or prohibitions or restrictions on certain activities.	✓	✓ - In extreme cases, regulators may consider closure of the firm.		
Groupings of regulators should co-operate to minimise opportunities for regulatory arbitrage.	✓	✓		
Regulators and supervisors should be encouraged to develop more risk-sensitive approaches to capital adequacy.	✓(defers specific suggestions to capital accord review)		✓	
In particular, derivatives with similar risk characteristic to the underlying instruments should have the same capital charge for market risk.			✓	
Maximum risk weighting of 50% for non-bank OTC derivatives exposure should be reviewed.	✓			
Absence of capital charges for possible unsecured exposures resulting from repo transactions should be reviewed.	✓			
Adequacy of 100% risk weighting for HLI counterparties should be reviewed.	✓			
All regulators, particularly those in OFCs, need to be encouraged to adopt internationally agreed standards. Incentives could include a higher risk weighting for counterparties from jurisdictions not applying the internationally recognised regulatory core principles; ability to join Basel/IOSCO/IAIS working groups being made contingent on implementation of international standards; and pressure from G7 countries			✓	

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	BASEL	IOSCO	PWG	CRMPG
with close links to OFCs.				
In the US, there should be statutory changes to grant the SEC, the CFTC and the Treasury expanded risk assessment authority over broker-dealer and FCM unregulated affiliates.			✓	
Regulators should carefully monitor the use of “double leverage”.			✓	
VaR and other risk models in financial intermediaries should be subject to validation procedures, including rigorous backtesting. This should be consistent with the Basel Committee’s approach.			✓	
Direct regulation of HLIs is not appropriate at this stage. The PWG states that it could be reconsidered if indirect measures and greater transparency are shown not to be working in an effective manner.	✓	✓	✓	

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4. Improvements in market practice at industry and firm level– The IOSCO and Basel reports primarily focus on firm-level improvements. The CRMPG report, the PWG and the ISDA 1999 Collateral Review make a number of recommendations that will require concerted industry action as well as action by individual firms. These are detailed below:

	PWG⁴⁵	CRMPG	ISDA
Bankruptcy Issues:			
Improvements to the close-out netting regime to allow counterparties to net across different types of contracts should be enacted into law.	✓		
There should be clarification that a US Court would apply US bankruptcy law to ancillary proceedings taking place in the US. This would prevent an offshore hedge fund from filing for bankruptcy abroad and then petitioning a US Court to block the sale of collateral.	✓		
The UN Commission on International Trade Law (UNCITRAL) should be codified to establish clear conventions to differentiate between a “main” and “non-main” insolvency. This would make it more likely that the jurisdiction of the main insolvency proceedings for an offshore fund would be determined by the fund’s principal place of business than the jurisdiction in which it is incorporated.	✓		
Documentation policies, practices and content:			
New industry standards should be adopted for documentation practices.		✓	✓
Firms, industry groupings, service providers and regulators should support efforts to introduce greater automation in the documentation process for OTC contracts.		✓	✓
Documentation should be revised to ensure that a non-defaulting party has the flexibility to value transactions in good faith and a commercially reasonable manner where circumstances warrant. Specific suggestions to aid this are given in the CRMPG report.		✓	
Modification of existing law to improve close-out netting agreements for financial contracts, including netting across different types of contract, should	✓	✓ (gives detailed guidance on recommended changes)	✓ (also recommends a more wide-ranging review for all laws and regulations that

⁴⁵ Most PWG recommendations on this subject refer to themes that should be addressed by regulators or private sector initiatives rather than direct recommendations. This means a tabular presentation of recommendations makes it appear less comprehensive than the detailed analysis contained in the report actually is.

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	PWG⁴⁵	CRMPG	ISDA
be considered.			impact on the collateral function)
Where possible, standard documentation should be harmonised across jurisdictions.		✓	✓
Collateral Practices:			
The ISDA recommendations on improvements the industry should make to market practices in collateral management should be implemented. These include:		✓	
ISDA and members should establish guidelines for informal dispute resolution practices.			✓
ISDA and members should consider revising credit support documents to include the option of a shorter time cycle for valuation, delivery and liquidation of collateral.			✓
Institutions should consider drafting into their collateral agreements a provision that allows cash to be delivered in the event of a collateral delivery failure.			✓
Greater consideration should be given to the use of cash as potential collateral.			✓
ISDA and members should consider the simplification of the documentation structure and execution process of master agreements and credit support documents.			✓

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5. Transparency: reporting and disclosure recommendations

	BASEL	IOSCO	PWG	CRMPG	MWGED
Regulatory reporting by financial intermediaries					
Financial intermediaries with significant credit/market risk should meet their primary regulator periodically to discuss principal risks, as well as market conditions and trends with potential market disruption or systemic effects				✓	
If requested by its primary regulator, financial intermediaries should voluntarily provide reports to their regulator detailing large exposure information on a consolidated basis. Regulatory agencies requesting such information should reach clear understandings with institutions on the permissible use of such information and safeguards against its misuse. This report should not be a blueprint for public disclosure.				✓	
Considers regular reporting, but favours enhanced public disclosure directly by the HLI. Reporting (either via financial intermediaries or direct from the HLI) should still be considered if public disclosure initiatives fail. Nevertheless, in all cases information at financial intermediaries should be accessible by its regulators. When crises occur, firms must be prepared and able to provide regulators with requested information in a timely way.		✓			
Financial intermediaries are encouraged to provide explanatory notes to the report, especially if there is a danger of misinterpretation of complex information.				✓	
Suggested specification of information that should be reported to regulators.				✓	
Reporting or disclosure should be by HLIs directly rather than by financial intermediaries.		✓		X	

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	BASEL	IOSCO	PWG	HF Industry Report	CRMPG	MWGED
Public disclosure of exposures to HLIs by public companies						
Public companies, including financial institutions should publicly disclose a summary of material exposures to “significantly leveraged institutions” including hedge funds.			✓		X This raises complex definitional and aggregation issues and might not be useful to investors. Further discussion of these issues is required.	
Enhanced public disclosures by HLIs						
Public disclosure by HLIs should be enhanced.	✓ Recognises the importance of enhanced transparency concerning all HLIs and other large firms but does not make specific recommendations.	✓ HLIs should be encouraged (supported by market pressure/incentives) to provide enhanced public information.	✓ Recommendations focused on Hedge funds/CPOs. Currently filed reports on CPOs should be enhanced and published. Legislation should be enacted to cover funds which are not CPOs.	? Hedge fund managers should also work with regulators and counterparties to develop a consensus approach to public disclosure. Agreements and other safeguards should be established in order to protect against the unauthorised use of proprietary information furnished to outside parties.	X In responding directly to the PWG’s recommendations, it argues there are questions about: the usefulness of this information; its uneven application to only hedge funds; and how it may reduce incentives to share more meaningful information with creditors.	✓
Detailed specification of information which could be disclosed.		✓ - Identifies types of information which should be considered when specifying data. Defers specific suggestions to MWGED.				✓

In terms of the specification of information that could be disclosed, the MWGED is currently conducting a pilot study that utilises a template. The CRMPG provides a possible template for regulatory reporting, although it notes that this would require further work to refine the nature of the information provided.

A specific proposal aimed at enhancing aggregate information about foreign exchange positions was considered by the CGFS last year, but a decision was taken in November not to proceed further with that initiative.

Background Note on the Hedge Fund Industry

**Prepared by the IMF for the
FSF HLI Working Group**

I. Executive Summary

- *Although there is no universally accepted definition, the term ‘hedge fund’ is frequently used to refer to “any pooled investment vehicle that is privately organized, administered by professional investment managers, and not widely available to the public”* (report of the President’s Working Group on Financial Markets, 1999). The term ‘hedge fund’ was coined in the 1950s to describe any investment fund that used incentive fees, short-selling and leverage. Typically, hedge funds employ dynamic (and sometimes opportunistic) trading strategies which involve taking positions in several different markets and adjusting their investment portfolios frequently to benefit either from an anticipated asset price movement or from an anticipated closing (or widening) of the price or yield differential between related securities.
- *While most hedge funds trade out of the U.S., many are registered in offshore financial centers. There is little direct regulation of hedge funds in the U.S. or other countries.* Hedge fund managers who are registered U.S. investment advisors and those who are registered U.S. commodity pool operators (CPOs) must, however, comply with the Investment Advisor’s Act and the Commodity Exchange Act, respectively. Hedge funds which carry out their transactions directly through organized exchanges are subject to the rules of those exchanges.
- *Because hedge funds are under few obligations to disclose information, it is difficult to obtain an accurate estimate of the size of the industry.* Estimates of the number of funds and total capital under management of hedge funds are based on information voluntarily provided by hedge funds to different commercial data vendors and vary enormously. The U.S. President’s Working Group Report (1999) estimated that as of mid-1998 there were between 2,500 and 3,500 hedge funds managing between \$200 and \$300 billion in capital, with approximately \$800 billion to \$1 trillion in total assets (the latter probably does not include the notional value of off-balance sheet positions). According to industry observers, hedge funds have experienced rapid growth over the past ten years. Most hedge funds (probably more than 80 percent of all funds) are fairly small, with capital under management below \$100 million.
- *The risk-return profiles of hedge funds are determined by their trading strategies.* There is a wide variety of ‘investment styles’ in the hedge fund industry (e.g., global macro funds, market neutral funds, event driven funds, short sellers) and a large diversity of trading strategies employed by the funds in the same investment category (resulting in a low correlation of their returns). Based on the available data, the average U.S. dollar returns on hedge funds over the last decade are comparable with the returns on benchmark U.S. equity indices. The return volatility of hedge funds generally depends on their investment styles and there is no conclusive evidence that the returns of the typical hedge fund are less (or more) volatile than the returns on mutual funds or market indices.

- ***The amount of leverage used by hedge funds largely depends on their trading strategies, which are determined by their investors' preferences and attitude towards risk.*** Leverage typically arises because hedge funds use financial instruments, such as repos, futures and forward contracts and other derivative products, where positions can be established by posting margins rather than the full face value of the position, and – less commonly – obtain bank loans (primarily in the form of credit lines for liquidity purposes). The estimates of leverage reported by different data vendors typically represent the ratio of the sum of total on-balance sheet risky assets and risky liabilities to investors' capital and are based on information voluntarily provided to them by hedge fund managers. While there are many problems with these data, the estimates would suggest that most hedge funds use modest amounts of leverage with an average ratio of 2:1, with market neutral funds having the highest leverage ratio among all investment styles – around 4:1.
- ***Other entities whose trading strategies are similar to those used by hedge funds include commodity trading advisors (CTAs) and the proprietary trading desks of commercial and investment banks.*** Because the measures of leverage reported by hedge funds to commercial data vendors differ from those reported by CTAs and investment banks both in terms of quality and coverage, it is difficult to determine whether hedge funds on average employ more (or less) leverage than these other institutions.
- ***Evaluating the risk-adjusted performance of hedge funds is difficult because of their dynamic trading strategies.*** Further, because of the relatively short time series of hedge funds' returns, conclusions about their past (and by some accounts, 'superior') risk-adjusted performance have to be treated with caution. Nevertheless, hedge funds may provide substantial diversification benefits, because their returns typically have relatively low correlation with standard asset classes. By some accounts, hedge funds may also be used for 'downside' risk management.
- While traditionally hedge funds have been popular with high-net-worth individuals and endowments, reportedly, many hedge funds have recently experienced ***an increase of interest from a broad range of institutional investors.*** Industry observers also report that in response to increased investor interest, ***some investment banks have been setting up hedge funds within their asset management groups,*** while at the same time reducing their proprietary trading activity. Looking ahead, it is likely that investors will try to diversify their holdings across more hedge funds (having in mind the lesson of LTCM), which will probably stimulate the growth of funds of funds. Some industry observers also point to signs of greater differentiation within the hedge fund industry – with some hedge funds becoming more liquid and reducing their minimum initial investments and other funds increasing their lock-up periods and lowering redemption frequency. During the past year, ***many hedge funds have reportedly reduced their leverage.*** If the lower leverage levels persist, then the typical hedge fund's absolute returns over the next few years may be lower than those in the past.

I. Introduction

1. The investment partnership set up in the U.S. in 1949 by A.W. Jones, which specialized in buying “undervalued” stocks and selling short “overvalued” stocks with the objective of reducing market risk, is widely regarded as the first hedge fund. Since then, the hedge fund industry has gone through periods of rapid growth (1966-68, and the late 1980s and early 1990s) and contraction (in 1969-70 and 1973-74).⁴⁶ Today, the hedge fund universe is diverse – some hedge funds use leverage and derivatives in order to enhance returns albeit at the expense of higher risk, while others are more conservative and employ strategies that seek to reduce market risk. Many hedge funds are highly specialized ‘niche’ players which rely on the expertise of the management team in a specific area.
2. Despite its relatively small size (compared to other institutional investors), the hedge fund industry has attracted substantial attention because of the hedge funds’ active trading strategies in stock, bond, currency and derivatives markets and such high-profile cases as the involvement of some funds in the 1992 ERM crisis and the recent near-failure of Long-Term Capital Management (LTCM), and partly, because of its exclusiveness (the minimum investor contribution is typically above \$100,000) and opaqueness (hedge funds face very few information disclosure requirements).
3. This note provides general background information on hedge funds, their investment strategies and risk-return profiles. It describes the range of estimates of the size of the hedge fund industry and the available measures of leverage used by hedge funds. It also presents different perspectives on the determinants of hedge fund performance and the diversification benefits that could potentially be offered by hedge funds. Finally, the note outlines recent developments in the industry and current trends.

II. Characteristics of hedge funds

4. *The term ‘hedge fund’ typically refers to “any pooled investment vehicle that is privately organized, administered by professional investment managers, and not widely available to the public”* (report of the President’s Working Group on Financial Markets, 1999). Hedge funds are typically organized as limited partnerships or limited liability companies, bound by the investment agreement that investors sign with the sponsors of the fund. While many hedge funds are registered in offshore financial centers (often for tax reasons), most hedge fund managers trade out of major financial centers such as New York and London. In the United States and other major industrial countries, hedge funds are not subject to direct prudential regulation and are often

⁴⁶ For more on the history of the hedge fund industry, see Eichengreen et al. (1998).

exempt from many investor-protection and disclosure requirements. In the U.S., hedge funds are generally structured so as to be exempt from regulation under the Investment Company Act of 1940 and, therefore, typically comply with one of the exclusions of the Act, i.e. they may have 100 or fewer investors/partners or they may only have investors who are “qualified purchasers”, which effectively restricts participation in hedge funds to sophisticated investors – high-net-worth individuals and institutions – who are able to assess risks inherent in ‘alternative’ investments.⁴⁷ Hedge funds that have U.S. investors and trade commodity futures contracts or commodity options on organized exchanges are considered to be “commodity pools” under the U.S. Commodity Exchange Act (CEA) which subjects the operators of commodity pools (CPOs) to U.S. regulatory requirements, including the reporting requirements of the Commodity Futures Trading Commission (CFTC). However, the CEA does not impose capital minimum or other financial standards on CPOs, nor does it impose restrictions on the financial interests that a commodity pool can trade. Hedge funds which carry out their transactions through organized exchanges are also subject to the rules and regulations of those exchanges.

5. ***Because of regulatory restrictions, the hedge funds’ investor base consists of two classes: ‘high-net-worth’ individuals and institutional investors, such as pension funds, insurance companies, foundations, banks and corporations.*** According to industry observers (see Rao and Szilagyi, 1998), institutional investors were largely absent from the hedge fund industry until the early 1990s. As of end-1996, nearly 80 percent of the industry capital was estimated to have been contributed by private individuals, with the remainder coming from institutions, including 6 percent from pension funds and insurance companies, 8 percent from endowments and foundations, and the rest from banks and corporations. However, the share of hedge fund holdings in the total asset holdings of both individual and institutional investors was estimated to be very small (1.6 percent for ‘high-net-worth’ individuals, 0.08 percent for pension funds, 0.03 percent for insurance companies and 1.17 percent for non-profit organizations), which suggests that there is still a considerable potential for further demand-driven growth of the hedge fund industry.
6. ***Other financial institutions have exposures to hedge funds which arise via several channels including counterparty trading, derivatives activity, the provision of brokerage services, direct equity investments, and direct lending.*** The President’s Working Group Report (1999) estimates the aggregate U.S. bank direct lending exposure to hedge funds (as of September, 1998) at around \$4.5 billion (based on the sample of twelve banks with total assets of around \$2.6 trillion that were identified to

⁴⁷ “Qualified purchasers” are individuals with at least \$5 million of investable assets or entities with \$25 million of investable assets. In addition, funds may also use Regulation D of the Securities Act of 1933, which exempts offerings to “accredited investors”. “Accredited investors” are individuals with at least \$1 million of investable assets or entities with \$5 million of investable assets.

have had exposure to hedge funds). U.S. commercial banks' direct investments in hedge funds were estimated at less than \$1.7 billion (including their participation in the LTCM rescue). The estimated notional value of the banks' derivatives contracts with hedge funds was around 4 percent of the banks' total notional value of derivatives contracts.

7. ***Because hedge funds face relatively few information disclosure requirements, it is difficult to obtain an accurate estimate of the size of the industry.*** The size of the industry can only be estimated using sample data provided by different data vendors which track hedge funds and other similar types of managed funds and the estimates vary widely. These databases typically cover different (though overlapping) segments of the hedge fund industry and suffer from many self reporting or self selection biases.⁴⁸ The President's Working Group Report (1999) estimated that as of mid-1998 there were between 2,500 and 3,500 hedge funds managing between \$200 billion and \$300 billion in capital, with approximately \$800 billion to \$1 trillion in total assets (compared to \$4.1 trillion of U.S. commercial banks' total assets and \$5 trillion of assets managed by U.S. mutual funds). The upper bound estimate of the hedge fund universe was provided by Van Hedge Fund Advisors who estimated that as of end-1998, there were 5,830 hedge funds around the world with total capital of about \$311 billion.⁴⁹ A more modest estimate – around 3,000 funds with \$175 billion of capital under management⁵⁰ – was provided by Managed Account Reports Inc. (MAR). The actual number of funds that report to various data vendors is typically much smaller than their estimates of the hedge fund universe. For example, as of end-1998, the MAR/Hedge database contained information on 1385 hedge funds (including funds of funds) with \$128 billion of capital under management. Thus, in light of the wide range of estimates, one cannot be too categorical in statements about the size or growth of the hedge fund industry.
8. ***Nonetheless, because all major data providers appear to have a representative coverage of all segments of the hedge fund industry, any conclusions regarding the industry structure, fund size distribution and performance may not be very sensitive to the choice of the information provider.*** Accordingly, for the remainder of this note, the quantitative analysis is based on the data from MAR, a leading New York-based data provider that appears to have representative coverage of U.S. registered and offshore

⁴⁸ Fung and Hsieh (1997) provide a detailed description of the common biases in hedge fund data bases (such as those produced by TASS, Managed Account Reports Inc. (MAR), Van Hedge Fund Advisors and Hedge Fund Research), which include 'survivorship' bias, 'self-selection' bias (the observable portfolio is not a representative sample of the market portfolio) and the 'instant history' bias (when the data vendors add a new fund to their database, they backfill its performance). They also suggest different ways to try to measure these biases and the ways to circumvent them.

⁴⁹ This figure may include funds of funds, as well as CTA funds, CPO funds and other similar managed funds.

⁵⁰ Capital under management refers to the sum of contributions by the fund's investors and all subsequent capital gains and losses. The terms 'total assets under management' or 'total dollars under management' are also used by data providers to refer to the same concept. The data providers do not generally provide information on the total size of hedge fund balance sheets.

hedge funds.⁵¹ As an illustration of the representativeness of different data samples, the value-weighted portfolio returns of the funds in the MAR sample were compared with those on a new value-weighted index of the 284 largest funds computed by CSFB/Tremont⁵². The correlation between the two series for monthly returns over January 1994–August 1999 was 0.97.

9. *Unlike mutual funds, hedge funds typically have an absolute return target, substantial flexibility in their investment options, and management fees that are heavily performance-based.* Although there are no regulatory restrictions on hedge funds' use of short-selling, leverage and derivatives, there are self-imposed limits set by their own risk management and investment guidelines as well as the hedge funds' commitment to a particular investment orientation outlined in their prospectuses. Counterparty credit limits also restrict the hedge funds' ability to accumulate leverage. Unlike mutual funds, hedge funds are not statutorily required to allow shareholders to redeem their shares daily and their redemption frequency may vary from one month to several years. The initial 'lock-up' periods set by hedge funds typically range from one to five years. Although hedge funds are not statutorily required to mark their investments to market on a daily basis, most of them reportedly follow this practice as part of sound risk management. Typically, the hedge fund manager's fee is between one and two percent of the net assets plus 20 percent of annual return. Most funds operate with high watermarks, where no performance fee is charged until earlier losses are offset.
10. Commodity trading advisors (CTAs) and the proprietary trading desks of commercial and investment banks frequently engage in activities similar to those of hedge funds – *they actively trade in both cash and futures markets as well as the OTC derivatives markets and use similar leverage practices to hedge funds. In the United States, a CTA is defined as anyone who advises others, for compensation or profit, about trading in futures or options on futures. If such advisors direct the trading of client accounts, they must be registered under the Commodity Exchange Act as CTAs.*⁵³ *As of end-1998, the estimated total capital under management of all CTAs reporting to MAR was around \$26 billion; while the total equity of 9 major U.S. investment banks was more than \$70 billion (based on data from IBCA's BankScope) and the total equity of 334 of the largest U.S. commercial banks (with data available in IBCA's BankScope) was around \$360 billion. Although there is no publicly available*

⁵¹ The MAR data were used in the President's Working Group Report (1999) to obtain the estimates of the hedge funds' performance.

