The Actuarial Profession
making financial sense of the future

Life Conference and Exhibition 2010

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When you can't diversify how can you divest?

Managing concentrations of risk

7-9 November 2010

Agenda

- Nature of risks
  - Shock mortality
  - Trend mortality
  - Trend longevity
- Risk management
  - Using diversification
  - Risk transfer techniques
  - Examples and considerations
  - Innovation and the current market
  - 'Buyers' of life insurance risk
- Questions and comments

Life Insurance Risk Concentrations

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Shock Mortality

- Financial loss from sudden large number of excess deaths
  - Exposure from protection portfolios
  - Concentrated in insurance buying groups

Trend Mortality

- Financial loss from an accumulation of excess deaths over time
  - Exposure through protection-linked portfolios
  - Inherent in long-term guaranteed premium business

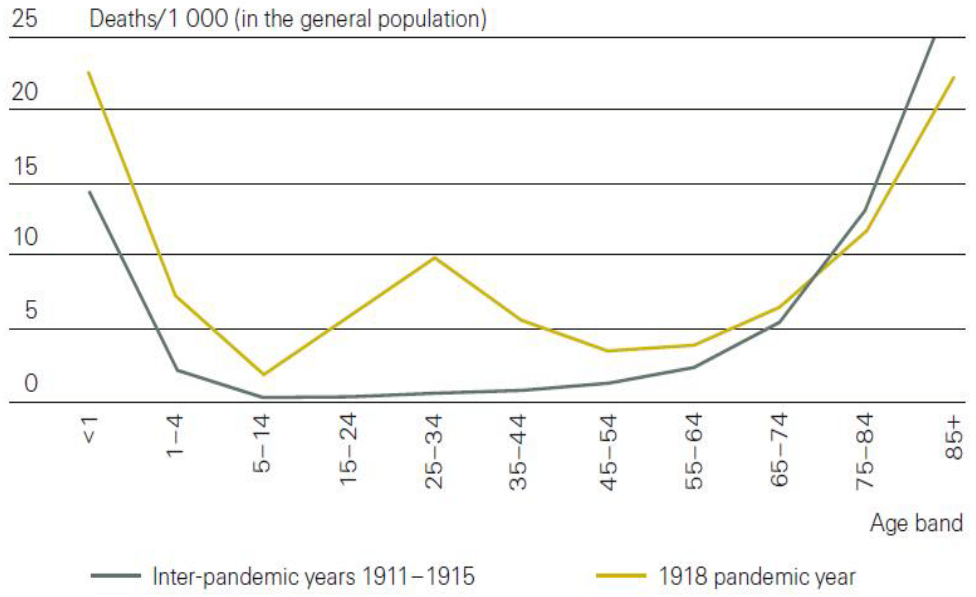
Trend Longevity

- Financial loss from fewer deaths than expected over time
  - Exposure through future annuity payments
  - Significant exposure to males at the start of retirement

Pandemic Shock

- Pandemic characteristics
  - Severe influenza potentially more lethal to younger ages
  - Traditional 'flu impact is on the infants and the elderly
  - Other infectious disease impact is uncertain
- Financial characteristics
  - Age concentrations
  - Geographical concentrations
  - Socio-economic concentrations

