Highwaymen or Heroes: Should Hedge Funds be Regulated?*

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Abstract

There are increasing calls for the regulation of hedge funds, both for consumer protection and systemic reasons. We argue that the consumer protection arguments for direct regulation are not convincing, but find that the systemic concerns are sufficiently serious to warrant some forms of regulation. Existing regulatory methods, disclosure and activity restrictions, are unsuitable for hedge funds. Any future regulation must reduce the likelihood and potential costs of the failure of systemically important hedge funds whilst at the same time preserving the wider market benefits of hedge funds' ongoing activities.

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1 Introduction

When hedge funds remained niche players, their special regulatory status raised few concerns. However, in recent years assets under management by hedge funds have grown exponentially and so have worries about their impact on the financial system. This has been prompted by the role of hedge funds in the major financial crisis episodes of the 1990s such as the ERM, Asian, and Long Term Capital Management (LTCM) crises. The recent expansion of the client base has added further micro–prudential concerns.

This has precipitated a vigorous debate about the regulatory status of hedge funds and a number of wide ranging national and supranational regulatory reviews. The debate has been further fueled by the conspicuous exclusion of hedge funds from the Basel–II process. Much of the discussion has focused on a narrow range of arguments leading to polar conclusions: either fully regulate hedge funds like other financial institutions, or leave them unregulated. However, prescriptions for public policy reform should ideally reflect a balanced analysis of the whole spectrum of views. Our objective is to identify the key economic reasons for and against regulating hedge funds, and identify the optimal form of regulation.

The arguments in favor of regulating hedge funds focus both on consumer protection and financial stability. Hedge fund investors have traditionally been wealthy individuals or private institutions that neither desire nor need special regulatory protection. As the client base of hedge funds expands to include regulated institutions such as pension funds, as well as small investors, some form of regulation appears inevitable. However, rather than regulation of the hedge fund industry *per se*, the investments in hedge funds of pension funds or small investors should fall under the existing structures regulating their investment behaviour. As a consequence, we do not see a need for direct regulation of the hedge fund industry for reasons of consumer protection. The case for regulating hedge funds because of concerns for financial stability are more compelling. The failure of a hedge fund, or a group of hedge funds, has the potential to trigger systemic crisis. Such an event may be very unlikely, but considering that the consequences could be disastrous the possibility should not be discounted entirely.

At the same time, hedge funds provide substantial benefits to the financial system, in addition to the private benefits accruing to their investors and managers. At a time when much of the regulated funds industry is engaged in indexing, tracking, and is encumbered by mandates, hedge funds, by their very nature need to act more individually. This means that the trading behavior of hedge funds can improve market efficiency, price discovery and

consumer choice. Furthermore, hedge funds may help in alleviating financial crisis. For example, in a crisis, when regulations compel banks to withdraw from risky investments in order to remain compliant with the minimum risk weighted capital regulations. Unregulated hedge funds have no such limitations and are thus in a position to provide liquidity when most needed.

To date the debate has not led to any substantive changes in the regulation of hedge funds. Nevertheless, if another hedge fund crisis were to occur this clearly could provide the impetus for major reform. There is a concern that reform in such circumstances could lead to suboptimal solutions, as happened following the 1929 crash. Prior analysis of the costs and benefits of different forms of regulation can play a role in helping to guard against such an outcome.

Traditional regulatory techniques, such as activity restrictions and disclosure, are likely to be ineffective for the regulation of hedge funds. This is partly because hedge funds are able to circumvent such regulations by moving operations offshore, and also because hedge funds specialize in the most advanced uses of proprietary financial technology. This makes it very difficult for even the most sophisticated regulator to issue effective regulatory guidelines based on the actual models in use. Thus the regulator may be more likely to resort to broader measures, which may unduly hinder the regular operation of hedge funds without delivering actual regulatory objectives.

Regulation is typically called for when private decisions of firms cause significant net costs to third parties. An example is the misselling of pensions. This action has some private benefits to the vendors, at the expense to their clients and society as a whole because of the undermining public faith in private pensions provision. Regulation to prevent such misselling can prevent the social cost. Hedge funds, however, do not fit neatly into this mould. Whilst their activities can impose negative costs on the economy in the case of a default, they provide positive social benefits, such as more efficient and liquid markets, which could be severely limited by certain forms of regulation. The simultaneous provision of negative and positive externalities from hedge fund activities is such that using traditional regulatory techniques to eliminate the former may destroy the latter. It is this feature that is unique to hedge funds.

Addressing financial stability concerns whilst at the same time preserving the benefits of hedge funds requires a new regulatory approach. The extreme downside from a systemic crisis, however remotely possible, strongly suggests that a central feature of any such approach should be its ability to deal with the potential fallout from the failure of a major hedge fund.

The resolution process instigated by the New York Fed following the collapse of LTCM in 1998 provides one example of such a mechanism. When the New York Fed learned of the pending collapse of LTCM and the potential systemic implications, it brought together all the key client banks, including prime brokers, and encouraged them to implement an orderly winding down process for LTCM's positions with the aim of providing the least amount of disruption to markets. An important part of this process was that no public funds were used, with the Fed's role limited to managing the process. The success depended on the determination of the Fed in ensuring that very reluctant client banks participated in the resolution process. A different regulator might have been less willing or less persuasive. Equally, the client banks might not have seen the resolution to be in their private interest, for example due to trading profits from an ongoing crisis. Thus, we cannot be certain that if another hedge fund failure has the potential to trigger a systemic crisis that the regulators and banks would voluntarily carry through a resolution process to a successful conclusion.

The most effective way for addressing the systemic risk arising from hedge funds is to have robust resolution mechanisms in place for dealing with the failure of systemically important hedge funds. The ongoing activities of successful hedge funds should not be regulated. The supervisor needs to have the duty and power to carry through the resolution process, if it judges the failure of the fund(s) to have sufficient systemic implications. The prime broker(s) and other client banks should have an obligation to participate. Under no circumstances should public funds be used because of the resulting moral hazard issues.

2 Regulatory Debate

Although there is no consensus on the exact definition of a *hedge fund* the SEC notes that a hedge fund is "an entity that holds a pool of securities and perhaps other assets, whose interests are not sold in a registered public offering and which is not registered as an investment company under the Investment Company Act" (p.3 SEC, 2003b).[1] Some of the investment methods that can be used to characterize hedge funds include short–selling, and the use of derivatives for investment and economic leverage (Financial Services Authority, 2005a). However, a wide range of styles have evolved

[1]For further information on the history of hedge funds see, for example, Fung and Hsieh (1999), President's Working Group on Financial Markets (1999), Lhabitant (2002) and SEC (2003b).

which may differ significantly from the long–short hedging strategy which was the original motivation for the term hedge fund. Individual strategies can be broadly classified into three groupings — *market trend* (or directional), *event–driven* and *arbitrage* (SEC, 2003b).[2] Market trend strategies include macro funds, such as those involved in the ERM crisis, that take positions on the long-term movement of macroeconomic fundamentals. In contrast, event-driven strategies attempt to exploit asset price movements around events such as firm distress or merger activity. Arbitrage strategies generally focus on pricing anomalies between closely related securities, for example convertible arbitrage funds exploit valuation differences between a firm's common stock and its other securities such as convertible bonds. These many differing strategies can thus give rise to varying regulatory concerns by type of fund.

