



Institute of Actuaries of Australia

5th Financial Services Forum

Renovating the Financial System

2010

13 and 14 May 2010 – SYDNEY

Variable Annuities in Australia: Managing the Risks

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Agenda

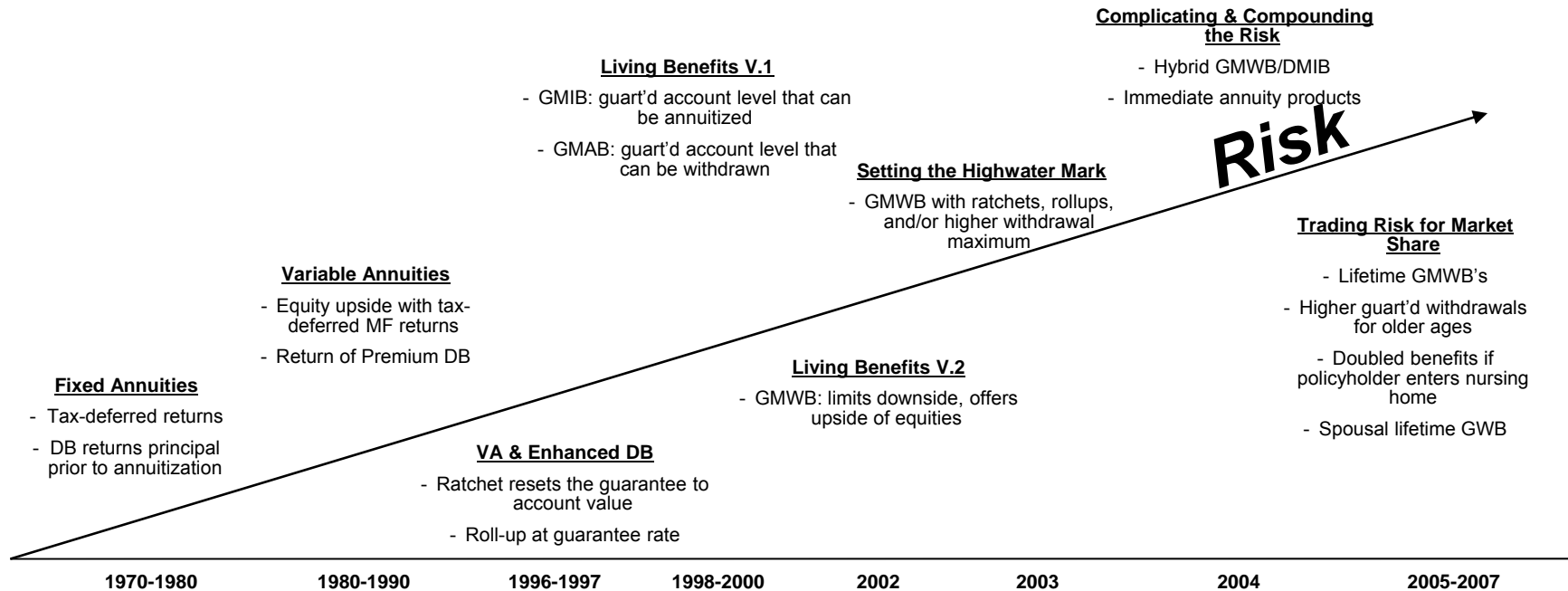
- VA Risks: Lessons learned from the past
- Dynamic Hedging: Ingredients for an optimal hedging strategy



VA Risks: Lessons learned from the past



Past US Experience: Benefits War



Source: Goldman Sachs Research, AXA Towers Perrin, Company Data

- Escalating richness of benefits steadily increased the risks taken on by insurance companies
- GFC brought to light certain weaknesses of existing hedge programs and increased the awareness and scrutiny of these risks