⁵² The CSFB/Tremont hedge fund indices as well as the description of the methodology are available at <http://www.hedgeindex.com>.

⁵³ Unlike the U.S. securities laws, which typically require the registration of an offering, the U.S. commodities regulations related to funds using futures apply to the fund manager rather than to the fund itself. Any hedge fund manager who is involved in trading futures would have to register as a CTA unless he has no more than 15 clients in a 12 month period and does not present himself to the public as a CTA or unless he is a registered commodity pool operator (CPO).

information on the amount of capital which commercial and investment banks typically allocate to proprietary trading, the information on trading positions of these institutions is available. As of end-1998, the total value of trading securities of 9 major U.S. investment banks was almost four times their equity, and the total value of trading securities of ten largest U.S. commercial banks was almost three times their equity (based on detailed balance sheet data from IBCA's BankScope).

11. The terms 'investment orientation' or 'investment style' are typically used to capture the distinctions between various hedge funds in terms of their asset class focus, sectoral and/or regional orientation, and risk/return properties. *Following industry conventions, MAR distinguishes between 8 (self-described) hedge fund investment styles; (i) global macro funds, which are the 'classic' opportunistic funds investing anywhere they see value; (ii) other global funds, which tend to have regional focus and are usually subdivided into international (non-US), emerging-markets and established-markets funds; (iii) market neutral funds, which attempt to minimize market risk by using such strategies as convertible arbitrage, stock arbitrage, fixed-income arbitrage or by taking both short and long positions in different stocks; (iv) event-driven funds, which tend to specialize either in risk-arbitrage (merger arbitrage) or distressed securities; (v) long-only leveraged funds, which differ from traditional equity mutual funds in their organizational structure and use of leverage; (vi) short-sellers, which attempt to pick overvalued securities and/or bet on downward market movements; (vii) sector funds, which follow specific economic sectors and/or industries; and (viii) funds of funds, which allocate capital among other investment funds, including hedge funds.⁵⁴ As of end-September, 1999, total capital under management of 978 funds (excluding funds of funds) in the MAR sample was around \$100 billion; funds of funds accounted for a further \$20 billion, implying that a considerable portion of hedge fund industry capital is contributed through funds of funds. This compares with MAR's estimate of the entire hedge fund universe of 3000 funds with \$205 billion of capital under management.*
12. *The hedge fund industry is fragmented with many funds being highly specialized niche players and more than 80 percent of capital under management of all hedge funds (not including funds of funds) concentrated in four investment styles/categories (based on the MAR sample). Global established-markets funds manage the largest portion of total capital (nearly 30 percent), followed by market neutral funds (24 percent), global macro funds (23 percent) and event-driven funds (12 percent) (see Table 1 and Chart 1).⁵⁵ More than 50 percent of total capital of all funds reporting to*

⁵⁴ For more detailed description of the MAR/Hedge investment styles classification, see Appendix I.

⁵⁵ The sample contains both funds which continue to report to MAR (it appears that a few of the largest funds are not included) and funds that have discontinued reporting. The latter include defunct funds as well as some funds that are still in operation.

FINANCIAL STABILITY FORUM

MAR is managed by funds that reportedly do not have foreign exchange exposure.⁵⁶ Around 40 percent of total capital of all funds reporting to MAR is managed by hedge funds registered in the United States. The vast majority of funds in all investment styles are active participants in derivatives markets.

13. The hedge fund industry is highly concentrated with a few large hedge funds accounting for a large proportion of industry assets and the majority of hedge funds being fairly small. *Table 2 presents the fund size distribution for each investment style and shows that in almost every investment style there are a few funds which manage more than \$1 billion of capital (as of September 1999, the MAR/Hedge database contained information on 20 funds with more than \$1 billion in capital under management).*⁵⁷ *Nonetheless, funds that manage less than \$100 million account for 83 percent of the total number of hedge funds in the sample. The average size of the global macro funds appears to be much larger than the average fund size in any other investment style.*
14. The hedge fund industry has experienced rapid growth during the past decade. *According to industry observers (see Rao and Szilagyi, 1998), following a period of modest growth in the 1980s, the hedge fund industry has experienced accelerated growth starting from 1990 (see also Summary Table and Table 1). In 1998 and the first half of 1999, total capital under management of hedge funds declined, with global funds experiencing the largest decreases resulting from withdrawals as well as losses on their investments. However, the overall performance of almost all investment styles in 1999 was fairly strong (see Summary Table). For each investment style, Chart 1 shows the annual changes of total capital under management of hedge funds in the MAR sample during the period from end-1990 to September 1999 indicating a generally upward trend for the industry.*

⁵⁶ This information is drawn from the funds' responses to MAR's questionnaire on whether they have exposure to (1) stocks, (2) bonds, (3) foreign exchange, (4) warrants, (5) options, (6) futures and (7) other financial instruments. Typically, funds respond either 'yes' or 'no'.

⁵⁷ Industry observers suggest that with the inclusion of a few large funds that do not report to MAR, there may be two to three dozen hedge funds with more than \$1 billion in capital under management.

III. Leverage

15. *A hedge fund's leverage is determined by its investment style and the types of financial instruments it uses.*⁵⁸ Leverage gives the fund manager an ability to invest more than the amount of money received from the shareholders (the owners' capital) and it typically arises because hedge funds use certain types of financial instruments, such as repos, futures and forward contracts and other derivative products, where positions can typically be established by posting margins rather than the full face value of the position, and – less commonly – obtain bank loans (primarily in the form of credit lines for liquidity purposes).
16. *The estimates of leverage reported by different data vendors typically represent the ratio of the sum of total on-balance sheet risky assets and risky liabilities to investors' capital.*⁵⁹ This definition of leverage is a very imperfect measure of the fund's market risk exposure.⁶⁰ On the one hand, it may understate risk because it does not take into account off-balance-sheet positions which may amplify the fund's market risk exposure. And on the other hand, it may overstate risk because it does not net out any offsetting positions which serve to reduce market risk.⁶¹ A recently issued report on "Sound Practices for Hedge Fund Managers" (2000), prepared by a group of five global hedge funds, emphasizes the limited usefulness of accounting-based measures of leverage in monitoring hedge fund risk exposures and recommends that hedge fund managers focus on measures of leverage that relate the overall riskiness of the portfolio (including market risk, counterparty credit risk and liquidity risk) to the capacity of the hedge fund to absorb potential losses.
17. *There is little reliable data on hedge fund leverage and the accounting-based leverage ratios reported by different data vendors suffer from many shortcomings.* For

⁵⁸ "The problem is the word 'hedge funds' is used to describe any fund other than a conventional mutual fund or unit trust, money market fund or bond fund...Hedge funds cover the Long-Term Capital risky leveraged funds—but also extremely conservative funds that are very well hedged—yet all are called hedge funds... Not all the animals in the zoo are like crocodiles and not all the hedge funds are like Long-Term Capital Management," D.R. Friedland, Chairman, The Magnum Funds.

⁵⁹ MAR includes the sum of risky assets and risky liabilities (long plus short positions) and therefore, a fund's leverage ratio may be less than one, if it holds cash or T-bills, while Van Hedge Fund Advisors include the sum of *all* assets and risky liabilities.

⁶⁰ In order to obtain a more meaningful measure of economic leverage one would need to add the off-balance sheet positions. For example, the Counterparty Risk Management Policy Group (1999) defines 'gross economic leverage' as (risky assets plus risky liabilities plus gross off-balance sheet notional) divided by equity. A VAR-based leverage measure would represent an even better measure of the fund's market risk exposure because it compares potential losses to the capital available to absorb these losses. For more details on such measures of leverage, see the report of the Counterparty Risk Management Policy Group (1999).

⁶¹ Apart from measuring the risk to the financial health of the fund itself, there are other reasons why one may be interested in leverage, including systemic risk (the possibility that a collapse of one fund (or a family of funds) may decrease the probability of survival of other institutions, for example, its counterparties) and the risk to market stability (i.e. the risk that an adverse shock to a particular fund may disrupt the orderly functioning of the market where the fund acts as major liquidity provider). Leverage measures that can be used to quantify these types of risk are not discussed here.

example, MAR asks hedge fund managers to report their maximum potential leverage and, therefore, the actual leverage that a fund uses at any particular time may be smaller than the reported leverage. However, because the public often associates high leverage with high risk and because hedge funds' reports to data vendors are typically not verified, hedge funds may have an incentive to report lower leverage than is actually used. Table 3 presents the distribution of reported maximum leverage ratios for each investment style, based on data provided by MAR. One problem with these data is that many global macro, global emerging markets funds and global international funds (accounting for at least half of the total capital in their respective investment categories) do not report their maximum potential leverage. Nonetheless, based on this partial information, market neutral funds appear to have the highest leverage ratio – around 4:1, which is not surprising, as many of the strategies used by these funds, such as convergence trading and relative-value trading, involve taking long and short positions in related securities. Other investment styles reportedly use more modest amounts of leverage ranging from 1:1 to 2:1. Further details about the nature of leverage (e.g. instruments used) are unfortunately not available, which makes it difficult to make any definitive statements about hedge funds' leverage practices or to compare hedge funds with other types of financial institutions.⁶²

IV. Investment styles and financial instruments

18. *Unlike mutual funds, which typically use 'buy-and-hold' strategies, hedge funds often employ dynamic trading strategies involving frequent changes of their positions in different asset markets.* Depending on how they trade, hedge funds can be divided into two categories: those funds that use mainly non-directional or “*arbitrage*” trading strategies, i.e. attempt to identify mispricings between related securities; and those funds that use mainly directional or “*speculative*” trading strategies, i.e. take positions based on their ‘view’ on the direction of asset price movements or asset price volatility.⁶³ Thus, the directional trading involves either (i) betting on the direction of the asset price movement (with a short bias generating higher returns in down markets and a long bias generating higher returns in up markets) or (ii) betting on an increase (or

⁶² The estimates based on MAR data are consistent with those of other data providers. For example, according to Van Hedge Fund Advisors, almost 28 percent of hedge funds do not use leverage at all and another 56% of hedge funds have a leverage ratio of no more than 2:1. However, if one looks at the estimates for total assets and total capital of hedge funds in the President's Working Group Report (1999), the midpoints of these estimates would suggest a ratio of 3.6:1 (i.e., \$900 billion/\$250 billion). If some short positions are added to this (and assuming that holdings of riskless assets are not too large) the implied long-plus-short leverage ratio would be over 4:1, which is substantially higher than the industry-average maximum leverage ratio of only 2:1 which is implied by the MAR data.

⁶³ Stephen Ross has been quoted by *The Economist* as saying that “there is no hard line between arbitrage and speculation; it is a continuum”. In reality, there are very few opportunities for pure arbitrage.

decrease) of asset price volatility (for instance, ‘straddle’- like strategies have higher expected returns during high volatility episodes).

19. ***An analysis of the asset exposures of hedge funds confirms that their investment strategies cannot be completely described by their asset market focus – there is not a one-to-one relationship between investment styles and the types of financial instruments used by hedge funds.*** Table 4B presents hedge funds’ exposures to three major asset classes: stocks, bonds and foreign exchange, based on the data provided by MAR.⁶⁴ For each investment style, all hedge funds are partitioned into five mutually exclusive sets according to their reported exposures to three asset classes: *equity funds*, *equity/fx funds*, *equity/debt funds*, *equity/debt/fx funds* and *other (non-equity) funds*.⁶⁵ The majority of long-only funds and sector funds (accounting for more than 80 percent of total capital in each investment category) are pure equity funds. Event-driven funds tend to be primarily equity/debt funds, while most funds of funds are diversified (equity/debt/fx funds). On the other hand, global funds, short-sellers and market-neutral funds do not appear to have a clearly dominant type. By contrast, mutual fund investment styles can typically be associated with a particular combination of asset exposures (e.g., growth funds invest in stocks, income funds invest in debt instruments and balanced funds invest in stocks and bonds).
20. ***Statistical regression analysis of the hedge fund investment styles confirms that hedge funds’ dynamic strategies result in returns that are less correlated with the returns on major asset classes than are mutual funds’ returns.*** Table 5 presents the results of a ‘style’ regression, as in Sharpe (1992), of the equally-weighted portfolio returns’ of MAR/Hedge investment styles on the returns of several major asset classes:⁶⁶

$$R_t = \alpha + \sum_k \beta_k F_{kt} + u_t$$

where the set of F_k ’s includes returns on U.S. equities, non-U.S. equities, emerging markets’ equities, U.S. government bonds, non-U.S. government bonds, corporate bonds, foreign currency (the Federal Reserve’s Trade Weighted Dollar Index), cash (LIBOR) and gold. Because focusing on portfolios of hedge funds eliminates the idiosyncratic differences between the funds that are due to the differences in skills of

⁶⁴ See footnote 11.

⁶⁵ Equity funds trade in equities, but do not hold either bonds or foreign exchange; equity/debt funds trade in equities and bonds, but do not hold foreign exchange; equity/fx funds trade in equities and foreign exchange, but do not hold bonds; equity/bonds/fx funds have exposure to all three asset classes and, finally, the non-equity funds may trade either bonds or foreign exchange, but not equity.

⁶⁶ The rationale for looking at the equally-weighted as opposed to value-weighted portfolio returns is that some investment categories in the MAR/Hedge sample are dominated by a few large funds (accounting for more than 50 percent of total capital), which often have higher return volatility than other funds in the same category. Thus, the value-weighted portfolio returns may be substantially distorted away from what constitutes a ‘typical’ fund’s performance profile.

individual portfolio managers, $\left(\sum_k \beta_k F_{kt} \right)$ captures the typical ‘asset class mix’, while $(\alpha + u_t)$ captures everything else which is specific to a particular investment style (the frequency of portfolio rebalancing and ‘asset class rotation’).

21. ***The ‘style’ regression results indicate that hedge fund style portfolios tend to have statistically significant correlations with more than one major asset classes. However, the explanatory power of hedge funds’ ‘style’ regressions is low compared to that of mutual funds’ ‘style’ regressions.*** The significant correlations include a few which are easily explained — for example, short-sellers have a negative correlation with U.S. stock returns, and emerging markets funds are positively correlated with the returns on the IFC emerging markets equity index. Overall, however, the explanatory power of the hedge funds’ ‘style’ regressions is low (with a median adjusted R-squared of 0.50) compared with what is typically obtained for mutual funds (adjusted R-squared of over 0.90).⁶⁷

22. ***Unlike mutual funds (which typically have highly correlated returns with other funds that belong to the same investment category), the strategies followed by hedge funds which fall in the same investment category are more diverse, resulting in returns that are much less correlated.*** If one were to use a median of pairwise correlation coefficients calculated for all funds in the same investment category over the period from January 1990 to August 1999 as a measure of the similarity in the funds’ investment strategies, then the following would be the descending ordering of the MAR/Hedge investment styles: short-sellers, long-only, funds of funds, global emerging, sector, global established, event-driven, global international, global-macro and market-neutral. The median correlation coefficients range from 0.56 (for short-sellers) to 0.10 (for market-neutral funds).

⁶⁷ See Fung and Hsieh (1997) for a more systematic attempt to quantitatively identify investment styles of hedge funds and CTAs.

V. Performance

23. *Comparisons of the volatility of hedge funds' returns with the volatility of returns of mutual funds and benchmark indices yield different results depending on the choice of the sample period.* Using data from 1988-1995 for a large sample of existing and defunct funds, Ackermann et al. (1999) find that hedge fund returns were more volatile than returns on mutual funds or market indices. By contrast, Edwards (1999) finds that during 1989-1998 the typical hedge fund's returns have been less volatile than the returns on mutual funds or market indices. An analysis of monthly returns for the MAR sample of hedge funds that are currently in operation and have at least 3 years of returns (521 funds and 181 funds of funds), for the period from January 1990 to August 1999 indicates that while 9 percent of hedge funds (not including funds of funds) had extremely volatile monthly returns (a standard deviation greater than 10 percent per month), approximately half of funds (not including funds of funds) were less volatile than the S&P 500 Index. Further, around 83 percent of funds of funds had returns that were less volatile than the S&P 500, illustrating the possibility of reducing risk by combining different hedge funds in portfolios.
24. *In addition, comparisons of the risk-adjusted performance of hedge funds with the performance of other financial instruments appear to be sensitive to the choice of the sample period as well.* Table 6 presents simple measures of the return per unit of risk (the Sharpe ratio⁶⁸) for portfolios of hedge funds by investment style which are calculated for two periods: from January 1990 to August 1999 and from January 1990 to August 1998. The results are quite different. During the period from 1990 to August, 1998, event-driven, global macro, global established, market-neutral, sector and long-only funds appear to have performed at least as well or better than the S&P 500 Index, while during the period from 1990 to August, 1999, only global established funds appear to have outperformed the S&P 500 Index.⁶⁹ These results are consistent with Edwards' (1999, p. 197), view that 'a 10-year period is a short history when it comes to predicting future returns on a financial asset'. Thus, even if the historical distribution of hedge funds' returns can be approximated by a normal distribution, given that many hedge fund investment styles have a relatively short history, the historical distribution may not always be a good approximation of the true distribution.

⁶⁸ The *Sharpe ratio* is a measure of excess return per unit of risk which is defined as a mean excess return on an asset or a portfolio divided by the standard deviation of excess returns. One problem is that such standard measures as the Sharpe ratio implicitly assume that the true distribution of hedge fund returns is symmetric and can be completely described by its mean and variance, which is unlikely to be true for most hedge funds which use dynamic trading strategies often with option-like properties. See Edwards (1999) for discussion of alternative measures of risk-adjusted performance for hedge funds. For more on the applicability of mean-variance analysis to hedge funds, see Fung and Hsieh (1999a).

⁶⁹ Ackermann et al. (1999) find that although hedge funds generate higher risk-adjusted returns than mutual funds, they do not consistently outperform market indices on a risk-adjusted basis. According to Edwards (1999) from 1989 through August, 1998, equally-weighted and value-weighted portfolios of hedge funds had Sharpe ratios of 1.58 and 1.47 respectively, which is almost twice as high as the 0.86 Sharpe ratio for the S&P 500 stock index for the same period.

25. Because the returns of many hedge funds tend to have relatively low correlations with standard asset classes, they may provide diversification benefits even if they do not offer superior risk-adjusted returns (*as measured by the Sharpe ratio*)⁷⁰. *One can assess the diversification benefits that can potentially be provided by hedge funds using a simple methodology developed by Elton et al. (1976). A new asset is a valuable addition to an existing portfolio whenever its Sharpe ratio exceeds the product of the Sharpe ratio of the existing portfolio and the correlation of the existing portfolio with the new asset. Table 6 shows that during the period from January, 1990 to August, 1999, despite the somewhat disappointing performance of many hedge funds on a risk-adjusted basis (as measured by the Sharpe ratio), the addition of a typical hedge fund (or a portfolio of hedge funds) to the S&P 500 Index portfolio could have improved (or at least left unchanged) its risk-return properties.*
26. *Academics as well as practitioners suggest that hedge funds and CTAs can help provide insurance against stock market downturns and, therefore, can be used for ‘downside’ risk control.* If hedge funds and CTAs perform better than other asset classes in down markets, this suggests that adding them to a portfolio of stocks and bonds can reduce losses during stock market corrections. Indeed, Fung and Hsieh (1999b) find that global macro funds tend to underperform the U.S. equities in up-markets, but outperform in down-markets. Further, Schneeweis, Spurgin and Potter (1996) show that an equity/CTA portfolio outperforms an equity/at-the-money put portfolio and conclude that a CTA investment may offer downside equity protection at lower cost than a protective put.
27. *The rapid growth and strong performance of hedge funds during the 1990s stimulated debate about their ‘superior performance’ relative to other investment funds.*
28. Many practitioners argue that *because hedge funds face very few regulatory restrictions, they are better positioned to take advantage of short-term market inefficiencies than other investment funds and/or to be able to capitalize on their narrow investment focus.* Because hedge funds can use short-selling and invest in cash, options and futures markets, they can take advantage of short-term mispricings in derivatives markets as well as other temporary mispricings between related securities. Many hedge funds operate in highly specialized areas (like distressed securities arbitrage), which require extensive institutional knowledge and research capacity and, therefore, may not be covered by investment funds that charge low management fees. Further, the existence of differential hedging demand allows hedge funds to specialize in different types of risks and to realize returns for holding unhedged positions.⁷¹

⁷⁰ The limitations of the Sharpe ratio were discussed above.

⁷¹ Differential hedging demand arises because some market participants lack expertise in managing certain types of risks, and therefore, may not want to have exposures to those risk factors.

