



The Actuarial Profession

making financial sense of the future

The Hidden Cost of Leverage

Applying the lessons of the financial crisis

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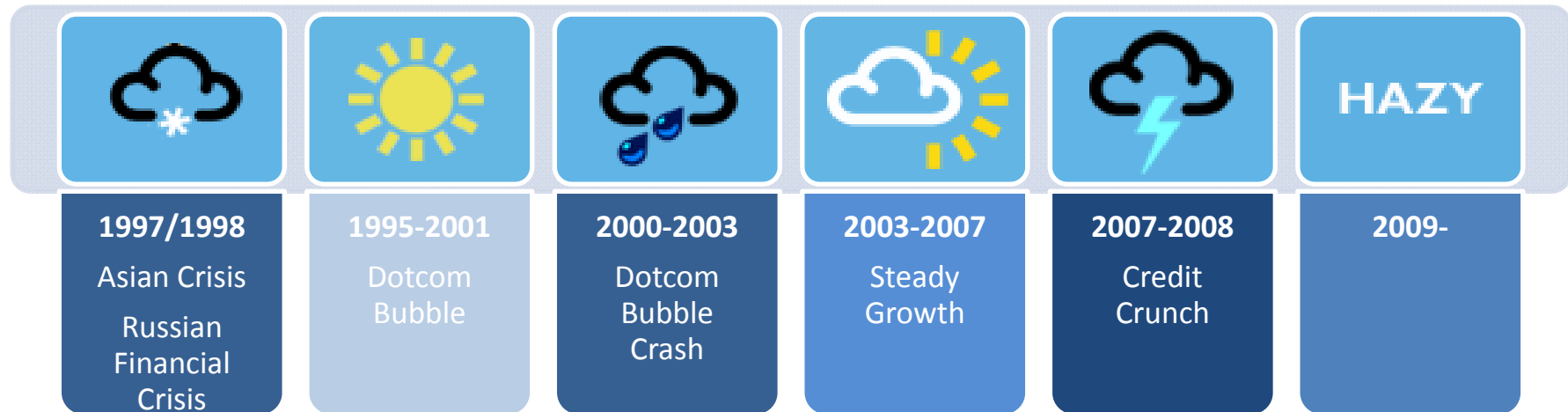
REDINGTON 

Hidden Cost of Leverage



Timeline: 1997-2009

“Isn't it interesting that the same people who laugh at science fiction listen to weather forecasts and economists?” – Kelvin Throop III



“Under this Government, Britain will not return to the boom and bust of the past.” – HM Treasury, Budget 2000



“I believe that the general growth in large [financial] institutions have occurred in...markets in which many of the larger risks are dramatically -- I should say, fully -- hedged.” – Alan Greenspan, Chairman of the Federal Reserve (2000)

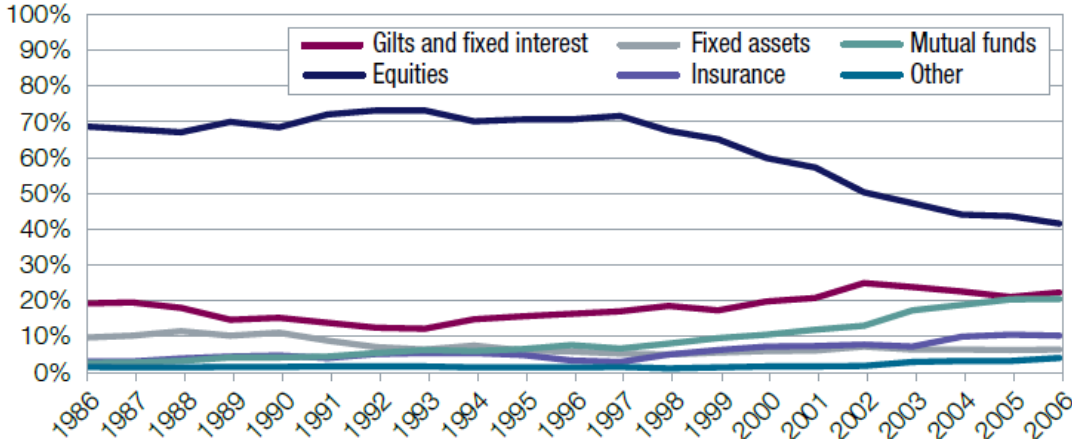
“These problems...are unprecedented... We will not and must not relax our efforts to move this economy through the downturn back to a period of growth.” – Gordon Brown, Prime Minister (2009)





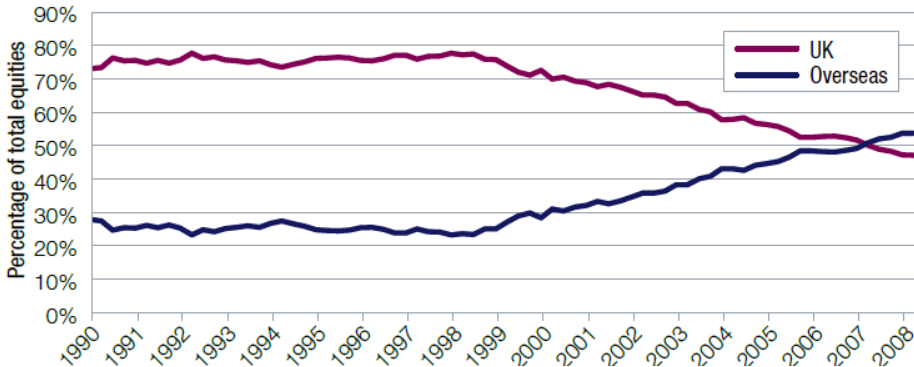
Diversification Away From Equities

Asset Allocation by Percentage Share and Asset Class

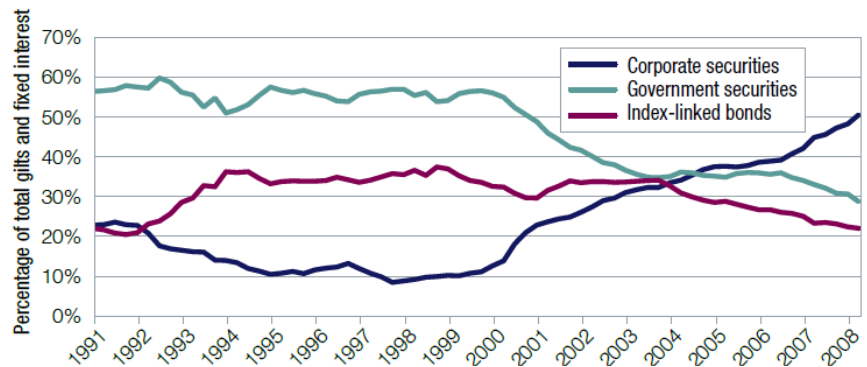


- Institutional investors such as pension funds have been reducing their investment in equities over the past twenty years.
- Instead, money has been invested both into bonds and new asset classes like hedge funds and private equity.

Proportion of Total Equities Held in the UK and Overseas



Proportion of Total Gilts and Fixed Interest Assets

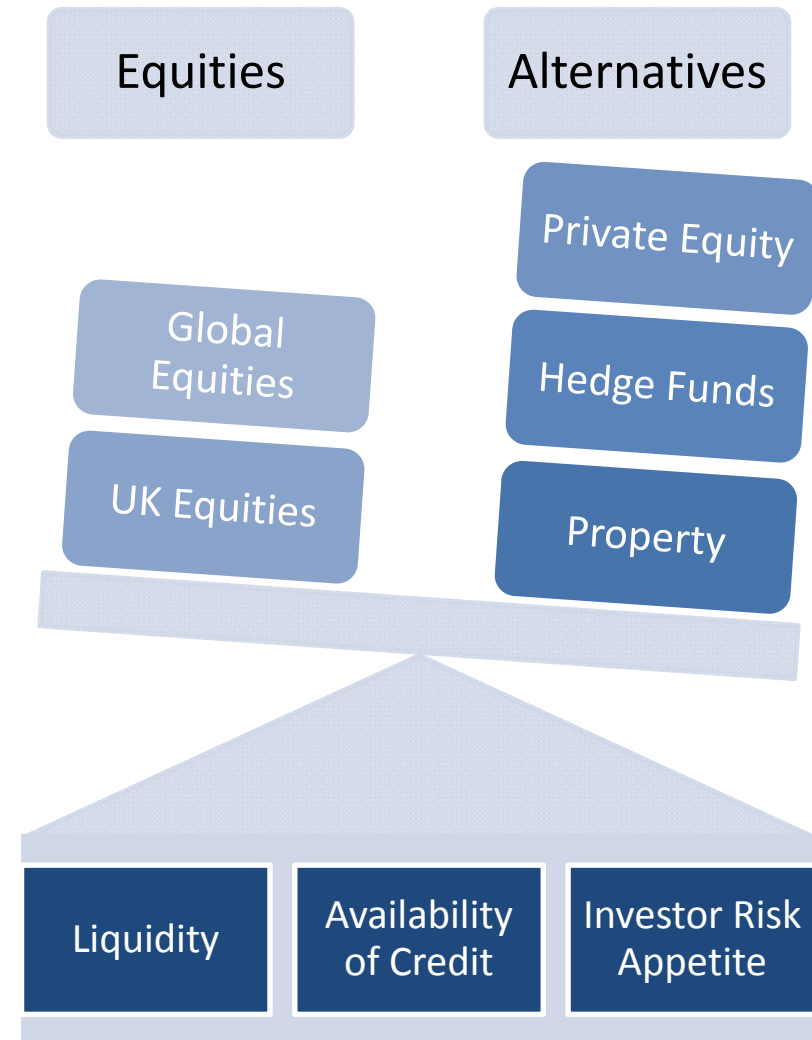


Source: ONS
* Data includes local authorities and defined contribution schemes



The shifting sands of boom and bust

- These changing trends were driven by investors seeking:
 - **Higher excess returns** over gilts during a period of low interest rates;
 - **Diversification** benefits for the overall portfolio.
- Adverse market conditions have revealed that the excess returns were dependent on key market factors: **liquidity, availability of credit** and **investor risk appetite**.
- As they disappeared, such seemingly diversified portfolios experienced losses across all these asset classes.



