

In Search of the Truth

DERIVATIVES, THE RISKS THEY POSE & CONSUMER FUNDAMENTALS A TAMRIS PERSPECTIVE

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INTRODUCTION

Commentary in the press about the possible role of derivatives related selling in the latest market downturn has initiated this perspective of derivatives and their supposed risks to the financial system.

Derivative related selling or buying of securities is a fact of life and the larger the derivative market becomes the bigger the impact derivative based buying and selling will have on world markets. It is probable that much of the volatility in emerging markets and commodities has a lot to do with the unwinding of leveraged positions.

While it is widely acknowledged that derivatives in theory improve the management and diversification of risk¹, the arguments for and against the risks they pose have been fairly evenly weighted.

But the real argument for the risks that derivatives pose has not been properly enunciated. Derivatives increase the risk in the financial system by transferring financial activity from the established financial exchanges, where the counterparties are indeed diversified, to an illiquid over the counter market lacking a true equilibrating mechanism where counterparties are also concentrated. Worse, the counterparties to which both risk and the clearing mechanism have been transferred are the gateway to the world's financial stability.

Notable in the concern over derivatives camp has been **Warren Buffet** with his now memorable “weapons of mass destruction comment” in the **2002 Berkshire Hathaway report**². Notable in the pro derivatives camp has been the Federal Reserve Board, in particular **Alan Greenspan**³, although the Federal Reserve has of late become more balanced in its assessment of the pros and cons of the derivative market place and even critical of the rudimentary trading mechanisms.

Recently a number of credible European opinions have started to weigh in on the “risk of derivatives debate”, with comments from the Bank of France, the German Central Bank, the European Central Bank and the Bank of England.

In its recent Financial Stability Review⁴ the **Bank of France** stated its concerns over the ability of current measures of Banks credit risk (Value at risk) to accurately measure their derivative risks. The Bank of France also stressed problems over the way in which banks record transactions between the trading and the banking book as leading to further errors in calculating value at risk. Indeed, even the **Federal Reserve** has noted caution with regard to the need for more conservative management of risk – see footnote 1 for further information.

The **European Central Bank**'s own Financial Stability Review⁵ echoed similar comments, in particular the fact that hedge fund trades have become increasingly correlated and stand at levels that exceed those seen prior to the collapse of Long Term Credit Management in 1998. Another of their concerns has been the “*the exponential growth of CRT (credit risk transfer) markets in which hedge funds are known to have become increasingly active. Although the CRT markets proved to be relatively resilient to recent credit events...its functioning under conditions of severe strain nevertheless remains largely untested*”. The report also criticised the lack of information about the credit default swap market making it “*impossible to*

¹ Comments by New York Federal Reserve Chairman at the New York University Stern School of Business; <http://www.ny.frb.org/newsevents/speeches/2006/gei060516.html>

² See pages 13 and 14 of the 2002 report for comments on derivatives; <http://www.berkshirehathaway.com/2002ar/2002ar.pdf>

³ <http://www.federalreserve.gov/boarddocs/speeches/2005/20050505/default.htm>;
<http://www.federalreserve.gov/boarddocs/speeches/2003/20030508/default.htm>

⁴ From the latest Bank of France Financial Stability Review; http://www.banque-france.fr/gb/publications/telechar/rsf/2006/etud1_0506.pdf

⁵ <http://www.ecb.int/pub/pdf/other/financialstabilityreview200606en.pdf>

assess on the basis of available information the amount of credit risk being transferred through this market, and indeed the amount of credit risk held by counterparties”.

But just what are the risks?

It would appear that few really know! The world's central banks, the Bank of International Settlements and the world's credit rating agencies (notably Moodys and Standard & Poors⁶) have all expressed concerns over the public risk disclosure of derivative management and trading.

With much of the world's financial transactions running through a few large investment banks, an extreme risk event could force leveraged entities to default on their contracts (whether these be credit default swaps, forward contracts, volatility swaps etc), forcing the debt onto the world's financial system.

The global derivatives market has snowballed in size. If, as seems possible, we are also over insured against financial risk, then an extreme event will affect more than risk management at the margin.

At a time when liquidity is needed, liquidity may be found wanting and those entities key to making sure liquidity is available through the OTC market may no longer be able to deliver it. The ability to price and to trade risk in the OTC market will impact on other markets. In an end game the world's central banks, even if they had the liquidity, may not be able to deliver it.

Is the magnitude of risk quantifiable?

Within reason yes! But only during reasonable conditions; most models that manage risk and that price derivatives are not adept at modelling extreme events and, covering extreme events within collateral agreements and derivative pricing models would curtail the growth and validity of these instruments in the first place.

It is therefore of concern that the impact of instruments designed to manage risk is ambiguous in situations most likely to test the world's financial system.

This debate over derivatives is of particular concern now that interest rates are rising and excess global liquidity is being withdrawn.

As liquidity is withdrawn, demand for risk falls and derivative positions may need to be unwound or offset. As this happens, those who enter into offsetting contracts will need to sell into the market to manage their risk, precipitating further downward price movements, further exposing leveraged trades.

While you can offset a position, it is unlikely you will be able to offset at a price which will offset your current losses under the original contract, only potential future losses. Indeed, as liquidity withdraws from the market during a risk event, you may find it difficult to enter into offsetting contracts, period. The dynamics of the clearing mechanism of the OTC market are unclear in an extreme event when both demand for risk and liquidity dry up.

The preferred pricing mechanisms for risk are the world's financial exchanges and not a crude, illiquid, counterparty clearing mechanism. While traditional exchanges are not exempt from the risks of declining demand for risk, they are not responsible for providing the liquidity that is the OTC's responsibility as a counter party to each trade.

While the banking industry appears confident in its ability to deal with normal day to day risks, we must remember that these are same institutions that said technology stocks were a sure bet; they make hay while sun shines.

⁶ [Banks around the globe Concentration risk](#)

It is important to note that derivatives in their own right are not dangerous instruments. Where the concern lies is their regulation and their management and the market place in which the majority of derivative contracts are initiated and settled. Efficient markets require transparency and liquidity and an efficient mechanism for the matching of demand and supply.

It is clear that there is considerable credible concern and it is clear that this concern is valid, since the arguments raised are from within the central banks and credit rating agencies that have the integrity of the financial system at heart.

Size of the “over the counter” derivative’s market

Most derivatives are initiated and settled in what is termed the Over the Counter Market and most of the world’s derivative contracts are initiated by a small number of counterparties. At a time when too much risk may be being transacted and managed, this is where the risk lies, the Over the Counter Market for derivatives.

Notional value is the value of all outstanding derivatives contracts.