Finally, because hedge funds can require investors to lock up capital for a long period of time, they can tolerate higher short-term volatility of their NAVs than many mutual funds, which opens up possibilities for using trading strategies that are typically not employed by mutual funds (like merger arbitrage).

29. According to TASS (1999), *some larger hedge funds typically enjoy many of the same trading advantages as the proprietary desks of commercial and investment banks*, such as superior information (first call on breaking news), lower transaction costs (either lower commission or tighter quotes from market makers) and better market access.⁷²
30. Practitioners suggest that *performance-based compensation used by many hedge funds attracts highly skilled portfolio managers, who produce ‘superior’ returns*. Ackermann et al. (1999) find a positive relationship between incentive fees and the risk-adjusted performance of hedge funds. However, it is not clear whether the superior performance of hedge funds can be attributed to ‘managerial talent’. Brown et al. (1999) test the ‘performance persistence’ hypothesis using a sample of offshore hedge funds and reject it. They conclude that repeat-winner and repeat-loser patterns are largely due to investment style effects.
31. In some cases, *the seemingly ‘superior risk-adjusted performance’ of hedge funds may reflect difficulties in measuring the true risks incurred by the funds*. For example, some academics believe that certain types of hedge funds, such as fixed-income arbitrage funds, effectively sell ‘disaster insurance’ - ‘where the low historical return volatility is consistent with a period over which the gathering of insurance premium is yet to be tested by disaster payout’ (Fung and Hsieh, 1999b, p. 326). More generally, as Fung and Hsieh point out, many arbitrage funds tend to perform best in calm markets and worst in volatile markets, i.e. as if they are ‘short volatility’.

VI. Recent developments and outlook

32. *It appears that the Russian crisis and the near-failure of LTCM caused only a temporary outflow of capital from the hedge fund industry*. Many hedge funds, especially global funds, experienced large losses and subsequent withdrawals in the second half of 1998. Based on data on all existing and defunct funds provided by MAR, the total capital under management of all hedge funds (excluding funds of funds) declined by about 3 percent in 1998 and declined further in the first half of 1999 (see Chart 3). However, the overall performance of hedge funds in 1999 was fairly strong

⁷² Schneeweis (1998) suggests that ‘hedge funds can be viewed as the privatization of the trading floor of investment banks’.

(see the Summary Table) showing the resilience of hedge funds and their apparent ability to quickly recover from losses.

33. ***While traditionally hedge funds have been popular with high-net-worth individuals and endowments, many hedge funds have reportedly recently experienced a significant increase of interest from institutional investors.*** The prime example of this trend is the California Public Employees' Retirement System (Calpers), the largest public pension fund in the United States with capital of around \$160 billion, which has recently announced that its board has approved an asset allocation plan that allows Calpers to invest as much as \$11 billion in hedge funds. Reportedly, Calpers is primarily interested in conservative non-directional (market neutral) hedge funds that employ little or no leverage. Reflecting the increased institutional investor interest in hedge funds, some investment banks are setting up hedge funds within their asset management groups, while at the same time reducing their proprietary trading activity.
34. Some industry observers also point to signs of ***greater differentiation within the hedge fund industry – with some hedge funds becoming more liquid and reducing their minimum initial investments and other funds increasing their lock-up periods and lowering redemption frequency*** out of concern that investors may decide to pull out their money at the 'wrong time', for example when they see an increase in the volatility of the funds' returns. Reportedly, some institutional investors are also concerned about the amount of hot money invested in hedge funds and some are said to be making their investment decisions based in part on who else has invested in the same fund.
35. ***Further, it is also likely that investors will try to diversify their holdings across more hedge funds (having in mind the lesson of LTCM), either by investing directly in a larger number of hedge funds or by investing in funds of funds.*** According to some industry observers, there is also a growing willingness of hedge fund managers to customize funds for investors by setting up separate funds rather than separate accounts, which leads to an increase of the number of funds managed by the same manager.
36. ***Both banks and investors will probably monitor hedge funds' leverage levels more closely than in the past.*** It was recently reported by *Risk* magazine (March, 1999) that following the turmoil of September 1998 the number of banks that provided prime brokerage and full derivatives services to hedge funds had decreased from 20-25 to only 9. In addition to the substantial reduction of credit that banks are prepared to extend to hedge funds, they have reportedly increased (or imposed new) margins or 'haircuts' and begun to require greater disclosure of hedge funds' holdings. If leverage has indeed been reduced, the typical hedge fund's absolute returns over the next few years may be lower than those that have been observed in the past, although this will not necessarily affect the risk-adjusted returns. However, it remains to be seen if reductions in leverage persist or will be reversed as memories of 1998 fade.

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Summary Table: Estimates of the Hedge Fund Universe and of Hedge Funds' Performance.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Estimated number of hedge funds:										
a. Hedge Funds (MAR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	3000	3000
b. Hedge Funds (Van Hedge Funds Advisors)	1977	2373	2848	3417	4100	4700	5100	5500	5830	n.a.
Estimated capital under management (in \$US bn.):										
a. Hedge Funds (MAR)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	145	175	205
b. Hedge Funds (Van Hedge Funds Advisors)	67	94	120	172	189	217	261	295	311	n.a.
Memo items (in \$US bn.):										
Net assets of US mutual funds	1066	1393	1642	2070	2155	2812	3526	4468	5525	6844
NYSE market capitalization	2820	3713	4035	4545	4448	6014	7305	9360	10765	12146
Annual average returns (in percent):										
Hedge Funds (MAR)	14.4	37.1	16.3	31.7	-3.0	25.4	21.8	22.5	0.7	23.4
Memo item (in percent):										
Return on S&P 500 Index	-3.1	30.5	7.6	10.1	1.3	37.6	23.0	33.4	28.6	21.0
Annual median returns (in percent):										
Global Macro Funds (MAR)	20.2	40.7	16.9	33.8	-4.4	17.5	11.8	18.2	3.7	11.6
Global Established-Markets Funds (MAR)	3.1	32.2	18.9	20.3	1.3	26.2	22.1	24.0	7.3	39.6
Global Emerging-Markets Funds (MAR)	2.2	41.1	16.3	48.4	-1.8	-1.9	31.9	18.5	-31.1	50.9
Global International Funds (MAR)	9.2	28.5	17.9	23.2	-1.4	16.2	13.6	10.6	4.3	29.4
Short-Sellers (MAR)	28.0	-22.1	-5.0	-1.0	11.6	-8.1	3.9	0.7	4.3	-14.3
Market Neutral Funds (MAR)	7.3	15.2	9.0	13.1	2.5	13.0	14.6	13.8	5.1	14.8
Arbitrage	2.4	16.9	11.8	16.2	1.8	14.0	13.8	12.1	4.5	40.6
Long/Short	11.1	14.4	7.7	12.0	2.4	10.8	17.3	15.6	6.2	15.7
Event-Driven Funds (MAR)	3.4	22.6	18.4	27.4	5.2	16.4	16.5	18.0	3.1	17.9
Funds of Funds (MAR)	5.9	10.8	10.2	22.0	-2.1	11.9	15.3	17.7	0.4	19.0

Footnotes:

Data for hedge fund returns in 1999 are based on the returns on the CSFB/Tremont Hedge Fund Index.

For other explanations and data sources, see the text as well as the Appendix.

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Table 1: Number of Funds and Total Capital under Management of Hedge Funds

(sample includes all funds reporting to MAR/Hedge)

		Dec.90	Dec.91	Dec.92	Dec.93	Dec.94	Dec.95	Dec.96	Dec.97	Dec.98	Sep.99
GLOBAL MACRO	1/	16	22	36	59	80	68	69	74	74	69
Total capital under management (in \$US bn.)	2/	4.5	6.3	9.0	16.0	28.2	24.0	31.4	32.2	30.4	22.8
<i>Per cent changes</i>			42	42	77	76	-15	31	3	-6	-25
GLOBAL ESTABLISHED	1/	42	63	90	119	179	196	239	284	314	273
Total capital under management (in \$US bn.)	2/	1.5	2.4	3.3	5.4	6.6	8.9	12.1	18.4	25.0	27.1
<i>Per cent changes</i>			54	39	64	22	34	36	53	36	9
GLOBAL (EMERGING and OTHER)	1/	24	36	55	84	166	191	247	218	154	141
Total capital under management (in \$US bn.)	2/	0.7	1.4	3.0	6.0	13.0	13.2	17.9	20.4	8.7	10.0
<i>Per cent changes</i>			95	112	98	117	2	35	14	-58	15
LONG-ONLY	1/			4	5	10	11	21	27	25	24
Total capital under management (in \$US bn.)	2/			0.0	0.0	0.1	0.2	0.5	0.4	0.3	0.4
<i>Per cent changes</i>					219	148	98	108	-11	-19	12
SECTOR	1/	1	3	6	11	22	35	54	80	83	79
Total capital under management (in \$US bn.)	2/	0.0	0.0	0.0	0.1	0.2	0.7	1.9	3.4	3.0	2.5
<i>Per cent changes</i>			384	415	140	121	243	173	82	-11	-19
SHORT-SELLERS	1/	7	9	11	14	18	14	18	20	22	19
Total capital under management (in \$US bn.)	2/	0.2	0.2	0.2	0.3	0.6	0.5	0.5	0.6	0.8	1.1
<i>Per cent changes</i>			30	0	15	108	-17	10	11	39	30
MARKET NEUTRAL	1/	20	27	55	89	148	179	227	276	288	255
Total capital under management (in \$US bn.)	2/	0.9	1.4	2.5	4.5	6.4	7.5	12.9	23.8	26.3	24.3
<i>Per cent changes</i>			51	83	82	41	18	72	85	10	-7
EVENT-DRIVEN	1/	20	25	29	45	66	85	118	135	129	118
Total capital under management (in \$US bn.)	2/	0.9	1.1	1.3	2.7	3.9	4.7	6.7	10.4	11.6	12.5
<i>Per cent changes</i>			20	18	111	45	20	42	55	12	7
FUNDS OF FUNDS	1/	33	48	71	116	198	232	284	314	296	278
Total capital under management (in \$US bn.)	2/	1.5	2.2	3.4	7.8	11.3	11.5	15.3	22.3	21.7	19.8
<i>Per cent changes</i>			49	53	129	45	1	33	46	-3	-9
Total number of funds		163	233	357	542	887	1,011	1,277	1,428	1,385	1,256
(excluding FOFs)		130	185	286	426	689	779	993	1114	1089	978
Total capital under management (in \$US bn.)		10.2	15.1	22.8	42.9	70.3	71.2	99.2	132.1	127.9	120.5
<i>Per cent changes</i>			47	51	88	64	1	39	33	-3	-6
(excluding FOFs)		8.7	12.8	19.4	35.0	59.0	59.7	83.9	109.8	106.2	100.7
<i>Per cent changes</i>			47	51	81	68	1	40	31	-3	-5

Footnotes:

1/ Total number of funds reporting to MAR.

2/ Total capital under management of hedge funds as of end period.

3/ The 5% decline in the reported total capital under management of hedge funds between December 1998 and September 1999

in part reflects the fact that several large funds that are still in operation stopped reporting to MAR during that period.

Source: Estimates based on data provided by MAR/Hedge.

FINANCIAL STABILITY FORUM

Table 2: Size Distribution of Hedge Funds

(sample includes funds reporting to MAR/Hedge, as of September 1999)

Total Capital under Management/ Number of Funds	0-50 \$US mln	51-100 \$US mln	101-200 \$US mln	201-300 \$US mln	301-500 \$US mln	501-1000 \$US mln	>1000 \$US mln	Average size \$US mln
GLOBAL MACRO	51	3	6	0	3	1	5	331
GLOBAL ESTABLISHED	180	43	21	12	6	6	5	99
GLOBAL EMERGING	82	7	4	2	1	1	0	41
GLOBAL INTERNATIONAL	30	6	1	2	1	3	1	138
LONG-ONLY	22	1	1	0	0	0	0	16
SECTOR	64	9	5	1	0	0	0	31
SHORT-SELLERS	12	3	3	0	1	0	0	19
MARKET-NEUTRAL	154	49	23	10	10	4	5	95
EVENT-DRIVEN	67	17	18	8	1	6	1	106
FUNDS OF FUNDS	207	35	19	5	6	3	3	71
ALL FUNDS	869	173	101	40	29	24	20	96
<i>(In percent of the total)</i>	<i>69</i>	<i>14</i>	<i>8</i>	<i>3</i>	<i>2</i>	<i>2</i>	<i>2</i>	

Source: Estimates based on data provided by MAR/Hedge.

FINANCIAL STABILITY FORUM

Table 3: Financial Leverage of Hedge Funds 1/

(sample includes funds reporting to MAR/Hedge, as of September 1999)

		Not reported	1-100%	101-200%	201-300%	>300%	Weighted Average Leverage 4/
GLOBAL MACRO	2/	6	18	35	3	7	
Total capital under management (in \$US mln.)	3/	14,868	466	7,311	31	164	197%
(In percent of total capital)		65%	2%	32%	0%	1%	
GLOBAL ESTABLISHED	2/	0	118	129	9	17	
Total capital under management (in \$US mln.)	3/	0	13,441	7,648	4,406	1,622	186%
(In percent of total capital)		0%	50%	28%	16%	6%	
GLOBAL EMERGING	2/	5	39	48	3	2	
Total capital under management (in \$US mln.)	3/	1,879	1,055	923	24	52	146% 5/
(In percent of total capital)		48%	27%	23%	1%	1%	
GLOBAL INTERNATIONAL	2/	2	20	18	1	3	
Total capital under management (in \$US mln.)	3/	3,285	1,484	1,265	19	2	136% 5/
(In percent of total capital)		54%	25%	21%	0%	0%	
LONG ONLY	2/	0	0	23	1	0	
Total capital under management (in \$US mln.)	3/	0	0	323	66	0	171%
(In percent of total capital)		0%	0%	83%	17%	0%	
SECTOR	2/	1	36	41	0	1	
Total capital under management (in \$US mln.)	3/	54	1,080	1,318	0	4	130%
(In percent of total capital)		2%	44%	54%	0%	0%	
SHORT-SELLERS	2/	0	9	10	0	0	
Total capital under management (in \$US mln.)	3/	0	760	313	0	0	116%
(In percent of total capital)		0%	71%	29%	0%	0%	
MARKET NEUTRAL	2/	0	86	90	21	58	
Total capital under management (in \$US mln.)	3/	0	8,802	4,711	1,516	9,316	376%
(In percent of total capital)		0%	36%	19%	6%	38%	
EVENT-DRIVEN	2/	1	55	58	1	3	
Total capital under management (in \$US mln.)	3/	440	3,947	7,978	50	61	140%
(In percent of total capital)		4%	32%	64%	0%	0%	
FUNDS OF FUNDS	2/	1	191	66	12	8	
Total capital under management (in \$US mln.)	3/	0	12,754	6,185	487	372	131%
(In percent of total capital)		0%	64%	31%	2%	2%	
Total number of funds	2/	16	572	518	51	99	
Total capital under management (in \$US mln.)	3/	20,526	43,789	37,974	6,599	11,593	212%
(In percent of total capital)		17%	36%	32%	5%	10%	
Total number of funds excluding FOFs	2/	15	381	452	39	91	
Total capital under management (in \$US mln.)	3/	20,526	31,035	31,789	6,112	11,221	232%
(In percent of total capital)		20%	31%	32%	6%	11%	

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Footnotes:

1/ Financial leverage is defined as the ratio of the sum of risky assets and risky liabilities to total capital under management.

The leverage ratios reported to MAR/Hedge are supposed to reflect the maximal leverage used by each fund.

2/ The number of funds which reported their total capital under management as of end - September 1999.

3/ Total capital under management of hedge funds as of end - September 1999.

4/ Weighted Average Leverage is the ratio of total risky assets and total risky liabilities to total capital under management of all funds that reported their leverage to MAR/Hedge.

5/ These estimates exclude outliers (2 emerging funds and 1 global international fund, managed by the same company) which reported a leverage ratio of 35:1, which may reflect reporting error.

Source: Estimates based on data provided by MAR/Hedge.

FINANCIAL STABILITY FORUM

Table 4A: Hedge Funds' Exposure to Asset Classes and Derivatives

(sample includes funds reporting to MAR/Hedge, as of September 1999)

		STOCKS	BONDS	F/X	WARRANTS	OPTIONS	FUTURES
GLOBAL MACRO	1/	49	55	47	23	40	47
(In percent of total capital)	2/	54%	59%	92%	26%	34%	78%
GLOBAL ESTABLISHED	1/	267	82	41	107	181	82
(In percent of total capital)	2/	98%	47%	34%	48%	68%	53%
GLOBAL EMERGING	1/	82	74	41	37	59	34
(In percent of total capital)	2/	65%	61%	48%	18%	60%	51%
GLOBAL INTERNATIONAL	1/	41	18	24	22	23	20
(In percent of total capital)	2/	94%	53%	94%	73%	69%	89%
LONG-ONLY	1/	24	6	0	7	11	1
(In percent of total capital)	2/	100%	15%	0%	13%	70%	17%
SECTOR	1/	79	13	0	23	50	6
(In percent of total capital)	2/	100%	14%	0%	35%	75%	5%
SHORT-SELLERS	1/	19	3	1	2	17	1
(In percent of total capital)	2/	100%	53%	0%	10%	99%	36%
MARKET NEUTRAL	1/	200	142	40	86	170	83
(In percent of total capital)	2/	68%	74%	13%	36%	70%	42%
EVENT-DRIVEN	1/	114	82	18	57	88	14
(In percent of total capital)	2/	95%	88%	27%	70%	81%	15%
FUNDS OF FUNDS	1/	272	210	147	176	226	168
(In percent of total capital)	2/	97%	91%	77%	84%	93%	78%

Footnotes:

1/ The number of funds that report they invest in each asset class, respectively.

2/ As a percentage of total capital managed by all funds in the investment category.

Source: Estimates based on data provided by MAR/Hedge.

FINANCIAL STABILITY FORUM

Table 4B: Hedge Funds' Exposure to Major Asset Classes

(sample includes funds reporting to MAR/Hedge, as of September 1999)

	Equity 1/	Equity/Debt 2/	Equity/Debt/FX 3/	Equity/FX 4/	Non-Equity 5/
GLOBAL MACRO	6/ 9	11	26	3	20
(In percent of total capital)	7/ 1%	7%	46%	0%	46%
GLOBAL ESTABLISHED	6/ 170	57	21	19	5
(In percent of total capital)	7/ 49%	16%	29%	4%	2%
GLOBAL EMERGING	6/ 17	35	25	5	15
(In percent of total capital)	7/ 8%	22%	26%	10%	35%
GLOBAL INTERNATIONAL	6/ 10	10	5	16	3
(In percent of total capital)	7/ 3%	3%	45%	44%	6%
LONG-ONLY	6/ 18	6	0	0	0
(In percent of total capital)	7/ 85%	15%	0%	0%	0%
SECTOR	6/ 66	13	0	0	0
(In percent of total capital)	7/ 86%	14%	0%	0%	0%
SHORT-SELLERS	6/ 15	3	0	1	0
(In percent of total capital)	7/ 47%	53%	0%	0%	0%
MARKET NEUTRAL	6/ 107	67	20	6	55
(In percent of total capital)	7/ 25%	33%	9%	1%	32%
EVENT-DRIVEN	6/ 34	63	15	2	4
(In percent of total capital)	7/ 11%	61%	22%	1%	5%
FUNDS OF FUNDS	6/ 50	79	127	16	6
(In percent of total capital)	7/ 4%	19%	72%	3%	3%

Footnotes:

1/ Equity Funds invest in equities, but not in debt or foreign exchange (f/x).

2/ Equity/Debt Funds invest in equities, debt, but not in f/x.

3/ Equity/Debt/FX Funds invest in equities, debt and f/x.

4/ Equity/FX Funds invest in equities, f/x but not in debt.

5/ Non-Equity Funds are all funds that do not have equity exposure.

6/ The number of funds.

7/ As a percentage of total capital under management of all funds in the investment category.

Source: Estimates based on data provided by MAR/Hedge.

FINANCIAL STABILITY FORUM

Table 5: 'Style' Regression of Hedge Funds' Returns on the Returns on Benchmark Indices.

(Sample period: January 1990 - August 1999; the sample includes funds reporting to MAR/Hedge, as of September 1999)

	Regression Coefficients										Adjusted R-squared
	Constant	MSCIUS	MSCINUS	JPMBUS	JPMBNUS	MLCBI	USDOL	GOLD	M1LIBOR	IFCINDEX	
GLOBAL MACRO	0.9	0.2**	0.0	0.5**	0.1	-0.2	0.4**	0.1	0.1	0.1**	0.36
GLOBAL ESTABLISHED	0.7	0.5*	0.0	-0.4	0.1	0.4*	0.0	0.0	0.0	0.0	0.76
GLOBAL EMERGING	0.2	-0.1	0.0	0.0	0.4	0.8	0.3	-0.5*	0.1	0.7*	0.45
GLOBAL INTERNATIONAL	1.2	0.1	0.0	-0.1	0.0	0.2	0.1	-0.1	-0.2	0.2*	0.50
SECTOR	1.5	0.7*	0.0	-0.5	-0.1	0.4**	0.0	0.1	-0.2	0.0	0.57
SHORT-SELLERS	1.2	-0.7*	0.0	1.3*	-0.6**	-0.7*	-0.5	0.0	0.3	0.0	0.66
MARKET-NEUTRAL	1.4*	0.0	0.0	0.0	0.1	0.2*	0.1	0.0	-0.2	0.0	0.28
EVENT-DRIVEN	1.1**	0.1*	0.0	-0.2	0.0	0.6*	0.0	0.0	-0.2	0.1**	0.57
FUNDS OF FUNDS	0.8	0.0	0.0	0.3	-0.1	0.0	0.0	0.0	-0.1	0.1*	0.42
Memo Items:											
US Equity Mutual Fund Index 1/	0.1	1.0*	0.0	-0.2	0.0	0.1	-0.1	0.0	-0.1	0.0	0.92
Emerging Markets Mutual Fund Index 2/	1.2	0.1	0.0	-0.2	0.0	0.3	0.0	0.0	-0.9	0.9*	0.98

Footnotes:

* Statistically significant in a 1% two-tailed test.