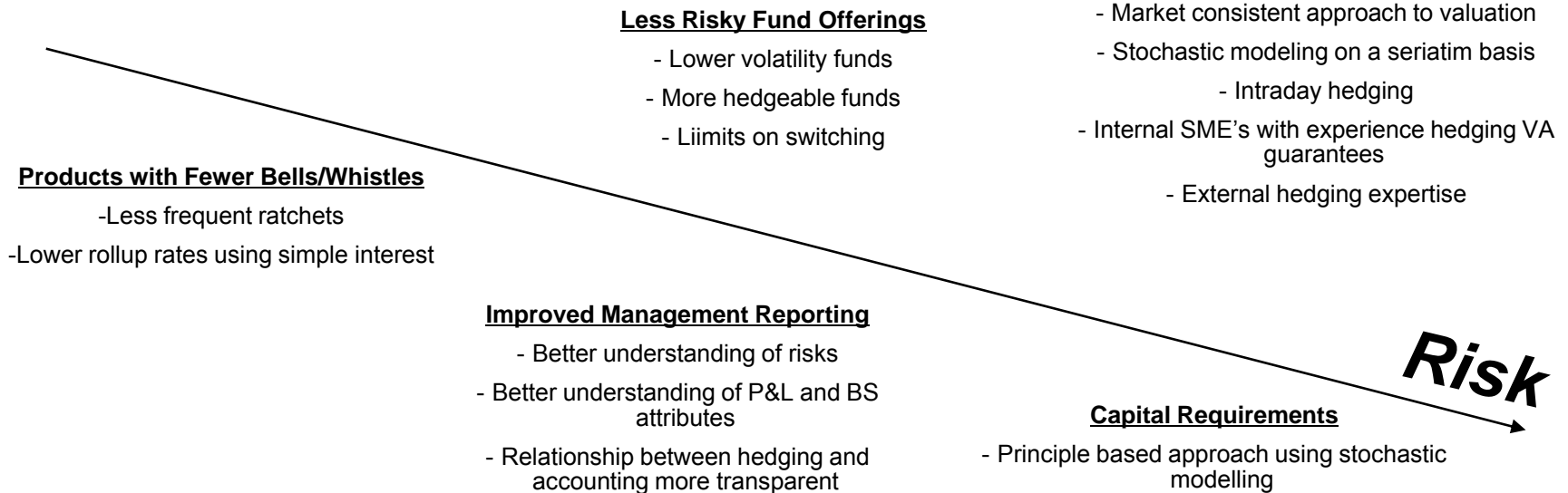


Diagnosis of Problem

- Lack of understanding of the risks embedded in these products and the management of said risks
 - Poor attribution of P&L and Balance Sheet movements
- Accounting asymmetry
 - Assets marked to market while liabilities valued through arbitrary accounting filters
- Silo business model
 - Poor communication between product development, pricing, accounting and risk management teams
 - Desire for increased market share in a very competitive environment meant risks often took a back seat to ever-richer product features
- Insufficient hedging programs
 - Models not sophisticated enough to properly price the embedded guarantees
 - Not enough horse power to run models
 - Not hedging the economics
 - Lack of sufficient operational controls and redundancies
 - Tracking error not given enough consideration