This is not the risk of the contracts at a point in time, just as the risk of stock market investment does not equal the value of all shares in the stock market.

The S&P 500 had a market cap of 12 trillion⁷ (11,887 billion) US dollars as of the end of April 2006 and the S&P Global 1200 a market cap of 28 trillion US dollars.

Compare this to the notional value of the **Over the Counter Derivatives** market of \$298trillion (including credit default swaps) at the end of December 2005⁸, and you start to get a measure of the size of the global derivatives market place. The size of the OTC market dwarfs the nominal value of outstanding **exchange traded contracts** which stood at \$58 trillion (futures \$22trillion, options \$36trillion) as of December 2005, according to the Bank of International Settlements.

Derivatives and their uses

The word derivative comes from the fact that the value and hence the price of a derivative is dependent on the direction of the movement in price of an underlying investment, asset, interest rate, currency or debt instrument. Derivatives are used for any one of the following.

- Insure or bet against a future fall or rise in the price of securities, commodities, currencies, changes in interest rates and more recently changes in the volatility (standard deviation) and the variance of daily market movements.
- To access cheaper corporate financing, for investors and portfolio managers to swap maturities, yields or enhance or reduce risk/return profiles on bond and/or equity portfolios.
- Recently to protect banks and financial institutions against the risk of default on their outstanding loans (which also helps reduce regulatory capital requirements), to repackage corporate debt or to develop synthetic debt products.

⁷ Short scale 10 to power of 12

⁸ Source Bank of International Settlements 6 monthly report on OTC derivatives.

Derivatives; their benefits, their risks and their costs

One of the oft cited benefits of derivatives is that they transfer risk from those least able to cope with to those most able to manage it. Also, by providing greater liquidity to more risky areas of the economic market place, they provide capital to areas that may not normally have received it; again by allowing those better able to manage risk to take the risk.

It is debatable that a risk transfer to a leveraged entity meets this criterion, or likewise the repackaging of debt to the retail investor. It is also debatable whether the transfer of pricing from a liquid and efficient open, transparent market place to an opaque, illiquid one could be termed risk management, let alone risk reduction.

There is of course strong evidence that the development of credit derivatives have helped banks offload debt (thereby freeing up capital for further lending), to diversify their credit risk and to attract liquidity to higher risk debt markets. Also, via the ability of counterparties to exploit leverage, derivatives have become fixers of price anomalies in the market place, helping markets become more efficient at pricing risk and return.

The trouble is that this is only one side of the equation. The other side of the equation is that derivatives are an extremely lucrative business in their own right, the largest single product market in the world and a means to gain leveraged returns on financial markets and to arbitrage the relationships between financial assets.

There is a very large interest in selling, promoting and marketing both derivative contracts and derivative based products. It is therefore probable that a large element of the risk currently being transferred by derivatives need not have been transferred at all.

There is also evidence that risk is being recycled⁹, to the benefit of those remunerated from the transaction and management charges. In this context, the marginal return on risk is also being eaten up in costs and siphoned out of the market place by financial intermediaries. To what extent this is of benefit to the financial system is also unclear, since the risk of such spirals is well known in reinsurance circles.

Importantly, if derivatives help provide liquidity to the market place through leverage, they also risk exaggerating the natural demand and supply imbalances that occur during market and economic excesses.

Derivatives operate within a market place driven by fear and greed and the constraints of human investor preferences. Contrary and relative value investment styles, exemplified by many of the leveraged hedge funds, can only operate effectively as long they take contrary positions to the market. Once they become the market, and start to enhance trends, they exacerbate risk.

Risk management does not begin and end with derivatives. Most risk should be managed by the portfolio/business structure and by careful planning and management of portfolio/business risks and returns. Risk management should only be a marginal exercise for the management of extreme risks, not all risk.

Alan Greenspan famously pointed out the way in which derivatives market helped the spread the risk of the default in the telecom bubble. This of course misses the point! Much of this risk should not have been assumed by the banking system in the first place. It is therefore likely that current explosion in the derivatives market hides a significant element of risk that should not be being borne by the financial system at all¹⁰.

⁹ A 2003 report by Standard & Poors challenged the risk diversification benefits of the credit transfer market stating that most of the risk was merely being recycled.

¹⁰ <http://www.cerf.cam.ac.uk/events/files/Instefjord.pdf>

So we have had very strong growth in liquidity, very strong growth in derivatives contracts and strong growth in particular in credit risk transfers.

The question is can the over the counter derivatives market place manage this risk during an extreme risk event?

The derivative cost of risk and return

It is not just risk that is being transferred, but return.....

When someone buys a derivative contract, risk does not disappear, it is merely transferred. But, if someone is taking risk away from you, they will need to be paid for doing so. In fact, they will need to be paid, at the very minimum, for what they consider to be the risk of loss over the time period of the contract plus an element for the risk of being wrong, plus transaction costs.

If we consider that over long periods of time the risk of an investment should more or less relate to the additional return on that investment over and above the return on a lower risk investment, then if you are hedging the risk of an investment over all periods, you should only ever earn at the very most the "risk free rate"¹¹.

Too much use of hedging effectively hands the seller of the contract the return on the underlying investment. The derivatives market place is built around this return. It is important to note that risks and returns on derivative contracts are guaranteed events, unlike most insurance contracts which pool the cost of an uncertain, low probability event¹².

Small wonder that derivative contracts are big business!

Far from diversifying risk being the primary rationale of a derivative, it would appear logical that derivatives are products that allow the seller to capture the risk/return on the movement of an investment without having to hold the underlying. This is something that hedge funds understand.

Indeed, many of the contracts that are set up within the OTC market are laid off to willing buyers such as hedge funds. The funds buy the risk others are not willing to hold.

In truth, derivatives should only be used to manage extreme risk or to engineer return at the margin. Long term indiscriminate use of derivative contracts to manage risk will on average lower return and in an extreme event (in particular credit risk transfers) will place considerable strain on the ability to meet liabilities on the contracts.

Counterparty risk, the double edged sword

Contracts for differences; derivatives are a double edged sword!

While fundamentally benign (non dangerous), derivative risk depends largely on the ability of the parties to a contract to meet the obligations of the contract, itself affected by market risk. With the exception of purchased and covered options positions, derivative contracts to those who purchase them are a double edged sword.

The purchaser of a future or a forward contract to sell shares or commodities or bonds at a future point in time for an agreed price would be compensated for any loss if the assets fell in value. However, if the securities or commodities rose in price, the purchaser of the contract would owe the seller of the contract any increase in the value of the underlying investment or asset.

¹¹ In truth, there is no such thing as the risk free rate, since even this risk free rate varies in accordance with risk and return in the market place and is subject to the same economic risks as stock market investments over the long term.