** Statistically significant in a 5% two-tailed test.

MSCIUS denotes the return on MSCI US Equity Index.

MSCINUS denotes the return on MSCI non-US Equity Index.

JPMBUS denotes the return on JP Morgan US Government Bond Index.

JPMBNUS denotes the return on JP Morgan non-US Government Bond Index.

MLCBI denotes the return on Merrill Lynch High Yield Corporate Bond Index.

USDOL denotes the return on Federal Reserve's Trade Weighted Dollar Index.

GOLD denotes the change in price of gold.

M1LIBOR denotes the change in one month LIBOR.

IFCINDEX denotes the return on IFC Emerging Markets Investible Index.

1/ The return series is based on the Lipper Growth Fund Index (1990-97) and Moody's Equity Mutual Fund Growth Index (1997-99).

2/ The return series is based on the Lipper Emerging Markets Fund Index (1994-97) and Moody's Emerging Markets Equity Fund Index (1997-99).

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Table 6: Risk-adjusted Returns on Portfolios of Hedge Funds

(sample includes funds reporting to MAR/Hedge, as of September 1999)

		Event Driven	Global Macro	Global International	Global Emerging	Global Established	Sector	Market Neutral	Long	Short	Funds of Funds	All Funds 4/	S&P 500
12 months holding period returns 1/													
<i>(Sample period: January 1990 - August 1999)</i>													
Average Excess Returns	2/	10.3	16.6	8.3	26.7	13.9	20.6	6.4	16.8	2.6	8.3	13.5	14.7
Standard Deviation of Excess Returns		9.7	18.1	13.1	41.1	10.4	17.7	5.3	15.5	11.5	9.8	12.2	11.5
Sharpe ratio	3/	1.1	0.9	0.6	0.7	1.3	1.2	1.2	1.1	0.2	0.8	1.1	1.3
<i>(Sample period: January 1990 -August 1998)</i>													
Average Excess Returns	2/	12.4	19.7	11.0	34.0	14.5	22.0	7.5	19.9	1.6	10.0	15.8	14.2
Standard Deviation of Excess Returns		7.9	16.7	11.3	37.3	10.6	17.6	4.6	14.2	11.7	9.1	11.1	11.8
Sharpe ratio	3/	1.6	1.2	1.0	0.9	1.4	1.2	1.6	1.4	0.1	1.1	1.4	1.2
1 month holding period returns													
<i>(Sample period: January 1990 - August 1999)</i>													
Sharpe ratio		0.30	0.19	0.14	0.21	0.26	0.32	0.28	0.17	0.02	0.19	0.26	0.20
Corr(S&P 500;HF)		0.50	0.22	0.45	0.42	0.81	0.74	0.23	0.80	-0.54	0.60	0.41	
Sharpe ratio of S&P 500 x Corr(S&P 500;HF)		0.10	0.04	0.09	0.08	0.16	0.15	0.05	0.16	-0.11	0.12	0.08	
<i>(Sample period: January 1990 -August 1998)</i>													
Sharpe ratio		0.29	0.24	0.16	0.22	0.21	0.27	0.39	0.12	0.02	0.19	0.27	0.16

Footnotes:

1/ For 12-month moving window; returns are compounded assuming full reinvestment of dividends.

2/ Excess return is defined as return in excess of the U.S. Treasury Bill Yield.

3/ Sharpe ratio is calculated as a ratio of the average excess return to the standard deviation of excess returns.

4/ Value-weighted portfolio of all hedge funds (not including funds of funds).

Source: Estimates based on data provided by MAR/Hedge.

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Table 7: Correlations of Monthly Returns of Hedge Funds.

(sample includes funds reporting to MAR/Hedge, as of September 1999;

sample period: January 1990 - August 1999)

	Event Driven	Global Macro	Global International	Global Emerging	Global Established	Sector	Market Neutral	Short Sellers
Correlations between average (value-weighted) returns for different investment categories								
Event Driven	1.0	0.3	0.6	0.5	0.7	0.6	0.5	-0.4
Global Macro		1.0	0.2	0.1	0.2	0.2	0.2	0.0
Global International			1.0	0.5	0.6	0.5	0.5	-0.4
Global Emerging				1.0	0.4	0.4	0.3	-0.3
Global Established					1.0	0.8	0.5	-0.6
Sector						1.0	0.4	-0.5
Market Neutral							1.0	-0.2
Short Sellers								1.0
Medians of pairwise correlation coefficients calculated for all funds within each investment category								
	0.34	0.16	0.25	0.45	0.38	0.43	0.10	0.56

Source: Estimates based on data provided by MAR/Hedge.

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Appendix I

The MAR/Hedge classification of the hedge fund investment styles.

Source: <http://www.marhedge.com>

Style	Sub-type	Comment/ description
Event-driven investment theme is dominated by events that are seen as special situations or opportunities to capitalize from price fluctuations.	Distressed Securities	Focused on securities of companies in reorganization and/or bankruptcy, ranging from senior secured debt (low-risk) to common stock (high risk)
	Risk Arbitrage	Manager simultaneously buys stock in a company being acquired and sells stock in its acquirers. If the takeover falls through, traders can be left with large losses
Fund of funds Capital is allocated among funds, providing investors with access to managers with higher minimums than individual might afford.	Diversified Niche	Allocates capital to a variety of fund types Allocates capital to a specific type of fund
Global	International	Manager pays attention to economic change around the world (except US); bottom-up-oriented in that they tend to be stock-pickers in markets they like. Use index derivatives much less than macro managers
	Regional- Emerging	Manager invests in less mature financial markets. Because shorting is not permitted in many emerging markets, managers must go to cash or other markets when valuations make being long unattractive. Focus on specific regions.
	Regional – Established	Focuses on opportunities in established markets. US opportunity European opportunity Japanese opportunity

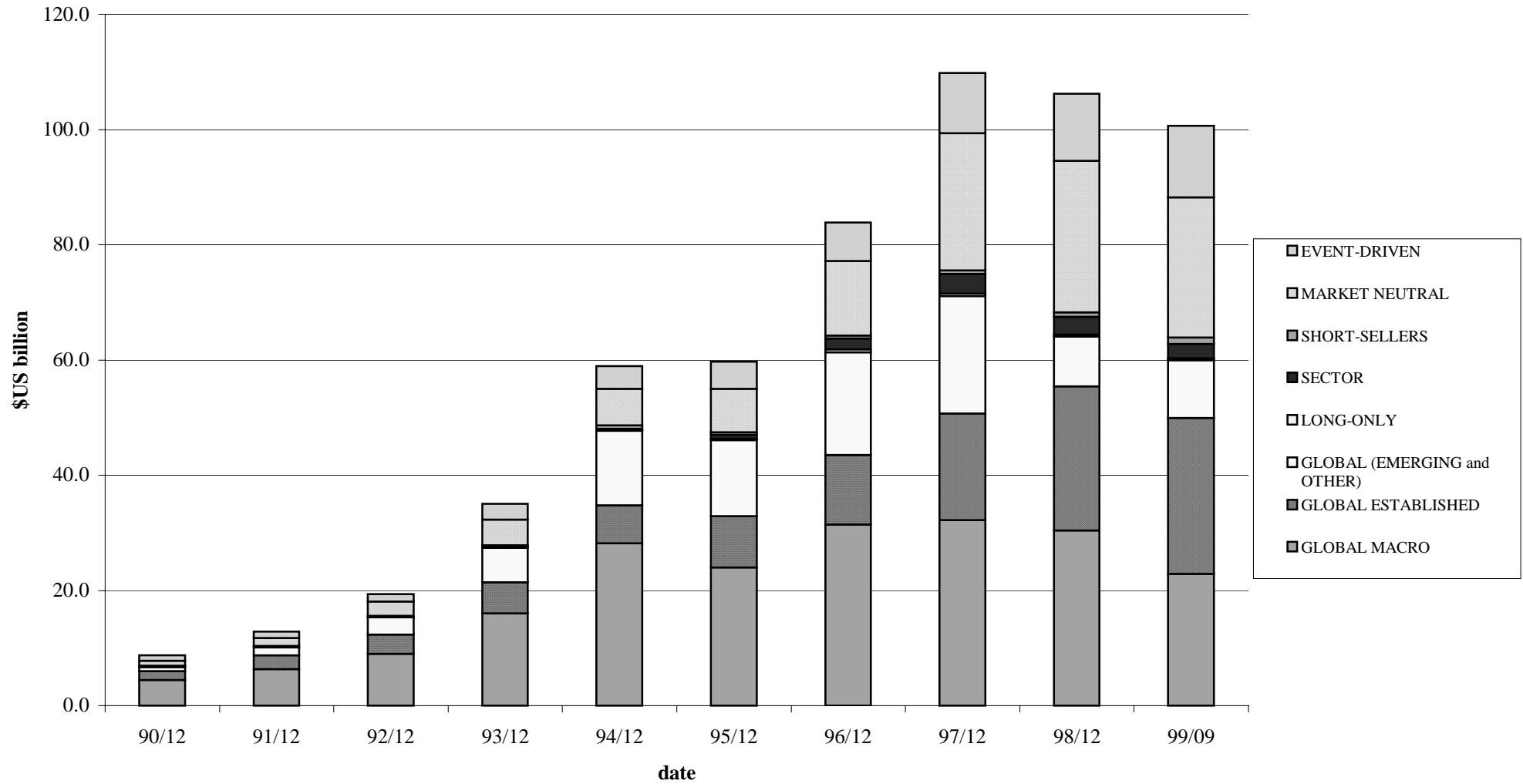
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Global Macro		Opportunistic, the “classic” Soros-Steinhardt-Robertson type hedge fund manager profiting wherever they see value. Use leverage and derivative to enhance positions, which will have varying time-frames from short (under 1 month) to long (more than 12 months).
Long-Only Leveraged		Traditional equity fund structured like a hedge fund, i.e. uses leverage and permits manager to collect an incentive fee.
Market Neutral Manager attempts to lock-out or neutralize market risk. In theory, market risk is greatly reduced but it is difficult to make a profit on a large diversified portfolio, so stock picking is critical	Long/Short Convertible arbitrage	Net exposure to market risk is believed to be reduced by having equal allocations on the long and short sides of the market One of the more conservative styles. Manager goes long convertible securities and short underlying equities, profiting from mispricing in the relationship of the two.
	Stock arbitrage	Manager buys a basket of stocks and sells short stock index futures contract, or reverse
	Fixed income arbitrage	Manager buys bonds - often T-bonds, but also sovereign and corporate bonds and goes short instruments that replicate the owned bond; manager aims to profit from mispricing of relationship between the long and short sides.
Sector		Follows specific economic sectors and/or industries: managers can use a wide range of methodologies (e.g. bottom-up, top-down, discretionary, technical) and primary focus (e.g. Large-cap, Mid-cap, Small-cap, Micro-cap, Value Growth, Opportunistic)
Short-sellers		Manager takes a position that stock prices will go down. A hedge fund borrows stock and sells it, hoping to buy it back at a lower price. Manager shorts only overvalued securities. A hedge for long-only portfolios and those who feel market is approaching a bearish trend

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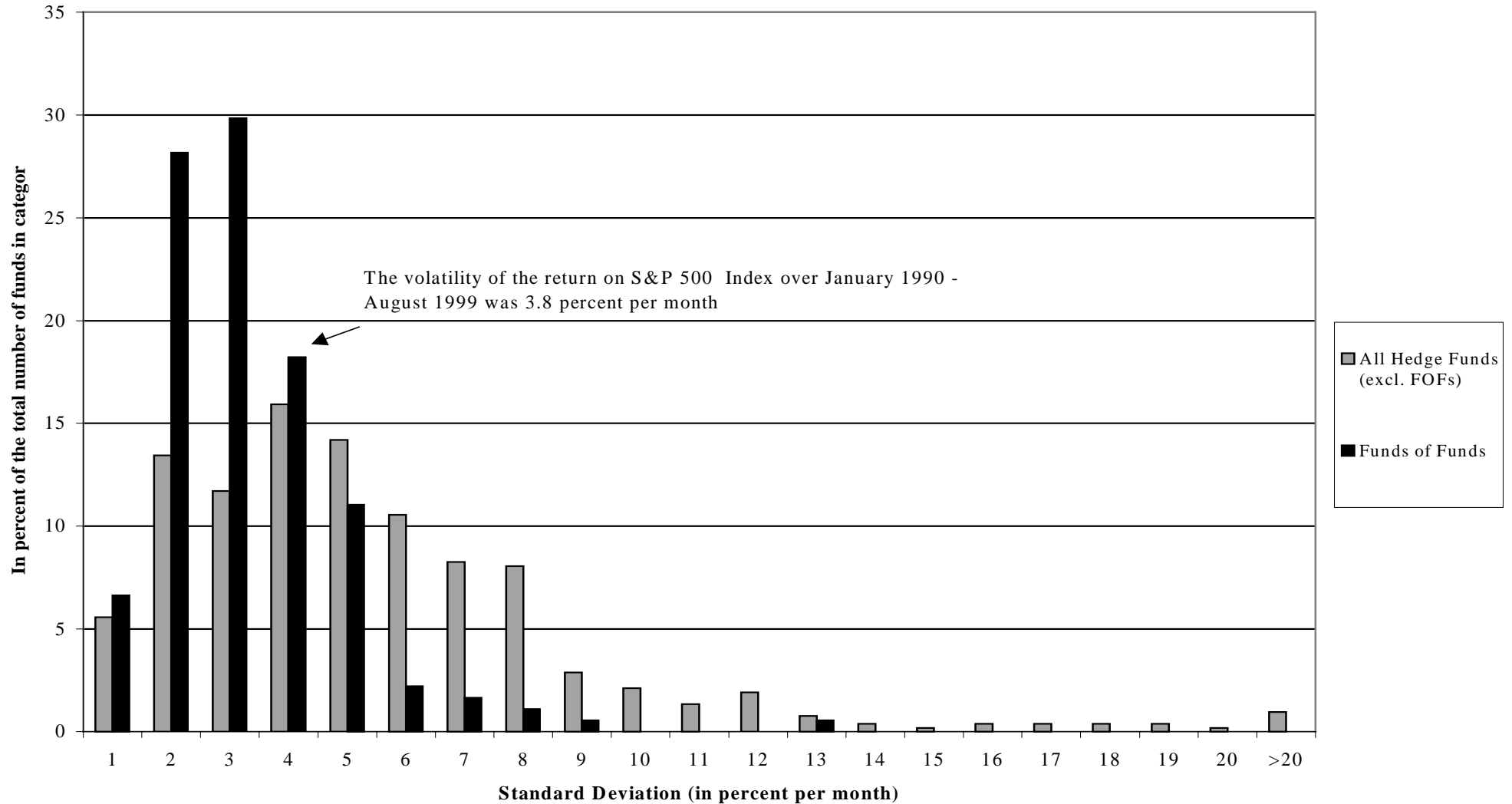
Chart 1: Total Capital under Management of Hedge Funds by Investment Style.

(sample includes all funds (excluding funds of funds) reporting to MAR/Hedge;
sample period: December 1990 - September 1999; total capital is as of end period)



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Chart 2: Volatility of the Hedge Funds' Monthly Returns.
 (sample period: January 1990 - August 1999;
 sample includes funds reporting to MAR/Hedge, as of September 1999)

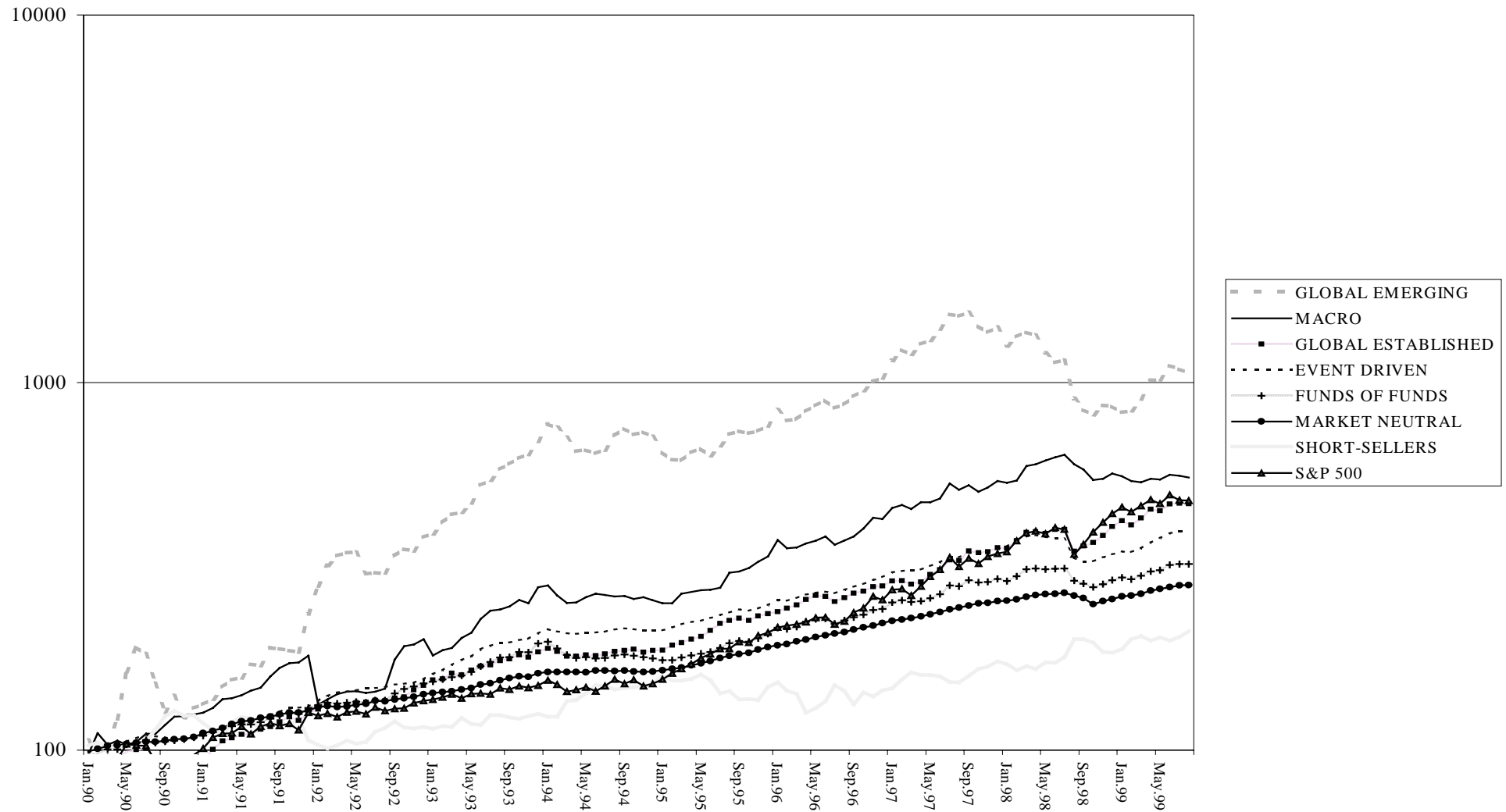


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Chart 3: Cumulative Returns on the Value-Weighted Portfolios of Hedge Funds.

(December 1989 =100; log scale;

sample includes funds reporting to MAR/Hedge, as of September 1999)



Report of the Market Dynamics Study Group⁷³
of the Financial Stability Forum
Working Group on
Highly Leveraged Institutions

⁷³ The study group included the following: Charles Adams (International Monetary Fund, convenor), Gordon de Brouwer (Reserve Bank of Australia), Hervé Ferhani (Banque de France), Dino Kos (Federal Reserve Bank of New York), Julia Leung (Hong Kong Monetary Authority), Robert McCauley (Bank for International Settlements), Anthony Richards (International Monetary Fund), Nouriel Roubini (U.S. Treasury), Andrew Sykes (Financial Services Authority, U.K.) and Iwao Toriumi (Bank of Japan).