2.1 The Legal Environment

The special status of hedge funds is been rooted in particular exemptions from the securities laws of the US, and some other countries. Investors in a hedge fund have to be few in number (less than 100) and *accredited*, i.e. sufficiently sophisticated and wealthy. Investments can only to be offered in private placements excluding public advertisement and marketing. Meeting these criteria frees up hedge funds from constraints on investment activities, governance and transparency.[3] These laws were originally designed with consumer protection in mind, and it was felt that accredited investors should not be legally forced to be protected from fraud and abuse by the securities industry.[4] Other countries, like the UK, have similar laws, but not all jurisdictions provide the necessary exemptions to allow for the operation of hedge funds.

If investors find the domestic legal requirements too restrictive they may opt for hedge funds domiciled offshore. These jurisdictions have advantages in terms of disclosure, and allowable activities, but the main benefit in offshore investing relates to taxation. However, since most clients are onshore, the

[2]For further details of the many different strategies see, for example, the index categorizations provided by Hedge Fund Research (HFR), www.hedgefundresearch.com/pdf/HFR_Strategy_Definitions.pdf.

[3]For example, regulated funds which do not fall under these exemptions face restrictions on leverage, diversification, choice of securities, activities between affiliates, disclosure, governance, redemption, transparency, and registration. For country details see, for example, SEC (2003b) for the US, Financial Services Authority (2002) for the UK and Lhabitant (2002) for various other jurisdictions.

[4]Furthermore, legal exemptions allow for *funds of funds*, i.e., funds that do not trade on their own account, but instead invest in other hedge funds.

management companies, or advisors, of those offshore investment vehicles are mostly also onshore in the major financial centers. In the US, advisors can choose to be registered with the SEC although in October 2004 the SEC voted to require the registration of hedge fund advisors under the 'Investment Advisers Act' of 1940 by February 2006.[5] In much of Europe registration is compulsory.

Even if the fund itself or its advisors are unregulated they do not operate in a regulatory vacuum — they trade on regulated exchanges and deal and interact with other regulated institutions. Hedge funds outsource most activities except trading decisions (for example, execution, settlements, clearing, leverage, risk management, etc.) to *prime brokers* which generally are major investment banks.[6] Since prime brokers are regulated, their hedge fund business indirectly falls under supervisory oversight. For example, in the UK, the Financial Services Authority (FSA)[7] is holding meetings with prime brokers over their links with hedge funds in order to assess the extent of due diligence and risk management, presumably partly with a view of using prime brokers as early warning signs of any risk to the financial stability posed or believed to be posed by hedge funds.[8]

2.2 Development of the regulatory debate

The growth in the hedge fund industry over the past two decades has been rapid. According to the 2005 Annual Hennessee Hedge Fund Manager Survey there are an estimated 8,050 hedge funds with over US$1 trillion in assets. This represents a five-fold increase in assets compared to US$210 billion in 1998 under 3,200 managers (and almost a thirty-fold rise on the US$35 billion in assets under 880 managers in 1992).[9] The growth has been promoted by the substantial benefits that have accrued to owners and investors in hedge funds — the 2005 Hennessee Group survey estimated that since 1987, the annualized return from hedge funds has averaged 14.9% compared to an

[5]In 2003 around 50% of hedge fund managers were not registered under the Investment Advisers Act of 1940 (SEC, 2003b).

[6]Most hedge funds only deal with one prime broker, while some might use more. Tremont estimates that through November 2003, Morgan Stanley, Goldman Sachs and Bear Stearns had a 79% of the prime broker market.

[7]As reported in the Financial Times (2004a).

[8]Financial Services Authority (2005a) provides further details of the FSA's activities concerning the relationship between hedge funds and their counterparties such as prime brokers.

[9]Comments of the Hennessee Group LLC for the US SEC Roundtable on Hedge Funds, May 14-15 2003, http://www.sec.gov/spotlight/hedgefunds/hedge-gradante.pdf.

11.9% return on the S&P 500 but with 40% lower volatility.[10] There has also been a rise in the proportion of trading volumes accounted for by hedge funds in many markets due to both the growth in assets under management and the nature of hedge funds' trading strategies. Indeed hedge funds are estimated to account for between one-third and one-half of daily trading activity on the New York Stock Exchange and London Stock Exchange (Financial Services Authority, 2005a) with this figure rising to over 80% in certain markets such as in convertible bonds or distressed debt (Bank of England, 2005).

Whilst regulators had followed the growth of hedge funds in previous decades with interest, for example, as far back as a 1969 SEC investigative study, there has been growing regulatory investigation over the past decade, stimulated by both the considerable rise in hedge funds assets, their growing importance for liquidity in various markets and their involvement in the crises of the 1990s. The failure of Long Term Capital Management in particular precipitated major investigations by the President's Working Group on Financial Markets (1999), the Basel Committee on Banking Supervision (1999) and the Financial Stability Forum (2000). More recently, mispricing scandals and the retail offering of hedge fund products have prompted a further regulatory concern over consumer protection. Indeed the absence of an independent check on hedge fund advisors' asset valuations was one of the most serious concerns of the recent SEC review of hedge fund activity mentioned above (p.79, SEC, 2003b). The process of regulatory reviews is ongoing — the UK Financial Services Authority recently initiated reviews both of hedge fund risk and regulation (Financial Services Authority, 2005b) as well as consumer protection issues related with such products (Financial Services Authority, 2005b). whilst the International Organization of Securities Commissions (IOSCO) is also currently undertaking a regulatory review.

The regulatory debate is often very polarized, and numerous proposals has made. We can distill these proposal into four main viewpoints.

Regulate everything At one extreme is the view that hedge funds should be regulated in the same manner as other financial institutions. This sometimes reflects a desire for a fair and equal treatment of all financial institutions, or perhaps a generic concern over market failure.

Laissez–faire At the other extreme is the view that hedge funds should not be regulated at all because of the efficiency they provide to the financial system. This view is perhaps most notably associated with US Federal

[10] See www.hennesseegroup.com/Press_Client_Releases/release20050531.html.

Reserve Board Chairman Alan Greenspan.[11] This has also become the default option in the Basel–II negotiations but for a different reason as the various members of the Basel Committee have not been able to come to an agreement on how hedge funds should be incorporated in the Basel–II process.

Micro–prudential The opaque nature of most hedge funds makes it harder for investors to verify hedge fund valuations, giving rise to the potential for fraudulent behavior. The complicated investment strategies and limited disclosure of hedge funds have also promoted concern over investor protection, particularly as such products are extended to retail investors and regulated institutions.

Macro–prudential Hedge fund activities in the ERM crisis, the Asian crisis, the Yen crisis of 1998, and most significantly the LTCM liquidity crisis, are the focal point of macro–prudential calls for regulation. The primary concern is the potential for hedge funds to trigger or exacerbate liquidity crises, and therefore increase counterparty risk which ultimately leads to domino style defaults in the financial system.