Impact of 1918 ‘flu pandemic by age band

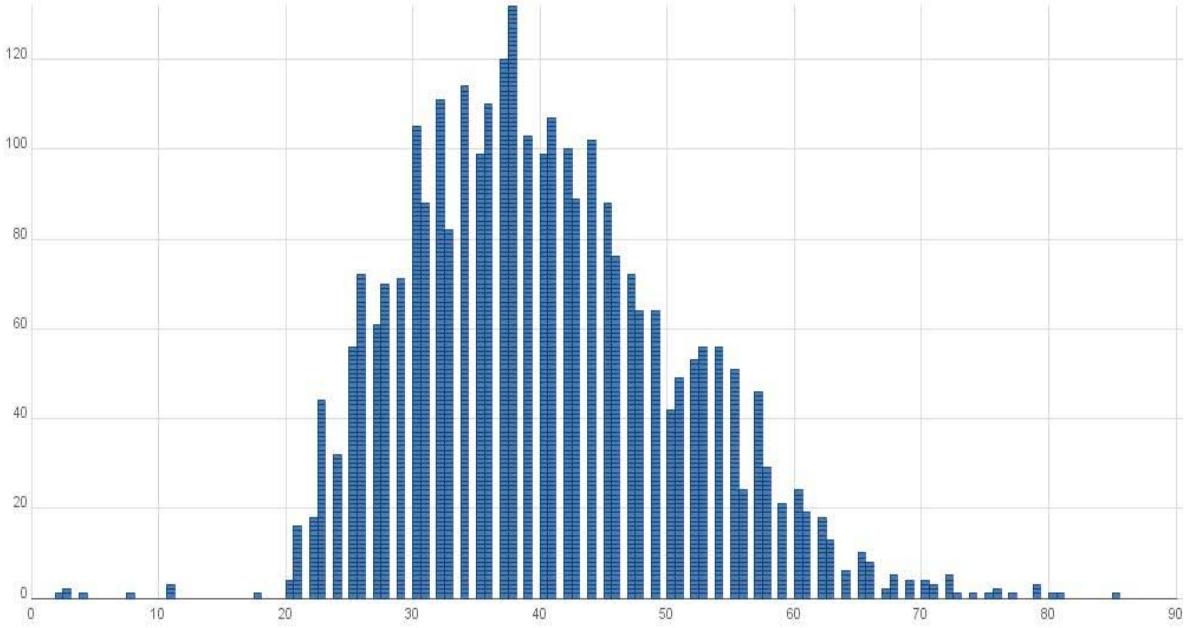


Source: Swiss Re - Pandemic influenza: A 21st century model for mortality shocks

Other Mortality Shock

- Terrorism characteristics
  - Working age individuals more vulnerable
  - Targets where population density is high
  - Dynamic nature of the threat
- War characteristics
  - Younger males predominant
- Natural disasters
  - Geographical concentrations

Number of deaths by age in the September 11 terrorist attacks



Source: Data from www.cnn.com/SPECIALS/2001/memorial

Trend Mortality

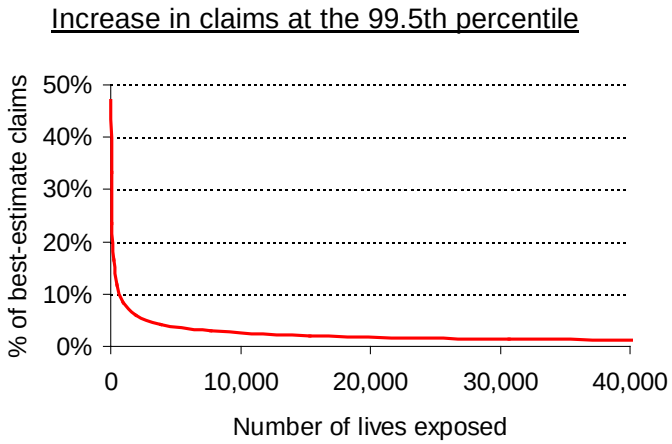
- Changes to anticipated mortality improvements over time
  - Term assurance portfolios exposed to deterioration in mortality rates for the 50 to 55 age group (greatest impact on liability value)
  - Whole of life assurances exposed to mortality rates at higher ages i.e. mid 80's (depending on underlying improvement best estimate)
- Drivers
  - Socioeconomic: e.g. health care provision and population density
  - Lifestyle: e.g. obesity and excess alcohol
  - Disease: e.g. new and re-emerging diseases

Trend Longevity

- Ever increasing improvements to senior mortality
  - Exposures aggregated by defined benefit schemes and annuity writers
  - Immediate concern for in-payment pensions
  - Long-tail exposure with deferred pension liabilities
  - Significant exposure to mortality improvements of newly retired males
  - Changes to mortality rates in the mid 80's have greatest financial impact
- Drivers
  - Personal healthcare: e.g. preventative and remedial treatments
  - Medical developments: e.g. improved drugs and procedures
  - Lifestyle: e.g. good nutrition and high levels of activity with few ‘bad habits’
  - Aging: e.g. breakthroughs in the understanding and 'treatment' of aging