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I. Introduction

1. This report presents the findings of the market dynamics study group established by the Financial Stability Forum (FSF) Working Group on Highly Leveraged Institutions (HLIs). The report was prepared against the background of strong external pressures faced by a number of medium-sized economies during 1998 associated with the possible deepening and spreading of the Asian financial crisis. The group was asked to assess concerns of authorities in a number of economies about the possible destabilizing impact of large and concentrated HLI positions during this period and the implications for market integrity⁷⁴ of the use of various aggressive practices. In preparing this report, the group visited Australia, Hong Kong, Malaysia, New Zealand, Singapore and South Africa for discussions with senior officials of monetary authorities and regulatory bodies, and with representatives of major commercial and investment banks. It also visited New York to meet with a number of internationally active financial institutions including some large macro hedge funds. The meetings with private sector market participants were for general background purposes, with the understanding that there would be no attribution of information or opinions to any particular institution.
2. The economies visited represent useful case studies for the issues in the group's terms of reference. In all cases, they can be viewed as medium-sized markets that in normal circumstances offer significant liquidity, including for position-taking as a proxy for developments in correlated but less liquid markets. Further, although HLIs reportedly took large positions in most of these economies' markets during 1998, the authorities reached somewhat different conclusions about the significance of HLI activities. The authorities in Australia, Hong Kong, Malaysia and South Africa expressed strong concern that HLI positions—together with what they saw as very aggressive practices—posed major risks to financial stability during 1998 and adversely impacted market integrity. While expressing some sympathy with these concerns, the New Zealand and Singapore authorities said that their own markets had seen less HLI activity that raised significant concerns during this period, in the latter case, in part, because of tight restrictions on the supply of domestic credit to non residents.
3. As a result of its discussions during the visits, the study group has adopted a wide definition of HLIs that includes the proprietary trading desks of regulated commercial

⁷⁴ As discussed below in Section IV, market integrity refers to the “efficiency and fairness” of the price discovery process in a market.

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and investment banks, as well as hedge funds. In the case of the six economies visited, proprietary trading desks appear to have taken positions similar to those of many macro hedge funds and frequently used the same leveraged financial instruments.

4. This report is organized as follows. Section II briefly describes the general economic and financial background to the pressures experienced by the six case-study economies in 1998. Section III outlines key aspects of the market dynamics observed in these economies, drawing on the group's discussions with official representatives and market participants. Finally, Section IV presents and discusses the group's conclusions on the potential impact of HLIs. There are three Annexes to the report. Annex I reviews the individual experiences of the six economies that were visited. Annex II presents a summary of the theoretical and empirical literature relevant to the group's assessment, and Annex III discusses the principal means and instruments by which HLIs employ leverage.

II. Economic and Financial Market Backdrop

5. The six economies visited by the study group all experienced significant pressures in foreign exchange and domestic financial markets during 1998. While these pressures were partly due to common external fundamentals and the possible spreading of the Asian crisis, the sharp rebounds experienced in many of their markets in early October of that year, amid general HLI deleveraging, suggested also a possible commonality in terms of market participants. Moreover, the authorities in most of these economies suggested that HLIs had been very active in their markets during this period.
6. The pressures in these economies in 1998 occurred against the background of a long run-up in asset markets. For example, over the four years to mid-1998, U.S. and European stock markets yielded average annual returns of close to 30 percent. Furthermore, credit spreads had fallen across the board through much of the decade and remained very low by historical standards even after the Asian financial crisis in the second half of 1997. One reflection of the strong returns in financial markets and continued search for high yield was the growth in assets of the global hedge funds,

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which saw assets under management effectively double between end-1995 and mid-1998.⁷⁵

7. The pressures in asset markets in the six economies occurred in the midst of growing uncertainty about global prospects;⁷⁶ a substantial depreciation of the yen, worries about the stability of the Chinese renminbi, sharp falls in commodity prices and growing concerns about the situation in Russia. After a rally in a number of emerging market countries in January-April 1998, there were renewed pressures in many economies with links to Asia or with dependence on commodity exports. In the case of the six economies, each had some elements of external or domestic vulnerability—see Annex I—but were, for the most part, considerably stronger than the economies most affected by the Asian financial crisis in late 1997. Pressures in their financial markets during 1998 were exacerbated to some extent by the fact that they all offered reasonable liquidity for hedging or speculating on regional developments (see Table), especially the potential spillover from weakness in the Japanese yen. One result was a substantial increase in the degree of co-movement in the six economies' dollar exchange rates and the Japanese yen during the course of 1998 (see Annex I and Chart).
8. The heightened pressures resulted in severe exchange market weaknesses in the six economies in late May and early June 1998. After a temporary respite following the Federal Reserve/Bank of Japan intervention to support the yen in mid-June, pressures reached their peak in most cases in late August, following Russia's unilateral debt moratorium and devaluation; some of the economies saw their currencies slip to record lows at this point. The authorities in Hong Kong responded to concerns about

⁷⁵ These figures are estimates based on data from the vendor MAR/Hedge and include funds categorized as “macro”, “emerging”, “established” and “international”. Appendix ___ includes background information on the size and structure of the hedge fund industry.

⁷⁶ Most notably, the consensus forecast for annual 1998 GDP growth for Japan was lowered progressively from +1.1 percent to -1.5 percent between December 1997 and August 1998.

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manipulation of their financial markets by large purchases of equities, while Malaysia imposed capital controls and fixed its exchange rate.

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Table. Size of Selected Foreign Exchange Markets, April 1998

(average daily turnover in billions of U.S. dollars) 1/

	Domestic market	Global turnover
U.S. dollar	315.87	1260.00
Japanese yen	124.05	300.06
Pound sterling	114.82	157.91
Deutsche mark	62.15	429.95
French franc	32.63	73.33
Swiss franc	31.61	100.98
Canadian dollar	25.87	51.76
Australian dollar	23.60	44.21
Italian lira	22.50	n.a.
Hong Kong dollar	18.71	n.a.
Dutch guilder	18.65	n.a.
Singapore dollar	17.64	n.a.
Spanish peseta	13.01	n.a.
Mexican peso	8.54	n.a.
South African rand	7.29	n.a.
Swedish krona	6.29	n.a.
Greek drachma	5.36	n.a.
Brazilian real	5.13	n.a.
New Zealand dollar	4.93	n.a.
Russian ruble	4.73	n.a.
Czech koruna	4.17	n.a.
Thai baht	2.57	n.a.
South Korean won	2.29	n.a.
Argentine peso	2.17	n.a.
New Taiwan dollar	1.72	n.a.
Saudi Arabian riyal	1.42	n.a.
Indian rupee	1.39	n.a.
Indonesian rupiah	0.97	n.a.
Malaysian ringgit 2/	0.66	n.a.
Hungarian forint	0.55	n.a.
Philippine peso	0.49	n.a.
Chinese renminbi	0.21	n.a.
Bahrain dinar	0.02	n.a.

Source: Central Bank Survey of Foreign Exchange and Derivatives

Market Activity, 1998 (BIS, May 1999), Tables E7 and E1.

1/ n.a. denotes not available.

2/ In the case of Malaysia, a larger-than-typical proportion of trading occurred offshore in the neighboring Singapore market (prior to the tightening of capital controls in late 1998).

INSERT Chart. (Weekly Exchange Rate Changes, 1998)

9. Although the outlook for emerging market and commodity-dependent economies remained weak, the pressures tended to ease from early September 1998. The easing coincided with the beginning of position cut-backs by some HLIs, amid losses in Russia and elsewhere, sharply rising credit and liquidity spreads, especially in the United States, and decreased risk tolerance on the part of investors and credit providers. This process accelerated in early October with further deleveraging in the wake of the near-failure of Long-Term Capital Management (LTCM). The unwinding of positions contributed to sharp appreciations in the Japanese yen and the currencies of most of the economies visited. Subsequent cuts in official interest rates in major industrial countries helped ease concerns about the outlook for the world economy and helped strengthen and sustain generalized recoveries in asset prices in the six economies.

III. Market Dynamics

10. The macroeconomic and global financial developments described in the preceding section revealed vulnerabilities in the exchange rates and domestic asset markets of the economies visited. Falling international demand, currency depreciations elsewhere and commodity price weakness all brought pressure to bear during 1998. Nonetheless, even though they showed varying degrees of vulnerability, these economies had greater strength in their macroeconomies and financial systems than the economies caught up in the Asian crisis in 1997. In such uncertainty, as exchange rates and asset prices fell, a number of market dynamics began to work. Some of these dynamics had a broadly stabilizing character, such as exporters' reactions to more favorable exchange rates, but many dynamics involved selling into weakness.
11. The market dynamics in these economies reflected the interaction of many complex forces which are difficult to understand through ex post "re-creation". The section is based on views of national authorities and market participants on how those forces operated. To understand the market dynamics, the behavior of HLIs needs to be placed in the context of that of the many other participants in these markets. The section first enumerates the various participants in these markets, sketches the dynamics of others' positioning, then that of HLIs and finally their interaction, including other market participants' reactions to reports of HLI activity. The relevant dynamics include both the reaction of other market participants to a single price, whether exchange rate, bond yield, or equity price, and the reactions of participants in one market to anticipated or actual developments in another market. Key features of HLI positioning are size, concentration and, in some cases, aggressive promotion.

(a) Market Participants

12. The foreign exchange markets in the economies visited saw the interaction of a broad range of market players during 1998. These included exporters and importers adjusting hedges to their cash flows, foreign multinationals, local banks and institutional investors, and foreign investors such as pension funds and mutual funds that all transacted through brokers and dealers. For pension funds and mutual funds, the available data suggest net sales of assets in several of the economies visited during 1998. The particular role of leveraged accounts, whether proprietary trading desks, momentum model-driven hedge funds (often dealing to maturities of futures contracts in Chicago), and macro hedge funds, is not always easy to disentangle.

(b) Intra-Market Dynamics

13. Market participants respond to the course of exchange rates and asset prices in ways that can limit movements or add momentum to them, and can cause under- or overshooting. These market participants, highlighted below, include exporters and importers, investors with short horizons, financial firms hedging swap and option books, and exporters' reactions to exotic option developments.
14. Changing exporter and importer hedging tended to provide a stabilizing element in Australia, New Zealand and South Africa. In particular, as the Australian and New Zealand dollars fell with commodity prices in early 1998, exporters extended their forward selling of foreign currency receipts, locking in what appeared to be favorable exchange rates. In South Africa, exporters were said to have contributed to pressure on the rand at an early stage and then helped brake its fall. Through the second quarter of 1998 in South Africa, importers and exporters had positioned themselves to profit from rand stability and high rand interest rates. At early signs of pressure on the rand, importers scrambled to buy dollars and a large gold exporter apparently reversed a forward sale of gold against rand in April, putting pressure on both the rand and interest rates. Later, South African exporters sold dollars forward when the rand approached its most depreciated levels. Hong Kong companies are reported to have written options on their holdings of U.S. dollars. Such corporate behavior could be judged broadly stabilizing, although reactions to developments with exotic options could be less so (see below).
15. Liquidation of carry-trade investments played a key role in New Zealand and South Africa, albeit at different stages.⁷⁷ During 1996 and early 1997, high yields and the appreciating trend of the New Zealand dollar attracted considerable carry-trade investments, notwithstanding growing Reserve Bank public concern about the strength

⁷⁷ A carry-trade funds an investment in a relatively high-yielding currency with liabilities in a low-yielding currency.

of the New Zealand dollar. Although European and Japanese retail investors continued to purchase high-coupon New Zealand assets, a number of leveraged funds began to reverse their carry trades in late 1997. In South Africa, the rand's high yields, its stability and rising prices of government bonds had attracted a large sum of carry-trade positions by early 1998. These positions began to be closed out the rand and government bonds came under pressure in April-May 1998.

16. In the case of South Africa, management of dynamically hedged swap positions also implied selling into weakness. In the South African bond market, a sizable quantity of mostly 30-year zero coupon euro-rand bonds had been sold to European retail investors. Borrowers swapped into dollars and left major international banks the task of dynamically hedging the long-duration liabilities with the available medium-term government bonds. As yields declined into early 1998, hedging required purchases of government bonds; when yields rose, bonds had to be sold regardless of any view on fair value and a vicious circle resulted.
17. Zero-cost option structures (for example, where the purchase of a put option is financed through the sale of an out-of-the-money call option) contributed to additional pressures on the Australian and New Zealand dollars. There, exporters apparently bought low-cost insurance against local dollar strength by agreeing to sell U.S. dollars if the local currency reached what seemed implausibly low levels. In the event, local currencies declined to these levels in mid-1998, and the exporters in some cases found themselves in a position of having sold an uncomfortably large sum of dollars. They were hardly able to sell U.S. dollars and perhaps inclined to buy them.

(c) Cross-Market Dynamics

18. In addition to these reactions to exchange rate movements in a single market, there are reactions to rate dynamics in other markets. A key conditioning variable in such reactions is liquidity. As noted above, the economies visited had exchange markets of medium size that offered more liquidity than the exchange markets for other Asian-Pacific currencies such as the Thai baht, Indonesian rupiah, Philippine peso or Chinese renminbi (where the principal relevant market was in non-deliverable forwards). In addition, Hong Kong's equity and South Africa's bond markets offered extraordinary liquidity for, respectively, the asset classes of Asia ex-Japan equity and emerging market bonds. A portfolio manager uncomfortably holding a long position elsewhere in a related currency, equity or bond, representing weeks of current trading volumes, would sometimes seek a roughly offsetting short position in one of the markets visited. Companies with direct investments in countries where there are exchange rate changes, ongoing or feared, that could not be hedged, would look elsewhere to hedge. At times selling took place where possible rather than where preferred by the portfolio manager.
19. Such transactions, termed proxy hedging, involve a speculative element in the assumed correlation between long positions and short positions in different currencies but took

on particular importance at times of high volatility and reduced liquidity. A related and, in practice, hard to distinguish, transaction can be termed a proxy or correlational play. This was based on calculations such as: if world demand continues to weaken and commodity prices fall, then the Australian, New Zealand, and Singapore dollars and the rand will all weaken; if the baht has fallen into the 50s against the dollar, Malaysian exporters will be disadvantaged without a ringgit of 5 or more to the dollar; if the baht and rupiah fall, then Singapore's implicit effective exchange rate target means a lower Singapore dollar against the U.S. dollar. Within Hong Kong and South Africa, the reasoning was also to some extent that higher interest rates (depreciated forward Hong Kong dollars) or a lower rand would, respectively, be accompanied by a lower Hang Seng index or higher bond yields.

(d) Size of HLI Positions

20. Among those putting on proxy or correlational plays, HLIs were described by some market participants as standing out owing to their size, concentration and, in some cases, aggressive promotion of their positions. For the medium-sized markets under consideration, interviews with risk managers at bank counterparties suggested the binding limit for the larger hedge funds' positioning was their own assessment of liquidity rather than counterparty credit or concentration limits.
21. The range of estimates of the cumulative weight of short positions by HLIs suggested that they reached substantial size in most of the economies visited. The restraints on lending Singapore dollars to nonresidents were described as more effective in limiting the shorting of the currency than capital controls in South Africa, where requirements that forward transactions be trade-related were not generally closely observed.
22. Position size matters at the level of the individual firm or fund and at the aggregate level. At the fund level, the macro hedge funds grew with success, so that reputation and size went together. Moreover, by the first half of 1998, the size of the major macro funds implied a substantial minimum position, pointing to the need for multiple orders to establish positions. In the interviews, it was suggested that a position that became profitable would often be allocated more capital within the fund and could lead to improved terms for credit from bank counterparties for further positioning.
23. At the aggregate level, the cumulative scale of short positions can appear large in relation to the capacity for contrary position-taking by those with U.S. dollar cash flows and local currency costs in these economies, namely exporters and local managers of foreign-invested portfolios. For given export cash flows, this capacity depends on constraints imposed on corporate treasurers by boards of directors or senior management as well as constraints imposed by counterparties, for example, in the willingness of banks to accept the potential credit risk in forward transactions or to engage in forward purchases of commodity exports.

24. Against this background, it is interesting to compare the estimated aggregate size of short positions of HLIs to exports in the six economies. In particular, short positions in the Hong Kong dollar, Australian dollar, New Zealand dollar, South African rand, Malaysian ringgit and Singapore dollar may have amounted at times during 1998 to as much as two to six months of exports. Where the HLI positions were said to have had exporter selling as their most important single counterpart (Australia, New Zealand and South Africa, with banks also to some extent important), HLI positioning may have left exporters at the edge of their institutionally determined limits on forward sales of export receipts.⁷⁸ One can imagine that other global participants enter only at extreme points, so that cash-flow based capacity to absorb local currency selling is less relevant. However, there seemed to be little positioning contrary to that of HLIs by mid-1998 in some of the economies visited although domestic residents—and, in some cases, central banks—were initially on the other side of the transactions as HLI positions had begun to be put in place.⁷⁹ Thus, while it is difficult to corner a foreign exchange market, which is in principle expandable without limit, one-way HLI positioning can in practice leave the bid side for local currency with little ammunition and the market temporarily vulnerable to one-way movement.

(e) Concentration of HLI Positions

25. HLI involvement in the currencies of the economies visited was frequently said to be concentrated. Observers named a handful of major macro hedge funds and perhaps a dozen substantial proprietary trading desks. Moreover, the proprietary trading desks are part of financial firms that execute and finance many transactions for major hedge funds. Thus, observers noted a structural opportunity for information on positioning by the major hedge funds to flow to the proprietary trading desks, notwithstanding hedge fund efforts to distribute orders to prevent copy-cat trading. Such a structural opportunity could well be more important than any explicit collusion, of which the study group heard several reports.

26. In particular markets, concentration was evident during 1998. Thus, in the Hang Seng futures, Hong Kong Securities and Futures Commission (SFC) data show that at one time during 1998 three hedge funds accounted for around half of the net delta/net open interest of the entire market while one fund accounted for a third. Moreover, the SFC data show these positions to have been positively correlated. Short positions in the New

⁷⁸ Initial conditions matter: the South African mines, which are said to do less forward selling than their counterparts in Australia, were said to have played a larger role in selling dollars when the rand reached its nadir than did the Australian mines at the Australian dollar's nadir.

⁷⁹ More realistically, one might expect the institutional investors with overseas assets and domestic currency liabilities to sell dollars at local-currency lows, but even apart from South Africa (where foreign-currency assets are accumulated under exchange controls only through cumbersome asset swaps that mitigate against reversal), the Australian institutional investors were said to have bought heavily into momentum-based currency overlays.

Zealand dollar were said also to be highly concentrated. Market participants in Hong Kong, Australia and New Zealand tended to name the same three or four macro hedge funds as the largest participants, but there was both less specificity and less sense of concentration in discussions with market participants in the cases of South Africa, Malaysia and Singapore.

27. The number of HLIs taking positions has an impact on close-out risk. Several factors can, and apparently did, lead HLIs eventually to cover their short positions in the currencies of economies visited in only a matter of weeks. The Russian debt moratorium meant a number of HLIs lost some of their capital; lower net assets meant a lower appetite for risk on the part of the HLIs affected and there appeared to be a lower tolerance for risk by exposed counterparties more generally. The imposition of capital controls by the Malaysian authorities led to an immediate close-out of short ringgit positions but also highlighted the risk in forward transactions (so-called wrong-way swaps) in which counterparties governed by national policies contracted to pay dollars to offshore banks. If positions were taken off faster than they were put on by HLIs, then the effect of the positioning is likely to be more apparent in the jump upwards in the currencies in September-October 1998 than in the earlier declines.

(f) Aggressive Practices

28. It was suggested by some market participants that HLIs may have attempted at times to influence the course of market prices to their own advantage. Such influence was thought principally to take the form of “talking the book” and aggressive trading. Large positions and the possibility of still larger positions can be significant information in a market and some market participants saw HLIs as seeking to exploit their knowledge of their own positions. It is, of course, hard to distinguish mild “talking one’s book” from more objectionable behavior. Under strained circumstances, however, negative comments about a currency by a senior hedge fund manager can cause concern for officials. Some observers interpreted the correlation between research conclusions of some financial institutions and positions cynically, and suggested that positions led research rather than vice versa. In Australia, in June 1998, the market was said to have been filled with reports of impending positioning by HLIs, which was said to have led to the withdrawal from the market of many regular traders.
29. Aggressive trading was reported to have taken a number of forms but its extent and impact were difficult to assess. Given the importance of other participants’ momentum trading, heavy trading by HLIs at illiquid hours, during lunchtime in the home market, or in quiet periods between major centers’ active trading times, was viewed by some market participants as implying attempts to move rates rather than get transactions executed at the best price. In Hong Kong, having quietly put on short equity and/or currency positions, HLIs became “impatient”, in the words of one well-placed market participant. Having swapped into longer-term Hong Kong dollar funding, HLIs were

said to have sold Hong Kong dollars spot to exploit the automaticity of the interest-rate response and thereby to have gained both on the forwards and especially on short equity positions.