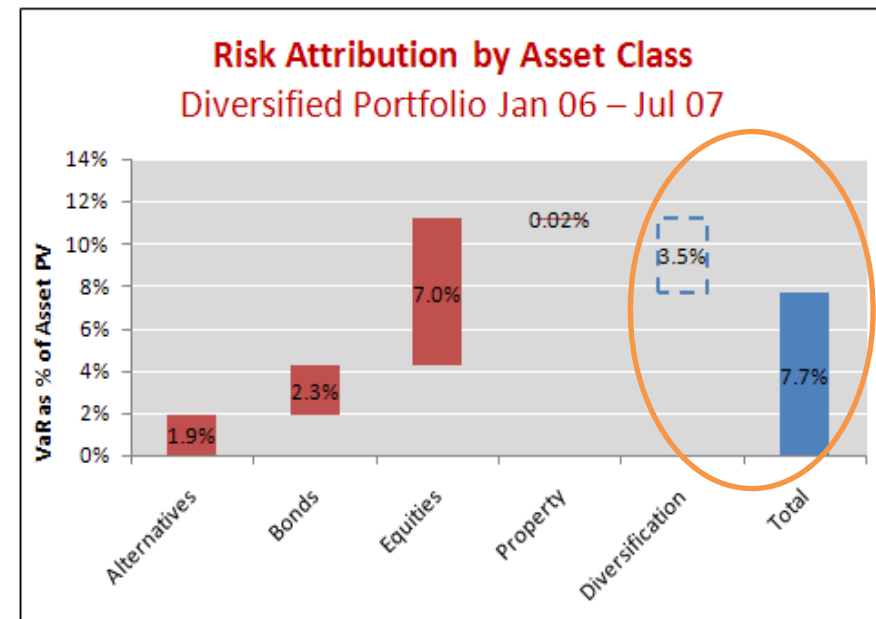
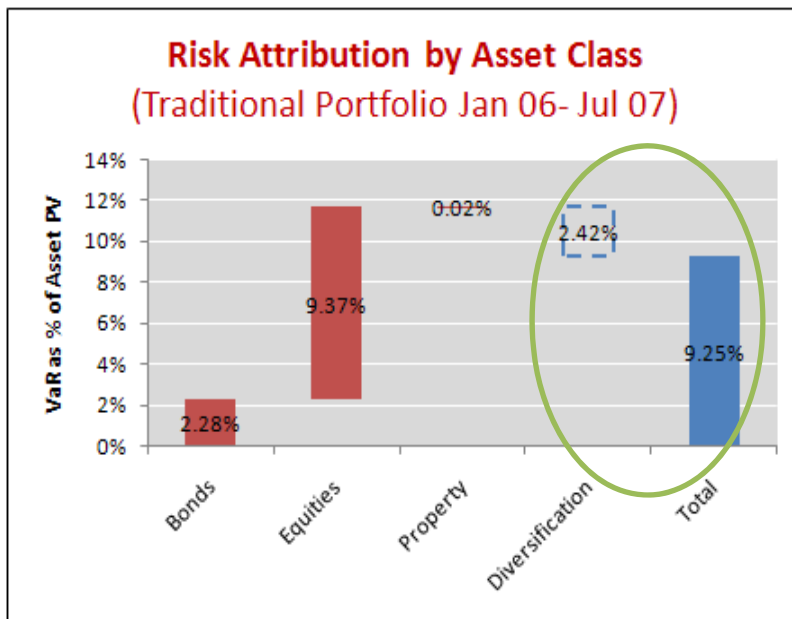


Dependency on Diversification

- Consider a pension scheme (pre-crisis) invested substantially in equities with little allocation to alternative investments.

Diversification benefit = **20.7%** of total VaR.

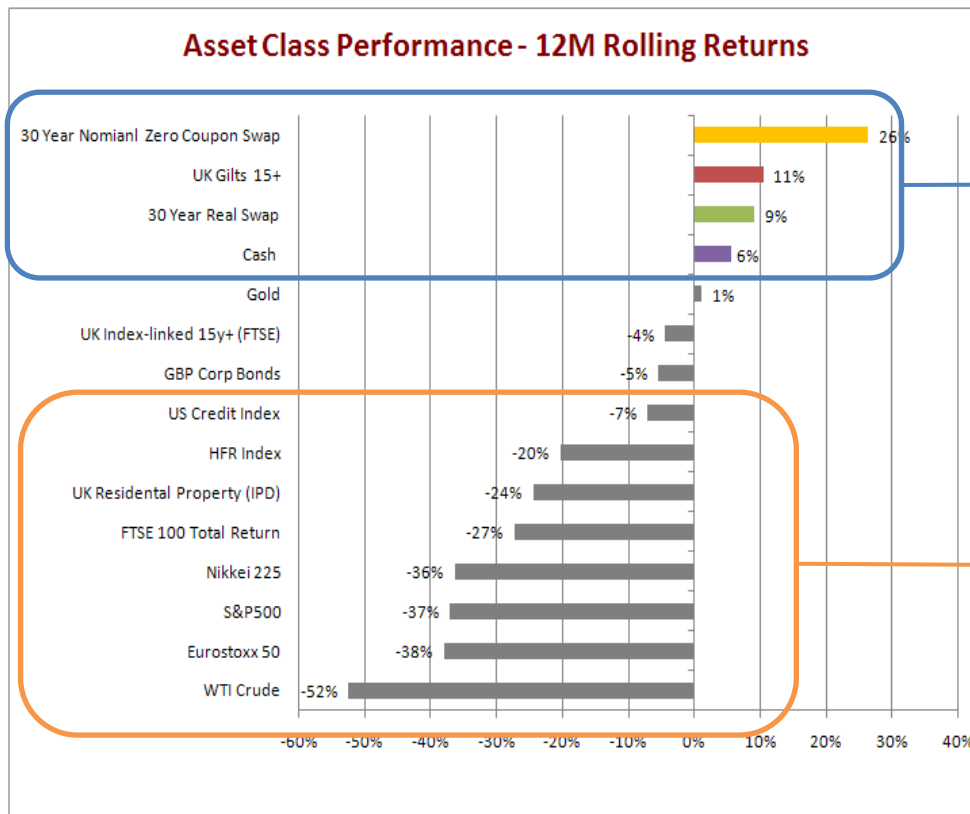
Diversification benefit after selling some equities and investing in alternatives = **31.3%** of total VaR



The impact of making an allocation to alternative assets is a decrease in Total VaR.



The Historical Data Raises Some Key Questions:



- Are matching assets uncorrelated to growth assets ?

- Are most growth assets correlated with each other?

Source: Bloomberg / Barclays Capital Redington – Jan 2008 to Dec 2008

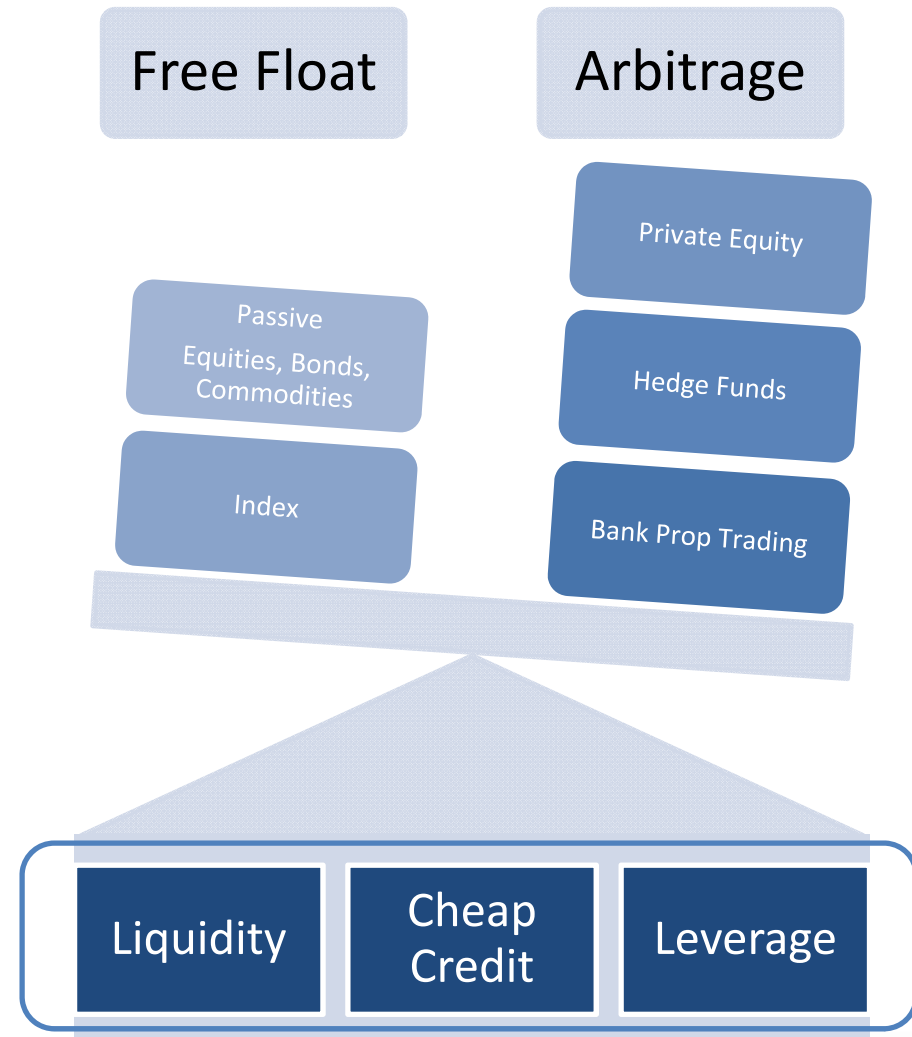
Is diversification working?



