Dealing with Predictable Irrationality – Actuarial Ideas to Strengthen Global Financial Risk Management

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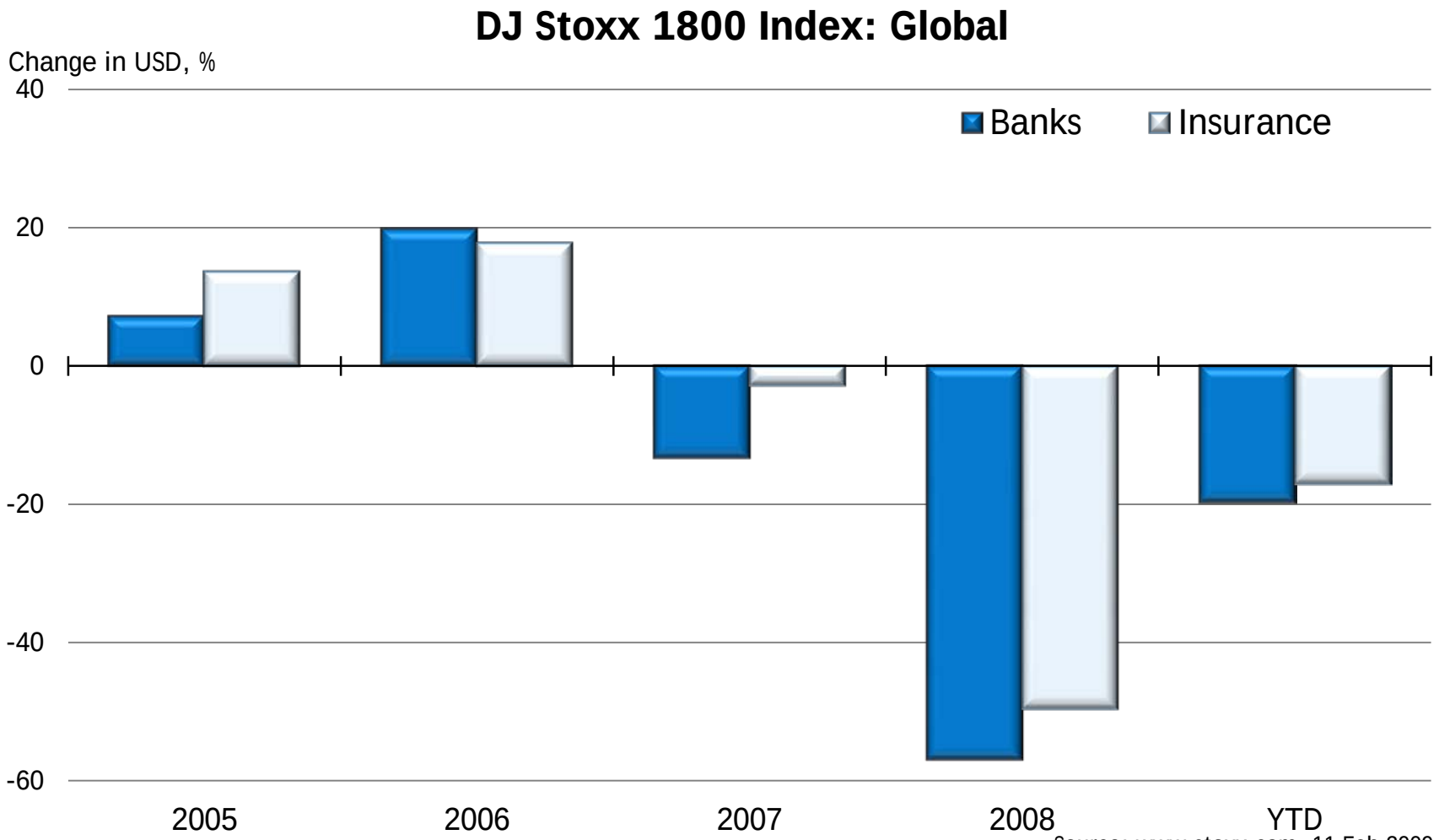
IAA

The International Actuarial Association (IAA), representing the global actuarial profession, sees many lessons being learned from the current crisis

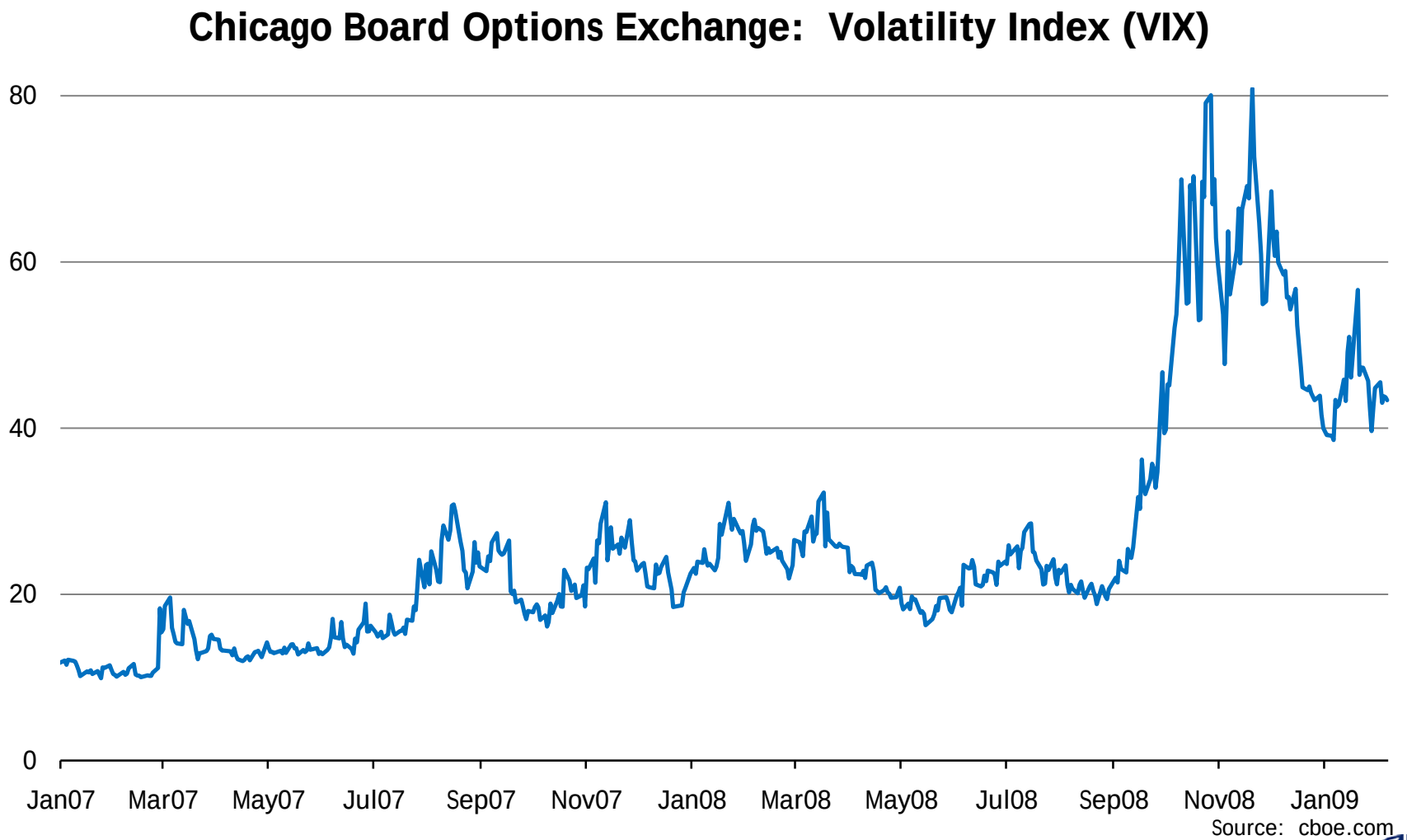
Actuaries, experienced in measuring and managing risk, are suggesting potential reforms, improvements and solutions applicable across the financial services sector