(g) Interaction of HLIs and Other Participants/Dynamics

30. Successful HLIs work with the grain of market dynamics, that is, integrating the reaction functions of other market participants, including at times officials, into their strategies. This makes it hard to specify the partial effect of their positioning. For example, an early apprehension of how declining prices of South African bonds would require bond sales by swap desks could inform proprietary trading desks in staking out short positions in those bonds.
31. While variations of liquidity over time and across markets pose risks to HLIs, especially in closing out their positions, they also offer opportunities. Some HLIs were said to build up positions in the most liquid times and to put market-moving orders through at the least liquid times. Or, they reportedly sought to exploit differences in liquidity in correlated markets. Positions were reportedly put on in the more liquid market (South African bonds, Hong Kong equities) but the trades intended to move the market were thought to have been done in the less liquid markets, that is the money markets.
32. The reported presence of HLIs in the market was said to have affected the behavior of other market participants, in some cases in a destabilizing fashion. Other market participants were said sometimes to be emboldened to add to momentum. Perhaps more important, it was often said that other market participants would not attempt to stand in the way of positioning by large HLIs.
33. In conclusion, in unsettled times such as in 1998, many self-perpetuating market dynamics can be in evidence. In interviews, it emerged that HLIs were thought to have contributed to and worked through these dynamics in most of the economies visited, albeit not always with success.

IV. Assessment of the Impact of HLIs on Market Dynamics and Market Integrity

34. The study group has been asked to assess whether large and concentrated HLI positions and aggressive practices have the potential to amplify market pressures in medium-sized markets and compromise market integrity. Drawing on the six case studies, this section presents and discusses the group's assessment of the 1998 experiences and of the potential for HLIs to influence market dynamics and market integrity. Even though the group has reached agreement that large HLI positions can, in some circumstances, materially influence market dynamics, there is not consensus on the role and importance

of the aggressive practices cited in the preceding section and their implications for market integrity.

35. The group's assessment has had to be largely judgmental and subject to more than the normal caveats. First, the assessment has been seriously hampered by a lack of data on foreign currency and other positions of HLIs and other market participants. While market participants were sometimes willing to reveal their own positions, they generally did not reveal specific information on those of their clients, and the group had to rely on market intelligence of varying reliability to arrive at a judgment about aggregate positioning and the role of different classes of investors.⁸⁰ Second, there is no agreed or established analytical framework for assessing the impact of large players on medium-sized markets and the six case studies obviously do not cover the full range of experiences with such players in these markets. Finally, the group does not know what would have happened in the six economies in the counterfactual had HLIs not been active in their markets. Given the global and regional situation, some market volatility and turbulence would have occurred in these economies and the assessment of the "marginal" impact of HLIs is extremely difficult.
36. The group's framework for considering the impact of HLIs distinguishes long-run from short-run influences (see also Annex II). Over the long run, economic fundamentals are assumed to be the ultimate determinants of (real) exchange rates and asset prices. Such factors are incorporated into exchange rates and a range of real and financial variables through a complex process that includes trading and position taking by market participants and interaction between a large number of variables. Over short time periods, in particular, however, it is likely that exchange rates are strongly dependent on the micro financial structure. The latter includes the capital allocated to market making, the number of market participants, and the available instruments for trading risk. Over these periods, markets seem to be influenced in significant ways by herding, feedback effects, hedging strategies and the presence or absence of key market players. Over time, the role of these factors is normally expected to dissipate as fundamentals come to play an increasingly important role. In some circumstances, however, such as when market liquidity is low, markets can become one sided with "short-run" factors threatening to exert large and more longer-lived impacts. Market dynamics are also obviously influenced by a wide range of "structural" factors including the exchange rate regime.

⁸⁰ Some recent work by Brown et al, "Asian Currency Crisis," New York University Working Paper (1997) and Fung and Hsieh, "Measuring the Market Impact of Hedge Funds," (1999) has sought to use hedge funds' reported returns to make inferences about positioning and market impact with particular emphasis on the Asian financial crisis in 1997. Group members are somewhat skeptical about the usefulness of these approaches given the complex dynamic trading strategies followed by many HLIs. Moreover, comprehensive data are not available on both hedge funds and proprietary trading desks.

37. There are a number of mutually reinforcing ways in which HLIs may influence market dynamics. Some of these should be viewed as tentative hypotheses that could be tested at some time should actual data on positions and market activity become available.

(a) Position Size and Concentration

38. HLIs can influence market dynamics through the sheer size of their positions relative to the market and vis-à-vis other market participants. In most circumstances, individual HLIs will tailor the size of their positions to their perceptions of market liquidity so as to minimize market impact. But large positions relative to the market also can arise inadvertently if inadequate account is taken of other market participants' positions or the overall size of the market, or if there are unexpected contractions in liquidity after positions have been built. Further, as suggested in the interviews, having already established large positions, some market participants may add to them to try to move prices in ways that make those positions profitable.

39. In addition to their direct effects on prices, large and concentrated HLI positions may, especially in conditions of fragile sentiment, have the following effects:

- When known or rumored, have a chilling effect on other market participants and lead them to move to the sidelines, or encourage imitation. Large positions also raise the size required for contrary positions by market players with different expectations.
- Provide HLIs with significant information asymmetries vis-à-vis other market players that can be used at critical times to try to move markets.

In addition, large HLI positions make markets susceptible to sharp reversals related to changes in the financial condition of positioned HLIs.⁸¹

40. Of course, under normal circumstances, HLIs—as in the case of other market players—have a strong incentive to protect information about their positions to avoid being squeezed by other market participants when they seek to close those positions. Any release of information about individual positions would thus carry risks for individual HLIs.

(b) Investment Styles

41. HLIs can influence market dynamics through their investment styles. A common approach of many HLIs—especially macro hedge funds—is strategic position taking in response to shifts in perceived economic performance and market inefficiencies. Even though such positioning implies that HLIs may be on the scene at time of financial turmoil, it should be recognized that their presence does not necessarily cause the pressures. The group heard the concern, however, based in part on the 1998 experience,

⁸¹ For further discussion of outsized positions, in the context of the problems that arose at LTCM in 1998, see the U.S. President's Working Group Report (1999).

that large strategic HLI positions might under some circumstances become self fulfilling (a concern frequently cast in terms of the possibility of multiple equilibria) and become an independent source of pressure. The group's judgement is that the risk of self-fulfilling currency crises is relatively low when the fundamentals are strong, but it is concerned that the risk might be higher where there are some vulnerabilities and sentiment is fragile. As discussed in the preceding section, much will depend on the behavior of other market participants, including "natural" transactors in the domestic currency such as exporters and importers, as well as their interaction with HLIs and how they are influenced by them.

42. HLIs may also influence market dynamics through positive feedback trading. Under positive feedback, position building (unwinding) is directly or indirectly linked to position performance with positions augmented (cut back) when there is string of positive (negative) returns. Although normally associated with momentum or mechanical trading rules, positive feedback can occur if HLIs obtain improved access to credit or additional capital when they perform well, or there are increases in risk tolerance as net assets grow. Positive feedback can add to other sources of market momentum.

(c) Aggressive Practices

43. HLIs may influence markets through the impact of aggressive practices on prices and other market participants. Although the following practices have been mentioned as used in the six economies, the group is divided on their scale and significance:
- Heavy selling of currencies at illiquid times to move prices and the quoting of off-market prices.
 - Dissemination of rumors about impending policy actions or forecasts of adverse economic outcomes that seem to correspond to positions already in place (talking the book). Spreading of information about positions and strategies at critical times.
 - Correlated HLI position taking within markets either by coincidence or design. Position taking across markets either within single domestic systems (e.g. the Hong Kong double play) or across international currency markets with the intention to move prices in the illiquid market and induce spillover to the liquid market.
44. Evaluating the nature and impact of these kinds of practices is obviously very difficult, and the group had to rely on the sometimes different assessments of a range of market participants. Among the more difficult issues for the group has been to determine the scale and scope of such practices, their degree of severity and market impact. Especially difficult has been to distinguish 'normal' talking of the book from more aggressive spreading of unwarranted rumors, and determining when lines of acceptable behavior might be crossed. There is also the problem of determining whether practices have been used for manipulative purposes with potentially adverse implications for market integrity or were used for other reasons. As a working assumption, the group has defined as manipulative those actions taken by market participants, alone or in

collusion, that are intended to distort market prices.⁸² The group is concerned about such actions because they can adversely affect the price discovery process and the perception that markets are “fair and efficient” (market integrity). This said, it should be noted that the group is of the view that foreign exchange markets are less susceptible to conventional cornering than many other financial markets on account of their potential unlimited expandability. The group believes, however, that HLIs may be able, at least temporarily, to push exchange rates to critical psychological or technical thresholds (related, for example, to stop-loss orders or knock-out options) and that these effects could be more significant and long-lived in circumstances when liquidity is low.

45. There are many practical difficulties deciding whether practices are used for manipulative purposes given that the motives of market players are not known. The difficulties arise because many practices—as well as correlated positions—are capable of different interpretations. By way of illustration, trading during illiquid times of the day may influence prices, especially if technical thresholds are crossed. But this might occur because market participants desire to quickly establish or liquidate positions rather than to move markets. Correlated positions can reflect common strategies based on similar information or the possibility of copy-cat trading, rather than explicit collusion. And position taking across correlated liquid and illiquid markets might reflect portfolio diversification rather than strategies such as the double play. Another issue is whether actions tend to distort prices rather than move them towards their equilibrium level. Especially in foreign exchange markets, it is not easy to reach common understandings on the fair or equilibrium price so as to make this kind of judgment.
46. Given, in particular, the difficulty of establishing motive—and the issue of the appropriate burden of proof⁸³—the group was unable to reach a conclusion on the extent to which manipulation and collusion might have occurred in the six economies and whether market integrity was compromised. The issue is not whether some of the practices mentioned above raise concern, but whether there is enough information to conclude that manipulation was necessarily and systematically involved and market integrity compromised. There is also the question of the extent to which the cited aggressive practices were actively used.
47. Against this background, the group’s overall conclusions are as follows. Even though there is broad consensus, there are differences in emphasis within the group.
 - Under normal market conditions, HLIs do not threaten the stability of medium-sized markets. Together with other market participants, HLIs can play an important role translating views about the fundamentals into prices and face the same incentives as

⁸² Although approaches differ to some extent, most organized exchanges define manipulation in the context of their interest in promoting market integrity. See “Objectives and Principles of Security Regulation” (1998), IOSCO.

⁸³ Given uncertainty, any judgment will be probabilistic and there is not agreement in the group on how to balance Type I and Type II errors.

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other market participants to avoid outsized positions. Because of their ability and willingness to take leveraged positions, HLIs can be an important source of market liquidity and can, over time, contribute positively to market development.

- From time to time, large and concentrated positions may be established in medium-sized markets by HLIs. When this is the case, HLIs have the potential materially to influence market dynamics. The size and duration of the effects can be amplified through herding or through other market participants moving to the sidelines and depend critically on the strength of the fundamentals and the behavior of “ongoing” transactors in the domestic currency.
- The judgement as to whether in such cases HLI positions are destabilizing has to be made on a case-by-case basis. Several members of the study group believe that large HLI positions exacerbated the situations in several of the case-study economies in 1998, contributing to potentially unstable market dynamics and significant spillovers. These group members are of the view that HLI positions and tactics can at times represent a significant independent source of pressure. Some other group members do not think there is sufficient evidence to advance such judgments on the basis of the 1998 experience, given the uncertainty prevailing in markets at that time. They believe that the impact of HLIs on markets is likely to be very short-lived and that, provided the fundamentals are strong, HLI positions and strategies are unlikely to present a major independent driving force in market dynamics.
- The group is concerned about the possible impact on market dynamics of some of the aggressive practices cited in the case-study economies during 1998; it is not, however, able to reach a conclusion on the scale of these practices, whether manipulation was involved and their impact on market integrity. Some group members believe that the threshold for assessing manipulation can be set too high and that some of the aggressive
- Practices raise important issues for market integrity. They are of the view that there is sufficient evidence to suggest that attempted manipulation can and does occur in foreign exchange markets and should be a serious source of concern for policymakers.

Individual Economy Experiences

Australia

The financial market pressures experienced by Australia during 1998 took the exchange rate to its weakest-ever level. These pressures occurred in the context of strong domestic fundamentals including low inflation, strong GDP growth (the consensus forecast for 1998 growth never fell below 3.2 percent, and the actual outcome was 4 percent), a healthy fiscal position (the underlying 1997/98 federal budget outcome was a surplus of 0.2 percent of GDP) and a strong financial sector. The main weakness was perceived to be on the balance of payments where Australia was vulnerable to falling commodity prices (the Westpac commodity price index fell 22 percent between December 1997 and August 1998) and a worsening outlook for its export markets in Asia. Australian financial markets were also perceived to offer liquidity for those wishing to speculate or hedge other positions in the region: the Australian dollar, a freely floating currency, is around the eighth most traded in the world.

After peaking at around US\$0.81 in late 1996, the exchange rate depreciated gradually through 1997, largely reflecting the weakening situation in Asia. Interviews with market participants suggested that HLIs began to build up speculative positions from late 1997. As commodity prices continued to fall and the outlook in some emerging markets (notably Indonesia and Russia) worsened, speculative position taking reportedly accelerated in April and May of 1998, and by end-May the exchange rate had fallen to US\$0.623, 24 percent down from its peak in late 1996. Some of these speculative positions were reportedly proxy plays on other regional currencies whose liquidity had contracted, while other positions were based on views of a much wider regional crisis that included devaluations of the Hong Kong dollar and Chinese renminbi.

Having already accumulated large short positions, a few HLIs—primarily large macro hedge funds—according to some market participants took actions in late May and early June to attempt to push the exchange rate lower. These actions reportedly included spreading rumors about an upcoming attack on the currency to deter buyers, and aggressive trading. A key feature of this latter was to concentrate large amounts of sales into periods of thin trading. These actions were reported by some market participants to be designed in part to cause those who might have taken contrarian positions to withdraw from the market. One

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consequence was that exporters, who had been consistent buyers of Australian dollars at higher levels, not only stood aside and stopped buying at this time but some even began selling as the currency looked to fall to record lows. Structured option positions may also have contributed to the pressures on the Australian dollar in this period⁸⁴

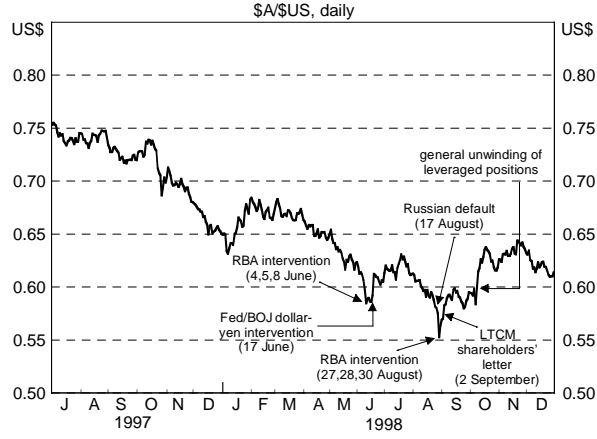
The selling pressures in early June pushed the Australian dollar down to around US\$0.588, its lowest level in the post-float period. The Reserve Bank of Australia intervened to attempt to slow the fall, buying A\$2.6 billion in this period, its first major intervention in six years. At this point, short positions of the large macro hedge funds and some other HLIs were estimated at A\$10 billion or more, or over 2 percent of GDP. The coordinated Federal Reserve/Bank of Japan intervention to support the yen in mid-June also helped to support the Australian dollar, and the currency appreciated modestly until pressures resumed in mid-July, and accelerated in August amid fresh commodity price weakness around the time of the Russian devaluation and domestic debt moratorium.

The exchange rate touched a new record low level of US\$0.553 in late August, prompting a further A\$0.7 bn of RBA spot market intervention in August/September and some options market intervention (through purchase of call options). At this point, according to Reserve Bank calculations, the exchange rate had fallen below the level which was implied by the traditional explanatory variables—commodity prices and interest rate differentials. Within a few days, however, the rate had jumped back over US\$0.58 as HLI deleveraging began and commodity prices moved higher. The currency recovered further in early October as further short positions were closed out and amid the appreciation of the yen that occurred following the LTCM rescue: the currency rose by almost 7 percent during one 24-hour period in early October, its largest such rise in the post-float period. By mid-October, a substantial proportion of HLI positions had reportedly been unwound and the currency had risen back to around US\$0.63 and regained the levels of early May.

⁸⁴ There were also references to the role of trend-following CTAs, IMM players and currency overlay managers, but the importance of these seems a more recent phenomenon.

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Chart 1 Australian Dollar



Hong Kong

After a sharp run-up in asset prices before the transfer of Hong Kong to Chinese sovereignty in mid-1997, pressures on Hong Kong emerged around October 1997 and continued into 1998, subsiding only late in the year following the successful intervention by the Hong Kong Monetary Authority (HKMA) in the equity market and the generalized cutback in leveraged positions following the Russian crisis. These pressures were in an economy that was fundamentally sound and had a strong banking sector (with risk-weighted capital ratios of around 20 percent), but was viewed as vulnerable due to inflated asset prices (property prices fell by around 60 percent from their peak), an emerging and deepening recession (which saw GDP shrink by 6.9 percent in the year to the third quarter of 1998), close links to mainland China, and an exchange rate that was viewed by some market participants as overvalued following depreciations elsewhere in the region. The pressures were compounded by the fact that Hong Kong has deep and liquid equity and currency markets that allow positions to be taken based on views about other countries in Asia. At the height of the pressures in August 1998, equity prices had fallen over 55 percent from their peak a year earlier, while the 12-month forward rate on the Hong Kong dollar was around 8 percent above the HK\$7.8 per US dollar link under the currency board arrangement.

The pressures that began in October 1997 put upward pressure on the forward rates for the Hong Kong dollar and resulted in a sharp fall in the equity market. Markets remained under substantial pressure through January 1998, amid problems in Korea and Indonesia. Pressures continued periodically through the first half of 1998 and accelerated from late June. The heightening of pressures was associated with growing evidence of weakness in the domestic economy, rising concerns about the health of the Japanese economy and financial system (the yen had fallen to an 8-year low of 147 per dollar), the situation in Russia, and renewed concerns about a possible devaluation of the Chinese renminbi. These intense pressures and the authorities' belief that a group of speculators was manipulating Hong Kong's equity and foreign exchange market led to the intervention of the HKMA in the equity market during August 14-28, resulting in purchases of around US\$15 billion in equities.

Market participants suggest that at their peak, HLI short positions against the Hong Kong dollar may have amounted to over US\$10 billion (6 percent of GDP), with some estimates suggesting far larger positions. In some cases, the establishment of short positions may have been facilitated through the large swap-driven issuance of Hong Kong dollar denominated securities by international financial institutions in the first eight months of 1998. Effectively, the buyers of these securities—and indirectly the HKMA through the currency board—may have been on the other side of the HLIs' positions. Aggressive trading strategies by HLIs reportedly included concentrated selling intended to move market prices, large sales in

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illiquid offshore trading hours, and “spoofing” of the electronic broking services to give the impression that the exchange rate had moved beyond the HKMA’s intervention level. There were frequent market rumors, often in offshore Friday trading, that a devaluation of the Hong Kong dollar or Chinese renminbi would occur over the weekend. By contrast, selling pressures from domestic entities do not appear to have been significant. While there was some hedging by corporates, many others were confident that the peg would hold and took advantage of the high interest rates on Hong Kong dollar denominated assets. Households also appear to have retained their confidence in the peg, with the share of bank deposits denominated in domestic currency remaining constant at about 57 percent.

Activity on the Hang Seng equity futures contract rose substantially from April to early August. Some market participants suggested that there were attempts to carry out a “double play” involving the equity and currency markets, whereby short positions would be first established in the equity (or equity futures) market, and sales of Hong Kong dollars would then be used to drive up interest rates and thereby depress equity prices. Some other market participants questioned whether such a strategy was pursued. Any double play would have been facilitated at that time by institutional factors in the linked exchange rate arrangement which made short-term interest rates very sensitive to changes in the monetary base, and also by reduced market liquidity as a result of the Asian crisis. Among those taking short positions in the equity market were four large hedge funds, whose futures and options positions were equivalent to around 40 percent of all outstanding equity futures contracts as of early August prior to the HKMA intervention (there were no limits or reporting requirements on large equity futures positions at this time). Position data suggest a correlation, albeit far from perfect, in the timing of the establishment of the short positions. Two hedge funds substantially increased their positions during the period of the HKMA intervention. At end-August, four hedge funds accounted for 50,500 contracts or 49 percent of the total open interest/net delta position; one fund accounted for around one-third. The group’s meetings suggested that some large HLIs had large short positions in both the equity and currency markets.

The pressures on Hong Kong eased gradually from early September 1998 following the HKMA’s intervention, the subsequent improvement in the global outlook, and HLI deleveraging. The large hedge fund equity futures positions were mostly unwound in late September and in October.