What has changed?

- Globalisation has meant;
 - **Markets more correlated** and a much higher level of interconnectedness than people thought;
 - **Influence of new investors** such as hedge funds, bank prop desks, sovereign wealth funds, trying to arbitrage the markets and
 - **Passive investors/funds** growing in size and tracking the market up & down

• Underpinning all asset classes traditional and alternative...





Hedge Fund Leverage: 2008

(USD Billions)		AUM		Book Size
June 2008		1,800	4X Leverage	7,200
Performance: -20%	-360			
FX Losses	-100			
Subtotal		1,340		
Redemptions: est. 20%	-300			
January 2009		1,040	1.5X Leverage	1,500

The total size of Hedge Fund books declined by c.80%

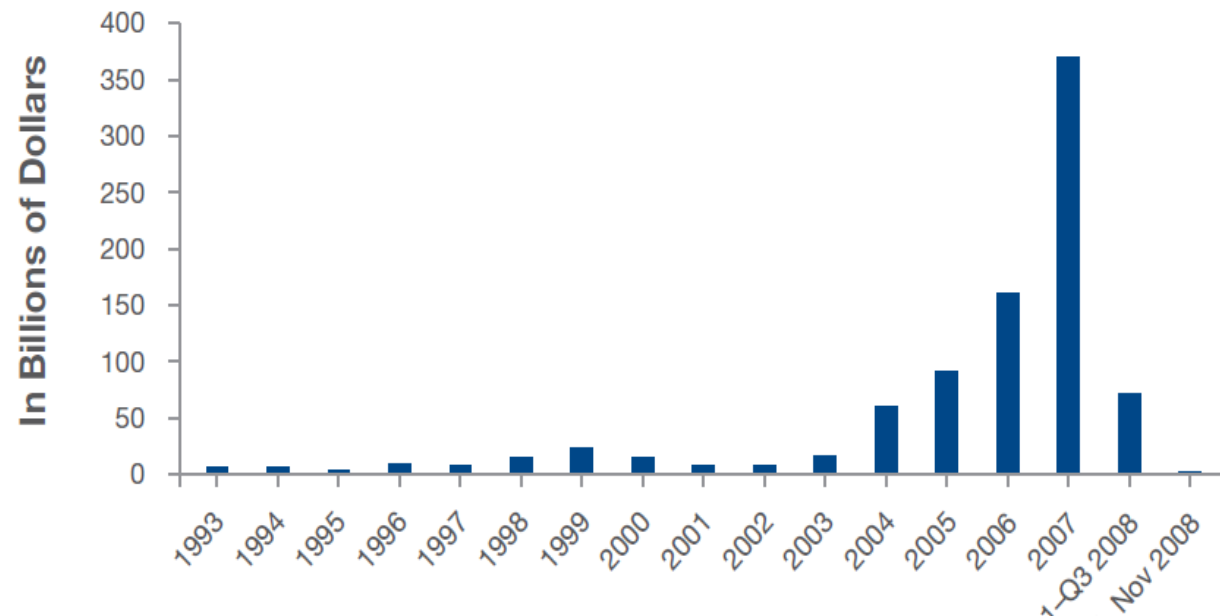
Source: FRM, HFR



Private Equity Leverage

- From 2003 to 2007, debt issues related to private equity transactions in the US rose from \$17 billion to \$379 billion.
- With the onset of the financial crisis, new debt for private equity acquisition fell 75 percent in the third quarter of 2008, compared to the third quarter of 2007.

New leverage for US Private Equity Transactions, 1993-2008

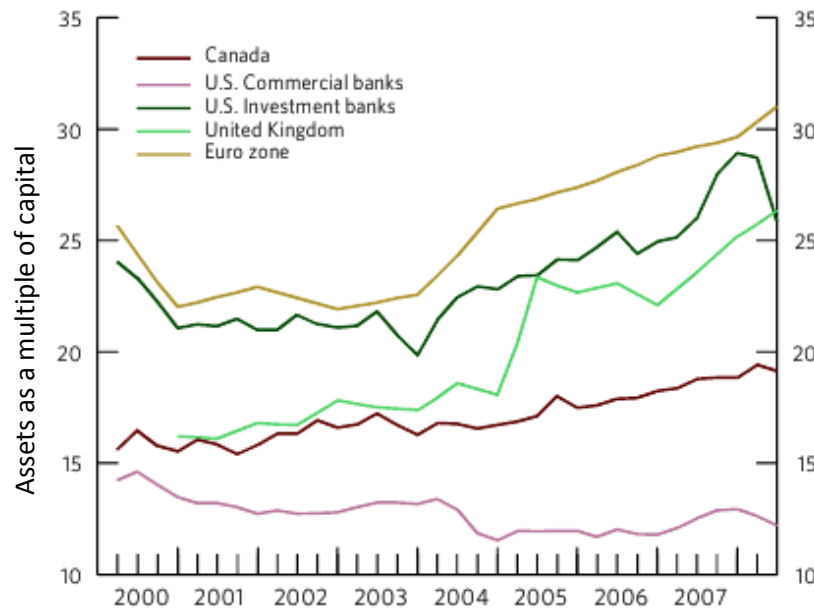


Source: R. J. Shapiro, *The Role of Private Equity Sector Promoting Economic Recovery*, March 2009,



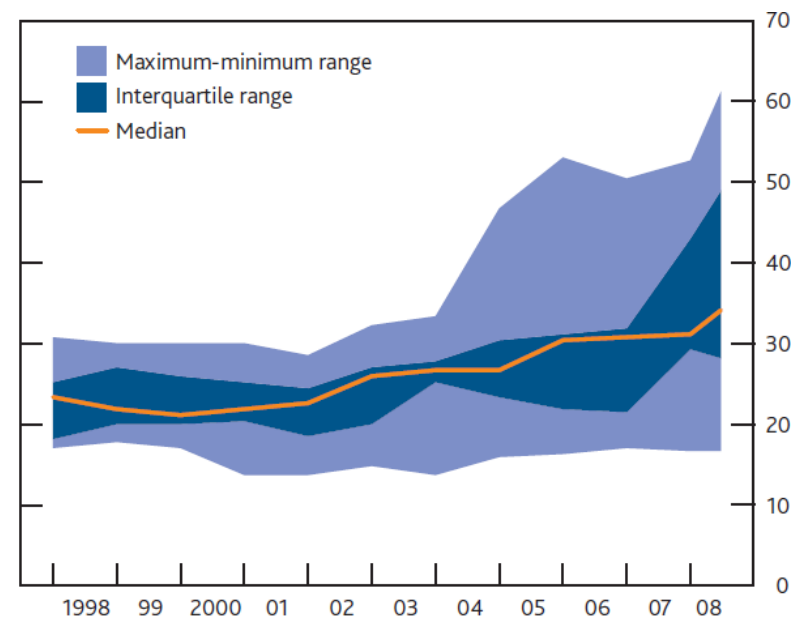
Increasing use of Leverage by Banks

Banking Sector Leverage



Source: Bloomberg and bank financial statements

Major UK Banks' Leverage

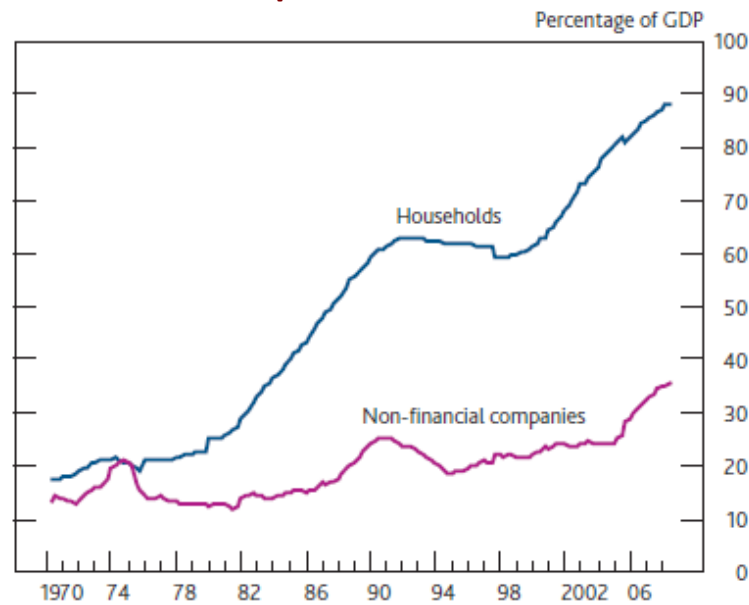


Source: Bank of England, Financial stability Report Oct 2008



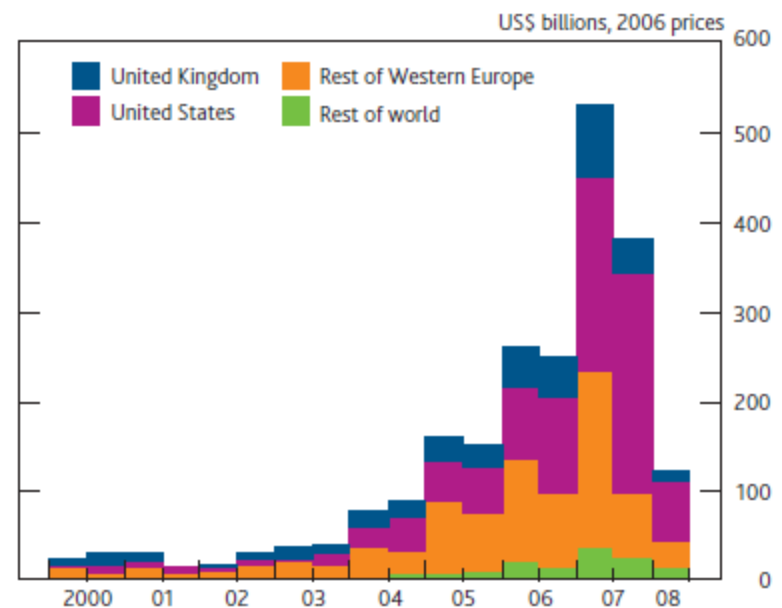
Increased Lending Banks Financed by Leverage