¹² Note that whole of life contracts are effectively pre payments. However, a life company would be forced out of business in the event of an extreme risk event that killed its premium base.

Inability to pay the difference creates a credit risk. The ability of either side of the contract to honour obligations represents the primary derivatives risk, counterparty risk, to the derivatives market place.

As of December 2005 the Bank of International Settlements put this risk, the sum of the positive and negative values of outstanding contracts at some \$9trillion US dollars (excluding credit derivative swaps and exchange traded contracts). It is important to note that this risk varies and depends on the volatility in the market place.

The industry itself would contend that counterparty risk is indeed much smaller than the \$9trillion noted by the BIS. Banks will often have numerous contracts with one counterparty and rather than summing up all the positives and negatives, they are able net all the contracts to come to a much lower figure. Additionally, banks also have collateral arrangements between counterparties, which should theoretically cover much of the outstanding balances. The trouble here is that in an extreme risk event, the value of collateral will fall and the size of collateral needed will rise, possibly further exaggerating a risk event as more collateral is demanded.

Additionally, once counterparties default, the ability to net disappears and derivative liabilities increase, affecting not just one but countless contracts and counterparties. So, it is not the relationships during periods of normal risk that count, but the potential for net liabilities to increase during periods of stress. What you see is not necessarily what you get.

Primary risks apply to counterparties and secondary risks apply to holders of the underlying securities or instruments.

What often obscures and makes assessing the risk of derivatives to the financial market place difficult, is the fact that all liabilities on derivatives contracts sum to zero; but a zero sum does not mean zero risk.

Derivatives may actually create additional risk by creating uncertainty over the direction, magnitude and shape of risk. A zero sum means that all positives amounts (owed by the purchasers of the contracts) and all negatives amounts (owed by the

seller of the contract) equal zero. But the risk equation is actually a different one, irrespective of the zero sum game.

The primary risk associated with the management of derivative positions therefore occurs when a counterparty (either the buyer or the seller) cannot fulfil their side of the contract.

Secondary risks associated with derivative contracts apply to their impact on the underlying investments. While the counterparty risk is seemingly the most important to the stability of the financial market place, there is in truth little understanding of the profound impact of increased leveraged and multiple derivative positions on the underlying assets' risk/return relationships. This is important since market risk is key to counterparty risk.

What makes counterparty risk a risk to be reckoned with?

A company that produces commodities or, a company looking to hedge currency risk associated with its exports or, a portfolio manager looking to hedge the risk of its asset positions all should (!) have collateral that should allow them to honour their obligations under a derivatives contract¹³. Likewise any investor or investment institution looking to change the risk/return characteristic of a portfolio through a non leveraged derivative position is also probably well collateralised.

And remember, a derivative is only a zero sum game if the speculator is on the correct side of the leverage. Many counterparties do not use derivatives to insure a well collateralised position, but to speculate and much speculation involves leverage. **In this case all counterparties to these speculative positions are exposed to the same risks.** All are ultimately speculators. If a speculator incurs heavy losses and cannot cover its losses, these losses become the losses of the originator/counterparty to the contract. And remember, a derivative is only a sum

¹³ Obviously, a corporate default or other problems that make honouring the contract difficult are still risks.

zero game for a speculator if they are on the correct side of the leverage. Note, losses on leveraged positions will occur during extreme market events where the credit risk is greater than shown by current net positions.

A good indicator of risk would be the sum of all liabilities under leveraged trades and a scenario analysis of the risks under stress.

While the most well known of speculators, the hedge funds, are easily identifiable as speculators, many more are not. Investment Banks are probably the biggest speculators in the market in that they are effectively the primary counterparties to leveraged trades. Banks are also involved in their own proprietary trading, apparently around 2% to 3% of notional trades; also according to the Bank of France, risk which should be held on the banking books is starting to find its way into the trading books. With the development of credit default swaps it is now believed that insurance companies are also entering into the derivatives market place.

There are also many companies that may be taking derivative positions for reasons other than hedging their primary business operations (Enron was a key example). How many companies are out there that have used derivatives for purposes other than hedging collateralised business risks?

The mechanics of risk in the OTC market

It is widely accepted that most of the large institutions that deal in derivatives are well capitalised and could probably cope with a fairly significant loss, or at least this is the reasoning put forward. However, it is the mechanics and the relationships of the Over the Counter Market place that will help determine counterparty risk in an extreme risk event.

- The derivatives market and the number of hedge funds operating in the derivatives market has significantly increased since the collapse of Long Term Capital Management. Future losses may not just be confined to one hedge fund and the amount of the total loss may well exceed the potential losses of LTCM.
 - In its latest **Financial Stability Report the European Central Bank** noted its concern with the recent “*crowding of trades*”, “*is that hedge fund returns, both within and across different investment strategies, became increasingly correlated after mid-2003. In addition, an area of growing concern has been the exponential growth of CRT markets in which hedge funds are known to have become increasingly active....In addition, the correlation of hedge fund returns both within and across investment strategies surpassed levels seen just before the near collapse of Long Term Capital Management in 1998...*”.
- Since 2000, the massive increase in global liquidity in the market place has been accompanied by significant growth in the notional value of outstanding OTC contracts¹⁴. How the number will impact the liquidity of the market place in the event of a risk event is unclear. One of the key requirements of risk diversification is the ability to sell risk from one party to another. While an exchange traded contract allows this mechanism to work efficiently, OTC contracts do not provide for counterparties to sell the risk; they can only offset the risk by entering into another contract; *futures contracts are for delivery*.

¹⁴ Data on how much of this growth is due to recycling of trades and the offsetting of existing trades either does not exist or is not readily available.

- Over the Counter contracts do not have a central market clearing mechanism (they are not exchange traded like futures or options) and there is no natural mechanism to bring demand for and supply immediately into equilibrium. The only way to offset a changing risk environment is to enter into yet further contracts, activity which can influence demand and supply of the underlying investments, requiring yet further derivatives activity¹⁵. According to the **Office of the Comptroller of the Currency**, **“OTC contracts expose participants to greater credit risk and tend to be less liquid than exchange-traded contracts..”**¹⁶ Judging by the administrative problems in the derivatives market, one wonders whether the OTC market could handle a risk event at the paper level.

“OTC contracts expose participants to greater credit risk and tend to be less liquid than exchange-traded contracts.....”

- It worth noting the problems quoted by Warren Buffet in closing down General Re's derivative positions; OTC contracts can last for 20 to 30 years.

- According to the Office of the Comptroller of the Currency (US), in its 4 quarter 2005 report, **“(US) derivatives continue to be concentrated in the largest banks. Five commercial banks account for 96 percent of the total notional amount of derivatives in the commercial banking system, with more than 99 percent held by the largest 25 banks”**.