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Chart 1

Hong Kong Share Price and Three-Month Interest Rate

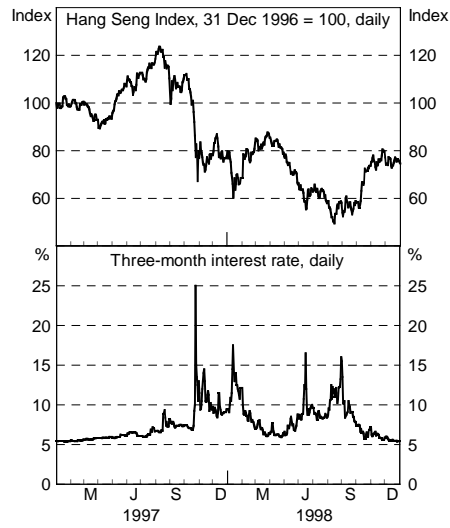
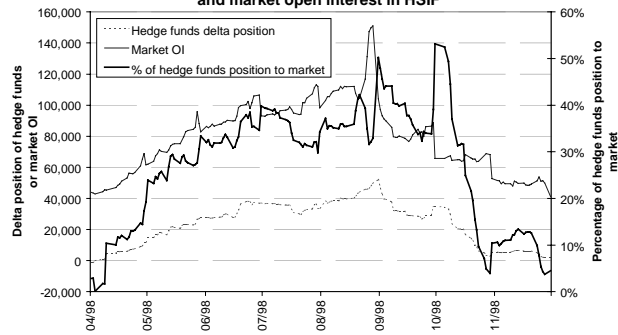


Chart 2

Net delta position of individual hedge funds and market open interest in HSIF



Malaysia⁸⁵

After the initial devaluation of the ringgit in July 1997, Malaysia remained subject to continuing financial market pressures. By the end of August 1998, the ringgit—which was then largely floating—had depreciated by 40 percent and the stock market had declined by more than 75 percent from pre-crisis levels. Against this background and the extreme pressures on other markets in the region in the wake of the Russian devaluation and domestic debt moratorium, the Malaysian authorities imposed tightened capital controls on September 1 and fixed the exchange rate a day later.

The ringgit first came under heavy selling pressures around May 1997 during the pressures on the Thai baht. Leveraged institutions reportedly had substantial short positions at this time. Pressures continued after the authorities floated the ringgit in July. In August 1997, the authorities limited Malaysian banks' lending to non-residents to RM2 million in an attempt to limit foreign speculators' access to the domestic ringgit swap market to fund short positions in the currency.

While Malaysia had a relatively low external debt and a strong fiscal surplus, it remained vulnerable amid the general backwash of regional contagion during the July 1997-August 1998 period. There were also concerns about the domestic economy (between December 1997 and August 1998, the consensus forecast for 1998 GDP growth was revised down from +3.9 percent to -3.4 percent), the current account deficit, relatively high domestic debt, rising non-performing loans and internal political factors. Moreover, the ringgit was viewed by non-residents as among the most liquid of the ASEAN currencies after the collapse of the baht and rupiah, and thus a good proxy to hedge regional risks or speculate on regional developments.

Intense pressures on the ringgit re-emerged in early January 1998 amid the turmoil in Indonesia, pushing the rate to a low of 4.88 against the U.S. dollar. The volume of currency trading (spot and swap) surged to RM50.5 bn in January 1998, compared to an average of RM30 bn in the preceding six months. While the rest of the first quarter was relatively calm, pressures re-emerged in April 1998 and largely remained until August.

As talk of HLI activity in the ringgit grew and the currency depreciated, Malaysian corporates reportedly increased their hedging of foreign currency exposures. Banks in Singapore suggested that Malaysian corporates did not wish to be seen by the authorities to

⁸⁵ The study group had less extensive discussions with market participants on Malaysia, so this summary may be less comprehensive than for the other case-study economies. In addition, the group's discussions were mainly about developments in 1998, so coverage of the initial 1997 depreciation is relatively limited.

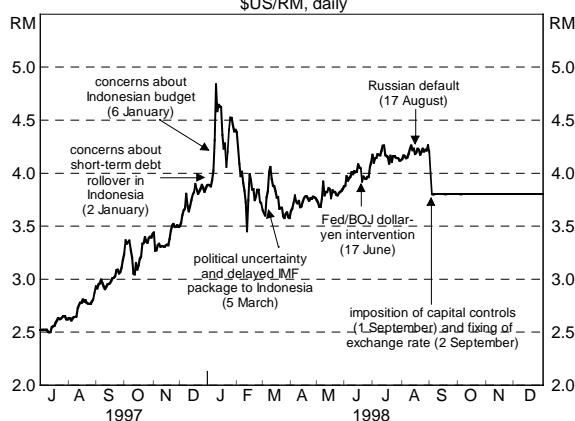
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be hedging, and so went offshore instead of using local markets. Speculation and hedging fed off each other in this period, resulting in large short positions being built up and downward pressure on the currency (which reached RM4.3 per dollar in mid July). Given limited access to swap funding in Malaysia, banks bid up the interest rate on ringgit deposits in Singapore, which led to a shift of ringgit deposits from Malaysia to Singapore, with Malaysian households taking advantage of higher offshore deposit rates, while still remaining in ringgit. Offshore rates peaked in May and July at close to 40 percent for one-month deposits. By the end of August, these deposits amounted to an estimated RM10 billion (about US\$2.5 billion). Market participants estimate that short ringgit positions at this time may have been substantially larger than the offshore deposit base.

Offshore interest rates started to decline in mid-August, around the time of Russia's devaluation and debt moratorium. Some market participants in Singapore suggested that HLIs had largely covered their short positions by the end of August and that Malaysians had started to repatriate deposits. It appears, therefore, that the market may have expected some form of controls, although it was clearly surprised at their breadth and depth. The exchange controls imposed on 1 September 1998 effectively cut off the supply of ringgit to the offshore market and—in conjunction with position unwinding after the Russian debt moratorium—contributed to bringing the strong speculative pressures to an end. Some market participants also noted that the fixing of the ringgit provided an anchor for the stabilization of other regional currencies.

Chart 1

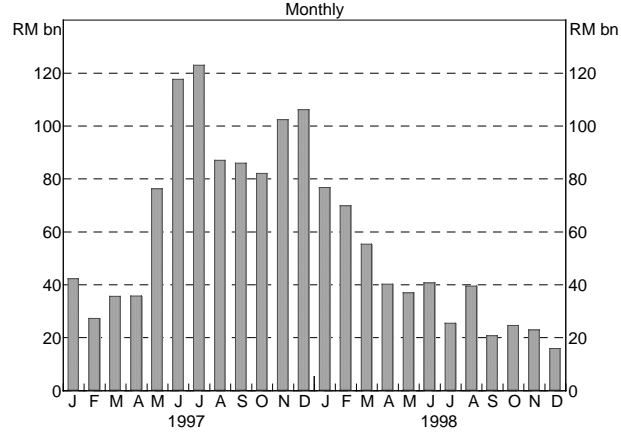
Malaysian Ringgit
\$/RM, daily



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Chart 2

Volume of Ringgit Swap Trade in Malaysia



New Zealand

The decline of the New Zealand dollar in 1997 and 1998 followed a period from 1992 to 1996 when the currency appreciated by about 30 percent and domestic and international investors, including highly leveraged institutions, established long positions in a range of New Zealand assets. By late 1996, there was a perception in some quarters, including in the official sector, that the currency—which is freely floating with no intervention from the Reserve Bank of New Zealand (RBNZ)—was overvalued. A range of domestic and international influences contributed to the New Zealand dollar depreciating by 32 percent between November 1996 to August 1998, from US\$0.72 to US\$0.48. As with many other currencies in the region, the New Zealand dollar regained some of its losses from late August 1998, and rose sharply in early October along with the rebound in the Japanese yen.

Market participants reported that the initial depreciation of the currency was accompanied by an unwinding of long carry-trade positions based on the expectation of an easing in tight monetary conditions (driven in part by public statements by the authorities), and evidence of a growth slowdown and weakening commodity prices. The regional turmoil from mid 1997 added to these pressures, as did concerns about a widening current account deficit (around 7½ percent of GDP in 1997) and the vulnerability imparted by the country's relatively large net external debt.

As negative sentiment became entrenched, short positions were gradually established and extended. The slow adjustment of the RBNZ's target range for its monetary conditions index (MCI) appeared to reinforce expectations of depreciation, increasing the attractiveness of short positions. Sluggish policy adjustment meant that as the currency began to fall, interest rates rose: three-month bank bill rates rose to nearly 10 percent in June 1998, a level that was widely viewed as too high given the weakening economy (the consensus forecast for 1998 growth was reduced from 2.8 percent to 0.7 percent between December 1997 and August 1998). The worsening regional outlook in 1998 and further weakness in commodity prices (the Commonwealth Bank commodity price index fell 8 percent in the first eight months of 1998) also contributed to the pressure on the currency. Market participants suggested that a range of highly leveraged players established large short positions in the market, with total HLI positions estimated to have been \$NZ12-15 billion (or 12-15 percent of GDP), of which around \$NZ10 billion may have been established by hedge funds. One large macro fund was thought to have had a short position of \$NZ5 billion in 1998, indicating a high degree of concentration. During this period, three-quarters of foreign exchange turnover was conducted with offshore counterparties. While there were instances of price gapping, there were few reports of very aggressive trading practices. One explanation for this may be that since there were only six market makers in the New Zealand dollar, all

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players were aware of the need to maintain good counterparty relations to ensure access to the market.

The group's interviews indicated that many other players also had an influence on price dynamics. Given that the currency had been at historic highs, exporters actively hedged future receipts as it depreciated, and often over-hedged. As the New Zealand dollar depreciated further, however, exporters were locked in at relatively high rates, and were not active buyers of the currency, increasing the one-sided sell tone of the market. As the currency depreciated, it also broke key technical points, triggering further options-related selling. The New Zealand dollar was highly correlated with the Australian dollar during this whole episode, despite the different stances of monetary policy in the two countries.

The New Zealand dollar hit a low of US\$0.486 in late August—albeit not as low as the record low of US\$0.431 reached in March 1985. The currency then strengthened in September and October, following the generalized position unwinding by highly leveraged players after the Russian default and near-collapse of LTCM: on one day in early October it appreciated by over 5 percent. There was also an abrupt recovery in the stock market, which rose over 15 percent in the month of October 1998.

Chart 1
New Zealand Dollar
\$NZ/\$US, daily



Singapore

The pressures experienced by Singapore in 1997 and 1998 were substantially smaller than in many other markets in the region. While this in part reflected the long-standing restrictions on the internationalization of the Singapore dollar, it also reflected the perception that Singapore's economic fundamentals were very strong—low external debt, low corporate gearing, a strong fiscal position, and a sound banking sector. Nonetheless, its economy was affected by the recession suffered by neighboring economies and the global downturn in the electronics industry: reflecting this, the consensus forecast for 1998 GDP growth was lowered from 5.1 percent to 0.1 percent between December 1997 and August 1998. There were also concerns about the effect of regional instability, particularly in Indonesia. As a result, from mid 1997 to early September 1998, the Singapore dollar—operating under a managed float with intervention by the Monetary Authority of Singapore (MAS)—depreciated by 20 percent and the stock market fell by about 60 percent.

The MAS policy of non-internationalization of the Singapore dollar has limited the ability of non-residents to fund short Singapore dollar positions. MAS Notice 757 requires banks to consult the MAS before they extend Singapore dollar credit facilities (including loans and currency swaps) to non-residents for speculating in the Singapore dollar currency and interest rate markets. Moreover, non-residents cannot borrow more than S\$5 million in local currency unless approved by the MAS. Market participants in Singapore also noted that the MAS could exercise moral suasion to limit outright forwards to non-residents, especially when the Singapore dollar is under downward pressure. Market participants noted the “fierce reputation” of the MAS in limiting speculation against the currency.

While market participants viewed restrictions on domestic funding as crucial in limiting the extent of HLI activities in the Singapore dollar market, the restrictions did not prevent speculation all together. Estimates of the shorting of the currency in 1998 through the outright forward market were around US\$1-2 billion (1-2 percent of GDP), with an average tenor of 3 to 6 months. It is possible that non-residents obtained their Singapore dollar funding in the offshore markets in London and New York, which are roughly half to two-thirds of the size of the onshore market. The interest rate differential between offshore and onshore Singapore dollar funds widened to over 10 percent at various times during the period.

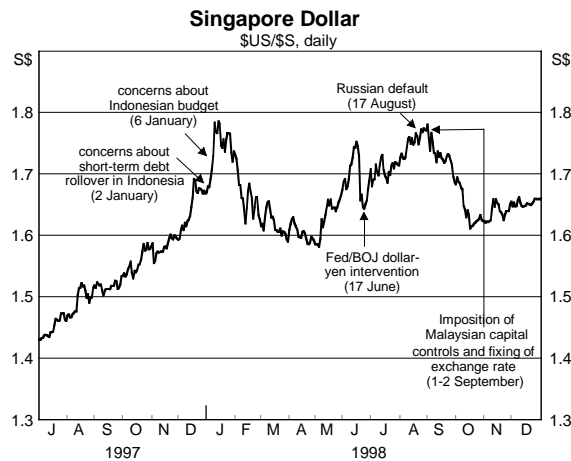
As the Asian crisis deepened, the market sold the Singapore dollar on the perception that a weaker currency was needed for Singapore's exports to remain competitive. While there was an increase in corporate hedging activities, market participants reported that some selling of the Singapore dollar was done on the assumption that the MAS would allow the Singapore dollar to fall in tandem with other regional currencies. Foreign and local banks in Singapore

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noticed an unusually high degree of activity by foreign international banks, but no significant additional activity by pension or mutual funds.

The Singapore dollar stabilized in late August 1998 and strengthened in subsequent months amid the closing of leveraged positions after the introduction of capital controls in Malaysia, the Russian debt moratorium and near-collapse of LTCM, and the subsequent improvement in global financial markets. According to some market participants, the exchange controls in Malaysia and the fixed exchange rate helped to give the Singapore dollar market a firm and credible level against the US dollar. The recovery in the Singapore currency was also helped by sentiment in financial markets by August that regional currencies and assets had been oversold.

Chart 1



South Africa

The substantial pressures experienced by South Africa in 1998 occurred after a period when a wide range of non-residents—including HLIs—had built up substantial long positions in South African assets. The build-up occurred against the background of a global search for yield, relative stability in the rand exchange rate following pressures in 1996 (the rand is floating, albeit with intervention by the Reserve Bank, including through the forward market), and perceptions that domestic asset prices would gain from an expected continued easing in monetary conditions. Starting around April 1998, a combination of factors triggered a sharp reassessment of the consensus, and non-resident capital flows in May/June turned around by 24 billion rand. While some foreign exchange controls were in place, they did not appear to constrain non-residents taking short positions in South African financial markets. From the start of April to late August 1998, the rand depreciated by 25 percent from R5 to R6.7 per US dollar, the Johannesburg stock index fell 40 percent, and yields on the benchmark 5-year bond rose from 12.9 percent to 21.6 percent. The easing of the pressures in September and early October occurred amid a pick-up in gold prices and the general deleveraging that followed the Russian crisis, and coincided with the easing of pressures in several countries in Asia and Australasia.

After remaining relatively immune to the Asian crisis in 1997, South African markets were hit by a turn in sentiment around April 1998 that was triggered by a mix of international and domestic factors, including weakening prices for gold and other export commodities (the price of gold fell 10 percent from end-April to end-August), political uncertainty (including that surrounding the transition to a new Reserve Bank Governor), and reductions in domestic growth forecasts (the consensus forecast for 1998 GDP growth was lowered from 2.2 percent to 1.3 percent between April and August). The market action was reflected first in the reversal of long carry-trade positions in the bond market, which pushed yields up and put pressure on the rand (though this was initially resisted by the authorities through increased intervention via the forward currency book). Worsening sentiment was then exacerbated by a slow interest rate response, hiccups in the setting of the official repo rate and teething problems following the introduction of a primary dealer system in the bond market. Sales of government bonds by offshore banks that were dynamically hedging swap books from euro-rand issues also contributed to the pressures.

Following this initial movement, leveraged institutions—proprietary trading desks and some hedge funds—shorted South African bonds and the rand reportedly in the expectation of further price falls and in order to hedge positions in other emerging markets, including Russia. South Africa's financial markets are among the most liquid of all emerging markets, and so were regarded *ex ante* as a place to hedge positions in other emerging markets. Given

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the existence of a large liquid repo market, it was straightforward to finance a short fixed-income position through borrowing in the repo market, and without the need to take a position in the rand. In the foreign exchange market, the fall in the rand accelerated in June following publication of data showing a build-up in the Reserve Bank's forward book and when the Reserve Bank stopped intervening, with the currency weakening from R5.50 to R6.50 per dollar in 7 trading days. Market participants estimated total short foreign exchange positions at US\$8-9 billion (about 7 percent of GDP), established at tenors of up to one year; these estimates correspond reasonably closely to the amount of Reserve Bank intervention through the forward market in May and June. Official figures show that there was a sharp increase in foreign exchange turnover, largely by non-residents and concentrated in swaps. At times trading was reported as very aggressive, including the sale of large parcels to the market at any price and greater than normal trading in periods of illiquidity, sometimes apparently with sustained price impact.

Other players also had a substantial impact on price dynamics at times. For example, the depreciation of the rand was reportedly exacerbated by the initial under-hedged position of importers. In addition, exchange controls on residents were thought to have played a role in the weakness because they limited the capacity of residents to take contrarian positions—it was suggested that there was a growing belief among domestic residents that the rand had undershot.

In late August, the rand hit R6.7 per dollar and the yield on the 2005 bond rose to over 20 percent. The pressures then subsided fairly quickly and the rand traded in the R5.5-R6 per dollar range through the fourth quarter of 1998. The easing of pressures occurred amid a jump in the gold price, Malaysia's capital controls, and as the Russian moratorium led to an unwinding of leveraged positions. South African firms reportedly also came to the view that their asset markets had been oversold. For example, long-term institutional holders of bonds bought bonds when interest rates were at their peak and cut back bond lending to the repo market, forcing short-sellers to cover their positions.

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Chart 1

South African Financial Prices and Exchange Rate

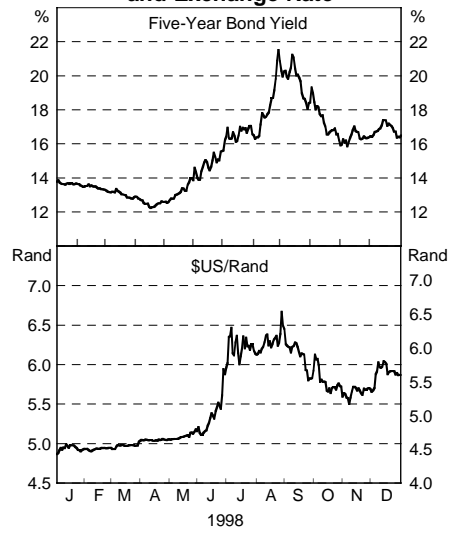
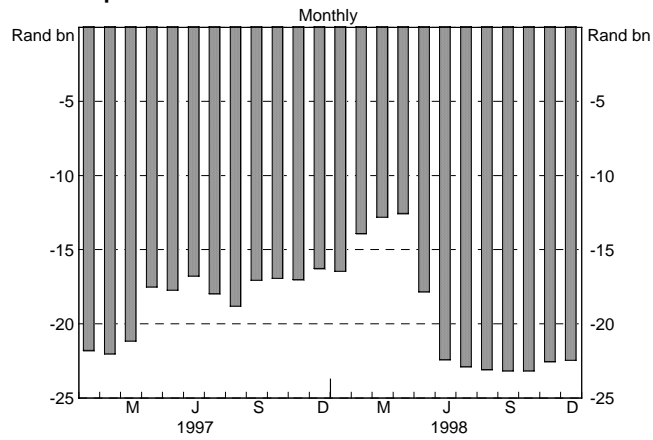


Chart 2

Net Open Position of the South African Reserve Bank



The Role of Highly Leveraged Institutions in Market Dynamics: A Survey of the Theoretical and Empirical Literature

I. Introduction

Recent events in the international currency and financial markets have raised some concerns about the role played by hedge funds, other highly-leveraged institutions (henceforth HLIs) and about large players in general in market dynamics. It has been argued that because of their size, reputation and large position taking, some large players (i.e. “big elephants in small ponds”) may contribute to adverse market dynamics and overshooting of asset prices away from fundamentals. According to some national authorities, aggressive tactics by HLIs may also constitute attempts to manipulate markets or distort market integrity. However, theoretical and empirical analyses that shed light directly on these concerns are few.

Section 2 presents the key results from relevant theoretical work. It specifically addresses research on speculative attacks, investor herding, and market manipulation. The literature is starting to pay more attention to models that do not fit the standard efficient market setup. Though a great deal of research has been done, very little explicitly addresses the role of HLIs and large players. Nonetheless, many relevant insights can be gleaned. The theoretical literature, for example, indirectly helps address whether particular players (for example HLIs) can be “leaders” in herding behavior, whether they can trigger “non-fundamentals” based currency crises, and whether they can contribute to adverse market dynamics and/or manipulate markets.

Relevant empirical research is considered in section 3. Again it represents a substantial breadth of work. Direct analysis of the role played by HLIs in the recent crises has been hindered by a lack of data (especially on positions), but the existing empirical studies provide many useful insights. Section 4 summarizes the conclusions that can be drawn from the theoretical and empirical literature considered.

II Theoretical Approaches

2.1 Speculative Attacks and International Liquidity Crises

In many regards, the relevant theoretical work begins with the extensive literature on speculative attacks and currency crises. For present purposes, its most salient conclusion is that, under a range of circumstances, multiple equilibria can exist. In other words, exchange rates may not be uniquely determined by macroeconomic fundamentals. Instead, investors' expectations can be self-fulfilling under certain conditions. While the theoretical models justify the existence of both "good" and "bad" equilibria, they typically focus, however, upon small, atomistic investors. Thus, they offer few insights about whether or not HLIs can force an economy into a bad equilibrium, either through their own actions or as "leaders of the pack."