Bank Lending to Households and Non-Financial Companies in the UK



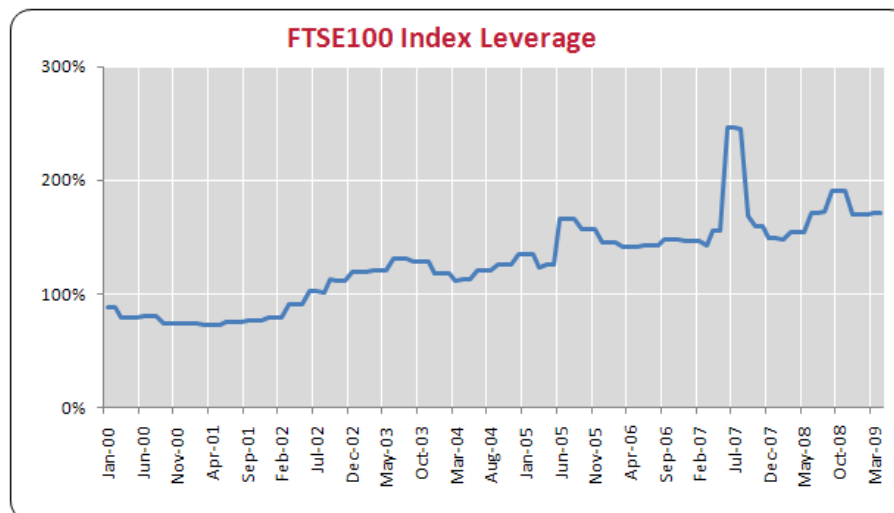
Source: Bank of England, Financial stability Report Oct 2008

Real Leveraged Buyout Loan Issuance



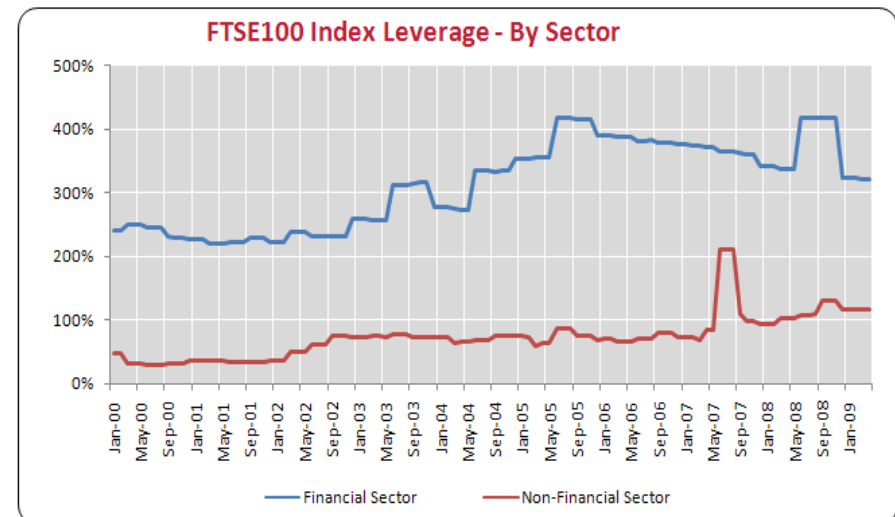


Equity Leverage



Source: Bloomberg and Redington

The increase in leverage is illustrated by the FTSE100 Index Debt-to-Equity Ratio.

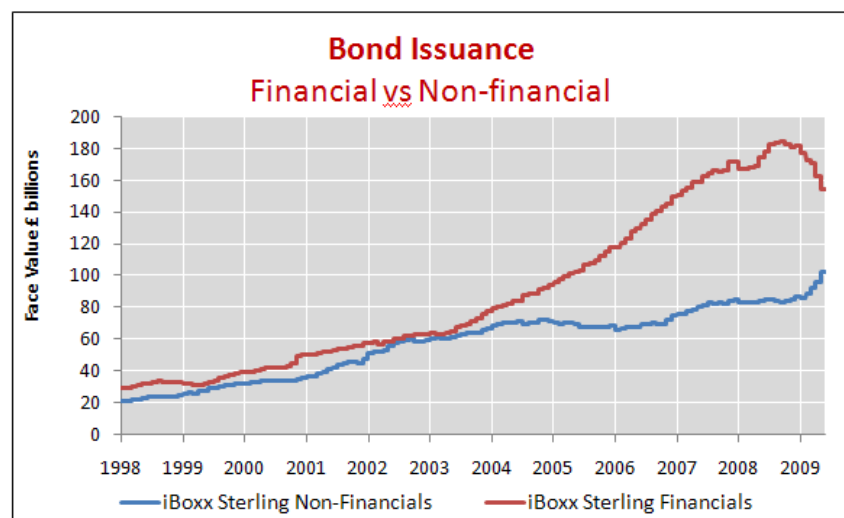


Source: Bloomberg and Redington

Companies in the financial sector use more debt as a source of financing, despite tending to have higher equity beta.

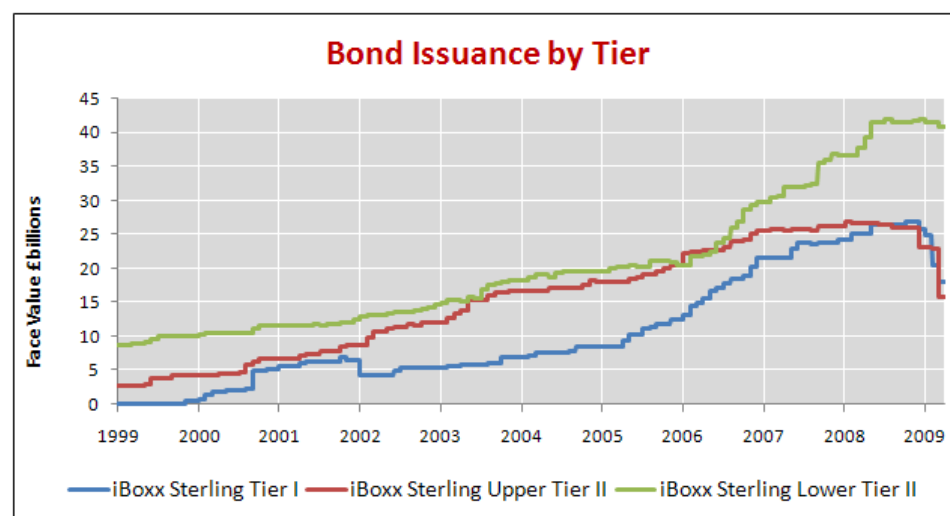


Bond Issuance



Source: Bloomberg and Redington

Bond issuance increased over the period, particularly in the financial sector.



Source: Bloomberg and Redington

Issuance of subordinated financial debt increased until 2008, but has since fallen.

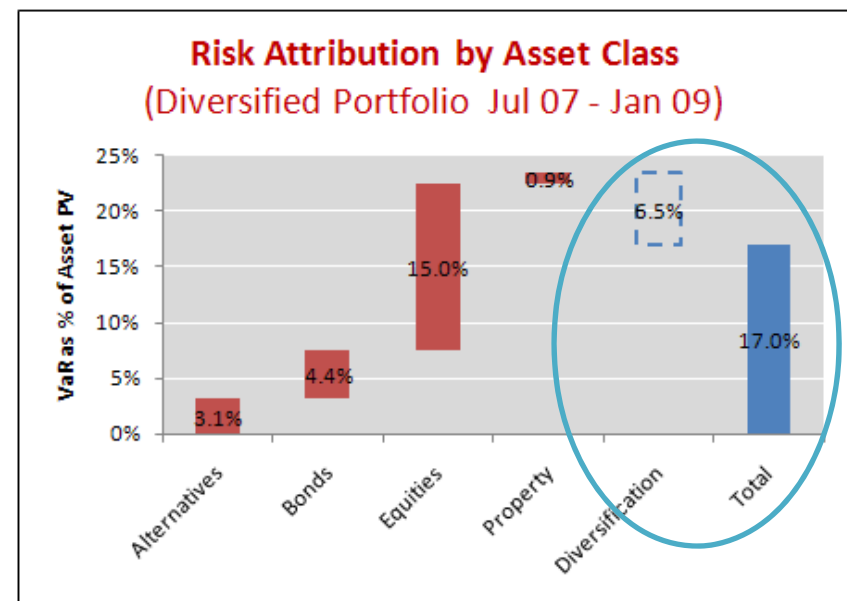
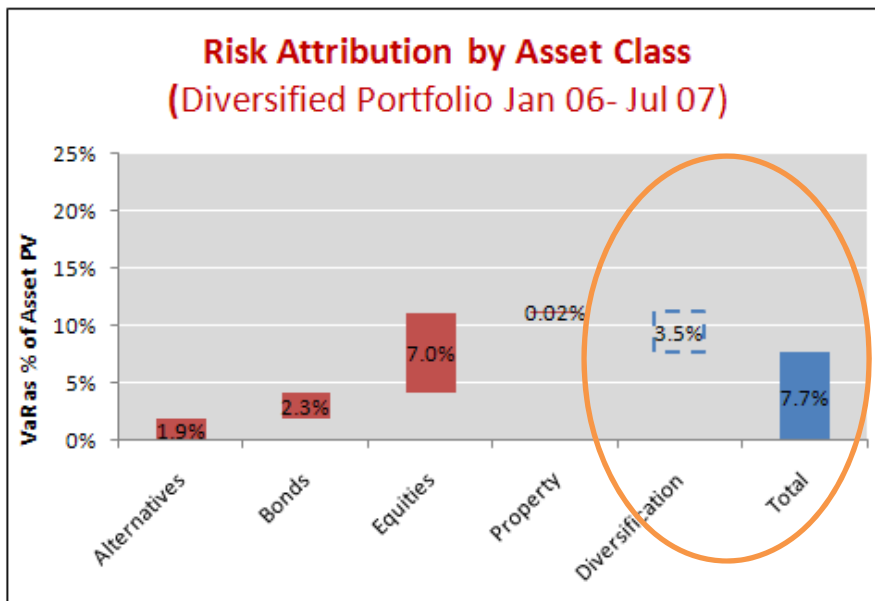