2.3 The Consumer Protection Motivation for Regulating Hedge Funds

Most recent discussion on the regulation of hedge funds is within the context of micro–prudential concerns, i.e., the investments of small consumers and regulated institutions in hedge funds. The Hennessee Group reports that as a proportion of hedge funds' sources of capital, pension funds have grown threefold, from 5% to 15% from 1996 to 2004. At the same time, in some jurisdictions small investors are allowed to invest in hedge funds, for example in Hong Kong and Germany[12], where a single hedge funds can only be sold by registered financial advisors, while hedge funds-of-funds can be sold also by non-registered financial advisors. As long as only accredited investors were allowed to invest in hedge funds, there was no reason to regulate hedge

[11] See, for example, Testimony of Alan Greenspan, Chairman of the Board of Governors of the Federal Reserve, Before the House Committee on Banking and Financial Services (Oct. 1, 1998) (Greenspan, 1998): "If, somehow, hedge funds were barred worldwide, the American financial system would lose the benefits conveyed by their efforts, including arbitraging price differentials away. The resulting loss in efficiency and contribution to financial value added and the nation's standard of living would be a high price to pay–to my mind, too high a price."

[12] The "Investmentmodernisierungsgesetz" law dated 15.12.03.

funds for reasons of consumer protection. The entry of small investors and regulated institutions into the hedge fund market alters the picture.

The opening up of the hedge fund market to small investors appears to have been primarily driven by the supervisors. Neither small investors nor the hedge funds themselves have shown much interest. Indeed, in Germany the amounts invested by retail investors in hedge funds have been minuscule compared to the overall funds market. At the same time, retailization of hedge funds carries with it significant risks. It is unlikely that most clients will understand the products, they are used to the implicit protection provided by the supervisor, and any significant losses are likely to prompt unwanted political interest in the hedge fund industry. As a consequence, we feel that a relaxation of the accreditation criteria would appear to be unwise.

The question of the regulated institutions investing in hedge funds is more complex, as there is considerable support from both pension funds and hedge funds for such investments. However, the regulation of pension funds has specific rationales. Investors in pension funds have very long investment horizon, in some cases 70 years or more, and are likely to be very sensitive to downside risk far into the future, but not to short–term fluctuations. At the same time, cumulative fees over such long investment horizons can be substantial. Furthermore, pension funds have substantial reporting requirements and fiduciary duties for understanding their investments, and in some cases the taxpayer underwrites pension funds to some extent. All these issues suggest that there are substantial public concerns in the investments made by pension funds, and an open-ended permission for pension funds to invest in hedge funds is unwise. At the same time, it would also be unwise to have a blanket prohibition on such investments.

This issue however should not be resolved by regulating the hedge fund industry, rather it appears to be a matter for the existing pension fund regulators. Pension fund investments should be regulated on the demand side and not on the supply side. Those regulating pension funds have a much better view of how much risk pension funds can assume, and it would be incumbent of them only to allow investments into hedge funds who meet certain criteria.

The above arguments point to a rejection of the need for direct regulation of hedge funds on the grounds of consumer protection. Thus, in the remaining sections we focus on the macro–prudential, financial stability rationale which we find to be more persuasive.

3 Perceived Costs and Benefits of Hedge Funds

Behind the different viewpoints on hedge fund regulation, lie differing assessments of the possible costs of their activities and the benefits they can provide. As often is the case with regulation, the externalities justifying hedge fund regulation are superficially more visible than the social benefits from not regulating. It is easy to point to well–publicized cases where hedge funds may have been destabilizing, while the efficiency they bring to the financial markets is less visible, since smoothly functioning markets are often taken for granted.

3.1 Costs Attributed to Hedge Funds

3.1.1 "Hedge Funds are Destabilizing"

Hedge funds are frequently accused of destabilizing the international financial system. This is especially true for macro funds, which take large positions on the long–term direction of macroeconomic developments. While a hedge fund's interest in a country may not be to the government's liking, this does not mean that the hedge fund is necessarily predatory or destabilizing. It may simply be exploiting the difference between the real state of the economy and market prices. In this case, the hedge fund activity could be beneficial to the economy at large (but not necessarily to individuals with vested interests) by eliminating the mispricing.

The available empirical evidence on whether hedge funds are destabilizing is mixed. Hedge funds are considered to have exerted a significant market impact during the ERM crisis (see for example Fung and Hsieh, 2000), but not during the Asian crisis (see for example Choe et al., 1998; Fung and Hsieh, 2000; Fung et al., 2000; Goetzmann et al., 2000). Indeed, during the Asian crisis, foreign hedge funds sometimes seem to have had a stronger belief in the economic fundamentals of the crisis countries than the often better-informed domestic investors.

Nevertheless, the evidence, hampered by data and methodological limitations, remains inconclusive. For example, in their comments on Fung et al. (2000), Edwards and Caglayan (2001) note the data problems relating to the need to consider factors other than changes in Asian currency values which could have affected the returns of the hedge funds considered, as well as problems relating to the limited number of hedge funds analyzed. Similarly, the Reserve Bank of Australia (1999) criticizes the methodology of Goetzmann et al. (2000) for assuming that movements in specific currencies over fixed

time intervals were the sole source of returns for the hedge funds.

3.1.2 "Hedge Funds are Overly Levered"

Leverage (or gearing) refers to the extent to which a financial institution is indebted, usually relative to its capital base. This leverage may be direct through formal debt such as bonds, IOU's, credit lines and so forth, or indirect through implicit borrowing due to certain derivative operations.[13] This indirect leverage is particularly important for hedge funds given their often significant derivatives positions.

Hedge funds, unlike regulated financial institutions, do not have an upper limit on allowable leverage. This leverage is argued to increase both the likelihood and severity of hedge fund defaults, potentially leading to financial crises. Whilst such concerns have long been expressed,[14] they were amplified following the LTCM collapse. At present, hedge funds do not appear to employ very high levels of leverage. In 2003, according to Hennessee Group (2003), 84% of hedge funds had leverage less than 200% of capital and only 2% used leverage over 500%. Gupta and Liang (2004) find that less than 4% of live and 11% of dead hedge funds in their sample would have violated the Basel-II capital adequacy requirements as of March 2003, with the under–capitalized funds relatively small. Market reports also suggest that leverage has not increased markedly recently and that it remains moderate compared to levels reached in 1997/1998.[15] In addition, the view of excessively levered hedge funds must be contrasted with the leverage of other regulated financial institutions, particularly the banks. Since banks have an 8% capital adequacy ratio, they can in principle be levered more than 12 times. As a consequence, worries about systemic stability due to the potential unlimited hedge fund leverage do not seem to be supported by the available facts.[16] For the most

[13]For instance, being long a call option, a forward or a futures is effectively equivalent to being long a certain number of units of the underlying, financed in part by borrowing cash.

[14]For example, in the 1992 Joint Report on the (US) Government Securities Market.

[15]See Bank of England (2004), p.53, who also note that 1997/98 may not be an appropriate benchmark.

