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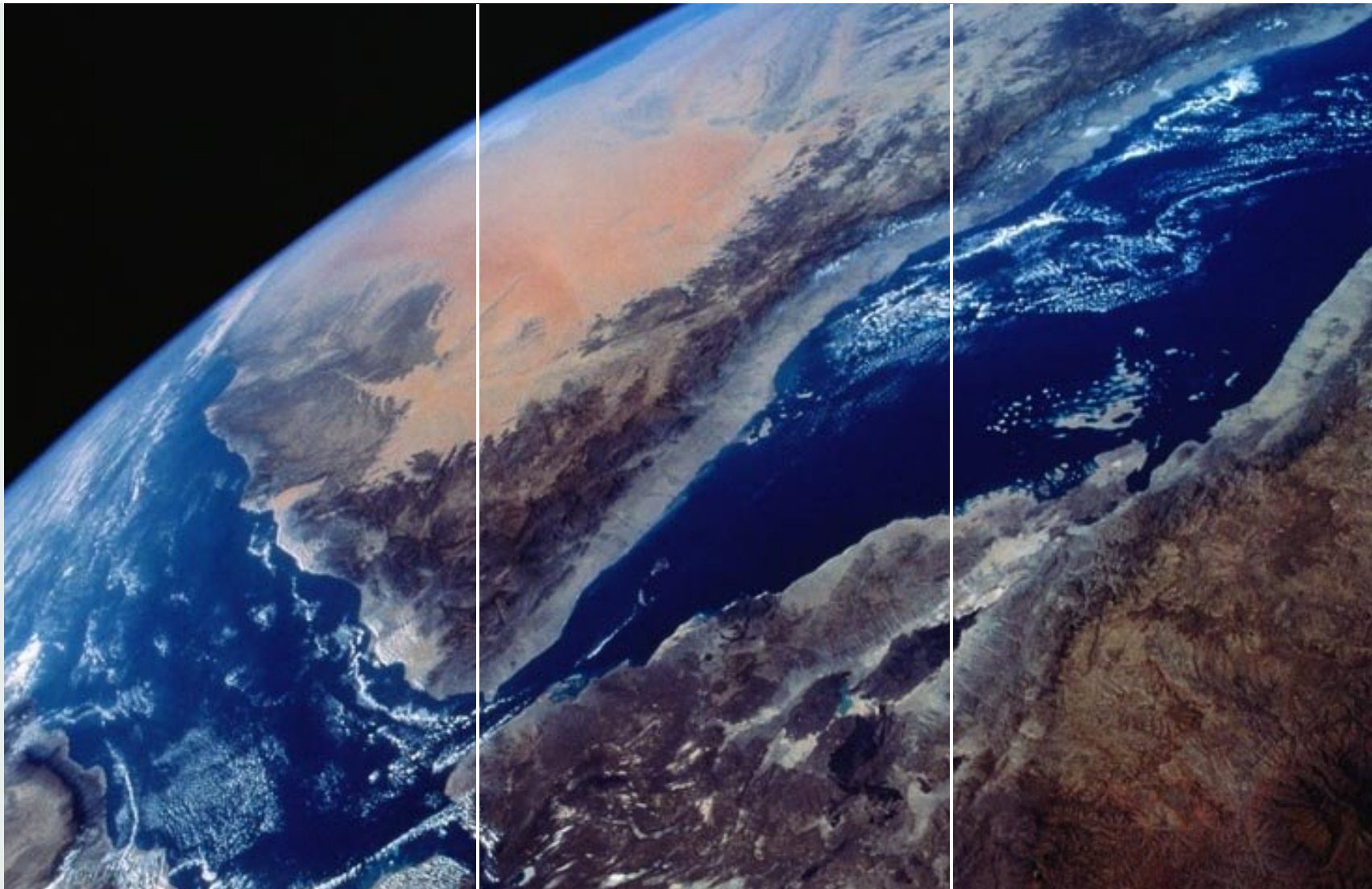
Risk Management in a challenging environment



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Introduction

- Risk Management is a relatively new and quickly evolving discipline
- Current crisis is unprecedented and has highlighted many weaknesses in the current RM frameworks, e.g:
  - lack of tail risk thinking in Financial Market Risk Management
  - overconfidence in hedging
  - not enough attention on liquidity
- This presentation aims at summarising a few of these key issues, focusing on those most relevant for actuaries involved in pricing, reserving and risk modelling