Impact of the Financial Crisis

Recalculating the risk of the example portfolio in the light of the financial crisis:

Diversification benefit at July 2007, before the financial crisis = **31.3%** of total VaR.

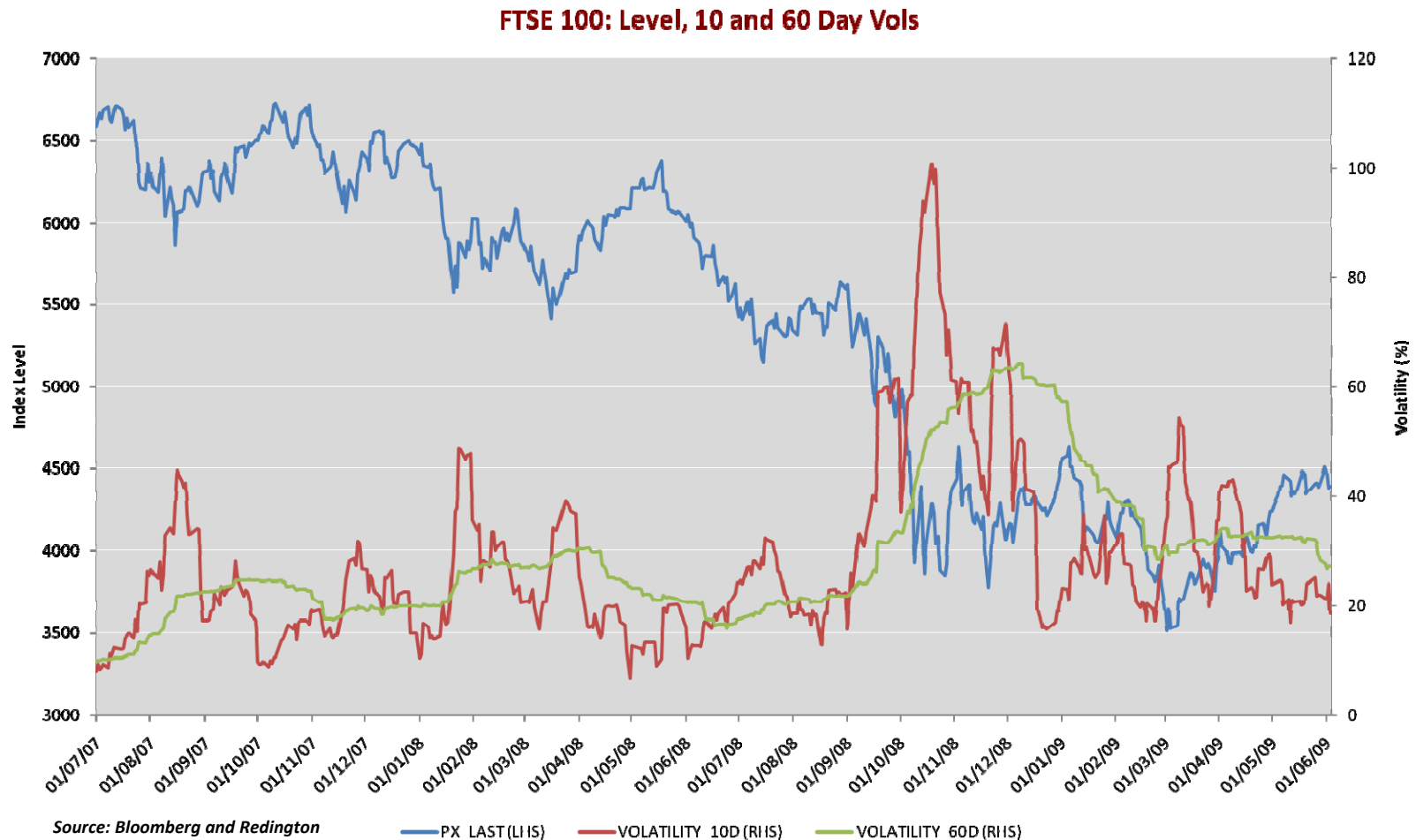
Diversification benefit following the financial crisis = **27.7%** of total VaR



Without changing the asset allocation, total risk has increased, and the diversification benefit has decreased.