Benefits of Diversification

- Diversification within a product line reduces specific risk leading to lower relative variation in experience
- Marginal volatility is lower than the aggregate of the component parts for non-perfectly correlated risks



Product Line	Trend Mortality	Trend Mortality	Shock Mortality	Trend Mortality	Shock Mortality	Trend Longevity
Stand Alone Capital	100	100	50	100	50	75
Combined Capital*	100	122		130		

Diversify by product, region or risk class

Utilise natural offsets

* Based on QIS5 technical specification

Limits of Diversification

- Company circumstances may restrict diversifying business
  - Monoline business strategies
  - Risk aggregators
  - Limited expertise
  - Regulatory restrictions
- Other circumstances may restrict diversifying business
  - Peak exposures dictated by insured appetite
  - Economically over-sized exposure
  - Unexpected correlations

Risk Transfer Techniques

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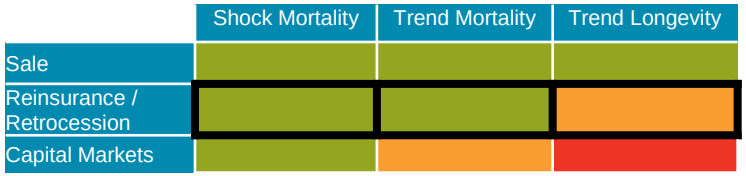
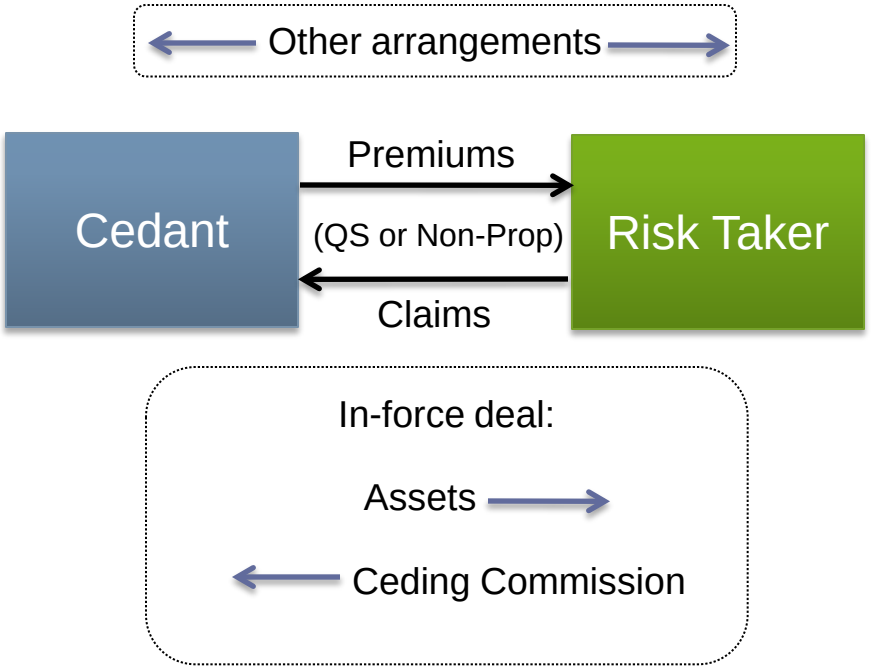
Established Methods | Emerging methods | Innovative methods

	Shock Mortality	Trend Mortality	Trend Longevity
Sale	▪ Portfolio Sale	▪ Portfolio Sale	▪ Portfolio Sale
Reinsurance / Retrocession	▪ Quota Share ▪ Non-Proportional ▪ Group Life Surplus ▪ Lloyds Market	▪ Quota Share ▪ Captives	▪ Insurance Swap
Capital Markets	▪ Mortality Bonds & Swaps	▪ Value-in-Force Securitisation ▪ Parametric Hedge	▪ Parametric Hedge