Market Valuation of Insurers –
Similar to Banks, but smaller value reduction



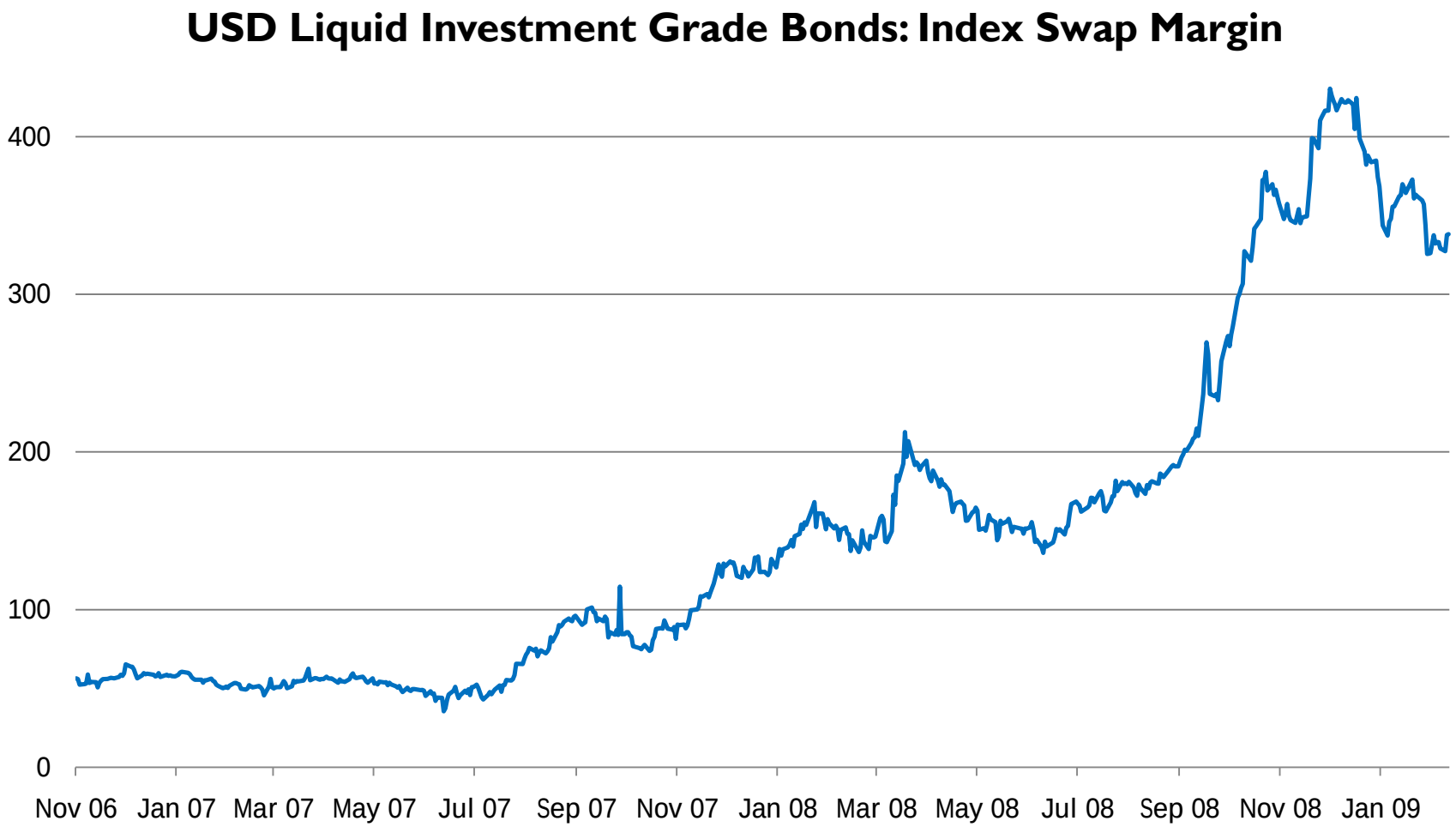
Source: www.stoxx.com, 11 Feb 2009

Continuing Market Uncertainty



Source: cboe.com

“Exploding” Credit Spreads



Source: www.indexco.com

Some Insurance Industry Issues .....

- Very low market interest rates will lead to low "risk-free" discount rates for liabilities and hence higher liability values
- When combined with low asset values, especially in jurisdictions where assets are marked to market, this will lead to significant pressure on emerging earnings, capital positions and solvency
- Life insurers with significant capital guarantees or minimum interest rate crediting obligations inherent in their product liabilities will come under intense pressure if unhedged
- Embedded Values reported will drop
- Reduced credit ratings leading to decreasing new business
- Potential liquidity demands may increase surrenders

Some Insurance Industry Lessons .....