[16]This viewpoint is made strongly by the Financial Economists Roundtable (1999) response to the President's working group report on LTCM: the "emphasis on excessive leverage as a systemic concern is unsupported. It fails to make a case that excessive leverage is a systemic concern, that private markets fail to constrain hedge fund leverage adequately, and that additional regulatory steps are needed to assure that in the future hedge fund leverage will not be excessive. Even assuming that a case can be made (which the Report does not make) that excessive leverage was the primary culprit in the LTCM collapse, this single event cannot by itself be the basis for the claim that leverage is in

part, extreme hedge fund leverage in crises is a symptom, not the cause of the crisis event.

In addition, by its very nature, leverage is difficult to measure. It clearly cannot be easily captured by enforced disclosure of direct exposures, since issues such as pricing and aggregation of exposures are very complex. It is also not obvious how such information can be communicated in an informative manner to the supervisors who would have to retain sufficient expertise to analyze the disclosure of every hedge fund. Furthermore, such information would likely be of limited value, even if it allowed supervisors to draw the right conclusions, as it would be extremely sensitive to the potentially rapid changes in the value of derivatives positions and capital values, particularly in times of crises.

As a consequence it seems impossible to measure the contribution of leverage to systemic risk with any degree of accuracy. In addition, while a hedge fund crisis might be coupled with extreme levels of leverage, as in the case of LTCM, it is important to note that extreme leverage is primarily due to an erosion of a hedge fund capital base, not an increase in overall speculative positions. Therefore, even if we could measure leverage, it might not be a very useful early warning signal, as extremely high leverage is likely to be correlated with crises, rather than predictive of crises.

3.1.3 "Hedge Funds Constitute Counterparty Risk"

Since hedge funds are unencumbered by mandated leverage restrictions, with primary activities focussed on relatively high risk trading, hedge fund defaults may be more likely and more damaging than in the case of regulated financial institutions. Essentially, hedge funds cause *counterparty risk* for regulated trading partners (such as prime brokers) and investors, thus increasing credit risk in the regulated part of the financial system.

Counterparty risk was an important issue in the LTCM crisis, where a key concern was the high exposure of major investment banks to LTCM settlement risk, and lack of information about overall exposures. Because of network linkages of their inter–bank exposures, both LTCM creditor banks, and financial institutions with no direct connection to LTCM were exposed to indirect counterparty risk. The main worry in such networks is the triggering of domino style defaults throughout the banking system.[17] The importance

general excessive in either the hedge fund industry or the financial system as a whole".

[17]These issues are discussed on a theoretical level by Allen and Gale (2000) and Cifuentes et al. (2005) who study the (exogenous) network structure put in place by the balance

for financial stability is hard to ascertain, in this case little empirical evidence has been provided.

As a result of the LTCM crisis, the improvement of counterparty risk management became a key focus of the Financial Stability Forum (2000) and the Basel Committee on Banking Supervision (1999) reports, with prime brokers keeping much closer eyes on client hedge fund positions and liquidity. One approach suggested to minimize counterparty risk is to adopt continuous settlement, marking–to-market, and margins, which certainly can help in containing counterparty risk.

Unfortunately, continuous settlement can also contribute to market instability.[18] Consider a hedge fund which has a superior pricing model used to implement an arbitrage strategy. The favorable outcome of this strategy relies on both the long position in the cheap asset and the short position in the expensive asset being held to maturity where they offset each other, giving the fund immediate arbitrage profits. However, if the shorted asset appreciates sharply and is marked–to–market then this may trigger margin calls and a potential liquidity problem for the fund. A fire–sale of the arbitrage portfolio may be necessary, leading to potential losses, and even default of the entire fund, despite the initial absence of default risk at maturity.[19]

In this case marking–to–market, rather than preventing the default, effectively causes the default. Since traders know this risk ex-ante, they will not attempt to fully correct the longer term mispricings, leading to market inefficiencies. As a result, hedge fund managers have started to seek contingent credit from banks, providing the hedge fund with protection against the need to liquidate positions rapidly. Similarly, hedge funds are also trying to base margining agreements, including initial margins, on the results of Value-at-Risk calculations that incorporate the effect of netting across multiple products. While these developments may appear to undermine the efforts of continuous settlements in reducing counterparty risk, they do in effect allow prime brokers to dispense with marking–to–market if it is in their interest to do so, presumably if it raises rather than lowers counterparty risk.

sheet counterparty relationships among financial market participants that can contribute to and amplify the risk of financial instability. Rahi and Zigrand (2005) have extended this analysis to endogenous networks.

[18]This point has for instance been made in various guises, among others, by De Long et al. (1990), Dow and Gorton (1994), Shleifer and Vishny (1997) and Liu and Longstaff (2004).

[19]This is similar to what happened with Metallgesellschaft in 1993, see Culp and Miller (1995).

3.1.4 "Hedge Funds Herd"

Hedge funds are often accused of herding, with the ERM and Asian currency crises cited as prime examples. The academic notion of herding (see, for example, Avery and Zemski, 1998; Lee, 1998) refers to the phenomenon by which funds mimic other funds, despite the fact that their own private information or proprietary model suggests different strategies. The latter informational requirement implies that herding is inefficient as it prevents the release of valuable information.

Is herding by hedge funds likely? Their strategies are unencumbered by mandates, and hence they are much more flexible in implementing new trading strategies or investing in new assets or markets, as well as putting on shorts. If flexibility and innovation are the *raisons d'être* for hedge funds, one might expect hedge funds to be less likely to herd than other institutions. Furthermore, since herding requires that trades are observable either directly or indirectly through prices, the secrecy of hedge fund trades makes wide ranging copy-cat herding unlikely. This does not prevent sharing of information to occur between groups of hedge fund managers, or among selected managers and their prime brokers. Some form of herding is therefore always possible, and anecdotal evidence suggests that prime brokers do sometimes inform some of their hedge fund clients about selective trades made by others. But, for a hedge fund to develop costly proprietary trading models and then ignore the model in favor of herding puts it at a distinct disadvantage to a lower cost copycat fund.

For some hedge fund types it is natural to have similar positions. For instance, convertible or merger arbitrage hedge funds tend to put on similar trades by the very nature of their strategies — this does not constitute herding any more than holding the market portfolio in a CAPM world can be called herding. Relatedly, the Financial Times (2004b) notes that the movement of individuals from investment banks into positions as hedge fund managers could create a potential similarity in trading strategies between former colleagues and also their employers. For instance, it appears that a majority of pure credit hedge funds launched in London over the past few years concentrate on synthetic CDOs and sophisticated derivatives-based strategies since the people behind them were correlation traders or exotic derivative dealers at banks.

On the other hand, it seems likely that the remuneration schemes for hedge fund managers encourage less herding compared to their mutual fund counterparts since mutual fund managers' pay is more explicitly linked to the benchmarking of fund performance, rather than the absolute return compen-

sation for hedge funds. Chevalier and Ellison (1999) show empirically that career concerns imply that mutual fund managers tend to herd and to not take on much nonsystematic risk.

The empirical evidence on herding by hedge funds is mixed. In some cases the evidence is relatively clear, for example as in the ERM crisis (Fung and Hsieh, 2000), whilst in other episodes there is less evidence. Liang (2004) argues that there may be some evidence of herding in down markets. In such markets, hedge funds are compelled to put on more similar trades, which in turn affects liquidity negatively and feeds back into the correlation structure.