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Agenda

- 8 challenges
- Recommendations

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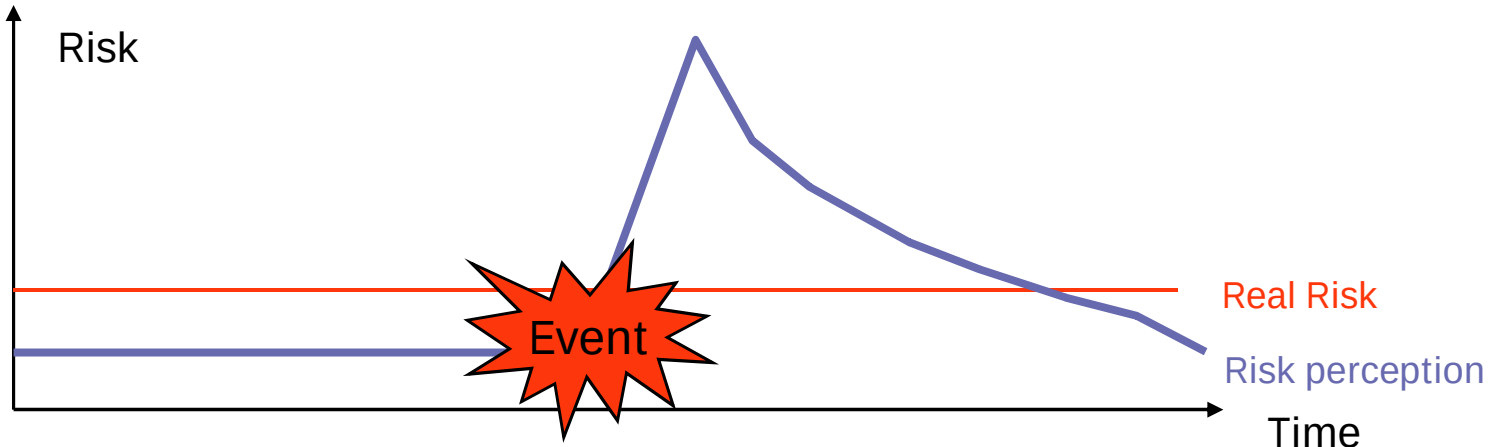
1: Over optimism in assessing risk

- There is a tendency for human beings to
  - overestimate risk that has just materialised (e.g. aeroplane crash, terror attack)
  - underestimate risk that has not yet materialised, or not in peoples life time (e.g. pandemic, longevity, capital market meltdown etc)
- Furthermore, the tendency to use (recent) historical data might underestimate trends



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Example of over optimism/ pessimism: Longevity projections

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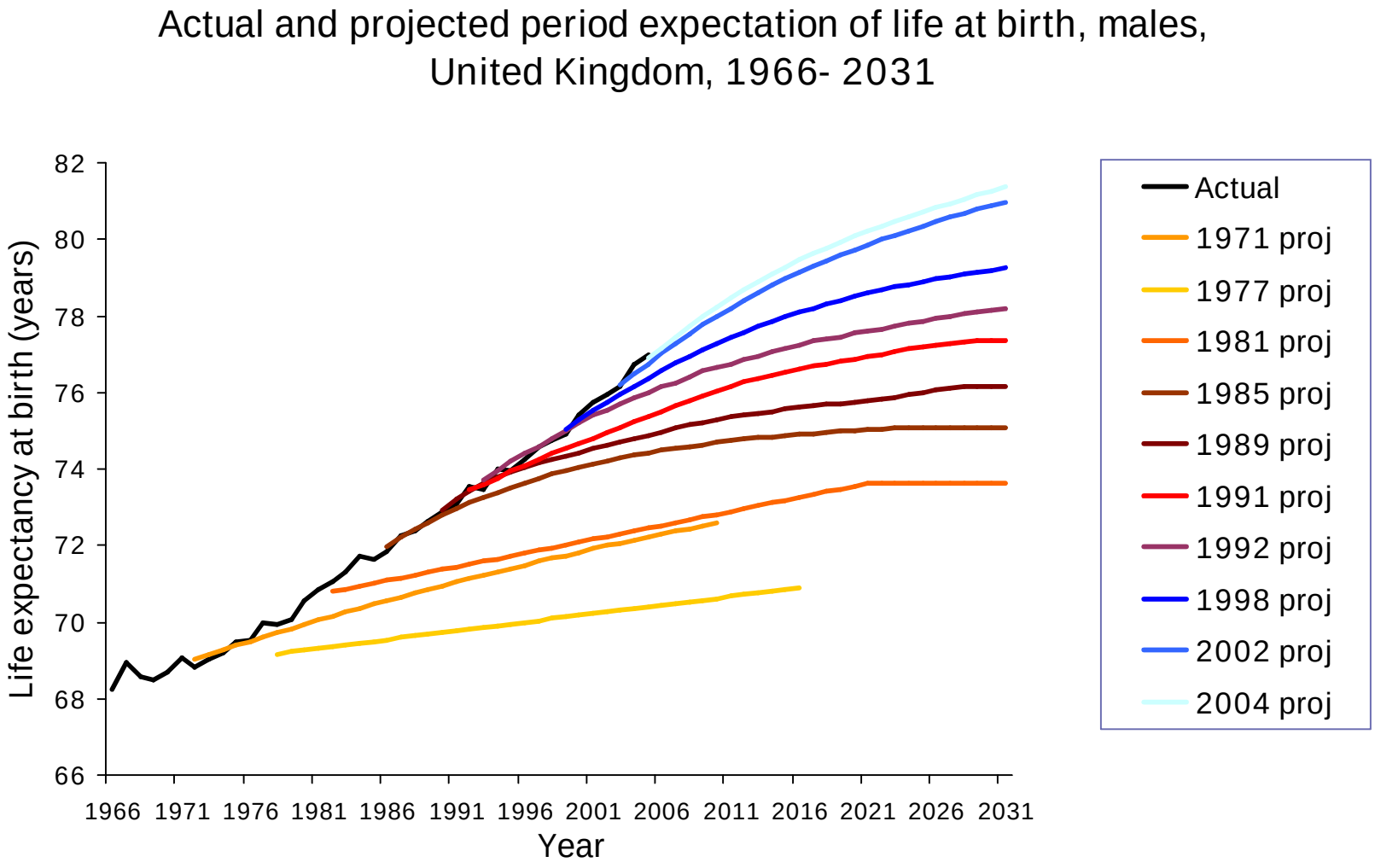