- Valuing illiquid assets reliably on a market consistent basis has become challenging
- Further difficulties arise in disaggregating spreads to obtain a fair "risk-free" rate (separating risk-free from illiquidity & credit risk margins) so liabilities can be valued
- The insurance industry is less susceptible to contagion risk than banking industry as it is less inter-connected
- Most insurers handled market risk well due to tough experience from 2003 to 2005, but credit and illiquidity risk have caused some problems
- Strong holistic stress tests have worked well where they were rigorously applied (e.g. UK FSA ICA's)

Further Insurance Challenges in EU

- Solvency II development has improved capacity to cope BUT,
- Solvency II based on one year VaR (99.5%) risk measure
- This relates capital required to (recent) historic volatility, introducing pro-cyclicality - as periods of low risk will lead to low Economic Capital outcomes that will not be adequate when higher volatility emerges (as at present)*
- Important challenges posed by AIG collapse to proposed regulatory regime for multi-national groups and respective roles of local and group regulators
- Economic Capital will generally increase as volatility rises

* See Andrew Haldane (BoE) "Why Banks Failed the Stress Test" Paper - 13 Feb 2009

CRO Forum Survey 2008* Findings

- Global financial crisis has raised significant challenges to estimating modeling parameters, but fundamental change in underpinning methodology is considered unlikely
- Many companies are reviewing risk dependency (correlation) assumptions for diversification calculations as GFC shows many prior correlations to be too low
- Most companies expect to need to increase the frequency of stress & scenario testing
- Most companies are considering improvements to modeling of capital fungibility (not modeled by 49%) and treatment of asset liquidity (not modeled by 78%)

* See CRO Forum Survey published 30 Jan 2009 at www.croforum.com

CRO Forum Survey 2008* Findings

- Major challenge is to embed use of Economic Capital Models (ECMs) for decision making at business unit level and to achieve executive ownership of results of ECMs
- Most companies have been using bank swap rate as proxy for "risk-free" in ECMs, (but need to consider this compared to government bond rates in current market)
- No standard approach to measuring estimated market implied volatilities in ECMs, but many companies rely on vendor models to assist with calibration
- Modeling of Operational Risk has not advanced significantly since previous survey in 2006

* See CRO Forum Survey published 30 Jan 2009 at www.croforum.com

Diversification Allowances

- A point of difference with the banking industry
- Material impact on Economic Capital outcomes
- Considerable debate about :
  - Methods of calculation
  - Dependencies / Correlation between various risks
  - Level within a group where calculation is applied
  - Disclosure of assumptions and impacts
  - Interaction with capital fungibility and group capital
- Difficulties separating individual company stress events from impacts on company of systemic stress events

Prevention of future financial crises

The G 20's common principles for reform:

- Strengthen transparency and accountability
- Enhance sound regulation
- Promote integrity in financial markets
- Reinforce international co-operation
- Reform international financial institutions

Actuaries believe additional measures are needed:

- Introduction of more counter-cyclical regulatory arrangements
- Creation of Country Chief Risk Supervisor role
- Wider use of comprehensive risk management concepts in banks and non-regulated sector
- Improved use of ERM & risk governance

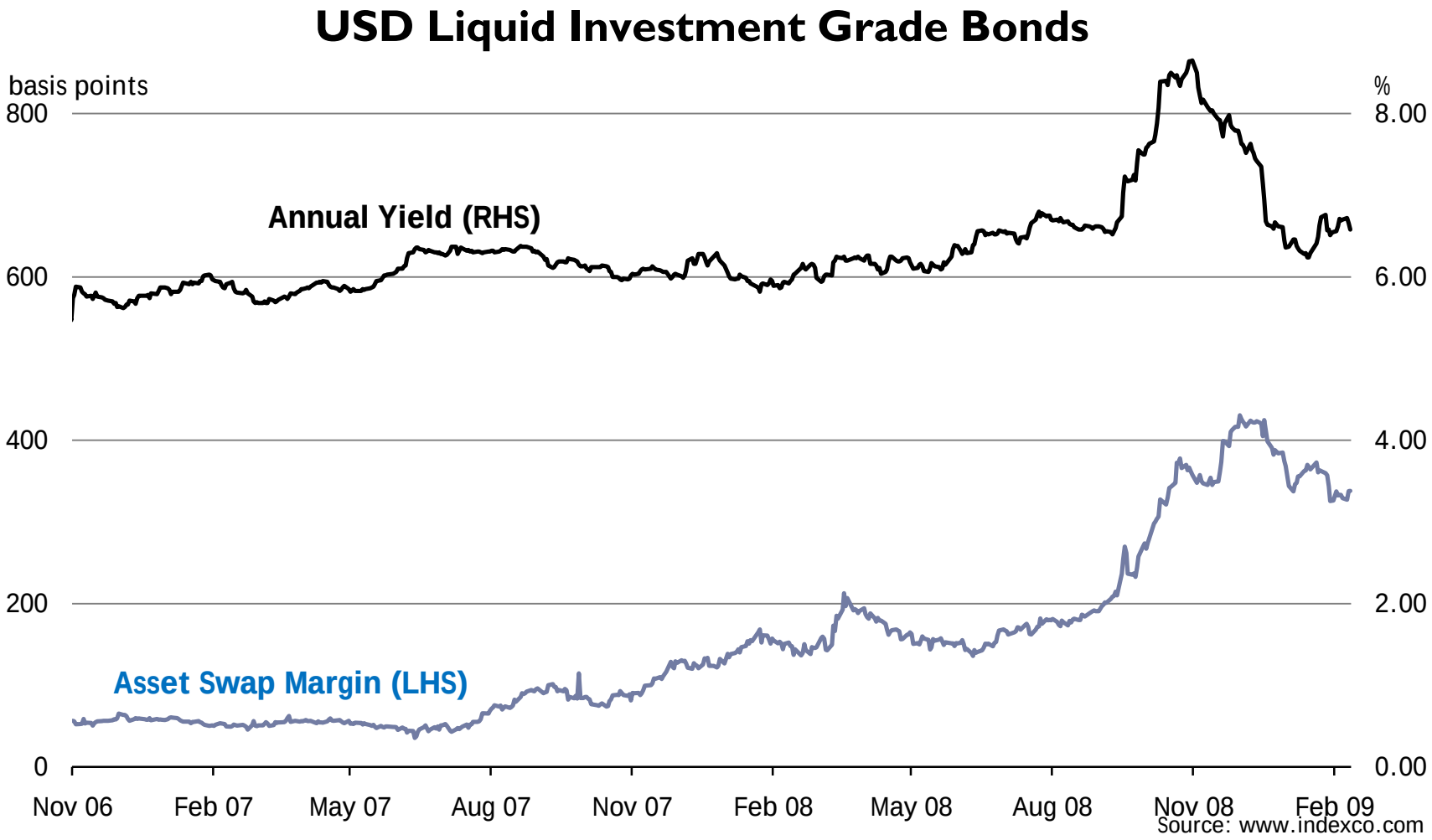
1. Counter-cyclical regulatory arrangements