Herding is often associated with the phenomenon of asset price bubbles, a typical example being the internet bubble the 1990s, but with many documented cases dating back to the tulip mania of the 1600s. Most mispricings exploited by hedge funds have a known reversion or resolution time. By contrast, bubbles are open ended. This open–endedness and lack of common knowledge[20] implies that it may be worthwhile to ride the bubble for some time before getting out, and even shorting the bubble. Herding is therefore a possibility in bubble environments, see e.g. Brunnermeier and Nagel (2004) for empirical evidence related to the internet bubble. This exposure to bubbles might be most pronounced in macro hedge funds, not least due to the (sometimes bubble-like) characteristics of exchange rates (e.g. carry trades).

Hedge funds of course may act as a catalyst, by triggering (whether accidentally or on purpose) herding by other investors. Intentional herd induction goes counter to the casual observation that hedge funds could always reveal trades so as to encourage herding, but hardly ever do. Available empirical event–studies have not found evidence of such triggered herding. Fung and Hsieh (2000) find indirect evidence that hedge funds were late comers to the trade during the Asian crisis, while Eichengreen and Mathieson (1999) find no evidence that other traders were guided by the positions taken by hedge funds in prior periods. Indeed they argue that the data suggests that hedge funds often act as 'contrarians.'

3.1.5 "Hedge Funds use up Market Liquidity"

Hedge funds are sometimes accused of 'using up' valuable liquidity, hence impeding other investors. By liquidity in this context we mean ease of trade in the financial markets in general (often viewed in terms of the price impact of trades) rather than access to funds or the ease of liquidating investments

[20]Refer to Zigrand (2001b) and Abreu and Brunnermeier (2002) for more on the subtle relation between arbitrage and common knowledge.

in hedge funds. If hedge funds in aggregate are large sellers of an asset or currency this may have a significant price impact and impose a cost so that other investors cannot find a buyer to close their trades at 'reasonable' prices. Such forced sales could for instance be the result of marking–to–market or margin calls. However, it is also likely that hedge funds do exactly the opposite. While the rest of the financial industry, perhaps due to Basel–II risk constraints, are all selling, hedge funds may see opportunities and buy, hence providing liquidity and stability, as discussed by Daníelsson and Zigrand (2003). A recent case in point is the growth of the credit derivatives market felled in part by the influx of credit hedge funds as counterparties, especially in London.[21] Since few other institutions have a natural desire for such objects, the involvement of hedge funds has allowed banks to issue more synthetic collaterized debt obligations (CDOs) and to price them more efficiently.

3.1.6 "Hedge Funds are Prone to Commit Fraud"

With the increased retailization of hedge funds, supervisors have expressed growing concerns about protecting hedge fund investors from fraud (see e.g. Financial Services Authority, 2002; SEC, 2003b). As listed in SEC (2003b), fraudulent activities include the misappropriation of assets, mispricing, insider trading, the misrepresentation of portfolio performance, inappropriate marketing, the falsification of experience, credentials and past returns and misleading disclosure. Anecdotal evidence indicates that investors in hedge funds are very much concerned with the same issues. However, there appears to be little evidence indicating that hedge funds or their advisors engage disproportionately in fraudulent activity,[22] regardless of whether they are registered or not.

[21] Greenwich Associates find that hedge funds are counterparties to around 30% of the credit derivatives outstanding, and own more than 80% of distressed debt. Also, hedge funds are the largest category of buyers of the equity tranches of synthetic deals.

[22] CFTC estimates suggest that in the five years up to 2003 hedge funds accounted for around 2% of SEC and CFTC enforcement actions (Testimony of Patrick J McCarty, General Counsel, Commodity Futures Trading Commission, in SEC, 2003a).

3.2 The Benefits Attributed to Hedge Funds

3.2.1 "Hedge Funds Aid Price Discovery"

In an age where much of the mutual funds industry is either index tracking, passively managed, or following narrow mandates, the comparative advantage of hedge funds is not to track but to be flexible. As a consequence hedge fund trading contributes to price discovery. For instance, long–short hedge funds pour resources into equity research in order to find pairs of stocks mispriced one relative to the other. By acting upon their research (which presupposes they do not herd), hedge funds affect prices and volumes and reveal some of their private information to the market at large, helping assets move back to fundamental values more quickly. Furthermore, by providing liquidity in certain markets, market prices become more meaningful. Anecdotal evidence suggests that the custom of hedge funds was instrumental in providing the necessary incentives to develop new credit derivatives, the prices of which provide useful estimates of the market prices of default risk. By–and–large,[23] prices closer to the fundamental ones allow market participants to engage in better and more efficient resource allocation.[24]

3.2.2 "Hedge Funds Aid Competition and the Invisible Hand"

The research and trading strategies of a large number of hedge funds are aimed at deriving profits from the perceived *mispricing* of securities. Mispricing between assets arises because market traders do not have costless and immediate access to all publicly available markets, exchanges and information while trading. For example, an option on the S&P–500 index trades in Chicago, while the underlying stocks trade on various exchanges, like NASDAQ and NYSE. If the derivatives price and the underlying stock prices do not properly reflect each other (e.g. do not satisfy the relevant no–arbitrage relationships), mispricing occurs. Of course, very few mispricings are quite so obvious, perhaps exactly because hedge funds by their trading push prices towards and inside the no-arbitrage set.

Traders profiting from the resulting arbitrage opportunities induce prices to move towards the *true* price, and hence allow trades to happen that other-

[23] A theoretical exception being the "Hirshleifer effect," see for instance Hirshleifer (1971), whereby better information leads some agents to forego risk-sharing which would have been ex–ante optimal.

[24] We are not aware of any formal empirical tests of the general price discovery role of hedge funds, other than the paper by Brunnermeier and Nagel (2004) analyzing the internet bubble.

wise would not have taken place.[25] Such activities can further aid efficiency by increasing the competitive pressures on market makers or intermediaries, whose bread and butter are the various spreads. To cite the regulator (SEC, 2003b), "The absence of hedge funds from these markets [of innovative financial instruments] could lead to fewer risk management choices and a higher cost of capital."

These benefits might well be considerable, but due to lack of data we are not aware of any research that has tried to quantify these benefits. Some parallels can be drawn from the academic literature on international economics, see for instance Van Wincoop (1999) or Davis et al. (2001) who quantify the portion of gains from trade that arises from cross-border trade in purely financial assets. Their estimates, due to different methodologies, vary from 1 and 5% of GDP for developed and developing countries respectively, to a multiple of those fractions.

3.2.3 "Hedge Funds Provide Diversification"

Traditional fund managers are usually constrained by their mandates in choosing trading strategies, while individual investors are usually constrained both by transaction costs and technological knowhow. Hedge funds are not subject to such constraints and so may provide investment strategies preferred by investors, but otherwise unobtainable.

Considerable empirical and theoretical evidence demonstrates that hedge funds provide investors with risk–return tradeoffs not available from traditional funds (see e.g. Lhabitant, 2002). Caution should, however, be applied to any such analysis due to the inherent biases and non-linearities[26] in hedge fund data. Patton (2004) for instance studies the empirical properties of so-called "market-neutral" hedge funds, in particular in view of the fact that hedge funds self-classify themselves into categories such as market-neutral.