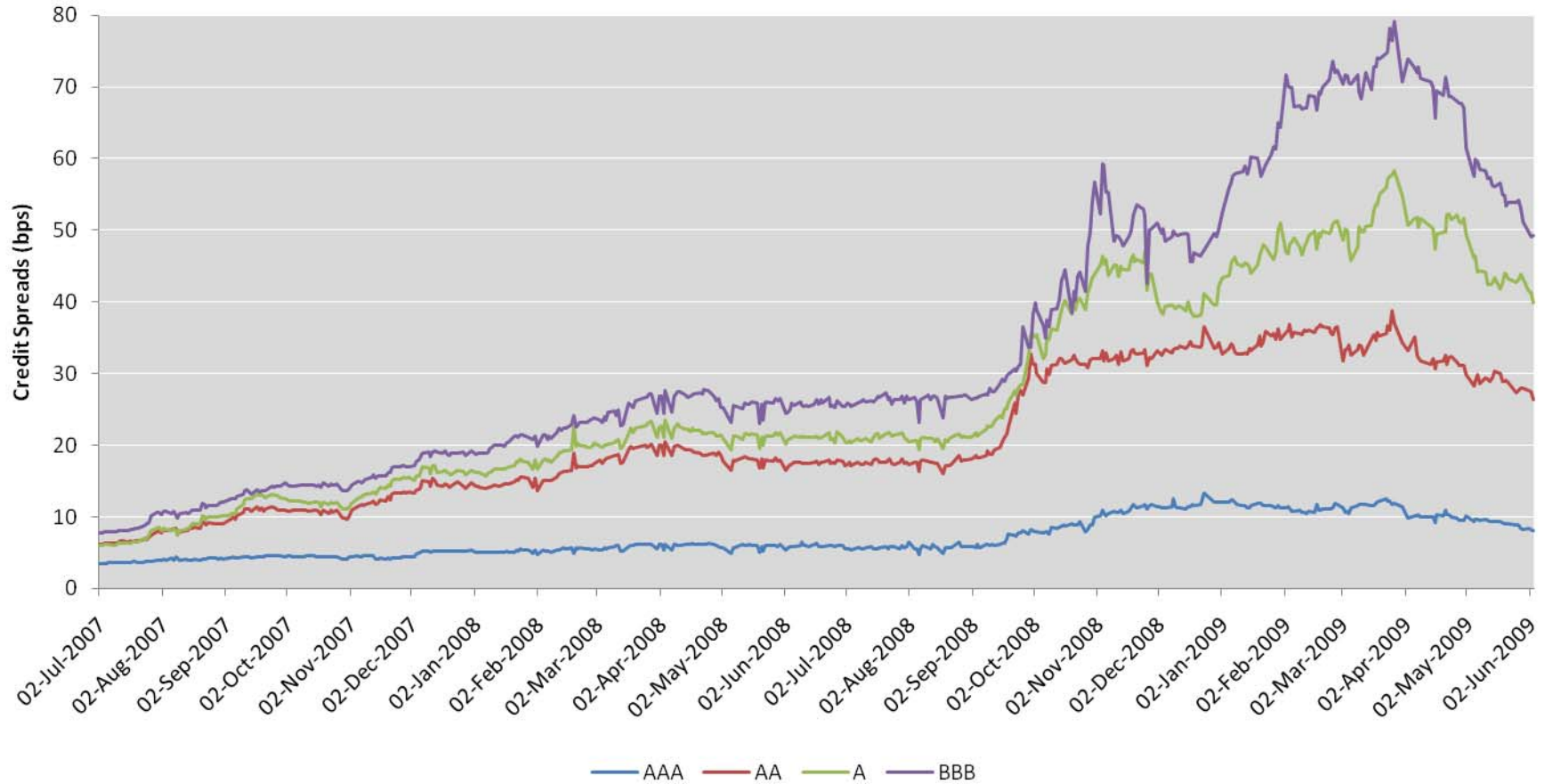
Significant increase in systemic risk



Falling asset values and increased volatility



iBoxx Historical Bid-Offer Spreads by Rating

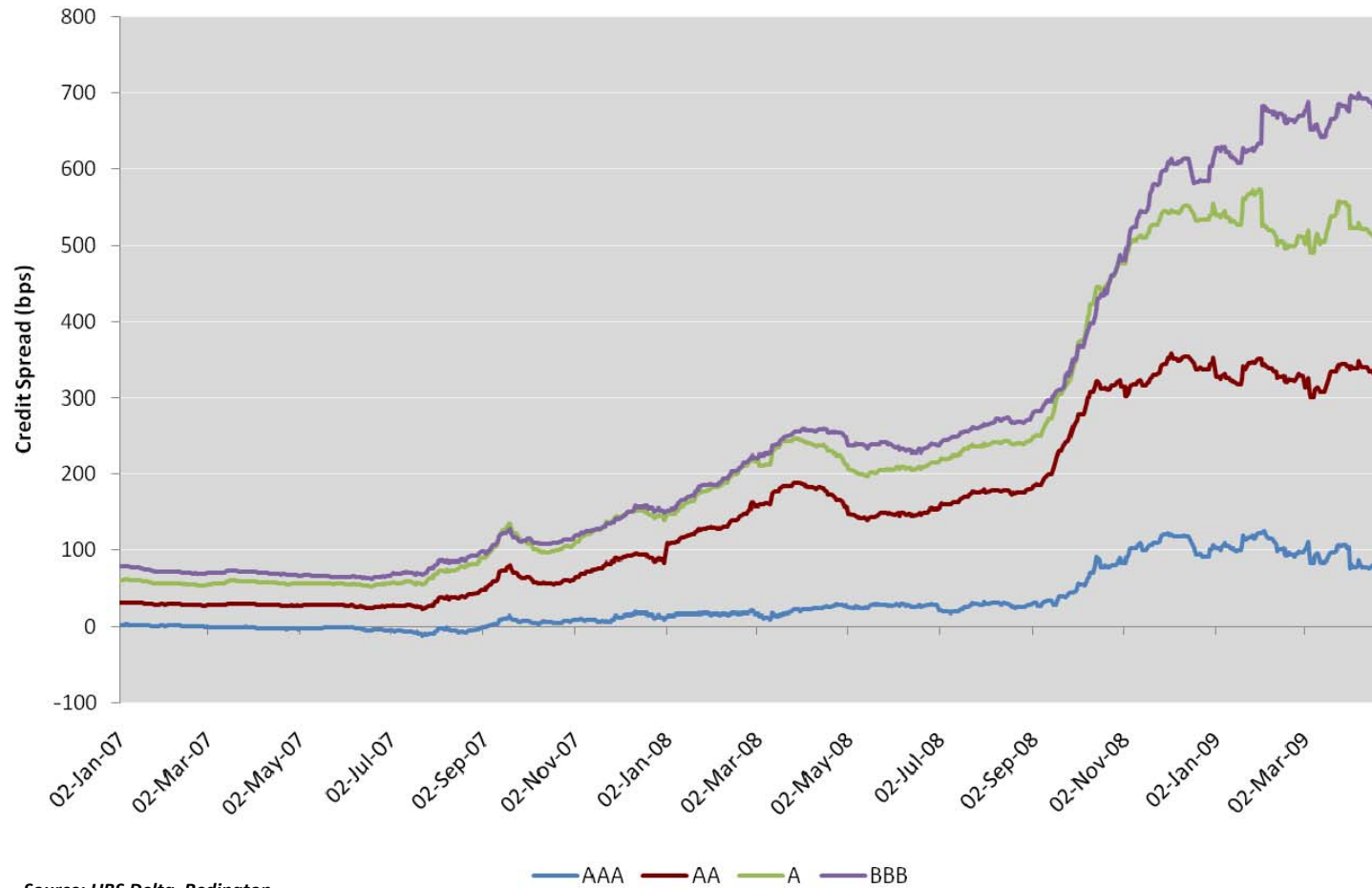


Source: UBS Delta, Redington

Liquidity disappeared from credit markets



iBoxx Historical Credit Spreads by Rating



Source: UBS Delta, Redington

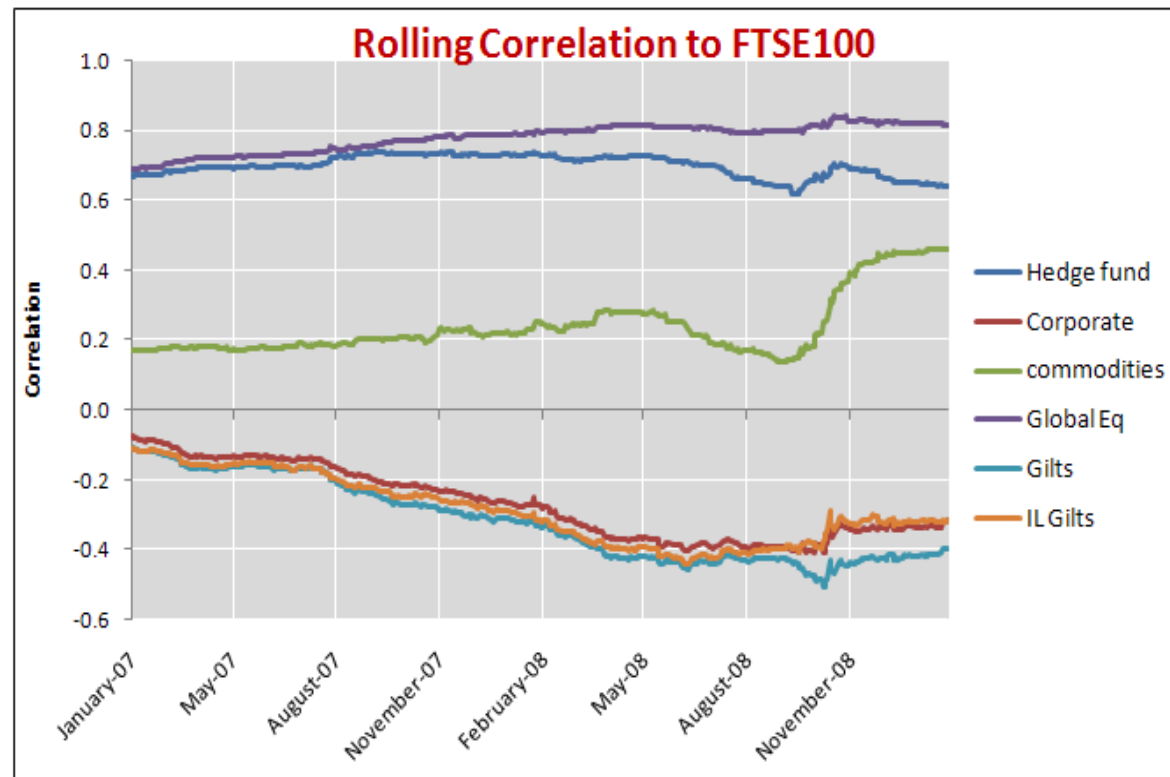
Credit spreads widened sharply



Correlation between Asset Classes

Correlations between hedge funds, global equity and commodities and the FTSE100 were relatively stable in 2007, but became more volatile in 2008.

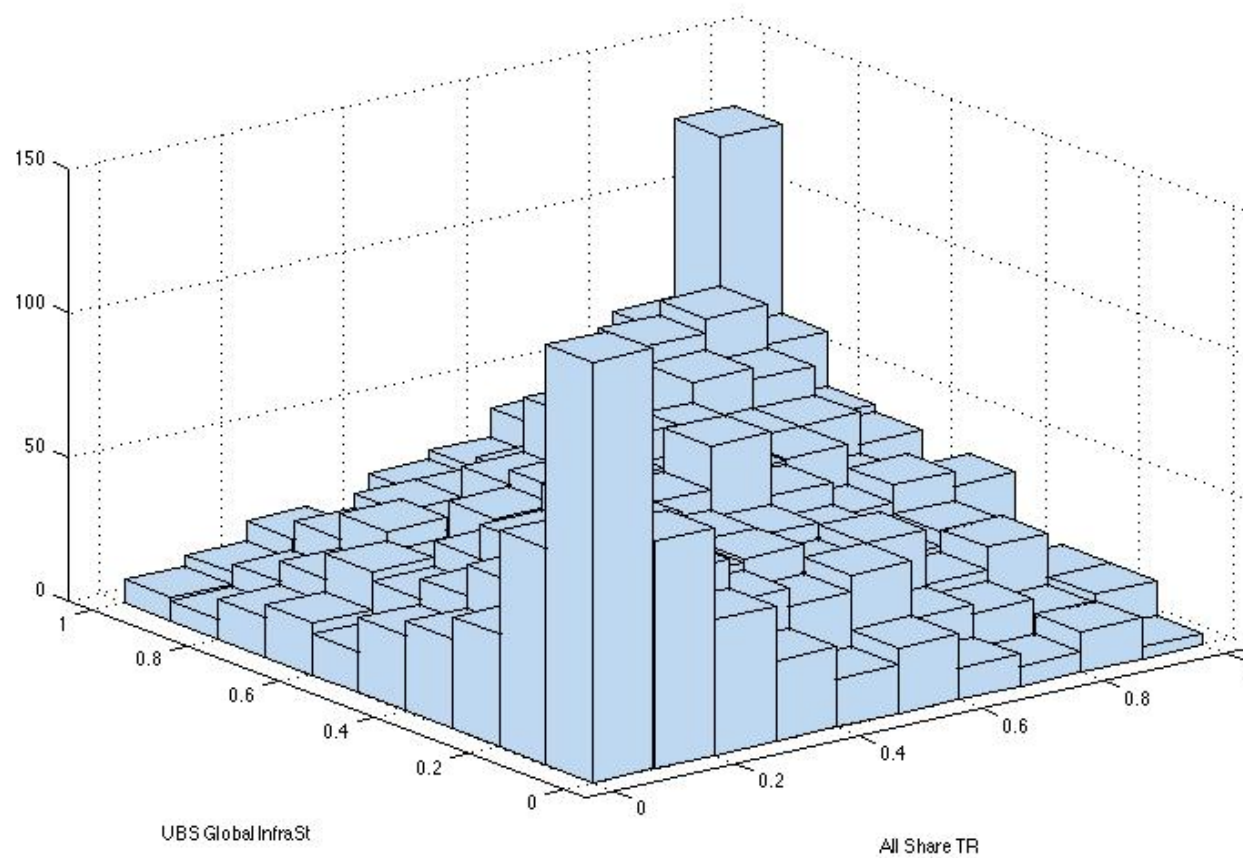
The correlation between UK equities and commodities became significantly higher in 2008.