At a "macro" or systemic level

Prudential regulatory arrangements

- Should be more dynamic and counter-cyclical rather than pro-cyclical
- Allow for the transparent change of provisioning and capital requirements for market participants - not just interest rates - when early warnings of market bubbles emerge
  - For example, "shock-absorbers" could provide the capacity to allow transparent draw downs of reserves during periods of subsequent market stress rather than having to enforce tougher capital requirements

Increasing credit risk margins vs official interest rate reductions



2. Country Chief Risk Supervisor (CRS)

At a "macro" or systemic level

Creation of a Country Chief Risk Supervisor role to minimise systemic financial risks by :

- Creating national risk appetite policy based on key risk indicators
- Monitoring and publicly reporting macro risk indicators
- Facilitating risk identification, communication with appropriate decision-makers, at national and international levels
- Providing a framework:
  - to better manage risks and
  - overcome the gaps in geographic and industry silos that critically weaken current risk management protocols

Functions of the CRS

Country Risk Appetite	• Develop • Agree with Government & Financial Regulators • Promulgate
Country Risk Indicators	• Develop – Leverage, Market Extremes • Monitor • Identify Potential & Emerging Threats • Publicly Report
Country Risk Mitigators	• Develop – Dynamic Capital Adequacy, Market Stress Tests, Risk Prices • Champion – with Other Financial Regulators & Firms • Activate – Directly Influence Market Pricing of Risk

Systemic Risk Indicators

Examples

- Leverage in the economy – household debt/GDP
- Leverage in institutions – total assets/capital
- Money supply measures (especially growth of these)
- Volatility, turnover & bid spreads in major financial markets
- Credit spreads
- Growth in derivatives markets – particularly options
- Major changes (especially concentrations) in market sectors
- Real interest rates – actual or implied
- Equity dividend yields
- Commercial real estate yields or IRRs
- Residential property affordability – median price/AWE
- Commodity prices
- Corporate profit margins
- Bonus levels paid by financial firms

Most already available & used – more holistic approach

CRS Mode of Operating

Broad information gathering & sharing powers. Focus on market information, but can collect from individual forms (prudentially regulated or not)

Substantial knowledge of the way financial firms & financial markets operate and risk sensitive, focused on influencing whole system, not on individual firms

Independence to decide when to act & authority to act unilaterally & multilaterally

Substantial capacity to analyze market & risk developments, understand drivers, forecast consequences & act preventatively

Able to use discretion (as for monetary policy) to act dynamically and counter-cyclically, working within ranges for risk appetite measures to change capital requirements and price of risk

3. Wider Use of Risk Management Concepts

At a "micro" or individual regulated entity level

Wider use of comprehensive risk management concepts

- The risk management framework of any entity providing financial or insurance guarantees – including banks – should include key concepts of a "control cycle" approach to the measurement and management of risk for assets and liabilities, including:
  - incorporating allowance for extreme event outliers
  - specific financial condition reporting (beyond just accounting)
  - independent sign-off on liability and loan loss provisioning for regulatory purposes by professionals (such as actuaries) subject to a professional codes of conduct and disciplinary processes
  - mandatory reporting of "Probability of Sufficiency" of provisions

4. Risk Governance

Improved use of ERM & risk governance

- Improved risk governance processes being adopted by all financial market participants to more consistently measure, apply, stress test and transparently report risk indicators

- Underlying concepts should be applied by all financial market participants – consistent with principles outlined in IAA paper on Enterprise Risk Management and recent IAIS Standards

Lessons learned - The actuarial profession's perspective

1. Need for a dynamic risk sensitive framework to avoid under-pricing of risk
2. Risk modelling that addresses inadequate risk measures
3. Risk Culture and Remuneration Incentives
4. Valuation of Illiquid liabilities and the use of Risk Margins in accounting
5. Recognising that the objectives of risk (or prudential) reporting and general purpose financial reporting are different
6. Need for a "Control Cycle" approach such as used by the actuarial profession
7. Independence and role of the Risk Function in prudentially regulated entities
8. International prudential regulation needs to be less "silo" driven

Need for a dynamic risk sensitive framework

Stability of financial services requires principles-based, comprehensive and risk-sensitive regulatory framework

Approach must include tracking risk measures in unregulated financial sectors in order to manage emerging systemic risk

To avoid under-pricing of risk, actuaries favour regulatory approach that is dynamic and responsive across all sectors and national jurisdictions

Major contributor to current crisis was absence of risk-sensitive capital charges for sub-prime lending and CDOs

Traditional approaches failed to identify real risks and expose inadequate capital support, leading to their under-pricing

Risk Modeling and Inadequate Risk Measures

Risk management – more than just risk models	• Risk models must be embedded in appropriate risk governance and entity-wide risk culture • Some models, although mathematically convenient, are not sufficiently sensitive to extreme events or changes in exposure to systemic risk, effectively invalidating their value in anticipating extreme events
Clarity and transparency	• Must be clearly defined and communicated risk appetite • Clear roles and responsibilities for risk and corresponding limits on risk taking, use of stress and scenario testing. • Modelling assumptions and results need to be transparent, understood, regularly debated
Improved risk measures	• Excessive focus on Value at Risk – measures a **minimum** amount of loss arising from a given low probability event, rather than the level of losses **expected** to arise from the event • Better risk measures (Tail Value at Risk) and use of "fat-tailed" non-normal distributions avoids systematically underestimating real risk exposures

Risk Culture and Remuneration Incentives

- Should not distort the proper evaluation of risks, especially where regulatory loopholes or prudential inadequacies open the door for underpricing
- IAA supports concept of increasing capital requirements for market participants with remuneration incentives focussed excessively on short term results

Remuneration Incentives &

- A poor risk culture will allow human behaviour and mis-aligned remuneration incentives to work against the timely reporting of risk-critical information
- Timely reporting of risk-critical information is crucial so that management can take corrective action to respond to emerging risks before they become too onerous