Source: Chris Shaw, "Fifty Years of United Kingdom National Population Projectior How Accurate have they been?", *Population Trends*, 128, Office for National

Example where using historical data average might be dangerous: Stock Market Correlation

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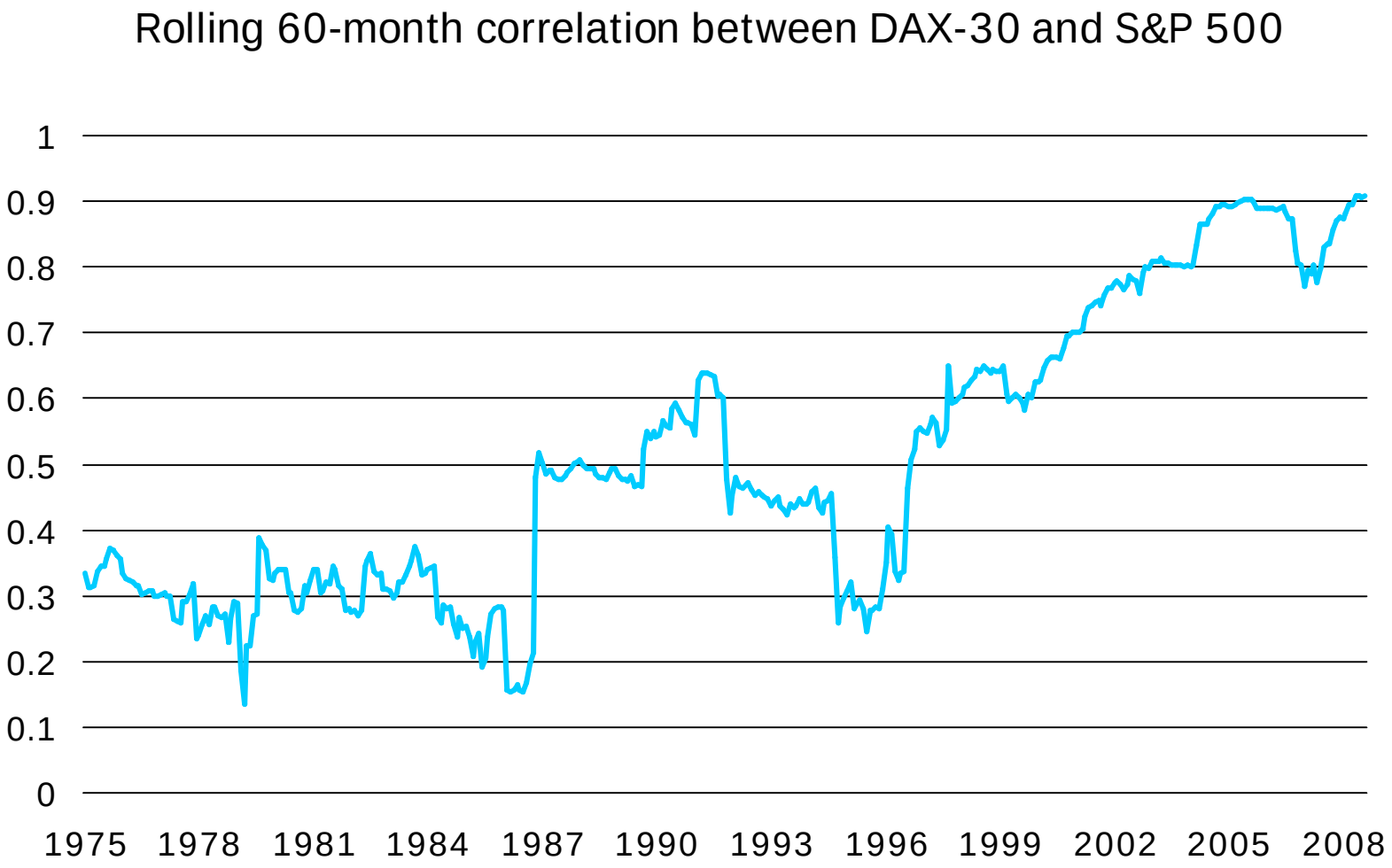