Other than providing the market with new static return characteristics that may have a diversification benefit, hedge funds have the flexibility to alter

[25] In other words, hedge funds help reduce pricing inefficiencies and allow marginal rates of substitution across the global economy to converge. In classical economic terms, we say that the arbitrageurs provide some of the benefits of the elusive Walrasian auctioneer. For the technical details see Zigrand (1997) and Zigrand (2001a). For empirical results along those lines, consult Chen and Knez (1995) and Chen et al. (2003).

[26] For instance, beta coefficients for down-markets can be markedly different from the beta coefficients for up-markets. Also, credit factors may become more highly correlated with market factors during economic downturns, and virtually uncorrelated at other times. In order to profit from the diversification properties of nonlinear returns, investors would need to be aware of the specific nonlinearities. For more details, refer to Chan et al. (2005).

styles depending on market conditions. This enables them to pick an asset mix whose performance tends to be less sensitive to bear markets without being less sensitive to bull markets. This outperformance is the result of market timing. Kosowski (2002) finds evidence for this in an empirical study of active mutual fund managers for which better data is available. Within this flexibility, however, also lies the potential pitfall for style drift, whereby a hedge fund manager drifts into strategies which are neither his forte, nor provide the expected diversification benefits to the investors. As an illustration, the recent fall–off in convertible bond issuance has meant that many convertible arbitrage hedge funds drifted towards capital structure arbitrage.

In addition to providing potential diversification benefits for their own investors, hedge funds indirectly benefit other investors, at least in theory. Daníelsson and Zigrand (2003) argue that the presence of hedge funds in the market reduces correlation between assets, especially in bear markets, thus benefiting all investors, not only the direct hedge fund investors. This particular benefit of hedge funds has not yet found widespread recognition, and we are not aware of any empirical evaluations.

3.2.4 "Hedge Funds Aid Market Clearing and Provide Liquidity"

Rapid advances in financial technology and data availability, encouraged by Basel–II, have brought advanced trading and risk management techniques within the reach of just about any financial institution and investor. This has resulted in the information available to market participants and their resulting behavior being more uniform than at any other time. As a consequence *endogenous risk*, as discussed in Daníelsson and Shin (2003) and Daníelsson and Zigrand (2003), is greatly amplified. This phenomenon is especially damaging during financial crises, where highly correlated information and behavior conspire to amplify the severity of financial crises, by leading to a reduction of liquidity at a time when it is needed most. Furthermore, since hedge funds are unencumbered by mandated risk limits and generally operate at the top end of the technological chain, they have the possibility to act countercyclically during a crisis, providing liquidity and reducing volatility. While regulated investors may need to liquidate risky positions for no reason other than regulatory compliance, hedge funds may find it profitable to take the other side of these fire sales, thus providing liquidity. This implies that the presence of unregulated technologically advanced institutions can play a key role in ensuring financial stability, and that regulating hedge funds could actually increase market volatility and decrease liquidity and stability of financial markets. The issue is certainly not settled (recall the discussion

on continuous settlement in Section 3.1.3), neither in theory nor in the data.

4 Application of Existing Regulatory Methodology to Hedge Funds — Appropriate, Sufficient or Desirable?

The main challenge in designing a regulatory structure for hedge funds is striking a balance between leaving hedge funds as unencumbered as possible so as to deliver the benefits they offer, while at the same time containing any possible systemic events resulting from a hedge fund induced market collapse.

Supervisors could apply the most important tools in their arsenal for this purpose: disclosure and activity restrictions. Both of these have proven successful in day–to–day regulation of the financial system, and it is frequently suggested that they be applied to the regulation of hedge funds. While this might be a sensible proposition if we think of hedge funds as any other financial institution, we have considerable doubts that these tools would be effective in simultaneously preserving the benefits of hedge funds and containing systemic risk.

4.1 Disclosure

Public and private disclosure is integral to regulatory regimes. Public disclosure supplies information to consumers and instills market discipline while private disclosure provides supervisors with a measure of the stability of the institution in question. Disclosure of market risk can be based on summary statistics (e.g. value–at–risk) or position level information. It has been argued that enforced disclosure by larger hedge funds could play a key part in the macro–prudential regulatory mechanism by helping to forewarn and reduce the likelihood of crises should a hedge fund encounter difficulties. For example, such views motivated the Baker Bill reform proposed in the US in 1999.[27] The key issues on greater disclosures concern the nature, the effectiveness in achieving the macro–prudential objectives and whether such disclosure could be achieved through market discipline alone. Here we are

[27]The Bill, H.R. 2924, "The Hedge Fund Disclosure Act" did not get past the Committee stage in Congress. Its main features were the enforced disclosure of balance sheet information and measures of market risk of the largest 25 hedge funds to the Federal Reserve Board and other regulators.

not concerned with the micro–prudential rationale for disclosure, which has been discussed above.[28]

4.1.1 Disclosure of Summary Statistics of Aggregate Exposures

Value–at–risk (VaR) has emerged as the key component of financial regulation pertaining to market (trading) risk. It captures potential losses on a trading portfolio, typically the so–called 99% loss, i.e. losses that happen one out of every 100 trading days, or 2.5 times per year on average. The Basel–I and Basel-II Accords focus on this risk level. VaR does a reasonable job in capturing risk for small homogenous portfolios without derivative or fixed income assets. However, as a portfolio gets larger and more complicated, and especially when risk across asset classes and trading desks is considered or derivative or fixed income assets are introduced, VaR as a risk measure becomes increasingly irrelevant (see, for example, Daníelsson, 2002, for more details on this issue). For hedge funds, who usually employ very complicated trading strategies focused on derivatives, while rapidly changing positions and even styles, VaR is of little use. In addition, since the VaR measure is only a quantile of the distribution of profit and loss, it says nothing about the losses that can happen in exceptional circumstances — all it tells us is the losses that can happen in normal circumstances. Thus, since systemic risk is only about exceptional tail events, VaR is not meaningful for systemic risk measurement.

This problem is compounded by the serious flaw inherent in the VaR measure which is that it can easily and legitimately be manipulated by lowering VaR while increasing potential losses.[29] While considerable literature on alternative risk measures and better risk measurement techniques has emerged in recent years, we nevertheless believe that current state–of–the–art methods do not allow us to capture the systemic risk component of a hedge fund's position.

[28] These would seem to be behind the recent SEC ruling for the registration of most hedge fund managers as Investment Advisors which would imply disclosure on issues such as conflicts arising from side-by-side management of hedge funds and other client accounts and hedge fund advisors' relationships with prime brokers.

[29] See e.g. Ahn et al. (1999) who demonstrate that simple and easily implemented option strategies allow a hedge fund to lower its VaR significantly by taking mass out of the left tail, while at the same time raising losses in the tail by pushing the remaining mass further out. In that sense, riskier outcomes from a systemic point of view do not only fail to be flagged by the VaR number, they go hand-in-hand with a lower VaR!

4.1.2 Detailed Disclosures

The only alternative avenue open to supervisors is to require detailed position level disclosure, either publicly or privately to supervisors. It is likely that the former would be strenuously resisted by hedge funds while the latter would be resisted by the supervisors. In addition, it is doubtful that such disclosure would be effective.