Risk Culture

Valuation of Illiquid Liabilities and the Use of Risk Margins

- Approaches developed and refined by actuaries over many years using market consistent techniques to value these illiquid liabilities may be usefully applied to valuing liabilities and assets for other financial institutions where trading has ceased to exist in current market conditions
- The International Accounting Standards Board has recognised the merit of such actuarial techniques in their deliberations on a new international accounting standard for insurance
- The IAA is presently finalizing a research paper on the "Measurement of Liabilities for Insurance Contracts: Current Estimates and Risk Margins"
- Use of risk margins could be extended to accounting for non-traded banking assets and liabilities to build better prudential and risk reporting frameworks with quantified Probabilities of Sufficiency
- Similar concepts may allow banks and other prudentially regulated institutions to improve the transparency of the risk of financial instruments issued or purchased by those entities

Recognise a "Risk Balance Sheet" - Different to a financial reporting format

Application of a total balance sheet approach to measure:

- Amount of capital required to support the assets and liabilities of the business
- The actual capital available excluding all interests not truly at "arms length"

Focus of general purpose financial reporting is on:

- What actually happened in the past period rather than what could happen in future
- The assessment of a single number for reported profit, not recognising the various sensitivities in the values of both assets and liabilities

More effective assessment and communication of the consequences of uncertainty is needed

- For example, proper understanding of the value of some assets and liabilities can only be provided through the use of ranges of their potential future value.
- Consistent risk measures and sensitivity testing, which reflect the potential of those values to change in the future, should be utilized.

Need for a "Control Cycle" Approach

Current capital markets activity is based on daily procedures that can lose sight of the bigger picture:

- the longer term
- whole market risks
- shifts in fundamental risk parameters
- systemic risks and/or
- unexpected correlations between events, whether extreme or not

"Control Cycle" approach is used when managing long term risks that cannot be traded easily (due to the nature of many insurance and pension liabilities)

Actuaries actively use the concept of a "Control Cycle" for:

- Modeling of expected results
- Measurement of actual results
- An explanation of the differences between the expected and actual results, and
- Use of those findings to recalibrate and strengthen the model

Wider application of this modeling and management process:

- Will improve modeling of financial markets and capital requirements for financial market participants
- Will improve the capacity for action before a financial disaster
- Is more likely to succeed when placed under stress

Independence and Role of the Risk Function

The IAA believes that risk management must be viewed as integral to the operation of the business and not just as a cost or regulatory requirement

Strengthening risk management functions will result in growing professional responsibilities for actuaries, risk officers and their teams

Risk teams require:

- Freedom to take an objective view that may differ from management's based on unrestricted access to the same information
- A culture of mutual understanding and respect between line management and the risk function across an entity
- Differing views on material matters must be reported to the board and be transparent to the prudential regulator
- Risk managers should have professional and disciplinary standards (already required by the IAA for the actuarial profession)

International Prudential Regulation needs to be less "silo" driven

- The IAA believes the current crisis reinforces the case for internationally co-ordinated, principle-based and risk-sensitive regulation
- The basic principles of Enterprise Risk Management (ERM) remain valid

This crisis has reinforced the necessity for effective and integrated supervision of major international financial groups

- Holding companies of international financial services groups need to be supervised in a manner similar to other group entities
- Proper group supervision would lead to improved communication between group holding companies, their subsidiaries, and regional regulators

IASB Insurance Accounting Concepts – A way forward for counter-cyclical loan loss & liability provisioning ?

The Aim

- Realistic, Transparent, Consistent & Reliable Reporting, which could be used to respond to market cycles

The Method

- Step 1 Use best available estimates of future cash flows (no deliberate conservatism) to establish central estimate
- Step 2 Discount cash flows from Step 1 at risk free rate to obtain net present value of cash flows
- Step 3 Add a risk margin based upon the statistical volatility of the underlying cash flows, estimated from past experience of similar portfolios

Key International Insurance Accounting Documentation & Precedents

- IASB Insurance Accounting Project Discussion Paper (issued May 2007)
- IAA Risk Margin Working Group Paper (draft issued October 2008)
- APRA GPS 310 (Prudential Standard)

A Simple Illustration

Assume

First:

(i) a bank has a loan portfolio of 100 loans of $100,000 each

(ii) each loan is to be repaid in full after a five year term

(iii) interest is charged by the bank at 5.0% p.a.

(iv) the bank expects loan losses at 0.5% p.a. (50 bp p.a.)

Second:

(vi) the bank may decide to purchase mortgage insurance

(vii) the once-off up front insurance premium is $250,000

(vii) the insurer pays claims promptly when loan losses arise

(viii) the bank and the insurer can borrow or lend at 4.5% p.a.

Bank Results - No Mortgage Insurance

Year	Loans Outstanding at Start of Year	Interest Income	Credit Losses	Net Income	Performing Assets at Year End	NPV of Credit Losses 4.5%
1	10,000,000	500,000	50,000	450,000	9,950,000	47,847
2	9,950,000	497,500	49,750	447,750	9,900,250	45,558
3	9,900,250	495,013	49,501	445,511	9,850,749	43,378
4	9,850,749	492,537	49,254	443,284	9,801,495	41,302
5	9,801,495	490,075	49,007	441,067	9,752,488	39,326
Totals		2,475,125	247,512	2,227,612		217,411

Now Consider the Insurer

- The insurer's liability each year will be the net present value of the estimated claims liability, plus a risk margin
- Here, the NPV of the claims liability at outset is $217,411
- If we assume a suitable risk margin is 15% of the NPV (which is realistic in this case to produce a 75% PoS) we have an initial insurance liability of $217,411 x 1.15 = $250,022
- Note that this liability exists at the outset of the insurance policy, even though there have been NO CLAIMS YET (unlike conventional accounting for loan losses of banks)

Projected Profit of Insurer

Year	Assets at Start of year	Best Estimate of Liability at Start of year	Liability with Risk Margin Start of year	Premium Income	Claims Paid	Interest Earned	Net Income
1	250,000	217,411	250,022	250,000	50,000	11,250	7,477
2	211,250	177,194	203,773	-	49,750	9,506	7,799
3	171,006	135,418	155,731	-	49,501	7,695	8,113
4	129,200	92,010	105,812	-	49,254	5,814	8,441
5	85,761	46,897	53,932	-	49,007	3,859	8,783
	-	-	-	-	-	-	-
Totals	-	-	-	250,000	247,512	38,125	40,612