Source: Bloomberg and Redington



Correlation between Asset Classes



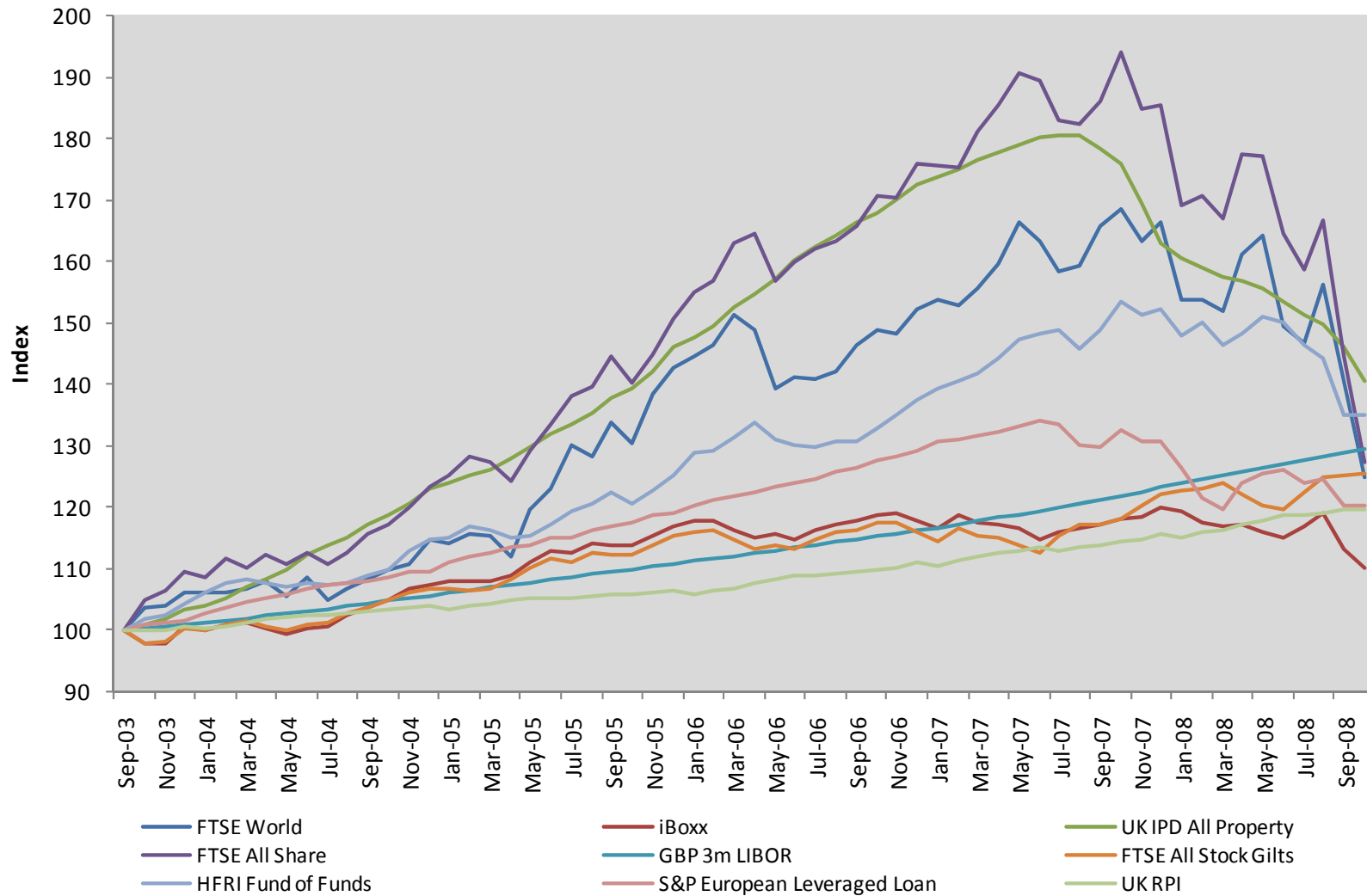
Source: Redington

Market Risk Attribution



End of diversification?

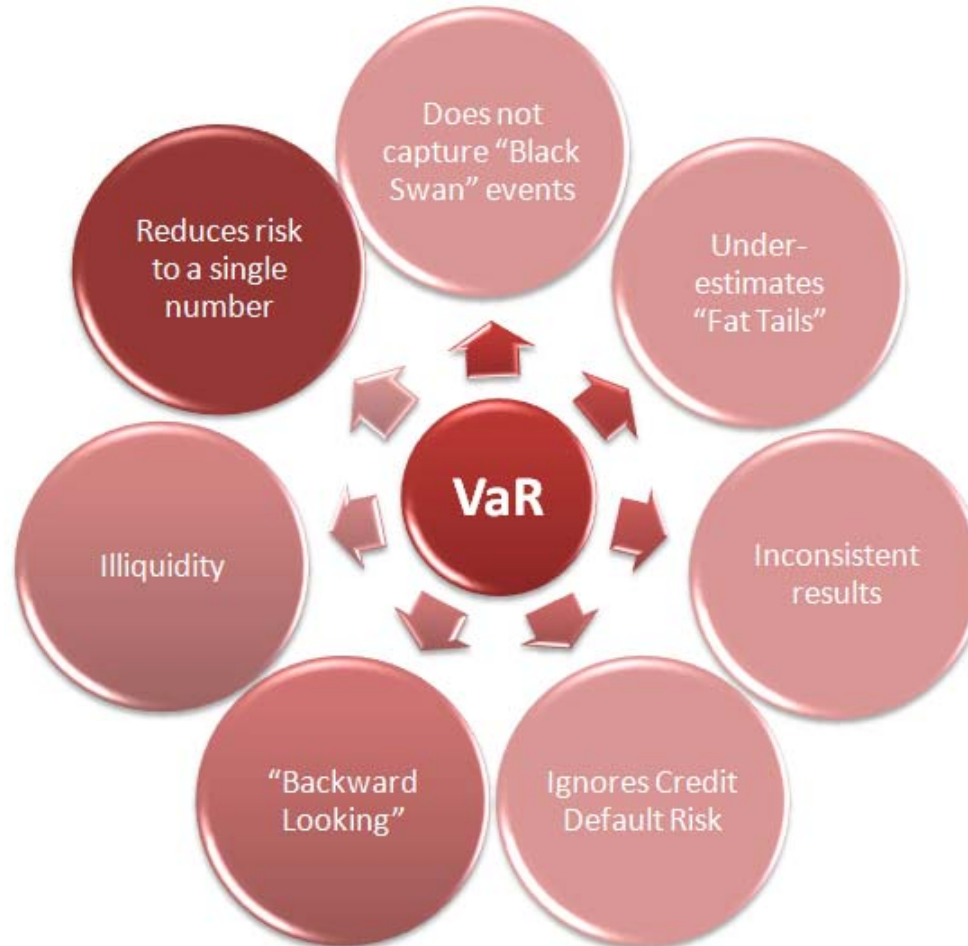
End of diversification?