As another example of multiple equilibria, international liquidity crises (of the type alleged to have occurred in several episodes of turmoil in 1997-98) can emerge as the international analog to domestic bank runs. Since governments cannot borrow unlimited amounts of reserves, they might be unable to respond to runs on their countries' liquid assets with sufficient liquidity relief. Currency and financial crises can thus ensue as the result of sudden losses of confidence. Though instructive, the analogy to domestic bank runs also points out the limitations of the self-fulfilling crisis story. Most bank runs have been historically been associated with weak banks or flawed supervisory and regulatory regimes. Thus, international bank runs might ultimately amount to crises induced by weak fundamentals. In a similar vein, more recent theoretical work has also cast doubt on the robustness of the foundation upon which multiple equilibria are predicated. As stressed in the literature, weak fundamentals might be necessary for the existence of vulnerable regions in which bad equilibria can occur.

Some recent work analyzes how the presence of a large investor affects the vulnerability of a country to speculative currency attacks. In a model of incomplete information with a currency attack triggered by weak fundamentals, one study finds that the presence of a large investor does make other investors more aggressive in their selling, in the sense that small investors are likely to liquidate their currency positions at an earlier threshold of weakening economic fundamentals than in the case where there is no large investor. However, the effect is relatively small unless the large investor is seen as better-informed than other investors. Thus, weak fundamentals and actual or perceived superior information by large agents are necessary for such market dynamics to occur.

Conceptually, then, HLIs could be "leaders of the pack" focusing market expectations on bad equilibria. Such an account, however, requires significant herding behavior among other investors. And, as addressed below, it is unclear whether or not other investors would benefit from following a leader, or from taking opposing positions.

2.2 Rational Herding

Herding usually refers to buying (selling) the same stocks/assets that other managers are buying (selling) at the same time. Positive feedback trading (also referred to as "momentum trading" or "trend-chasing") refers to buying winners (assets that have recently shown high returns) and selling losers (assets with poor recent returns). Contrarian (or negative feedback trading) refers to buying losers and selling winners. Most of the analytical literature on herding does not address the role of large agents in market dynamics; almost all the research is about the behavior of small, atomistic investors. However, phenomena such as herding, destabilizing speculation and positive feedback trading contribute to circumstances in which large players can affect market dynamics.

Within a classic efficient markets framework, herding behavior is hard to rationalize. If herd behavior causes prices to diverge from fundamental values, speculators can profit from purchasing assets whose prices are too low, and selling assets whose prices are too high. Thus, speculators stabilize markets in equilibrium. In opposition to this view are various noise trader models. A central feature of these models is the fact that nothing prevents distorted prices from moving even further away from fundamental values in the short run. In the presence of credit constraints and uncertainty, stabilizing speculators ("arbitrageurs") might find that it is too expensive to bet on prices returning to their fundamental values. Instead, they might benefit from acquiring the information that other investors have rather than information pertaining to fundamental values. In this case, investors may all focus on the same information—not necessarily related to fundamentals—and multiple equilibria can result.

Herding on the same (limited) information can also result from a number of additional mechanisms. Ironically, the benefits of international diversification—by reducing exposure to any given country—can reduce money managers' incentive to invest in the acquisition of private information about country prospects. Herding can also result from investment managers' personal concerns. If reputations (and compensation) result largely from performance relative to a given benchmark, missing a bull market might be much more costly than "hiding in the herd" if a popular investment strategy turns sour. Herding might also result from sequential trading or trend chasing (standard models assume that a large number of transactions take place simultaneously). Under reasonable (but restrictive)

assumptions about the nature of information, a small amount of public information in early trades can cascade sufficiently to overwhelm private information in later transactions. Finally, recent models of asset pricing by behavioral economists also point to momentum trading resulting from shortcomings in the way that agents process information and form expectations.

Since herding and positive feedback trading can reinforce tendencies for asset prices to move away from fundamental values, it could arguably increase market volatility. At the same time, if herding represents the simultaneous investors' response to similar assessments of news it could hasten the return of prices to fundamental values (in response, for example, to new fundamental information). This type of herding could arguably contribute to market efficiency. Models of market dynamics inevitably present dual hypotheses: hypotheses about how prices (i.e. fundamental values) are determined, and hypotheses about whether or not market dynamics generate these prices in equilibrium. Unfortunately, then, firm conclusions about whether or not herding systematically causes prices to diverge from fundamental values cannot usually be drawn.

It is also important to stress that none of the herding models discussed requires a large player (e.g. an HLI) to serve as leader of the pack. The models are all predicated on numerous small, atomistic agents. It is conceivable that small agents' expectations could be focused upon the trades or information of large players, particularly if large trades are perceived to be more informative than smaller ones. Some authors argue that this is, indeed, likely to be the case but contrarian trading may occur as well. Thus, the existence of large players could contribute to or exacerbate herding behavior, but is in no way necessary for it to occur.

Even so, it remains unclear whether or not HLIs profit from leading the pack. They might, in fact, prefer to engage in "stealth trading" to avoid conveying their superior information to the market. If other investors imitate their actions, for example, they could incur significant losses in building up or unwinding short positions. Thus, HLIs would want to talk their book *only* after silently building it. While broadly consistent with many of the herding models, this type of behavior falls much more squarely into the realm of market manipulation (addressed below).

2.3 Market Manipulation Models

Conceptually, the literature has distinguished between action-based, information-based, and trade-based manipulation. Action-based manipulation requires that the manipulator have the ability to take actions that directly affect the value of the asset. Classic insider trading falls into this category. Information-based manipulation represents attempts to profit by spreading

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false information, etc, and trade-based manipulation refers to attempts to manipulate markets solely through buying or selling assets (attempts to corner markets, for example).

Since investors do not control national policy-making, action-based manipulation seems unlikely in the present context. Information-based manipulation (rumor spreading) is a somewhat more likely possibility. Information-based manipulation models, however, require that the manipulators have (real or perceived) information advantages. The presence of inside information pertaining to the value of corporate securities makes this type of information asymmetry highly plausible. In the currency context, however, such "inside" information is harder to envision. Nonetheless, in fragile market conditions, rumors about the actions of players with high-profile reputations may have effects that do not occur in normal market conditions. High risk-aversion by small investors and uncertainty may render them unwilling to take contrarian positions when large players are in the market unless their prior beliefs and fundamental signals are quite strong. If HLIs are seen to have an information advantage, herding among smaller investors could well lead to amplification of their positions. Again, though, HLIs would profit from this shadowing behavior only after their positions have been quietly established, not in the build-up or unwinding stage. Thus, verbal manipulation could conceptually contribute to trade-based manipulation if it induces herding by small agents at the appropriate time.

Trade-based manipulation, then, seems the most relevant strain of research. However, under standard assumptions, one would expect that such manipulation should not be systematically profitable. Buying a stock tends to push up its price, and selling tends to cause its price to fall. So, a large trader who attempts to manipulate a market will drive prices up reducing its profits in the up leg of the manipulation while it will drive prices down increasing its losses in the unwinding phase. In an extreme case, there may not be any profit at all from such manipulation attempt. This intuition has been formalized in models that demonstrate that profitable manipulation is impossible in a perfect and efficient market. Thus, for market manipulation to be profitable for a large trader with market power, it is necessary that other (small) agents will take the opposite position and make net relative losses (or returns below the risk-adjusted measure). Small agents may behave so for two reasons: first, they may have an informational disadvantage relative to other agents (i.e. some agents are more informed than others and cannot be distinguished from the manipulator). Second, they may have to trade for some reason (such as liquidity constraints or 'noise' trading) and/or they may obtain alternative gains from asset trade (such as hedging benefits if they are risk-averse) that compensate them for the expected losses inflicted on them by the manipulator.

Trade based manipulation - in futures and spot markets - has been modeled: if manipulators cannot be distinguished from informed traders, they can short an asset in the futures market,

and then shadow informed traders by selling it in the spot market. Manipulators earn profits in the futures markets (at the expense of uninformed noise traders) that more than offset losses in the spot markets. Recently, authors have formally modeled a “double play” - a simultaneous speculative attack of currency and equity markets effected through short positions in futures markets and sales in spot markets—as some have argued took place in Hong Kong in 1998. The model identifies conditions under which such a “double play” can succeed, as well those required for a successful "bear squeeze" to thwart the attempt.

Market corners are another form of trade-based manipulation. Corners can succeed if the manipulator obtains control of a sufficient portion of the supply of the asset that must be delivered in the futures or forward market. This type of model has been applied to the Salomon Brothers' Treasury market corner and the Hunt brothers' corner of the silver market. While most of the work on corners deals with assets in fixed supply, market corners seem less feasible, however, in markets in which the relevant assets are not in fixed supply but potentially expandable in very large amounts such as the foreign exchange market. Liquidity, however, is key also in the forex market. Thus, cornering may be more likely under conditions of low liquidity. The latter could be triggered by increased aversion to liquidity risk and/or by the presence of large influential players leading smaller investors to the sidelines under conditions of policy uncertainty and economic vulnerabilities. Self-correction mechanism and the speed of adjustment of excessive deviations of prices from fundamentals when “manipulation” is attempted depend on the existence of other large and small players taking contrarian positions, their degree of risk aversion and access to credit, and the strength or weakness of the underlying fundamentals that drive such prices in the first place.

A few final observations. First, the issue of collusion, suggested to be a possible factor in recent market dynamics, has not been studied by the literature on manipulation. Collusion is usually hard to sustain in equilibrium in models of large competing agents; it may be more robust in repeated games but such collusive equilibria are often quite fragile and difficult to sustain over time. Second, while systematically profitable manipulation is unlikely, the possibility of one-off profits cannot be discounted. Third, when considering the profitability of speculation, one may want to distinguish games between the private sector and the public sector (as under pegged exchange rates where speculators can take one-sided and potentially large bets against authorities) versus those between different types of private agents (under flexible exchange regimes when there is no forex intervention). When economic vulnerabilities are significant and a pegged regime may thus not be sustainable, such bets against authorities are more likely to become successful, regardless of manipulation.

A final observation on theory. Theoretical models can help us understand better the conditions under which certain phenomena such as herding, multiple equilibria and

manipulation might occur. Whether they do in practice is an empirical issue, thus leading one to consider next the empirical evidence.

III. Empirical Studies

Very few studies bear directly upon HLIs' and other large players' role in recent crises. Nonetheless, a significant deal of relevant empirical work on HLIs is available for consideration. A sensible point of departure is the evidence on hedge funds, per se. Hedge funds vary tremendously in size—one study found an average net asset value of \$108 million among funds ranging in size from under \$1 million to over \$4 billion. Global macro and event-driven funds are generally much larger than average. Their most distinguishing characteristics are use of substantial leverage and employment of strategies that are highly dynamic rather than simple combinations of buy-and-hold. Some evidence suggests hedge funds, as a whole, earn positive abnormal returns and undertake very little systematic risk, perhaps as a result of their compensation schemes. Since it is difficult to quantify their risks, however, whether or not hedge funds earn abnormal risk adjusted returns remains an open question.

Studies of capital market dynamics in advanced economies have also documented a number of relevant phenomena. Short-run return momentum followed by long-run trend reversals, for example, have been well established in the literature and probably represent important departures from market efficiency. Studies have also sought to identify herding among large investors in advanced economies. Unfortunately, studies of insurance companies, pension funds, and mutual funds have offered conflicting conclusions. In general, (weak) evidence of herding—particularly among smaller stocks—seems to exist. However, institutional investors' positions seem unrelated to subsequent returns. Thus, even if they do tend to herd, they seem not to destabilize prices.

Recently, many of the results originally established in the advanced economies have also been documented for emerging economies. Return momentum and return reversals, for example, appear to be evident. This pattern is consistent with boom and bust cycles in international capital flows, and there is some evidence that smaller economies are more vulnerable. Studies suggest institutional investors' contribute to this pattern. Portfolio flows to emerging markets from institutional investors in developed countries, for example, have been shown to be strongly persistent. Thus, foreign institutional investors seem to be positive feedback traders. A detailed study of the Korean experience supports similar conclusions. Non-resident institutional investors appear to be positive feedback traders, while resident investors were negative feedback traders prior to the crisis and positive feedback traders after it. Non-resident investors also appear to herd more than their domestic counterparts. A very

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tentative conclusion from the few existing studies might be that herding among institutional investors seems more prevalent in the studies of emerging rather than advanced economies.

It is thus tempting to conclude that foreign institutional investors, through positive feedback trading and herding, may have played a significant role in recent crises. The available evidence, however, does not support such a strong conclusion. Evidence from the most comprehensive data set of foreign institutional investors' trades suggests that they remained net purchasers of emerging market equities from July 1997 to the end of 1998 (the latest data available). Also, three studies on equity investment in Korea did not find evidence that foreign investors destabilized markets or that foreign offshore investors were herding or engaging in momentum trading more than foreign onshore investors or local investors. Similarly, in the 1994 Mexican crisis, it has been argued that domestic residents played the leading role in portfolio outflows.

A few studies have also attempted to isolate the impact of large players and hedge funds in market dynamics. Evidence from the Taiwanese equity markets suggests that large individual investors are the dominant players, and that small investors tend to follow their lead and engage in positive feedback trading. Institutional investors, on the other hand, appear neither to herd nor to engage in positive feedback trading. Large participants' positions also seem to increase volatility in the currency markets, suggesting that their currency speculation does not stabilize currency markets. Herding among large players also seems present in currency markets, though abnormal profits do not seem to be earned. Hedge funds in particular seem to mirror the strategies of one another, but as a group they tend to be negative feedback traders.

One study looked at the role of hedge funds in a number of crisis episodes in the 1990s but considered the Asian crisis only up to 1997. This study found some evidence that hedge funds played a leading role in precipitating the ERM crisis in 1992 by acting as market leaders that other institutional investors followed, although they appear to have done so in response to economic fundamentals. In other episodes, notably the 1994 bond market turbulence, hedge funds as a group bet that interest rates would decline and lost substantial sums when their bets proved wrong. The analysis of the 1997 Asian crisis indicates that hedge funds participated in the months before the crisis in the large increase in the carry trade. This practice arguably contributed to the buildup of short-term capital flows and exacerbated the boom and bust cycle identified above. However, hedge funds were not the dominant players in this carry trade. As investors became worried about Thai economic fundamentals and began selling the baht forward, the hedge funds also participated, but the available data suggest that they were at the rear of the herd of investors rather than in the

lead. In addition, in the view of market participants, the baht was the only Asian currency for which the hedge funds' collectively took significant short positions.

Other studies have attempted to estimate the size of large macro hedge funds' positions in Asia in 1997 and 1998. Largely, they suggest a limited role for hedge funds in the 1997 attack episodes. Another study did not find support for the allegation that hedge funds caused the currency crisis in Malaysia. However, these studies suffer of a number of methodological and data problems in their estimates of hedge funds' short positions.

IV. Concluding Remarks

The stage for the current inquiry is set, both theoretically and empirically, by the possibility of multiple self-fulfilling equilibria. Theoretically, the robustness of multiple equilibria in the speculative attack literature is still a matter of debate. Empirically, it seems clear that speculative attacks occur on currencies characterized by at least some degree of fundamental weaknesses, and fixed rate regimes appear to be more vulnerable. Clearly, the crises were not completely random events.

Many accounts of the behavior of HLIs in recent crises rely on some degree of herding behavior among other investors. While herding and positive feedback trading seem to exist, empirical studies performed so far suggest that foreign institutional investors or HLIs (as proxied by foreign offshore investors) do not seem to engage in either to a greater degree than other market participants, including local investors. Most of all these studies, however, do not cover the episodes of turmoil in 1998. Note also that herding models do not generally require leaders of the pack, and considerable information asymmetries must exist for HLIs to play such a role.

Conceptually, information-based (verbal) manipulation (talking one's book) could be profitable, if it precipitates herding after the manipulator's short positions have been built. For such a strategy to succeed, however, market conditions must be quite fragile and the manipulator must have a perceived informational advantage by virtue of size or reputation. Alternatively, such an account requires collusion among HLIs, and such collusion has yet to receive empirical consideration in the literature.

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Noise trading, herding, and positive-feedback trading certainly seem to have caused excessive volatility in international asset markets, and at times seem to have caused asset prices to diverge from their fundamental values. At this stage, however, there is no hard evidence that HLIs and other foreign investors drove market dynamics or led a "herding pack." Note also that, even if data were to demonstrate that HLIs and other agents had significant parallel short positions in crisis episodes, such evidence would have to be cautiously interpreted. Also, analytically, it is difficult to distinguish between simultaneous short positions deriving from (similar) assessments of economic fundamentals, and irrational herding or conscious attempts at collusion or manipulation.

Highly Leveraged Institutions' Use of Leverage

Hedge funds use varying degrees of leverage depending on investment style, risk appetite, instruments used, extent of margining imposed by counterparties, as well as internal risk management disciplines. This annex briefly summarizes some of the main elements of this complex set of factors based on the study group's interviews with both bank credit officers and hedge fund managers. Because of the complexity of this topic it is difficult to generalize both about how individual hedge funds leverage their capital and about the manner and scale of credit extensions by banks to HLIs. Leverage can be achieved in two ways: either through borrowing to finance asset purchases or through off-balance sheet derivative transactions. The actual leverage that is generated is a function of the interaction of demand and supply between lender and borrower.

Overall leverage

Hedge funds leverage their capital to varying degrees. For the largest macro hedge funds, capital is typically leveraged three or four times. However, this is based on balance-sheet positions only and does not include risks arising from off-balance sheet positions. Because of measurement issues, such as the difficulty of assigning a balance-sheet equivalent for complex off-balance sheet positions, estimating the "true" leverage ratio is, of necessity, an inexact process. Bank risk managers with whom we met suggested that leverage used by the largest hedge funds could be of the order of 10:1 or 15:1 as a peak. It should be noted that there was wide variability among the hedge funds. For example, one of the large macro funds claimed that its leverage is minimal and never exceeded 2:1. The numbers cited above are only general estimates. Also, even with aggregate leverage of that order, individual positions can be leveraged far more depending on the margining arrangement.

Leveraged Instruments

The most commonly used leveraged instruments by HLIs are equities purchased on margin, fixed income instruments financed in the repo market, and foreign exchange positions – either outright forwards or spot transactions financed with swaps. Futures and options on equities, interest rates and exchange rates are also common with some hedge funds, and especially with so-called "black box" or "model driven" funds.

In the foreign exchange market, the most typical way of putting on a position is to sell (or buy) a currency against the dollar in the spot market. The fund now has to deliver that

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currency in two days. Typically the fund would then execute a swap transaction to simultaneously buy the currency in the spot market and sell that same currency at some point in the future (say ninety days). By swapping in the currency, the spot obligation can be met in two days, and effectively the fund has a forward position in the currency. An alternative to this multiple transaction process would be an outright forward. However liquidity is far better in the spot/swap market and hence this tends to be the preferable route for most market participants to hedge positions or speculate on directional moves.

Margining

Banks and securities houses that transact with hedge funds typically have elaborate collateral and margining arrangements. In a typical case the hedge fund will have to maintain a minimum margin with the dealer to cover mark-to-market fluctuations. This margin serves two roles. It both provides a cushion for the dealer against unexpected losses that the customer may suffer, *and* it serves to limit the aggregate leverage that the hedge fund can undertake. Banks reported that their hedge fund customers broadly fell into three groups. First, the smallest hedge funds were not allowed to leverage their capital at all. Essentially these are cash-based speculators. Second, a group of medium to large hedge funds that operates on minimum margins of anywhere from a few percent up to 15 or 20 percent. The precise margin depends on the size, riskiness, and standing of the fund. Third, a half dozen or so of the largest hedge funds reportedly operates on so-called “loss thresholds”. This is essentially a two-way margining arrangement where the bank and hedge fund exchange margin based on each day’s mark-to-market (MTM). An additional feature of this system is that for MTM changes that are relatively small (as pre-defined in the agreements) there would be no transfer of margin until that threshold is hit.

Where a HLI transacts on an organized exchange the normal margining rules would apply. In that case a small speculator (or individual) would be able to generate higher levels of leverage than if that speculator went to a banks. On the other hand, for the large speculator the opposite might be the case.

Proprietary Desks

The discussion above is primarily about hedge funds. Proprietary desks use the same leveraged instruments. However, because their activities are bundled with traditional market making, and because those banks and securities houses have a higher credit standing, the use of dealer-to-dealer margining is not developed and thus constraints on risk-taking by proprietary desks are typically self-imposed.

Risk Management

The largest hedge funds reported internal risk management processes that measured and set guidelines on the riskiness of individual positions and aggregate risk. These processes vary widely from fund to fund. In addition to traditional value-at-risk (VAR), hedge funds also reported careful monitoring of both the overall liquidity of the fund as well as the liquidity of individual markets. The crucial point of aggregate liquidity is whether the fund could meet sudden redemptions while individual market liquidity considers whether the fund can exit a position without unduly moving the price. Hence a fund's upper leverage will depend on whether these types of internal factors or external constraints (such as margin) are more binding.