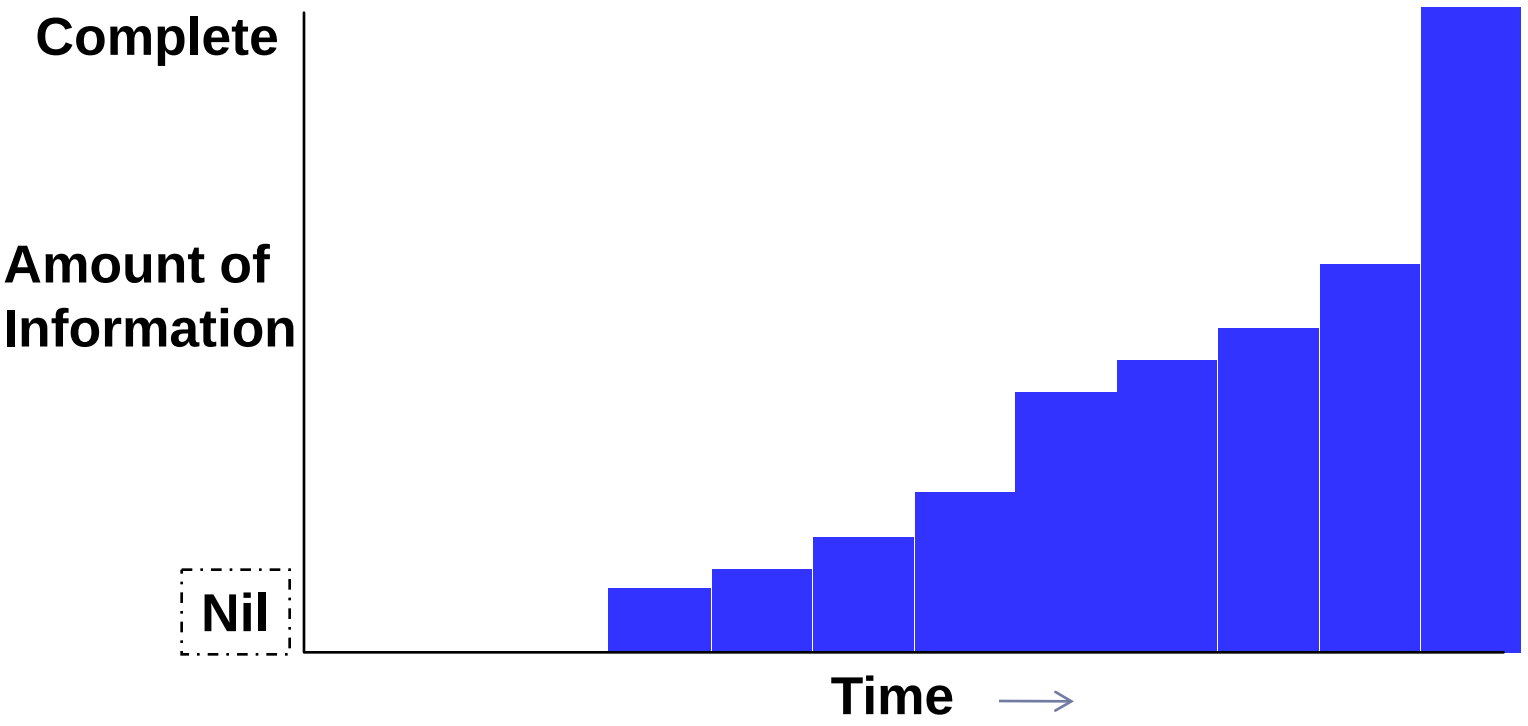
Bank Results If Using "Insurance Accounting" for Loan Provisions

Year	Loans Outstanding at Start of Year	Interest Income From Loans	Credit Losses	Liability with Risk Margin End of year	Net Income
1	10,000,000	500,000	50,000	203,773	246,227
2	9,950,000	497,500	49,750	155,731	495,793
3	9,900,250	495,013	49,501	105,812	495,430
4	9,850,749	492,537	49,254	53,932	495,164
5	9,801,495	490,075	49,007	-	494,999
Totals		2,475,125	247,512		2,227,612

Total net profits over 5 years are unchanged, but pattern of emerging profit is slower

Insurance (& Lending) Liability Estimation Process

Exposure → Notification → Quantification → Settlement



Some Insurance (& Lending) Basics

- Outcomes of risks from individual insurance policies or loans are unknown when underwritten
- However, when many similar risks are underwritten, expected results of total homogenous portfolio become more predictable
- Losses or Claims are driven by:
  - *Frequency (or probability) of a loss or claim event occurring; and*
  - *Severity (or size) of a loss or claim if it occurs*
- Risks inherent in different classes of lending or insurance vary over a spectrum :
  - *High frequency / low severity – outcomes relatively easy to predict reliably*
  - *Low frequency / high severity – outcomes are harder to predict reliably*
- *These risk differences can be measured and quantified*