Source: Swiss Re Economic Research & Consulting

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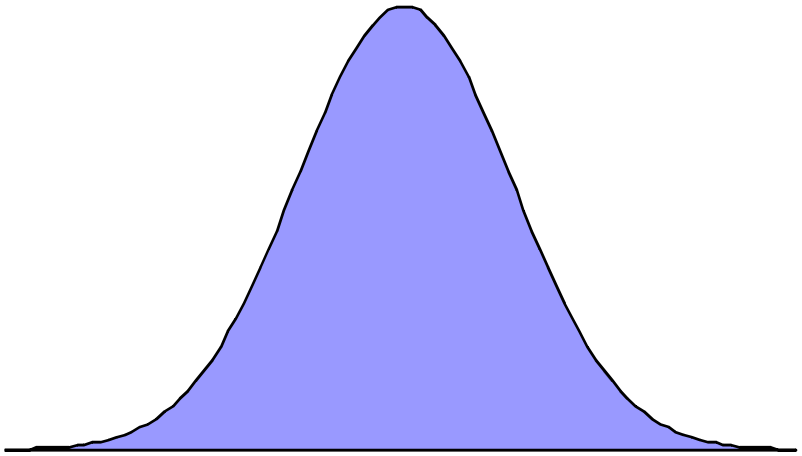
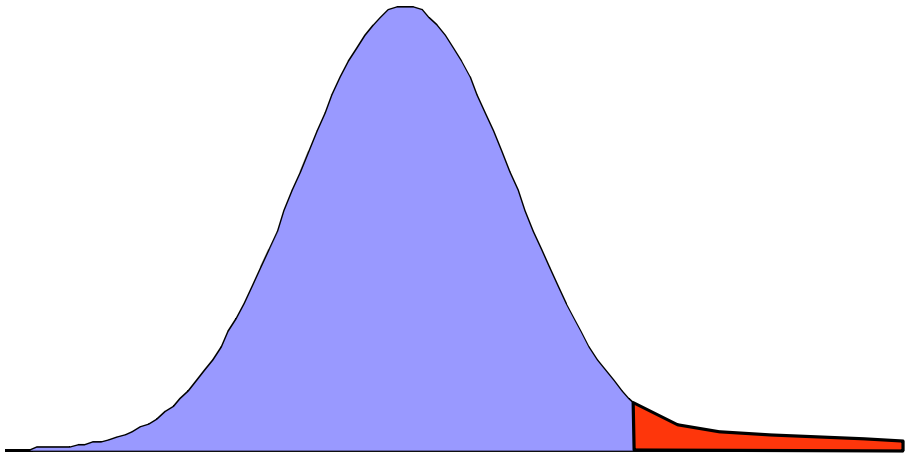
2: Tail risk underestimation

Model vs. Reality





Approximation of reality through normal distribution

e.g. actuarial model based on last 50 years history

or Black-Scholes option pricing

"Fat tail" ignored by simple models

e.g. pandemic, longevity

Rare events not included in recent history

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Financial Market models are the worst when it comes to estimating tail risk