Reinsurance / Retrocession

Examples

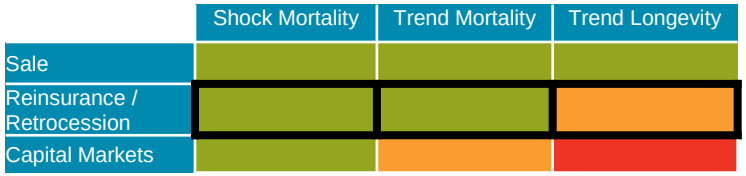




1. 'Traditional' retrocession – reinsurance of long-tail mortality liabilities to reduce trend (and lapse) risk. Inforce deals could have additional capital and liquidity benefits
2. Non-proportional shock protection – excess of loss cover for mortality risks. Cession of risk concentrations in the group life market e.g. large office buildings in central London or surplus cover on high income lives
3. Longevity swaps – reinsurance, without asset transfer, of inforce (and possibly contingent) annuity liabilities. Premiums and claims paid on net basis reducing exposures, counterparty risk may be mitigated by collateral arrangements. Possibility to 'shape' premiums
4. Risk swaps – potential for reciprocal arrangements for risk diversification e.g. mortality vs. critical illness, cross territory

Reinsurance / Retrocession

Considerations



- Benefits
  - Indemnity risk transfer
  - Long duration
  - Flexibility
  - Familiar (usually)
  - Significant capital relief
  - Lock-in profits from existing business
  - Generation of (fungible) liquidity

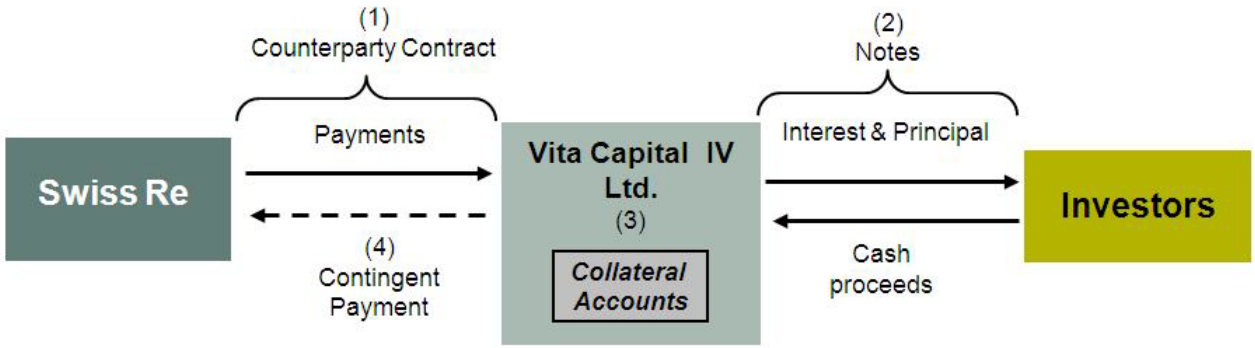
- Challenges
  - Limited capacity available
  - Significant counterparty exposure
  - Residual ‘tail’ exposures
  - Agreements on pricing and terms e.g. underwriting standards
  - Complex structure and administration
  - Removal of some risk specific diversification benefits

Capital Markets

Example

	Shock Mortality	Trend Mortality	Trend Longevity
Sale			
Reinsurance / Retrocession			
Capital Markets			

Swiss Re excess mortality protection transaction with Vita Capital IV



1. Swiss Re and Vita Capital IV (a Cayman SPV) enter into an ISDA mortality swap whereby Swiss Re purchases mortality shock protection.
2. Vita Capital IV issues floating rate notes to investors for the aggregate exposure of the mortality swap
3. The proceeds of the Notes are held in trust and invested in IBRD (part of the World Bank) debt securities. Coupons on the notes comprise of investment earnings on the assets plus risk premium payments from Swiss Re.
4. If population mortality is in excess of specified level in a certain country over a given period, Swiss Re is paid the calculated claim amount. On the note redemption date the collateral is liquidated and the principal on the notes is returned to investors

Capital Markets

Considerations

- Coverage
  - Parametric or indemnity cover (or some hybrid)
  - Basis risk and claim recovery timeline
  - Capital relieved relative to protection cost
  - Multi-year protection
- Execution
  - Insurance or derivative
  - Complexity and execution timing
  - Availability and quality of data
  - Suitable for large aggregated exposures
- Counterparty
  - Collateral: None, replacement value, full
  - Counterparty risk
  - Alternative and sustainable capacity