The flexibility of hedge fund investment strategies, which is their great advantage over other investment classes, fundamentally depends on confidentiality of trading positions. Furthermore, publicly disclosing trade level information is likely to cause front running and to erode private benefits from research. Such disclosure would undermine the ability, and hence incentives, of hedge funds to provide the market efficiency benefits discussed above. Public disclosure would most likely be of little benefit since it would have to be assessable by its intended audience. As a practical matter, this means that much of the technical details would have to be left out, effectively implying that the public disclosure would have to take the form of summary statistics, which as discussed above are of limited use.

The alternative is a private disclosure of position level information to the supervisor. Most large and successful hedge funds employ rather complicated pricing models and trading strategies involving complex derivatives. Calculating the risk of one such instrument is usually quite challenging, and calculating the risk of a portfolio of derivative instruments requires technical expertise at the highest (and most expensive) level. This involves intimate knowledge of the underlying pricing model and positions. For the supervisor this task is compounded by having to aggregate the risk across hedge funds. Effectively, the supervisor would have to run a risk engine that simultaneously encompasses the positions of all hedge funds. Such a task is beyond the limits of existing technology.

If mandatory disclosure to a regulator were to be implemented, a key question would be how the information is put to use by the regulator. For example, in the special case of LTCM, it could be argued that knowledge of the positions could have enabled the regulator to inform its counterparties and thus prevented the build up of such large leverage. However, the rapid build up in leverage might not have been captured by regulatory disclosure given time lags since the extreme leverage only occurred after the crisis was underway. Ultimately, the manner of its intervention is of crucial importance, rather than the disclosure mechanism.

The regulators themselves are likely to be reluctant to require detailed private

disclosure, because of future political implications of the interventions or lack of interventions. In the event of future problems relating to hedge fund activity, regulators are exposed to an ex–post criticism that they had the information and should have prevented the problem. And alternatively, for supervisors to take action erroneously is also problematic. Essentially, the fear of *type I error* which occurs when a regulator acts but shouldn't have, and *type II error* which occurs when a regulator fails to take action, but should have, is of considerable importance to supervisors. The nature of politics induces the regulator to minimize type II errors at the expense of type I errors.

There is, however, an alternative mechanism for using private information about hedge fund positions for the purpose of measuring systemic risk, i.e. via prime brokers. They observe the whole trading activity of client hedge funds, and often run its risk engines. Given their involvement in counterparty risk, they have a strong incentive to monitor fund exposures closely. Such continuous monitoring can provide early warning signs for systemic risk. While this is essentially a market solution, supervisors, who already regulate the prime brokers, could require that prime brokers fulfill such a function.

Following LTCM, prime brokers have become much more concerned about counterparty risk, and tend to require full position level and loan disclosure in the case a hedge fund uses more than one prime broker. The reason is that excessive concentration of positions is, in conjunction with the directional nature of some bets, as well as illiquidity, the major reason for a hedge fund demise. Prime brokers thereby play a role as risk managers and can use their power to recall short–term credit lent to the hedge funds in order to impose acceptable levels of risk taking. This latter ability can potentially give prime brokers much more power than banks have over their regular borrowers. However, there are also factors which could weaken the incentive of prime brokers to play such a disciplining role, for example the competitive pressures for mandates from hedge funds. The prime brokerage business is highly profitable, and over time competitive pressures may have led to a relaxation of lending standards which were tightened in the wake of the LTCM collapse. Such pressures cast doubt on whether prime brokers could be relied upon as an important regulatory tool.

While regulatory monitoring and disclosure burdens imposed upon prime brokers may seem onerous, this is not necessarily the case. Market discipline may be made more incentive compatible by requiring prime brokers as well as other market participants to purchase and hold a certain amount of traded subordinated debt in systematically important hedge funds. The details of how this might best be achieved mirror the argument in Calomiris (1998).

For instance, the holdings must be spread out so that there is little risk of the subordinated debt holder being bailed out, which would negate the purpose of subordinated debt to some extent. However, the subordinated debt proposal for banking regulations have come under considerable criticism, and those criticisms apply equally in the case of hedge funds.

4.2 Prescriptive Activity Restrictions

Activity restrictions are an important component in the regulation of financial institutions. For example, banks are usually prevented from lending too much to a single entity in order to ensure the bank's solvency in case its largest client defaults.[30] However, from a macro–prudential point of view capital requirements constitute the biggest part of activity restrictions. Regulated financial institutions are required to hold 8% of their risk weighted assets as safe or riskless capital, implying an allowable leverage factor of 12. For the trading book, the bank's capital is at least three times 99% ten day VaR. For example, if the trading book holds US$100mn of the S&P index, the required capital is around US$27mn.

It is conceivable that similar restrictions could be imposed on hedge funds, perhaps limiting leverage, the type of trading positions or trading strategies. Unfortunately, this leads to a Catch 22 situation. On the one hand, for the regulations to be effective, hedge funds will have to lose the flexibility which defines them. On the other hand, the regulations may not be effective, possibly due to regulatory arbitrage or feedback effects. Indeed, dangerously high leverage is probably due to a vanishing capital base in a crisis situation, rather than a deliberate strategic decision. In that case regulation is counterproductive, since forcing the hedge fund to lower the leverage ratio would mean that the hedge fund needs to sell risky assets in a fire sale at the worst moment. This might not only use up market liquidity, but is likely to lead to further falls in asset prices, leading to yet more turbulence, which in turn would require hedge funds to sell even more assets and so forth. This is precisely the scenario analyzed in Daníelsson and Zigrand (2003). In short, we do not believe that prescriptive risk–sensitive regulation is the panacea as sometimes claimed. In fact there are good reasons why it may lead to more, not less, systemic risk.

Indeed, such restrictions may not be necessary from a systemic point of view

[30] In the Basel Accords, banks are not allowed to have any single large non-bank risk in excess of 25% of their capital, and the sum of large risks cannot exceed 800% of their capital. A "large risk" is defined as a loan that exceeds 10% of the capital of the bank that grants it. See for instance Basel Committee on Banking Supervision (1991).

in the first place. The work of Gupta and Liang (2004) showed empirically that the fraction of live hedge funds that would violate the strict Basel-II capital requirements for banks is negligible. Furthermore, even if large hedge funds did want to employ extreme levels of leverage, their prime brokers and their major share holders, including the partners themselves, may not tolerate such high leverage. For small and medium–sized hedge funds, their leverage levels are unlikely to be important from a systemic point of view.

5 Proposals: Focusing on Systemic Events

Banking supervisors are faced with a dilemma. Even a remote probability that a hedge fund collapse would cause a systemic crisis warrants having some type of regulatory mechanism in place. At the same time, the extant regulatory tools of greater disclosure and activity restrictions are too blunt to be able to provide an effective and efficient regulatory structure for hedge funds.