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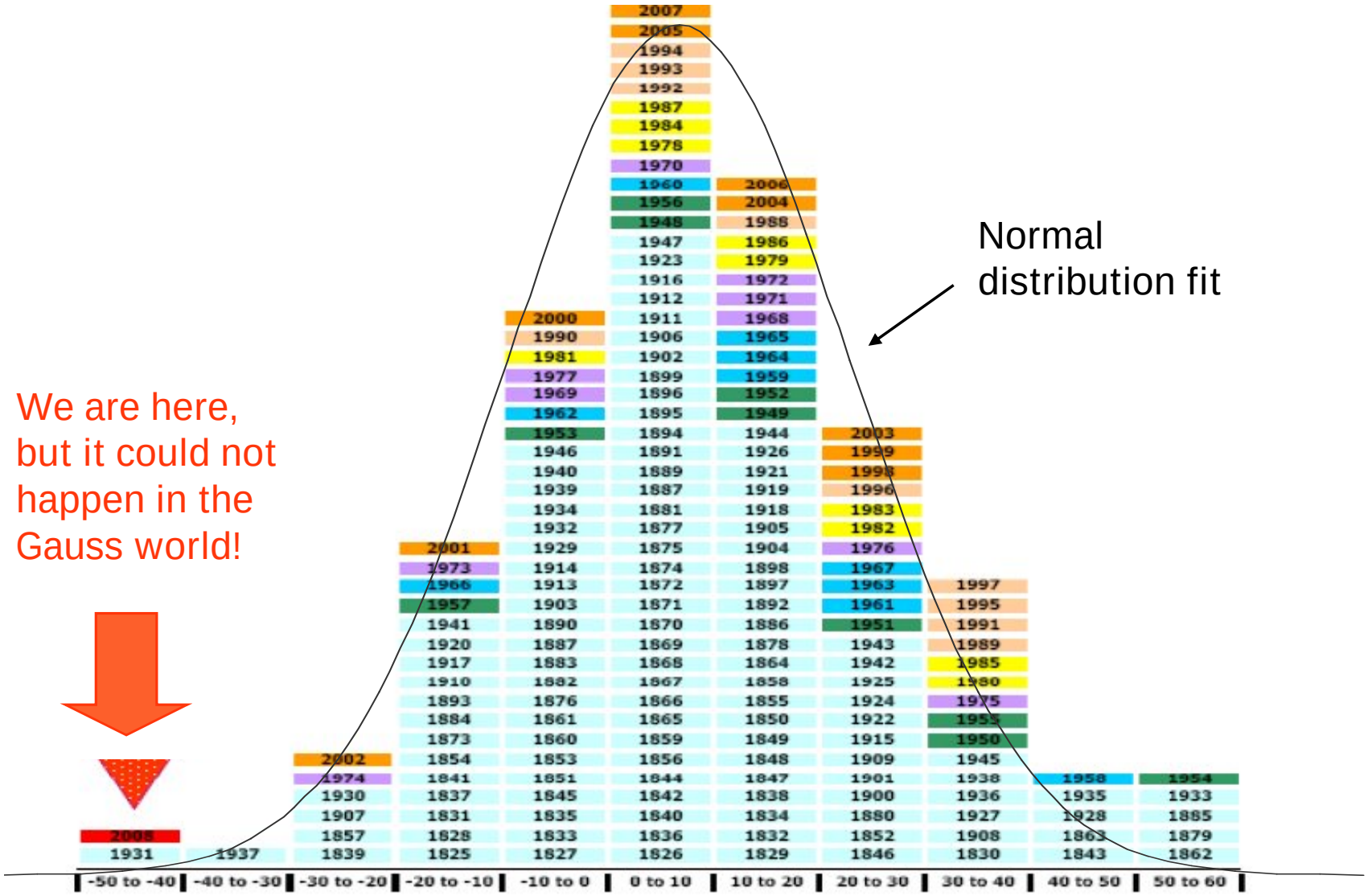
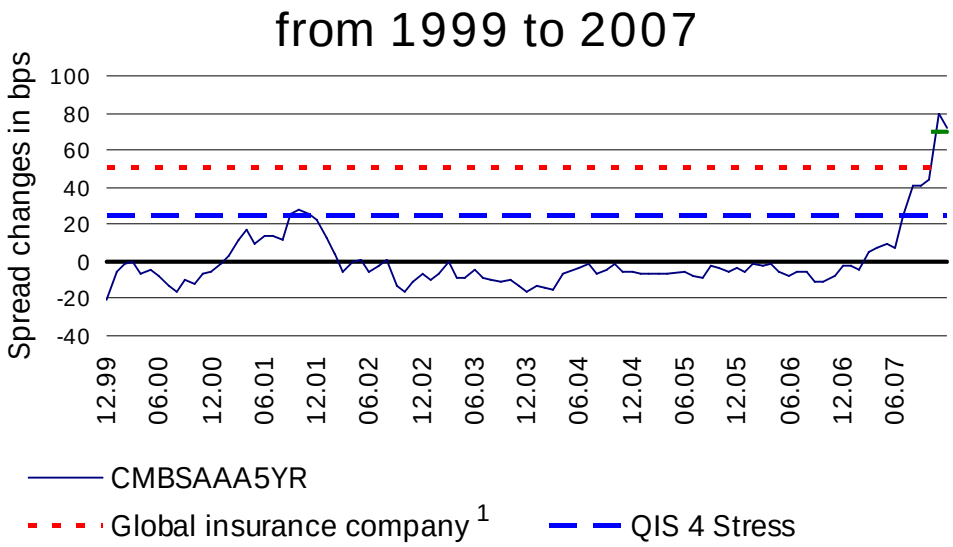
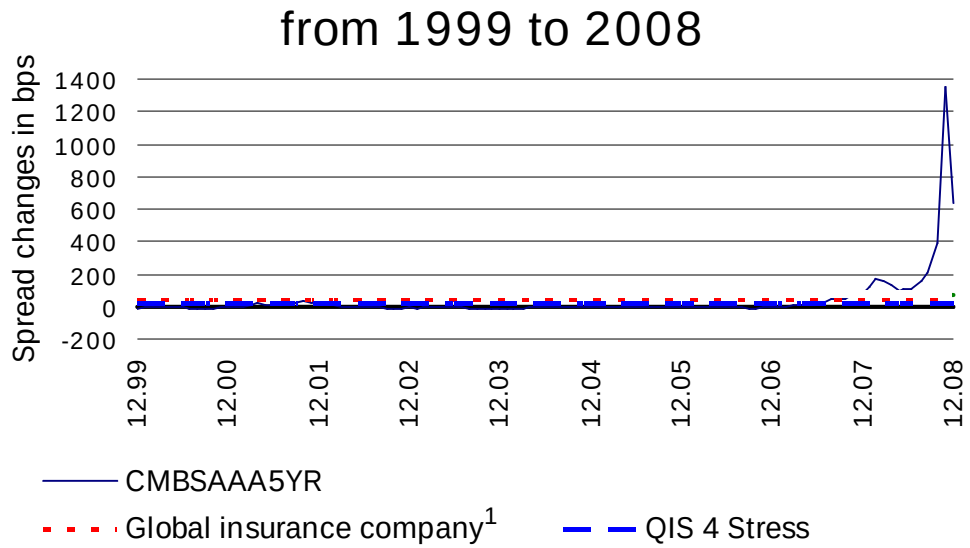