“Large amounts of risk..., have become concentrated in the hands of relatively few derivatives dealers, who in addition trade extensively with one another.”
Warren Buffet

This concentration of latent risk flies in the face of conventional theory that derivatives are a better way of managing risk.

Derivatives may diversify risk on the one hand but the ability to manage this risk depends on the counterparty relationships. Current dealer concentration represents a high, if unquantifiable risk and theoretically an unquantifiable risk is one you should not take.

- The size of the market implies a considerable amount of laying off of the risk to counterparties. To what extent this involves the type of spirals seen in reinsurance circles, in particular the one that led to the Lloyds LMX scandal, one does not know, but it is also a risk that needs to be quantified.
- Much of the statistics analysing and assessing risk do not sufficiently take account of model risk (risks which hit LTCM and which also hit the valuation of many of the early Collateralised Debt Obligations). Most market risk data and the assumption underlying models that manage derivative risk do not take account of extreme event risk. Also, there is evidence that banks are obscuring the amount of their risk exposure by moving items from the banking book to the trading book¹⁷.
- It is plausible that leverage alters the balance of the risk/return relationship introducing additional risk into the financial system. It may that the ability to accommodate this risk is dependent as growth in liquidity (excess money supply).

¹⁵ In the recent market declines it has been reported that many hedge funds entered into contracts to limit their exposure to falling stocks and commodities. The institutions that arranged the contracts had to sell the underlying assets to cover themselves against the fall in markets, therefore reinforcing the decline in the price of the underlying investments.

¹⁶ <http://www.occ.treas.gov/annrpt/annual.htm>

¹⁷ Note the Bank of France's recent comment that many risks on the trading book are unlikely to be settled within the 10 day trading period used to calculate VAR.

Pricing risk and the risk of pricing risk

If the outcome of an investment was certain, there would be no risk and all assets would most likely have the same return or time value. In fact, it is doubtful if the concept of return as we know it would exist at all without risk; indeed, because we cannot get rid of risk, capitalism is a risk based resource allocation system, *aspects of the financial system that appear to discount risk are either suppressing risk or transferring and accumulating risk in other areas, with consequence.*

“aspects of the financial system that appear to discount risk are either suppressing risk or transferring and accumulating risk in other areas, with consequence.”

As it is, we do not know the future price of an investment and, the greater the uncertainty over the future price of an investment, the greater the risk of that investment in terms of its price movement. Pricing a derivative contract depends to a large extent on the forecast of the volatility of the underlying investment. Where a number of assets are being hedged, the risk of the strategy will also depend on the correlation (the relative price movement of each of these assets) and, where the underlying asset on the derivative differs from the asset being hedged, the correlation between the hedge and the asset(s) being hedged. Assessing the risk of a derivative based strategy will also depend on the forecast returns of the assets.

Pricing risk is key to managing the risk of derivatives operations

Because of the risk that derivatives pose to those that sell them or those that take leveraged positions, pricing a derivative becomes extremely important.

If the price of the derivative is more or less correct, only the return for managing the risk is transferred to the person selling the derivative. If the price is wrong the return is kept by the person buying the derivative and the risk kept by the person selling the contract. It was the incorrect pricing of risk and the change in the correlation of asset price movements that led to the collapse of Long Term Capital Management.

“the recent climate of ultra-low interest rates and low volatility might have prompted investors to become complacent about underlying risks in the financial market.....and left investors mis-pricing risk, he said.”¹⁸

It is important to note that most risk pricing does not concern itself with extreme event risk. Over the period 2003 to 2006 most world markets experienced very low volatility. In low volatility markets, the price of risk will have fallen (suppressed by the demand for risk) and the exposure of counterparties to a change in risk will have risen. Most hedge funds combine active derivative and trading strategies to cope with changes in risk, returns and correlations and, it is this active element that is key to minimising the point in time risk.

One of the major risks that could precipitate a financial crisis is model risk. Forecasting risk, correlations and return is an imperfect science because the dynamics of the past relationships (whether longer time series or the shorter 250 day data) used to determine the inputs are constantly reacting to changes in the demand for and the supply of the underlying assets.

“Errors or omissions in the models of a large derivatives dealers could result in significant mismeasurement of exposure to risk”¹⁹

Many risk pricing models depend on equilibrium pricing assumptions regarding the distribution of risk and return and are exposed to the same risks that Monte Carlo techniques are faced given that the probability distribution of risk and return vary in accordance with the market and economic cycle (relative demand/supply relationships). Also, correlations are merely the price movement due to relative demand for and supply of an asset and if the relative demand/supply relationships change between assets, so do the correlations.

Since financial markets and financial market relationships are permanently in a state of dynamic disequilibrium, most models are poor at predicting anything but risk and correlation matrixes associated with either current trends, or historical averages. As such they need to be actively managed.

¹⁸ Financial Times, 19 May, Paul Tucker, director of markets at the Bank of England,

¹⁹ Source Derivative risk in commercial banking March 2003, Federal Deposit Insurance Corporation; <http://www.fdic.gov/bank/analytical/fyi/2003/032603fyi.html#ft1>

It is difficult to assess precisely what is wrong and what is right with any given model without actually being able to see it. Many do adjust for current price and risk relatives, making them more adept at managing point in time risks, but even here risk management at the margin is getting pretty close to active trading, with all the attendant risks of active management.

Furthermore, excessive leverage made possible by derivative contracts and high levels of liquidity can also adjust the risk paradigm on which the models were based. In popular parlance, the Heisenberg uncertainty principle applies; leverage and liquidity alter the symmetry of the natural relationships on which the models are based by introducing new relationships and new sources of financial energy (liquidity).

The Bank of International Settlements have themselves criticised a number of the models used to price default risk on credit risk derivatives²⁰. Indeed, the bigger risks may be within products where allocations are pre determined by inputs whose validity deteriorate over time.

Please note the following excerpt from the "Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management Report of The President's Working Group on Financial Markets"²¹.

"The LTCM Fund's size and leverage, as well as the trading strategies that it utilized, made it vulnerable to the extraordinary financial market conditions that emerged following Russia's devaluation of the ruble and declaration of a debt moratorium on August 17 of last year. Russia's actions sparked a "flight to quality" in which investors avoided risk and sought out liquidity. As a result, risk spreads and liquidity premiums rose sharply in markets around the world. The size, persistence, and pervasiveness of the widening of risk spreads confounded the risk management models employed by LTCM and other participants. Both LTCM and other market participants suffered losses in individual markets that greatly exceeded what conventional risk models, estimated during more stable periods, suggested were probable. Moreover, the simultaneous shocks to many markets confounded expectations of relatively low correlations between market prices and revealed that global trading portfolios like LTCM's were less well diversified than assumed. Finally, the "flight to quality" resulted in a substantial reduction in the liquidity of many markets, which, contrary to the assumptions implicit in their models, made it difficult to reduce exposures quickly without incurring further losses."