Innovation

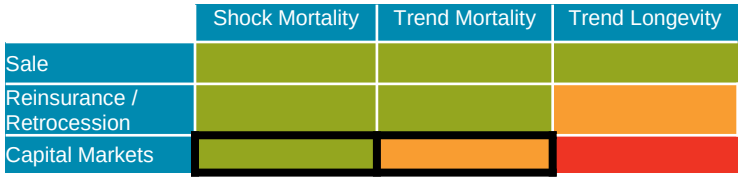
Longevity

	Shock Mortality	Trend Mortality	Trend Longevity
Sale			
Reinsurance / Retrocession			
Capital Markets			

- ‘Delta hedging’ liability value using parametric derivatives
  - Capacity provided by (re)insurers, banks and capital markets investors
  - Netting and collateralisation reduce counterparty risk
  - Flexibility to hedge subsets of a portfolio including deferred pensioner risk
  - Basis risk versus underlying portfolio limits scope to larger liabilities
- Transfer of liability and asset risk to a third party
  - Capacity provided by banks with ‘captive’ insurers e.g. GS, DB
  - Highly structured transactions
  - Complete exit or de-risking on specific portfolios
  - Full release of any associated capital, but comes at a cost

Innovation

Mortality



- Extreme mortality
  - Capital Markets indemnity risk transfer
  - Accelerated payouts
  - Group terror mortality protection
- Mortality trend risk
  - Parametric or modelled loss hedges
  - Risk swaps (exchange mortality for longevity)
  - Optimisation of natural offsets in trend risk
  - EV under Solvency II – tranching and financing of layers in SCR

Regulatory Environment

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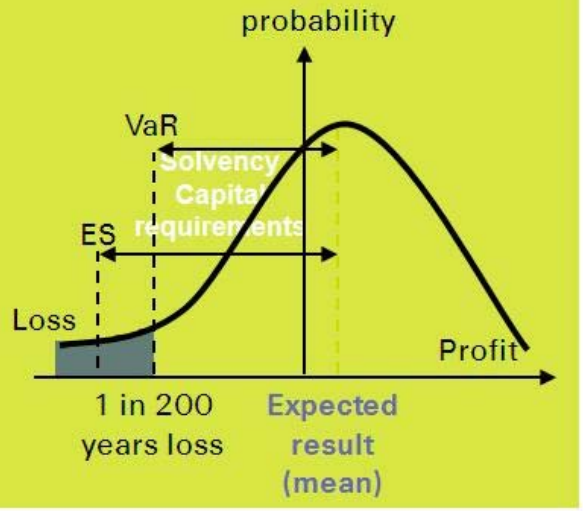
	Shock Mortality	Trend Mortality	Trend Longevity
Sale			
Reinsurance / Retrocession			
Capital Markets			

- Principles based regulation should more fully recognise non-traditional risk transfer methods
  - Liability securitisation
  - Insurance risk derivatives
- The EU is introducing the principles based Solvency II regime in 2013
  - Benefit captured through internal risk model
- Other regulatory domiciles (e.g. Bermuda, Switzerland) want to have equivalent regimes
- US regulation is moving towards principles based regulation, but timeline is uncertain

Probabilistic risk measurement



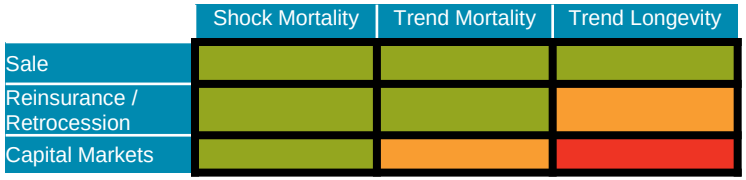
Solvency II risk measure will be based on a Value at Risk (VaR) level of 99.5% which is equivalent to a 0.5% target default probability, and specifies a time horizon of one year

Current Market Overview

What is getting done:

- Extreme mortality market
  - New Vita IV issuance, SCOR mortality swaps
- XXX (redundant reserve) financing
  - Mortality contingent LoC financing hedged with derivatives, private securitisations
- Value-in-Force transactions
  - UK FSA now requires funded basis – reinsurance solution involves sourcing cash
- Longevity risk transfer
  - LLMA developments, buyout, insurance based deals, interest in parametric deals
- Closed block
  - Renewed interest in wholesale divestment

‘Buyers’ of life insurance risk



Insurers, Reinsurers, Pensions Funds, Corporations, Asset Managers, Banks

- Attractions
  - Diversification from traditional asset classes
  - Attractive risk adjusted returns with low anticipated volatility
  - Offset and/or diversification of other insurance risks
  - Capture a premium for the illiquid and esoteric nature
- Concerns
  - Pricing and valuation transparency
  - Potential for anti-selection and information asymmetry
  - Standardisation and liquidity
  - Long duration and embedded second order risks (e.g. market risk)

Questions, Comments & Important Information

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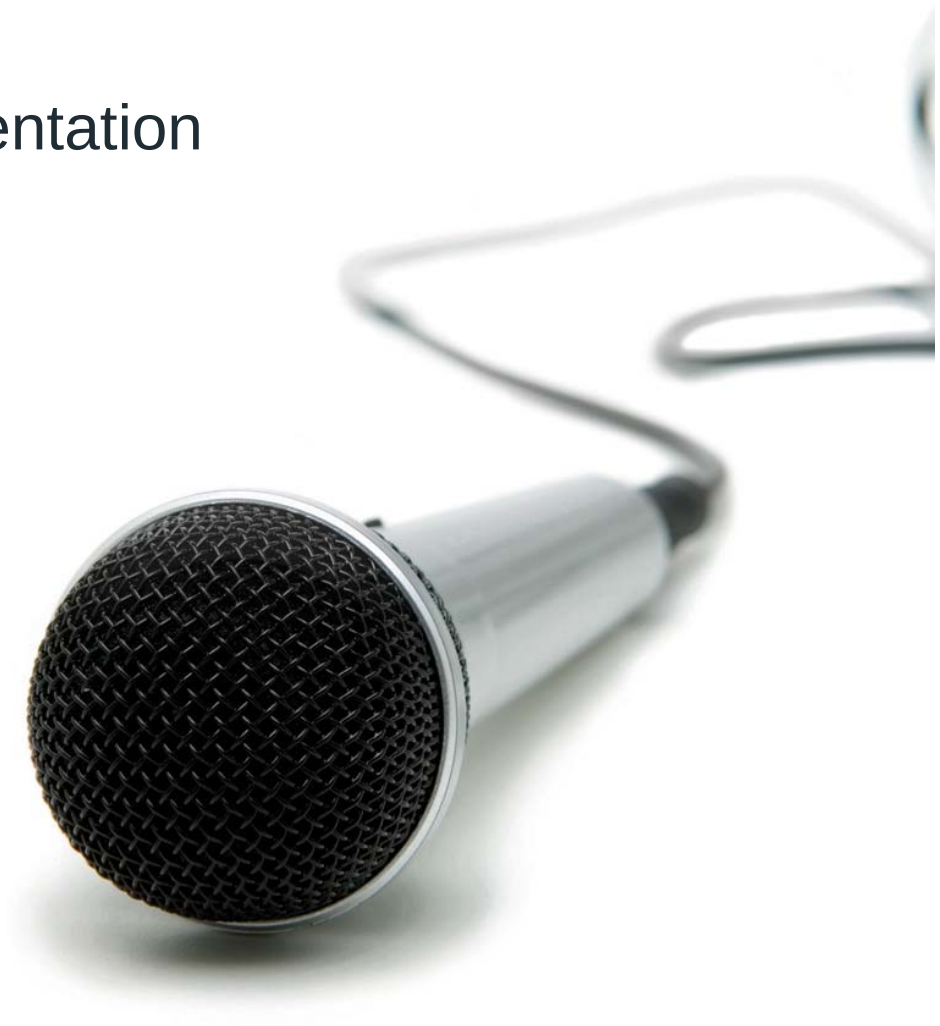

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