Source: Axa

Tails in risk factor distributions are known – but typically only in hind sight

Historical 1 year spread changes for AAA 5yr CMBS





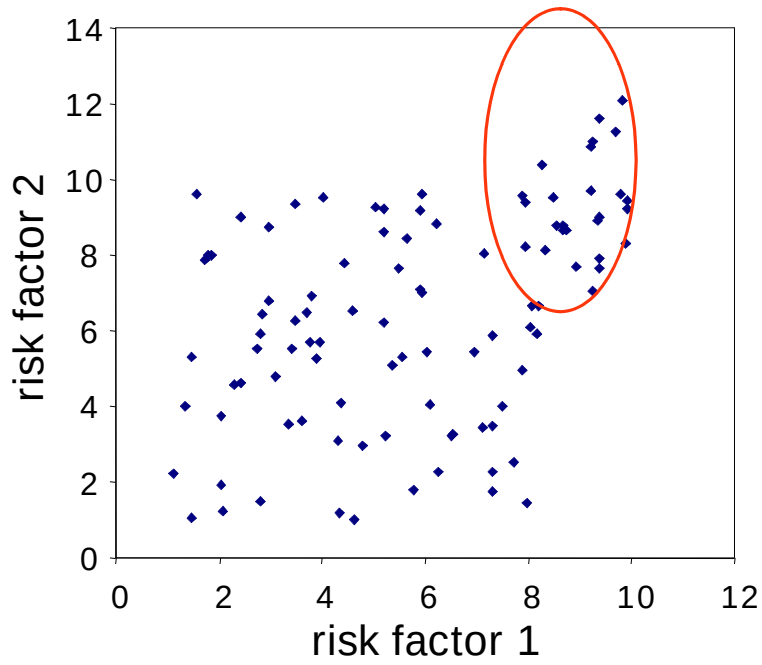
- Historical spread volatility started to increase towards the end of 2007
- Models are typically calibrated to an average of historic realisations

- In the crisis, AAA CMBS spreads further increased during 2008, but exploded in November, when spreads widened by more than 1000 bps within a month
- The spread increase observed in November is equivalent to a 80 times standard deviation event, which is not captured with a suitable probability in models

[1] Oliver Wyman benchmarking on stress

3: Tail correlation

- Some risks which are not correlated under normal circumstances, can become so under extreme circumstances, e.g:
  - extreme pandemic leading to a financial market crash
  - financial market losses (credit & credit spread & stock markets)
- Taking this into account uses up a lot of capital in an economic view



dependency in tail of distribution

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4: “Perfect hedging”

- Perfect hedging does not exist
- Example Variable Annuities:
  - Basis risk between funds and indices that are hedged
  - Errors in data and models
  - Deviation of reality from actuarial assumptions (e.g. lapses)
  - Exotic “risks” beyond financial market risk (e.g. counterparty credit risk for providers of hedges, own credit risk)
  - Differences between economic and accounting frameworks means hedge can only be optimised for one view

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5: Best estimates vs distributions

- There is a tendency in actuarial science to calculate one best estimate
- In reality, nearly every assumption projected over a long period has a probability distribution
  - e.g. lapses, mortality, longevity, investment returns, tax rates, capital, internal costs etc
- Typically, “core risks” get most attention in pricing (mortality, longevity)
- But other parameters like regulatory, rating agency and internal capital measures will change over time! (e.g. Solvency II)