Now, imagine the sum of all hedge funds' leverage and derivative activity in the market today and reread the above paragraph!!!

Administration

It is not just the impact of extreme events, or the concentration of activity in the OTC market that is a risk. Administration and book keeping in the OTC derivative markets has come under criticism. Reports by the Bank for International Settlements, the International Swaps and Derivatives Association, the Bank of England and the UK Financial Services Authority have all unearthed significant errors in contracts and delays in

²⁰ Note the Deutsche Bank Research report; http://www.dbresearch.com/PROD/DBR_INTERNET_DE-PROD/PROD0000000000081397.pdf

²¹ <http://www.treasury.gov/press/releases/reports/hedgfund.pdf>

confirming contracts. Even Alan Greenspan has himself been quoted as being “shocked” at the trading mechanics of credit transfer derivatives.

Consideration of the demand for and supply of risk and return

We need to be very careful when we suggest that derivatives help to better manage risk within the economy.

If they are used only to efficiently redistribute risk and to balance out differences between the relative demand for over valued assets and under valued assets, then they are probably beneficial. But, in this sense, the benefit of derivatives is only as much that they reduce transaction costs and overcome liquidity problems in making easier transactions in the underlying real assets; *the fundamentals, the will to invest and the expectations of return are still the drivers.*

If derivatives are to better manage the risk of the financial system, they should theoretically be helping relationships that are away from equilibrium²² to move towards equilibrium rather than away from it.

If instead they are reinforcing the current trend away from equilibrium (forcing a suppression or expansion of risk and the important information that risk holds) for example speculating on excess demand for commodities, or betting on interest rates converging, or betting on a market falling yet further, they will be increasing risk by exacerbating the forces of demand that are pushing relationships away from equilibrium.

This will perversely increase areas of relative value and relative illiquidity (note 2000 when relative value between value stocks and technology stocks were pushed to extremes) and suppress important risk information.

Large scale leveraging cannot be universally beneficial to the financial system principally because of the risk of reinforcing trends and suppressing risk information. The more they and the hedge funds that use them become mainstream, the more probable that they will act like the herd.

We know that excess demand for financial assets results in rising prices of financial assets and a disparity between the returns on securities and the underlying returns on the real economy.

Investment in indirect assets (securities) cannot, for long, provide either a lower risk or a higher return than an investment in the underlying real business. Yet, there are times when markets price the indirect asset as both a lower risk and higher return.

We know that the greater the disparity between the valuation of financial assets and the real economy, the greater the size of the correction needed to bring these relationships back into equilibrium.

Investment in indirect assets (securities) cannot, for long, provide either a lower risk or a higher return than an investment in the underlying real economic business.

We also know that activity in the derivatives market directly impacts the prices of securities where the counterparty buys or sells securities to offset the risk of the contract - and directly affects the price of real assets in the commodities market. Where derivatives activity is leveraged and in the direction of the trend, the final risk event will be more pronounced. Remember, the returns on assets and the risk of assets are at all times constrained by the real earnings growth and the cost of capital.

But just where will a financial correction take place? Most likely where the imbalance is and where the current liquidity is tied up and, this will be where the price of risk is lowest. The transmission mechanism for OTC derivative contracts will be in the OTC market and any weakness here will

²² Equilibrium in this sense is the point at which the risk adjusted return for all assets is equal.

impact on the financial adjustment process. As stated, much activity has been taken from the traditional financial markets and channelled through the less liquid OTC market.

This is a concern, because instead of the market adjustment taking place within the global stock markets and the futures exchanges, much of the adjustment is being transferred to a market without an efficient central exchange mechanism. This means risk is being transferred to the banking system instead of away from it.

Long Term Capital Management & other Risk Events

The derivatives market place and the hedge funds that lever relative value *need not be large in number* if they are to be of benefit to the financial system. If leveraged hedge funds are operating in numbers at the wrong end of relative value (overcrowding, overvalued, risk under priced), failure of one or many is guaranteed and the greater the concentration of hedge fund activity the greater the impact on the financial system

The LTCM²³ debacle was not an accident, but an accident waiting to happen. It was just a question of which fund and when. Highly leveraged hedge funds are always at risk of loss, otherwise they would not be at risk of making the return. But leveraging an under priced and low relative demand relative value position is not an extreme risk to the financial system. Leveraging an over priced and excess demand position, does pose such a risk.

To be of benefit to the financial system, leveraged derivative activity should only be used to leverage areas of relative under valuation. This is pretty much what falling interest rates are designed to do during a recession and rising interest are designed to do during a market peak; in other words bring relationships back into equilibrium.

During the last few years, it would appear that the bulk of hedge fund activity has become increasingly focussed on the extremes and dependent on the extremes for their return. The fuel for the fire has come from low interest rates and a rise in world money supply growth.

While the theoretical premise of derivatives and hedge fund activity is laudable, the human factor can turn these risk management tools into the beasts of excess, further magnifying risks in the financial system. But hedge funds are not the only actor; risk is just as likely to happen from another Enron²⁴ type event.

Risk is very important for the efficient working of the economy. If the markets incorrectly price risk, we risk misallocating capital not only within the financial system but within the economy itself.

Relative valuation and relative risk

There is an equilibrium price for all securities in a market place. This is the price at which the risk adjusted return for all securities is the same. For a given return, the actual equilibrium price of risk will itself vary in accordance with the amount of liquidity/demand in the financial system. Relative valuation opens up when demand moves disproportionately to one area of the market for reasons other than adjusting price for changes in risk and return.

Since liquidity is fixed at any given point in time, buying in one area must lead to selling in another. If the underlying (real) risk or return prospects of the individual security have not changed, this will reduce the risk premium on the investment and raise its price and increase the risk premium on the other investments and reduce their price.

²³ <http://www.cato.org/pubs/briefs/bp52.pdf>

²⁴ Hearings before the United States Senate Committee on Governmental Affairs, January 24, 2002
<http://www.fenews.com/fen26/enron2.html>

Too much buying in one area for reasons other than adjusting for changes in risk and return will result in a valuation anomaly. The technology bubble was a good example of such a valuation anomaly.

Hedge funds are designed to exploit these short term valuation anomalies by selling short overvalued assets and buying long under valued assets.