In designing prudential regulations, it is important to consider the actual externality meriting regulation, in particular, the notion of systemic crisis. Whilst there are various, often vague, interpretations of this concept, it is essential to define this concretely. Considering the regulatory and academic literature on the subject, what most people have in mind is a failure of markets to clear in an orderly manner, bringing with it a collapse of the financial system due to insolvencies leading to a potential domino effect in defaults.[31] The costs of such an event are likely to be enormous. If markets do not operate properly, the trades that are required to self–finance positions and to keep firms and financial institutions solvent cannot be executed at a reasonable, or indeed at any, price. If this situation lasts, the crisis will directly impact the production and consumption sectors of the economy leading to substantial real costs.[32] Whilst the costs of such an event are hard to quantify, the output losses during recent banking crises of 5-10% of annual GDP provide an indication of the potential scale (Hoggarth et al., 2003). Any regulatory proposals should therefore aim to minimize such costs and ensure an efficient and timely resolution to any such crisis.

[31] Many transmission mechanisms may lead to economic costs. Among them we can mention the failure to mark-to-market, the failure to respond to margin calls and the failure to sell assets held as means of payment against a debt as markets are inoperative (for instance frozen bank deposits). All these channels lead to defaults and result in further credit rationing.

[32] Our attempt to a formal modeling of this idea can be found for instance in Daníelsson and Zigrand (2003).

It must however be stressed that a systemic crisis arising from a hedge fund failure appears to be a low probability, if high impact, event. In actual fact, almost all hedge fund failures and dissolutions get resolved without affecting markets significantly.[33] But it must be kept in mind that the trigger need not be the failure of one large hedge fund, it may as well be the quasi concurrent failure of a number of medium size funds, for instance due to very similar exposures to the same source of risk and the ensuing run for the exit.

The economically reasonable approach to follow is two–pronged. Akin to the problem of setting up an efficient global financial system, the regulatory framework of hedge funds needs to comprise credible and clear ex-ante cost-sharing mechanisms as well as crisis management procedures.

Could the resolution process instigated by the New York Fed following the collapse of LTCM in 1998 provide important lessons for how to proceed ex-post? When the New York Fed learned of the pending collapse of LTCM and the potential systemic implications, they brought together all the key client banks and encouraged them to implement an orderly winding down process for LTCM's positions with the aim of providing the least amount of disruption to the economy. An important part of this process was that no public funds were used, with the Fed's role limited to managing the process. While there is no way to prove that in the absence of this resolution process there would have been a systemic crisis, the possibility that this could have happened appears to have justified the intervention.

In the case of LTCM, the Fed was ultimately successful in persuading the client banks to participate in the resolution process. If the Fed had been less determined, the client banks resisted more strongly, or the pending failure had attracted interest from the wider community and thus become more political, the Fed might have failed. Such a possibility highlights the need for a credible resolution mechanism to deal with the default of systemically important hedge funds. Some supervisors are concerned with these issues, and it has been reported in press that the Bank of England and the FSA, run on regular basis simulated financial crisis in order to identify how best to cope with a crisis.

Whilst the objective of this proposal is clear – to minimize the potential real costs of such a failure – the procedural issues and related incentive effects are complex.[34] For example, if a formal mechanism is adopted, which party

[33]There were about eight hundred hedge fund failures in 2003, up from seven hundred in 2002. This includes some sizeable funds, such as Robertson's Tiger Management funds which liquidated $6 bn worth of assets in March 2000, having lost about $20 bn prior to dissolution.

[34]In another field, this was exemplified most recently by the, now shelved, 2001/2002

or parties have the ability or duty to trigger the resolution process – the regulator, the prime brokers (which at present are locally regulated entities for the most part), the creditor banks (including the subordinated debt holders) or the hedge fund(s) itself (themselves)? What are the informational requirements for this party? Under what jurisdiction does the resolution mechanism proceed? These are issues which require further consideration in order to provide the correct incentives for the various parties.

The relevant supervisors would have the duty and power (e.g. power to revoke a business license) to start and carry through the resolution process. It is also important that the supervisor starts this process as early as possible, both because the extent of the problem and the related costs grow significantly with time and because it does take some time to understand the exact nature of the hedge funds' positions. A carefully thought through contingency plan would contribute to minimal disruption.

Both a hedge fund in difficulty and its prime broker(s) should be obliged to alert the supervisor if they suspect a fund is about to fail with systemic consequences. The other client banks, to the extent that they also have this knowledge, should have the same reporting obligation. Furthermore, the banks should have an obligation to participate in the resolution process. Enforcement of the necessary actions should be a part of the process and may require a special arbitration body. However, the unwinding, reorganizing or refinancing of the portfolio of a hedge fund may be profitable, certainly if the trigger for the resolution mechanism is a temporary lack of liquidity by the hedge fund.[35] Furthermore, such obligations should not be onerous, they are only be required in extreme circumstances, and would be to a considerable extent incentive compatible.

- Banks lend to hedge funds, and if a hedge fund fails due to a late reaction, the banks do not recover their principal or interest.
- Prime brokers earn profits from hedge funds, e.g. from transaction costs, so losing a hedge fund to bankruptcy means losing the net present value of future transaction costs.
- Prime brokers that are rumored to have prop trading desks front running ailing hedge funds will lose hedge fund business. That is an in-

IMF proposals for a Sovereign Debt Restructuring Mechanism.

[35]Such profits highlight the need for effective Chinese walls between the prime broker and other divisions of the investment bank. Otherwise the investment bank might have an incentive to hasten the demise of a hedge fund, or exploit its inside information in the resolution process.

centive for prime brokers to make sure that the Chinese walls between the prime broker and other divisions of the investment bank are thick especially in light of the intense competition between prime brokers. Furthermore, the many prime broker employees do move over to hedge funds would not deal with their old banks if they had witnessed thin Chinese walls while still at the bank.

- Banks have prop trading desks which act in effect as small hedge funds. A scandal would prompt supervisors to look more carefully at prop desks.

- Non–compliance might hasten the introduction of a more intrusive regulatory regime for hedge funds, and banks might suffer considerable costs if the failure of a hedge fund had systemic consequences prompting overbearing financial legislation, as happened following the 1929 crash.

The principals in the affected hedge funds should bear the majority of the cost of this process. Prime brokers may also need to make funds available during such a resolution procedure, which provides incentives for their closer prudential monitoring of hedge funds. Their costs must be reasonable and fairly shared in order to prevent prime brokers from moving out of the regulatory umbrella, by relocating offshore for instance. Obviously, any use of public funds gives rise to a moral hazard problem, further exasperating the systemic concerns, and under no circumstances should public funds be contributed.

Even this simple suggestive framework raises many procedural and incentive issues which would need to be addressed more formally. For example, might the exposure of prime brokers to hedges funds lead them in some circumstances to allow the fund to 'gamble for resurrection' through taking on even more risk, and how could those circumstances be mitigated without calling for overbearing regulation? Prime brokers may have the belief that if worse comes to worst, public funds will bail out the bank. Are the informational restrictions for investment banks likely to hold in practice?

6 Conclusion

Our discussion highlights the need for further analysis. However, hopefully it will also play a broader role — focusing the regulatory debate towards designing reform proposals which address the key cost of a systemic hedge

fund crisis whilst at the same time preserving the potential benefits which hedge funds can provide for a well–functioning financial system. Our proposal has a key advantage over other suggestions for regulating hedge funds. Its effectiveness applies regardless of whether the crisis is triggered by actual hedge funds or by any other institution, such as proprietary trading desks in investment banks or other financial institutions.

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