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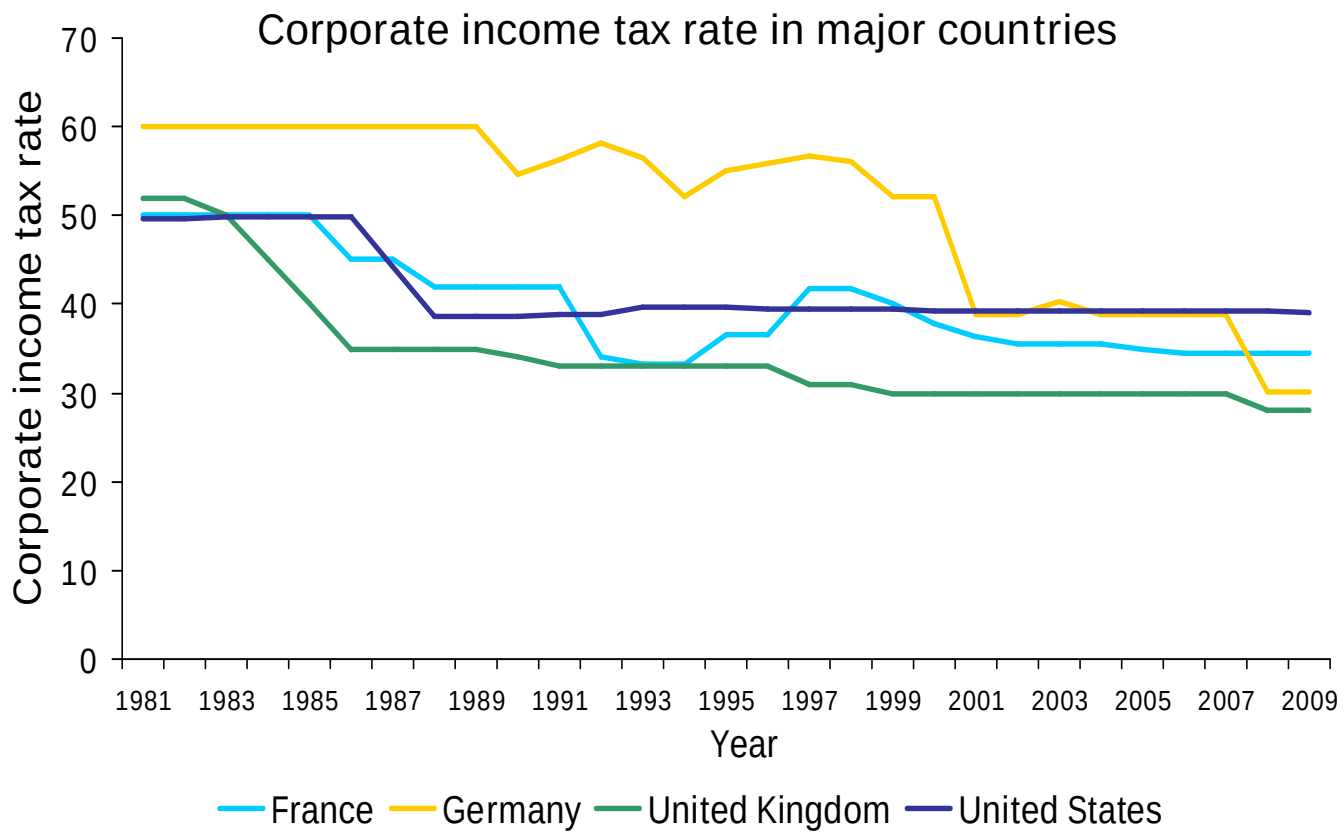
Tax as an example: large changes over 30 years!



- Changes from today could include that some very low tax environments might disappear!

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Source: OECD Tax Database 20

6: The aversion of the L&H business to price in a market consistent way

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"Interest rates are at a historical low. They will go up again. We cannot price in current rates into our products"

- Many companies follow the above logic – e.g. many VA products were uneconomically priced for months
- And yet by pricing in more positive assumptions, companies actually give a free option to policy holders
- Challenge: Would the banker say to his colleagues:

"The stock XXX is really too expensive right now. I am sure it will go down in value, and I'd like to sell it cheaper to my client"?

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7: Liquidity: it is different from capital!

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- Capital and funding liquidity are two distinct measures
- Holding additional capital does not necessarily improve liquidity
  - a company will default if not enough liquidity is available, even if it has a high capital adequacy ratio
- It follows that liquidity is a second “radar” besides capital adequacy that needs to be monitored very regularly
- L&H business typically is a liquidity “eater” because of the asset side where companies try to capture the “liquidity premium” of illiquid assets that match the liability duration (structured products, corporate bonds etc)

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Swiss Re's risk tolerance defines two distinct requirements