The mean variance optimisers used by the retail financial services industry on the other hand are based on equilibrium pricing, believing that markets are always efficiently pricing risk and return. Equilibrium pricing models in a market out of equilibrium can actually reinforce a trend away from equilibrium and expose those invested according to these models to higher levels of risk.

If markets were efficiently pricing risk and return hedge funds would not be able to make money by trading relative value.

By virtue of the above, additional liquidity is likely to reinforce a trend and suppress risk for longer and withdrawal of liquidity is likely to precipitate a change in trend by triggering selling.

Natural Hedges, Hedge funds & Hedge Type Products

A portfolio that is well structured will have some form of a hedge. To be effective, the hedge should relate to the amount of risk and return an individual can accept given their risk preferences and the size and timing of their financial needs.

Since the biggest risk an individual investor has to cope with is the impact of significant stock market and economic risk on the ability of their assets to meet their financial needs over time, the primary hedge will reflect the balance of the portfolio between cash, bonds and equities (a short/long portfolio). Even within equities, the allocation to assets of differing relative valuation and differing relative price movements will also provide a natural hedge over time.

A bond holding is an effective hedge against short term market risk as well as a hedge against falling interest rates. Cash is a hedge against rising interest rates, inflation and rising equity risk premiums. Equities are a hedge on inflation and global diversification is a hedge on domestic economic growth and market risk, while selling high and buying low is a much simpler and less risky long/short strategy.

Therefore a portfolio focussed on the management of value (risk and return relative to earnings growth and the cost of capital), relative value (*opportunities opened up by relative demand*), the time frame of financial needs and, the management of significant market and economic risk is already naturally hedged and should require little or no derivative exposure throughout its lifetime.

As discussed, most of the time, hedging risk involves the transfer of return.

At the most, a hedge should only be needed at the margin; for example, capital invested in risky assets which need to be realised over a time frame which may be exposed to significant risk might benefit from a derivative hedge. For many, the use of a passive hedge is an abnegation of a responsibility to value and manage risk through careful valuation and portfolio structure.

The rationale for hedge fund investment

Much financial advice is distributed through static, strategic asset allocation models that are incapable of taking advantage of relative valuation differentials²⁵. Even those services that avoid the bland, unimaginative

²⁵ Itself one of the primary engines of return for hedge funds.

mean variance optimisers that plague financial advice in the 21st century tend to stick to broad asset allocation and stock selection parameters, often irrespective relative valuations.

In cases where investors have sought higher returns, they have invariably had their hands burned from poor advice after the fact.

What made matters worse was that towards the end of the 1990s many portfolio managers that used to take contrary positions to the market became unpopular because of the out performance of large cap technology, media and telecommunications stocks. Most mainstream fund managers eschewed contrary styles for index tracking, which itself led investors being fully exposed to the over valued sectors in 2000.

The move towards strategic asset allocation and indexed investment created the relative value that hedge funds thrive on.

Not only did this trend reinforce average returns and index risks, but it also drew capital away from areas of relative under valuation and enhanced the allocation of capital to areas of higher relative demand. Perversely, this provided an opportunity for hedge funds to sell highly value assets short (over valued) and to buy under valued assets. It effectively transferred risk (return) to the hedge fund managers from the individual investor forcing individual investors into areas of suppressed risk.

It is no surprise that investors have turned increasingly towards hedge funds to either find higher returns, or returns without the risks they have experienced, but most importantly to have their money managed by someone who hopefully knows what they are doing.

Unfortunately, hedge funds are opaque vehicles that could expose many investors to high risk fates. Since they do not tell where they are invested and how they are managing their positions, you have no idea what the risk/return situation of the fund is. This counters the first rule of investment, which is do not invest in anything you do not know or understand.

There is also no guarantee that the risks the managers are taking are placing your assets at greater risk of loss and lower return than a conventional asset manager. Indeed, as the number of hedge funds increase, the risks are that the quality of the average fund will fall leading to many managers chasing leveraged returns in crowded trades.

Much of the benefits of what we consider to be hedge fund investment (higher risk adjusted returns) could easily be delivered to retail investors via more open and regulated investment solutions. As TAMRIS has said and, will keep on saying, one of the financial services industries key problems is its inability to distribute its asset management expertise, itself a reason why investors have sought hedge fund management.

Many investors who want access to higher risk adjusted returns have to resort to hedge fund vehicles to achieve it. While there are many mainstream funds that have provided high returns, there are not many individuals capable of managing the allocation to these vehicles in a transaction driven industry. Quite often they will be recommended after and not before the performance.

Investors have to accept that a hedge fund investment is not a sure thing and the risks of investing in unregulated, opaque vehicles are high to extreme.

If you have an organisation that can properly construct, plan and manage your assets and, that has the freedom to allocate to relative value, you should enjoy the benefit of natural hedging and the returns that come from the ability to buy and sell relative value.

The only reason hedge funds make money is that capital is under allocated to relative value strategies. The more capital invested in hedge funds, the greater the allocation to these types of strategies. If markets work efficiently, this should lower the returns available to hedge funds and hedge funds, on averaged, will start to act more like the herd. In this case you may find that hedge funds deliver poorer risk adjusted returns and deliver more of what the ordinary investor was trying to get away from.

Consumer products and the perfect circle

There are many vehicles nowadays that are referred to as hedge funds and sold to investors as sophisticated vehicles capable of delivering equity returns with capital guarantees (Principle Protected Notes). There are also income products that are starting to come onto the market place that provide a high income yield (collateralised debt obligations).

Principal Protected Notes – First half of the circle

Principal Protected Notes are one such vehicle that purports to provide both a capital guarantee and the potential for equity type returns.

The truth of the matter is that any product that guarantees to protect you against the downward movement in a market must also charge you for the privilege. The cost of this is invariably part of the equity return. Take away part of the equity return and you will find that the return you end up with may be no better than you could have achieved on a lower risk fixed interest investment.

If you sell the risk of an equity investment to someone, you are also selling the return. Now, you may get lucky and, markets are lower at the end of the period than at the start, but on average you will end up receiving less and paying for the privilege.

A well constructed portfolio should provide you with all the necessary low risk exposure to protect financial needs against significant market risk and a carefully managed relative value equity allocation should be able to diversify the risk of equity investment and provide above average returns – providing the rest of the market avoids this risk.

There are of course many more issues regarding investments such as principal protected notes and the TAMRIS website provides further information on products and factors that investors should consider when looking at products.

Principal Protected Notes represent the first half of the circle. This is the transfer of risk from the investor to the financial institution (and therefore the transfer of potential return).

Collateralised Debt Obligations – Second half of the circle

The second half of the circle is when the financial institution sells the investor risk. Collateralised debt instruments (CDOs) are one such product.