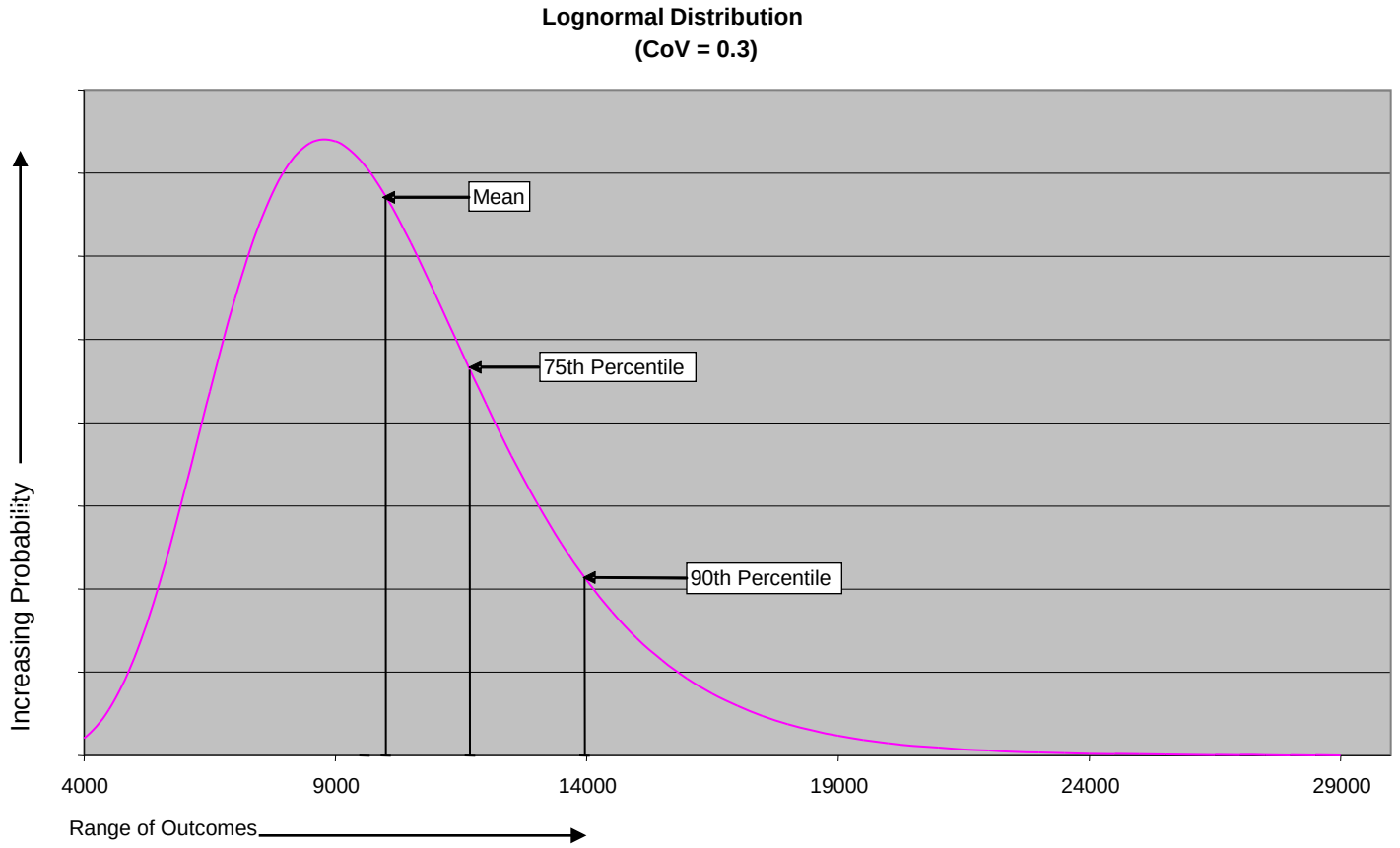
Key Measures of Liability & Risk

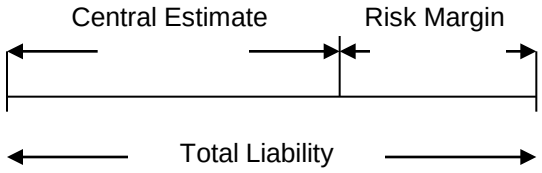
- Estimation of best estimate of cash flows from claims frequency (probability of default) & severity (loss given default), based on experience of similar portfolios

- Use of suitable probability distributions based on experience (e.g. lognormal etc)

- Measures of Uncertainty
  - Probability of Adequacy (PoA) (e.g. 50%, 75%, 90%)
  - Co-efficient of Variation (CoV) (=Standard Deviation / Mean) (e.g. 15%, 30%)

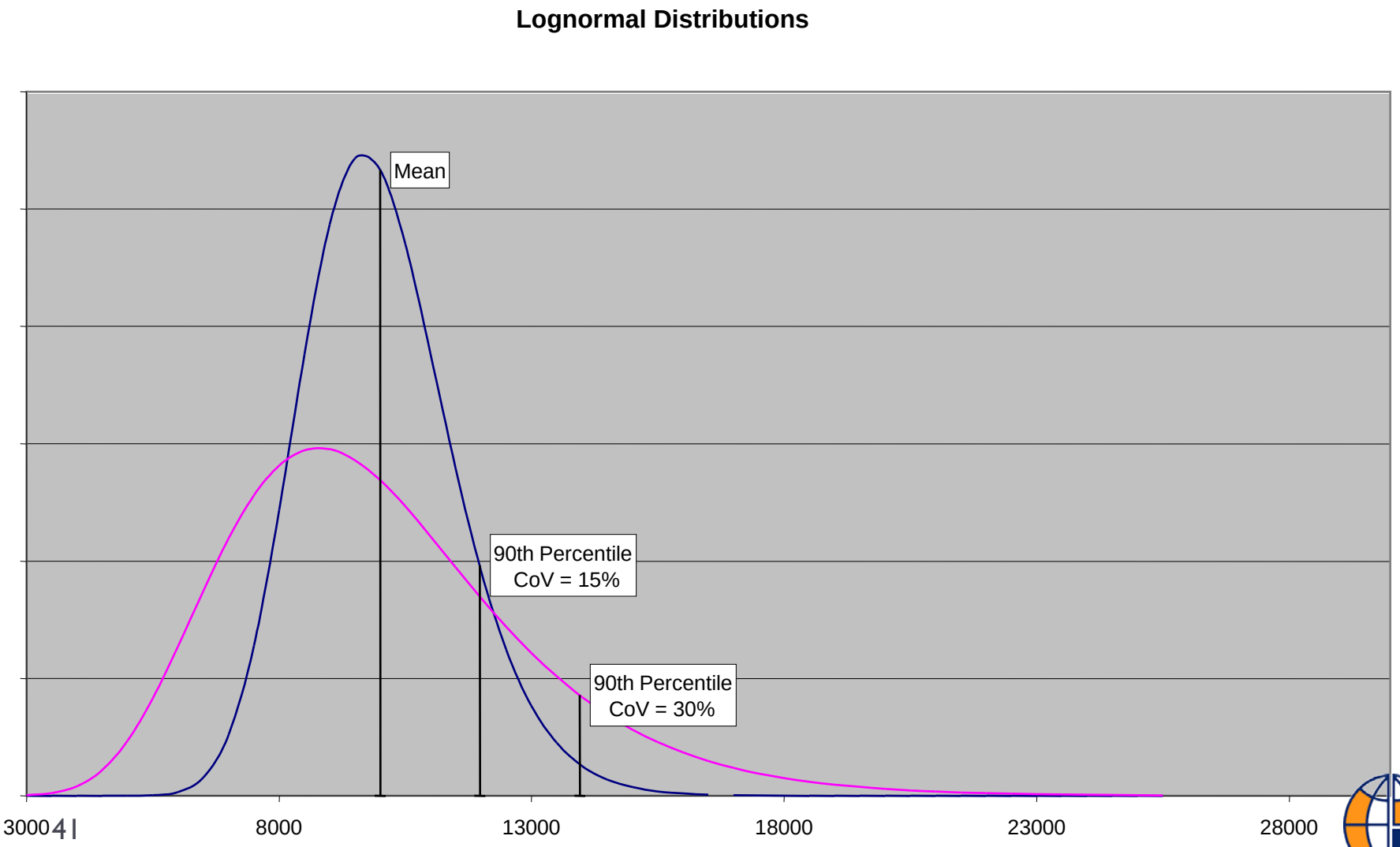
Central (Best) Estimate & Risk Margin – Components of Total Insurance Liability





Probability of Sufficiency (PoS)
= the area under the curve to the left of the liability outcome selected.