Source: Redington; Sep 2003 – Sep 2008



Interpreting VaR: risk is only calculated within set confidence limits

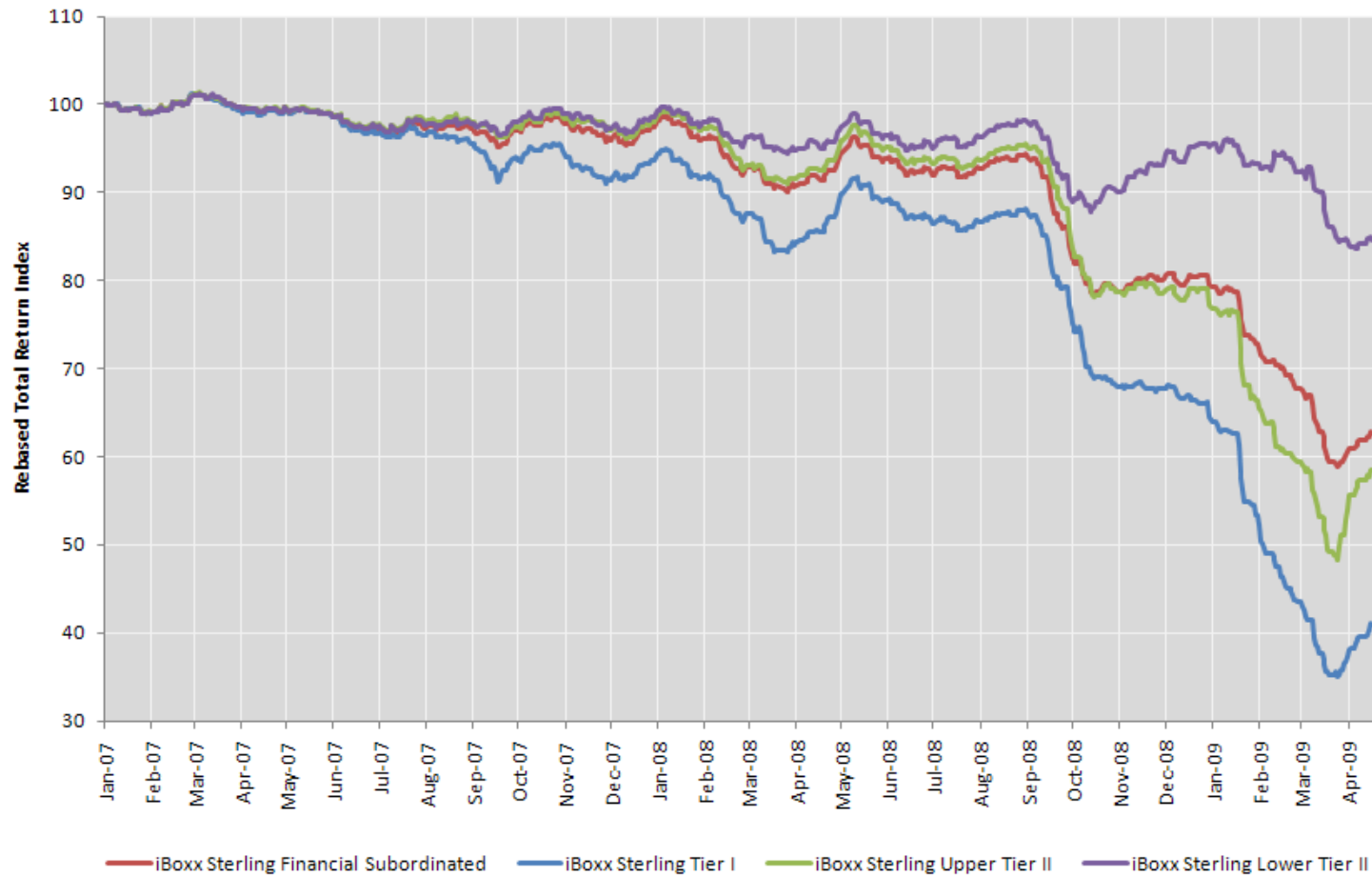


Extensive sensitivity and scenario analysis complement VaR analysis and identifies the risks it does not capture.



Rapid Deterioration in Sub-Financial Credit

UK Sub-Financial Sector

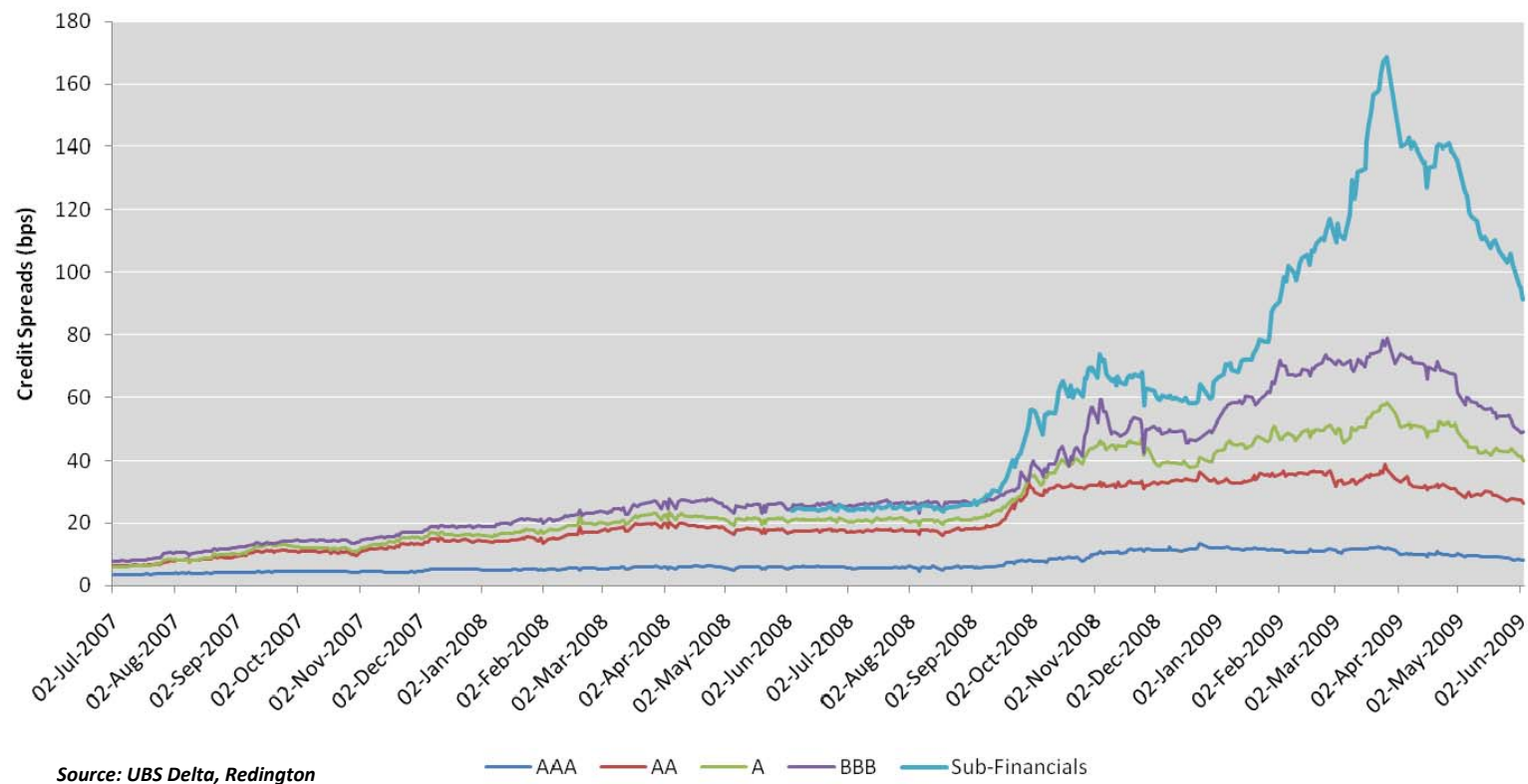


Source: Barclays /Redington; Sep 2003 – Sep 2008



Simultaneous Disappearance of Liquidity

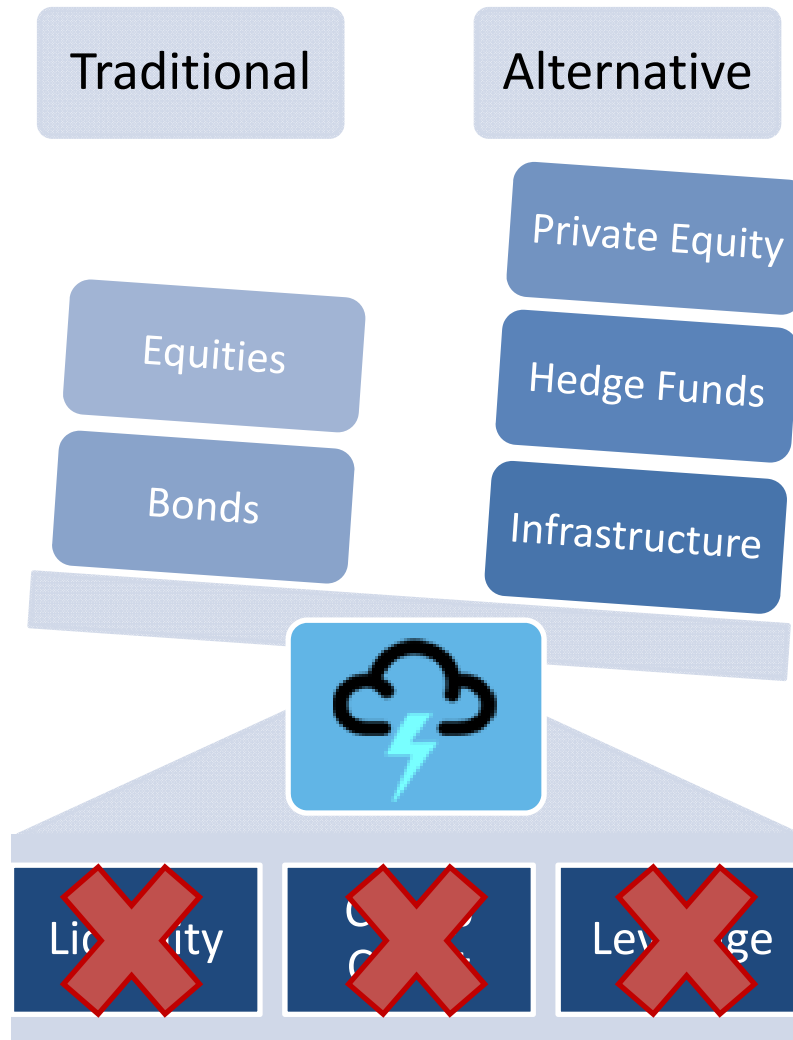
iBoxx Historical Bid-Offer Spreads by Rating



Liquidity dried up across credit markets, but particularly in sub-financial debt.



Broken – but has de leveraging stopped?



Alan Greenspan's legacy



Concluding thoughts

- Actuaries have the opportunity to help clients with their skills and experience to apply **judgement** – common sense to look beyond the models.
 - Use other lenses
 - Ask what if questions
 - Monitor change and understand what's causing the change
 - Do assumptions and models need to be revisited/revise
- Three rules to beat the Tiger
 1. Observe
 2. Analyse
 3. Challenge

Thank you and Good luck!





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