These are complex products with the potential for compromising the expectations of the income seeking investor. They essentially allow banks to securitise the lower rated corporate debt on their balance sheets. The securitised debt is split into tranches, with the lower subordinated tranches being first to take the hit in the event of a loan default.

By doing this, you can effectively turn lower grade corporate debt into a product which provides graded tranches all the way from AAA to the highly risky “equity tranche”, even though the underlying assets may be nowhere near AAA in quality.

For much of the decade the purchase of these investments have been the preserve of the hedge funds and institutional pension funds. But they are starting to be marketed to the consumer and a number of products have already been launched as closed end funds on the Toronto stock exchange.

These products tend to provide a higher yield than conventional corporate debt and the higher risk tranches a significantly higher yield. The yield and the risk of the product depends on a lot of factors, one of which is whether or not the lower subordinated tranches are held within the product and to what extent insurance (Credit Default Swaps) has been purchased to protect against a default.

The major risk is the risk of default on the underlying assets. Because the underlying assets tend to be higher risk debt, the banks that develop these products have developed sophisticated mathematical models that model the default correlations of the underlying loans. Get your modelling wrong and instead of a secure, higher yield investment with a graded rating, you have a high risk, high yield junk bond²⁶.

It is important to remember that financial institutions earn a good return from these products and that there is a strong financial incentive to initiate a higher level of lower quality lending in the knowledge that the lending can be collateralised. Banks earn a return on the initial loan transactions and a second return on the collateralisation and the retail market if it develops will earn another component of return on the final sale.

The environment for CDOs has been very accommodative over the last four years – low interest rates and economic growth and high levels of liquidity – but the economic landscape is changing. Interest rates are rising and liquidity is falling.

These are intensely complex products, with intensely complex risks that even those who regulate the banking industry are having a hard time coming to terms with. It is extremely unlikely that your average salesman, let alone your average client is going to be able to understand the risks.

It is important to realise that all the assets an investor needs to be able to provide both yield and capital growth and a source of both income and capital can be found in the main asset classes. All that many complex yield orientated products do is break down these assets into yet further components, increasing the risks they pose while apparently promising more.

In the end, these products cannot on average promise more for the simple reason that a far higher proportion of the return has been taken in charges. They are tricks of the light!

If your portfolio is full of these products, what are you left with? Quite often a leveraged, higher cost, higher risk, lower overall return portfolio. The landscape of the past is littered with good intentions gone bad. For those who are sceptical, you need look no further than the UK's split capital investment trust debacle.

Products like CDOs complete the circle by transferring back the risk to the individual investor. Someone who has both CDOs and Principal Protected Notes in their portfolio will have succeeded in increasing the risk and of reducing the return profile of their portfolio, while at the same paying the financial institution for the privilege.

Perfect circles exist almost everywhere. Note the individual with a static strategic asset allocation service comprised of indexed investment vehicles that also buys a relative value hedge fund. The indexed investments sell the relative value that the hedge funds buy to sell back to the investor at a price.

For further information on Collateralised Debt Obligations please note the following excerpt from a recent Bank of England speech²⁷.

...”whether the CDO factory has amplified the compression of credit spreads. The argument advanced goes roughly as follows: that, as credit spreads have fallen, the returns have become unattractive unless leveraged up; that the new technology for acquiring leverage has drawn new sources of capital – including

²⁶ These products have had their problems, note the following Bloomberg article; http://quote.bloomberg.com/apps/news?pid=10000039&refer=columnist_gilbert&sid=ap4adiVq8hKE

²⁷ <http://www.bankofengland.co.uk/publications/speeches/2006/speech273.pdf>

hedge funds – in to the credit markets; and that this increase in demand has fed through to a lower price for credit risk – i.e. lower spreads, easier covenants, etc – in the underlying loan markets, including for financing LBOs. These new instruments have of course emerged, and so have been priced, during a period when the default rate has been extraordinarily low.

A second question is whether the trade off between the demand for financial engineering and the demand for liquidity in the structured finance markets, not just amongst leveraged players, could switch – back to liquidity – if market conditions were to shift from benign to stressed. An illustration of what can potentially happen is perhaps provided by the disruption just over a decade ago in the US Collateralised Mortgage Obligation (CMO) market. After a period of ever more refined financial engineering of mortgage claims into capital market instruments, resulting in some fairly illiquid tranches being created, stress occurred when the dollar yield curve rose sharply in 1994. This underlines the importance of industry scenario analysis building in some allowance for the possibility of system-wide liquidity stresses.

A counterpart to whether market volatility could occur is the question of whether risk could flow back to the banking sector in adverse circumstances. Over the past decade, many banks have moved towards business models based around originating and distributing credit assets rather than holding them. But no one suggests that banks escape the risk completely. They warehouse risk before it can be securitized, and those warehouses will probably have grown with the volumes flowing through the securitisation markets. To a greater or lesser extent, they hold on to loans and securitised participations if they think them attractive, or perhaps punitively expensive to distribute. Through their prime brokerage operations, they finance leveraged holdings against collateral. And they sometimes provide committed lines of credit. Overall, this is akin to writing deeply out-of-the-money options, exposing the banking system to tail risk. That should not be too surprising given that commercial banks' liabilities are money, and so they are in the business of providing liquidity insurance. But it does make it difficult for market participants to assess, and price for, how much risk there is, albeit contingently, in the system as a whole."

Conclusion

For the derivatives market

Fundamentally derivatives are benign instruments that should theoretically help the management of risk at the margin and provide liquidity to areas of the market where demand relative to supply is low and returns relative to risk are high.

While many in the pro derivatives camp do not feel derivatives pose a risk to the financial system and, indeed the broad averages probably back this up (net liabilities outstanding after netting of trades and collateral), it must be stressed that a) this is not the risk the market will face in an extreme event and, b) averages hide a multitude of sins.

The **greatest risk** is posed by the transfer of risk from exchanges with many counterparties to a less liquid over the counter market place with few. It is a risk because contrary to the fundamentals of diversification, risk is being transferred to the few and to a medium that will be directly impacted by a risk event and the associated defaults of risk positions held by counterparties. Importantly it is a risk that has been transferred to the heart of the financial system, and, not away from it.

The derivatives market has expanded strongly during a period of easy money and perceived risks had fallen. With interest rates rising for some time in North America and Europe and on the rise in Asia, the demand for risk is falling and the cost of return is rising. As the demand for risk falls, the trades within the OTC market will need to adjust to the new risk pricing environment.

Rises in liquidity and falling risk has allowed many to leverage areas of lower marginal return, possibly to a greater extent, in certain areas, than ever before. As liquidity falls and risk moves back towards equilibrium, either the leveraged positions or the markets underlying these positions will become exposed, or both.