Capital adequacy versus liquidity risk

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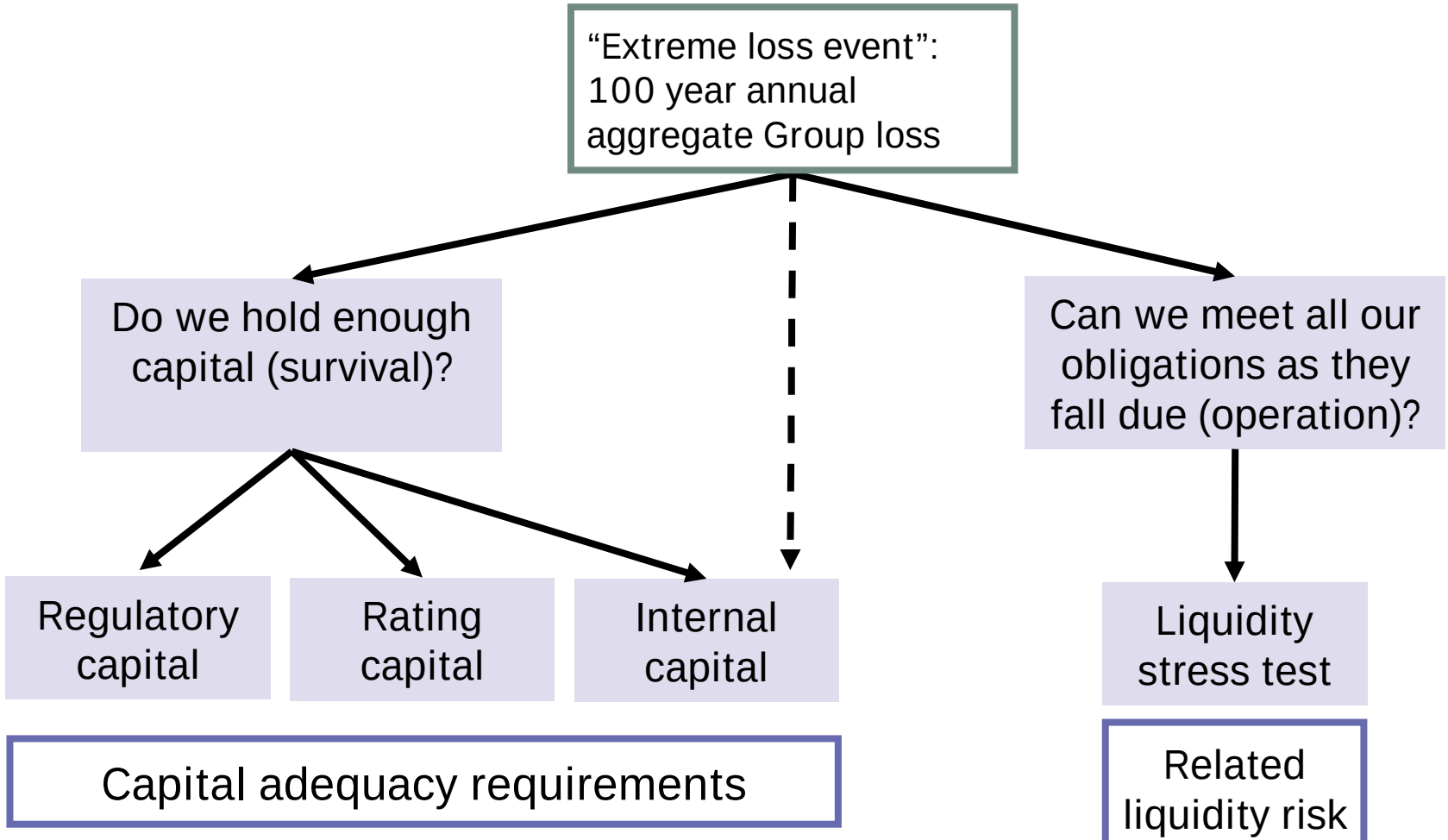
Risk tolerance definition of the Board:

"To be able to continue to operate following an extreme loss event."



8: Disclosure: does anybody understand what we are doing?

- Accounting standards are very inadequate to create insights into the L&H business
- Some more economic measures like EV and MCEV try to improve the situation
- But general lack of discipline in sticking with the MCEV rules undermines credibility
- As a consequence, our business is not very transparent and seen as hard to understand by analysts and investors
- Furthermore, while our industry is a risk taking industry, there is virtually no risk disclosure so far

Our industry needs to work on increasing transparency

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Swiss Re is disclosing its TailVar since 2005

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by lower property and casualty risk. More information on developments within the risk categories is provided later in this chapter.

Base capital requirement using one-year 99% Tail VaR

CHF billions, as of 31 December	2007	2008	Change in %
Property and casualty	8.6	**7.9**	–9
Life and health	5.9	**5.2**	–12
Financial market	7.7	**8.0**	3
Credit	2.8	**3.0**	6
Simple sum	25.1	**24.0**	–4
Diversification effect	–8.5	**–9.1**	
Swiss Re Group	16.6	**14.9**	–10

Our internal model considers the level of correlation and diversification between individual risks. The benefits of diversification can be seen in the table above, where the base capital requirement for the Group's overall portfolio is lower than the sum of the base capital requirements for individual sub-portfolios. We strive to diversify the risks to which we are exposed, not only to limit the impact of any single source of risk, but also to ensure that positive developments in some businesses balance out potential negative developments in others.

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Agenda

- My 8 preferred challenges
- Recommendations

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Recommendations (1/2)

- Risk assessment:
  - Be cautious when using historical data to derive the future
  - Explicitly think about tail events that have not yet happen
  - Do not use normal distributions for financial market risks (and pandemics, longevity, lapse risk etc)
  - Think about tail correlation between risk factors
- Do not believe in “perfect hedging”, e.g. in VA products
- Ideally, always price future cash flows using distributions, not point estimates
  - Be aware that many factors will change during the duration of the business (tax rates, capital needed etc)

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Recommendations (2/2)

- Make the distinction between costing and pricing
  - costing is the unbiased best estimate of what the product costs including all true market consistent values and daily fluctuations
  - pricing is the price at which the product is sold (and where some fluctuations can be absorbed if deemed not sellable)
- Set up liquidity risk management in parallel to the capital adequacy framework
  - look at the legal entity level liquidity at different durations in very stressed situations
- We as an industry need to improve on transparency and consistency in disclosure
  - apply MCEV rules consistently
  - disclose risk profile
  - come up with additional measures (cash flow disclosure?)

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