Central (Best) Estimate & Risk Margin – Different Risk Levels



Insurance Accounting Standard AASB1023 in Australia since 1 Jan 2005

- All assets at market value, through Profit & Loss A/c
- Full prospective assessment required for liabilities based on prospective expected loss (unearned premium used as a proxy for pre-claim liabilities)
- Discount insurance liabilities at risk–free interest rates
- Risk margins mandatory for insurance liabilities
- Mandatory disclosure of central (best) estimates of insurance liabilities as well as liabilities with risk margins
- Mandatory disclosure of Probability of Sufficiency (PoS) of insurance liabilities with risk margins
- Mandatory disclosure of sensitivity of insurance liabilities to key assumptions e.g. inflation, claims severity, claim frequency

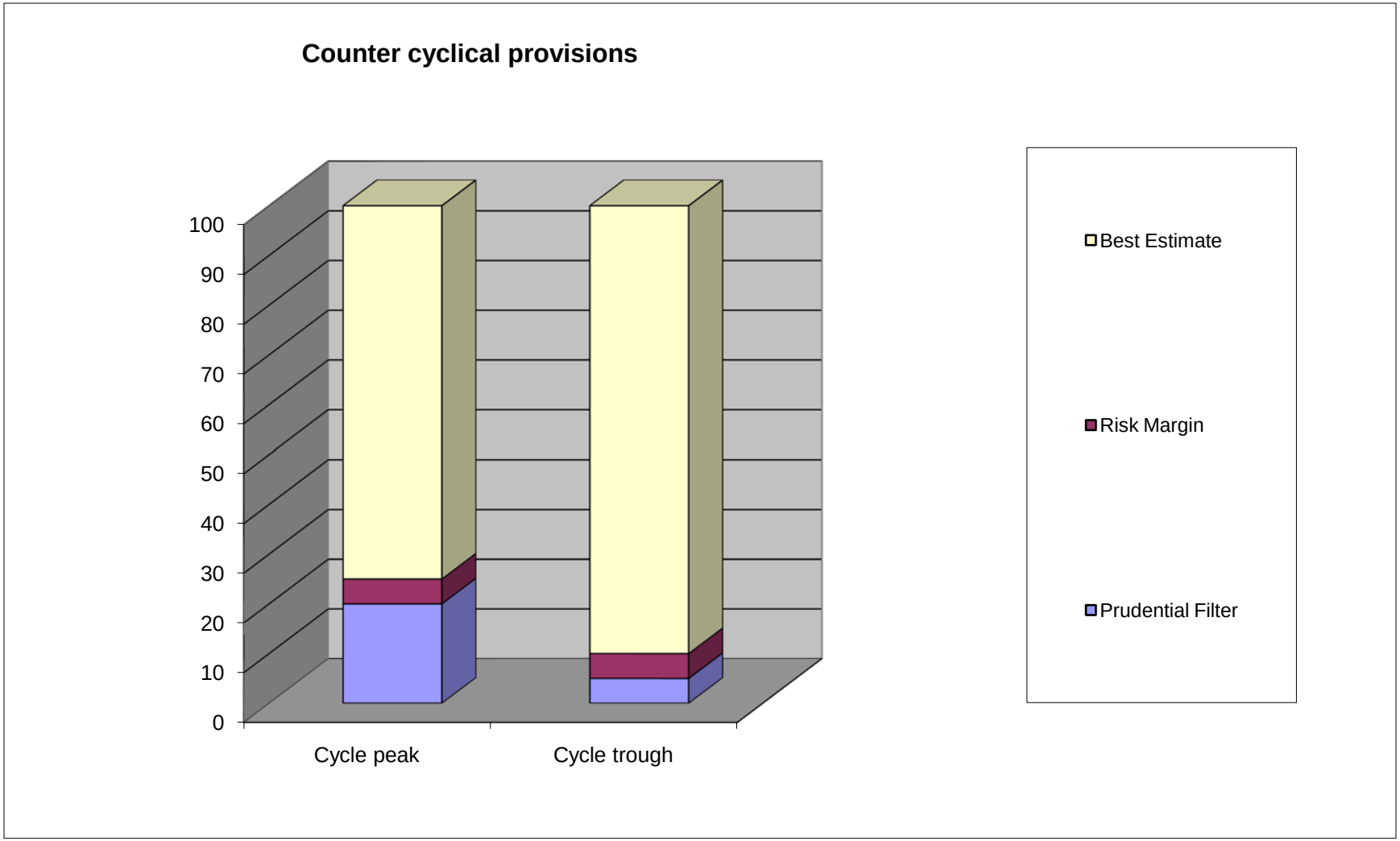
Transparency

- **Results Tend to be Volatile**
  - Discount rates will change with market movements
  - Prospective approach to unexpired risk speeds up recognition of both profits & losses, leading to more active management of the business

- **Disclosure and Discipline via Standards are Vital**
  - Transparency of reporting means that trends in business outcomes are recognised at an earlier stage
  - Regulators of insurers usually require regular (& sometimes independent) professional actuarial sign-offs on liabilities
  - Size of risk margins can be quantified and disclosed

- **Hence "Result Smoothing" becomes very evident to users/analysts & regulators if attempted by management**
  - All disclosures are auditable and audited !
  - Internal and external reporting can be entirely consistent

Potential Counter-cyclical outcomes



In Conclusion

- Insurance and banking are not "Black and White" businesses – the outcomes are nearly always uncertain
- Risk Margins provide a framework to provide improved accounting and disclosure for managing the "Grey" (or "Gray")
- Meaningful disclosure and use of standards is key to achieving reliability, consistency and comparability
- Meaningful counter-cyclical provisioning could use such a model where a regulator specifies the required PoS
- Management of the business is improved by the added transparency and discipline introduced