Indeed, the heavy selling in emerging markets and commodities has probably been influenced by the offsetting of leveraged hedge fund positions²⁸. If this is true, it is also proof that derivatives are being used in ways which are potentially destabilising to the financial system; that is reinforcing trends away from equilibrium. Derivative related buying/selling in its own right is not intrinsically evil, merely just another way in which securities or real assets can be bought and sold. What makes them dangerous is the combination of leverage in crowded trades and an inefficient exchange/clearing mechanism.

While over valuation and hence over crowding is a natural feature of an over extended market place, an efficient exchange can more easily and quickly adjust prices. One wonders how easy it will be to negotiate offsetting OTC contracts in a market downturn when seconds and not days are crucial. Warren Buffett's comments over the tremendous difficulty in unwinding General Res positions should be words of warning.

It is possible that the excess liquidity and low interest rates in the financial system has helped create a derivative induced risk pricing bubble. It is also probably that derivative aided risk pricing bubbles will be a feature of the future as they continue to extend their global reach and from the institutional to the retail investor.

One of the greatest concerns is the lack of transparency over the risk in a market place whose primary role is to earn a return and promote the expansion of its risk products. To say that this is a moral hazard is an understatement.

²⁸ With no access to data that can specifically confirm this, we cannot say this for definite.

For the consumer

Much of the financial services industry is now clearly in the business of recycling risk and, as risk is recycled the marginal return on risk falls. Many of the so called risk management products in the market place today are designed to either capture return or sell the recycled risk (higher cost/lower return), with the unwitting investor unaware of the returns they are selling and the risks they are buying.

What is ultimately ironic for the consumer, is that by ignoring relative value the modern portfolio theory influenced mean variance optimisers used to construct many a portfolio, are providing the fodder for hedge fund strategy. Also, by ignoring relative value they ignore the ability to engineer higher risk adjusted return, exposing investors to potentially higher risk and lower returns; *indeed mean variance optimisers expose investors to the trend.*

The investor must remember that the first stop for risk management is the portfolio structure and the management of structure and relative value.

Useful internet references and resources

- **Bank of France Financial Stability Review**
 - http://www.banque-france.fr/gb/publications/telechar/rsf/2006/etud1_0506.pdf
- **Bank of England**
 - Uncertainty, The Implementation Of Monetary Policy, And The Management Of Risk
 - <http://www.bankofengland.co.uk/publications/speeches/2006/speech273.pdf>
 - Financial Stability Review
 - <http://www.bankofengland.co.uk/publications/fsr/index.htm>
- **Bank for International Settlements Six Monthly Report on the OTC Market**
 - <http://www.bis.org/press/p060519a.htm>
- **Do Credit Derivatives Increase Bank Risk?**
 - <http://www.cerf.cam.ac.uk/events/files/Instefjord.pdf>
- **European Central Bank – Financial Stability Review**
 - <http://www.ecb.int/pub/pdf/other/financialstabilityreview200606en.pdf>
- **Federal Reserve Board**
 - <http://www.federalreserve.gov/boarddocs/speeches/2005/20050505/default.htm>
 - <http://www.federalreserve.gov/boarddocs/speeches/2003/20030508/default.htm>
 - <http://www.federalreserve.gov/Boarddocs/Speeches/2001/20011016/default.htm>
- **Financial Times; a lot of hedge fund and derivative related articles over the last 6 months.**
- **Fitch**
 - <http://fitchcdx.com/>
- **Forbes - JP Morgan - derivatives concentration small threat, 2004**
 - <http://www.forbes.com/reuters/newswire/2004/03/31/rtr1318534.html>
- **Lehman Brothers Guide to Exotic Credit Derivatives**
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 - <http://news.bbc.co.uk/1/hi/business/2817995.stm>

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 - <http://www.berkshirehathaway.com/2002ar/2002ar.pdf>
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- **Cato Institute – “Too Big to Fail? Long-Term Capital Management and the Federal Reserve” by Kevin Dowd**
 - <http://www.cato.org/pubs/briefs/bp52.pdf>
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 - <http://www.cme.com/about/>
- **Testimony of Frank Partnoy -Professor of Law, University of San Diego School of Law. Hearings before the United States Senate Committee on Governmental Affairs, January 24, 2002**
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- **FOW online magazine - Concentration in the derivatives market, article,**
 - http://www.fow.com/articles/fow_article.asp?storyCode=2746
- **IMF**
 - Global Financial Stability Report
 - <http://www.imf.org/external/pubs/ft/GFSR/2006/01/index.htm>
 - Managing Financial Risks—The Insurance Industry
 - <http://www.imf.org/external/np/tr/2004/tr040630.htm>
- **Mckinsey - The Real Risks of Credit Derivatives**
 - http://www.mckinseyquarterly.com/article_page.aspx?ar=1505&L2=10&L3=52
- **Joint Forum on Credit Risk Transfer**
 - http://www.osc.gov.on.ca/International/consultations/cc_20050300_jf_credit-risk-rpt.pdf
- **NBER - The Economics of Derivatives**
 - <http://www.nber.org/digest/jan05/w10674.html>
- **New York Federal Reserve**
 - Implications of Growth in Credit Derivatives for Financial Stability
 - <http://www.ny.frb.org/newsevents/speeches/2006/gei060516.html>
 - Comments by Chairman at the New York University Stern School of Business.
 - <http://www.ny.frb.org/newsevents/speeches/2006/gei060516.html>
- **Officer of the Comptroller of the Currency – Annual Report 2005**

- <http://www.occ.treas.gov/annrpt/annual.htm>
- **Reserve Bank of Australia - CDOs**
 - http://www.rba.gov.au/PublicationsAndResearch/FinancialStabilityReview/Sep2005/Html/collateral_debt.html
- **Risk glossary.com**
 - http://www.riskglossary.com/link/ARCH_GARCH.htm
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 - <http://riskinstitute.ch/>
- **RiskMetrics**
 - <http://www.riskmetrics.com/journals.html>
- **Standard & Poors**
 - [Banks around the globe Concentration risk](#)
- **UK Financial Services authority – Financial Risk Outlook 2006 & 2004**
 - http://www.fsa.gov.uk/pubs/plan/financial_risk_outlook_2006.pdf
 - http://www.fsa.gov.uk/pubs/plan/financial_risk_outlook_2004.pdf
- **UBS – information on CDOs**
 - <http://keyinvest.ibb.ubs.com/k2/DE/de/tiles/knowhow.ki?3=Performance&2=knowhow&1=fisp&knowhow2=64>
- **Other**
 - http://www.fenews.com/fen42/euro_angles/euro_angles.html
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