Lessons Learned

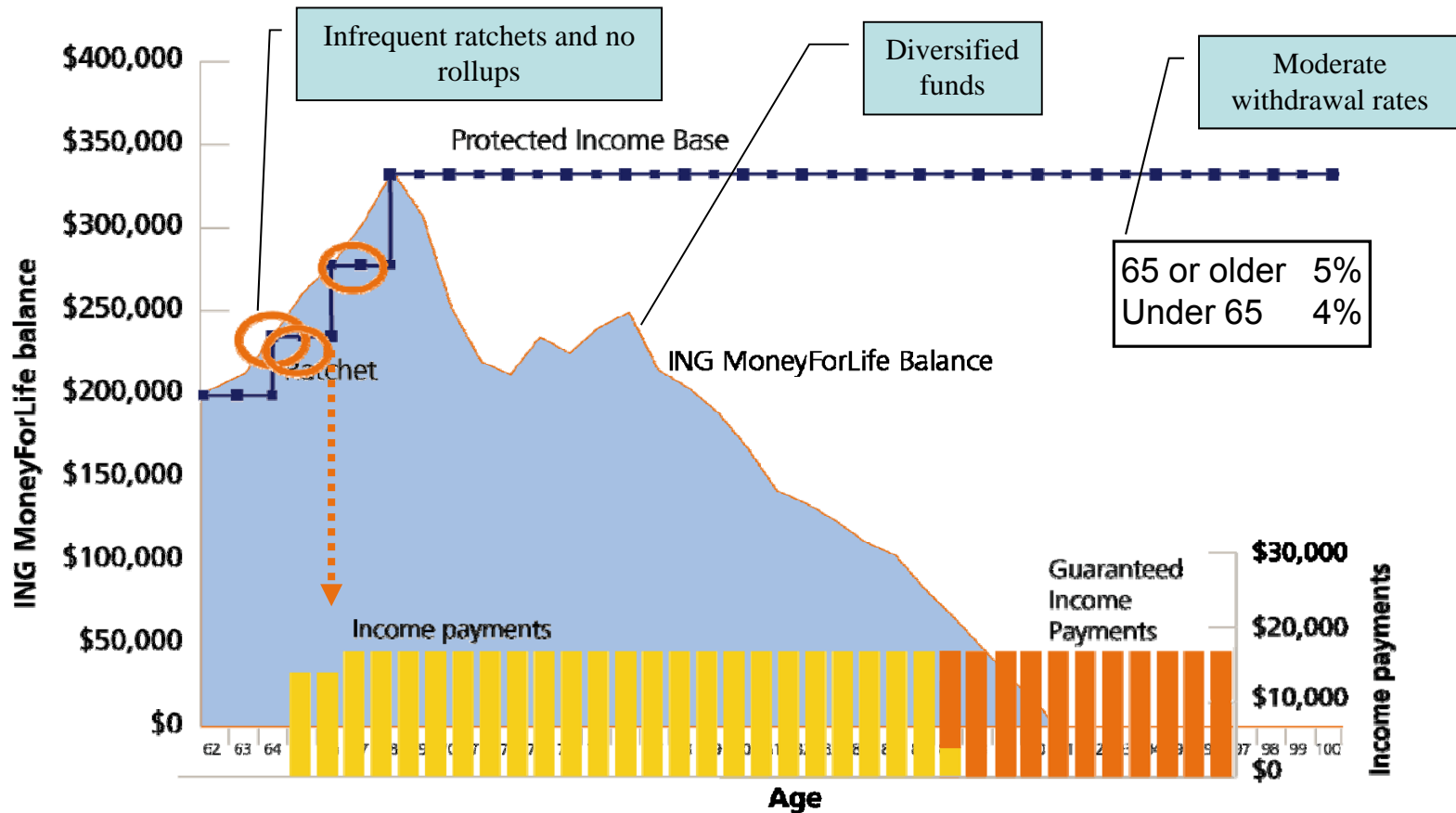


2008 →

Product features less risky	Less frequent ratcheting; lower rollup rates; capped benefits; forced diversification
Enhanced risk management platforms	State of the art hedging program; market consistent tail risk measures being employed by more providers
Greater knowledge and expertise	Sufficient in-house expertise to balance marketing and sales aspirations with prudent risk management



How Money For Life Works





Avoiding a Benefits War in Australia

Australia Prudential
Regulatory Authority

Will not allow further variations without an exhaustive review and approval process

Disciplined pricing
approach

Stringent pricing review process to ensure a holistic understanding of the risks and that an appropriate return is earned for that risk

Disciplined risk
management

At the BU and corporate level provides a better understanding of the VA-guarantee risk/return profile

Strict governance
structure

Regular review and oversight of product structure, risk management and value of product with key stakeholders will help to maintain discipline

Leveraging lessons
learned from global VA
experience

Particularly the issues brought about by the benefits war in the US VA market

“Simple” value
proposition

Consumers and advisers are more knowledgeable today and want to understand the value a product provides

Hard check points

Agree to regular pricing and risk review check points to assess risk exposure against appetite

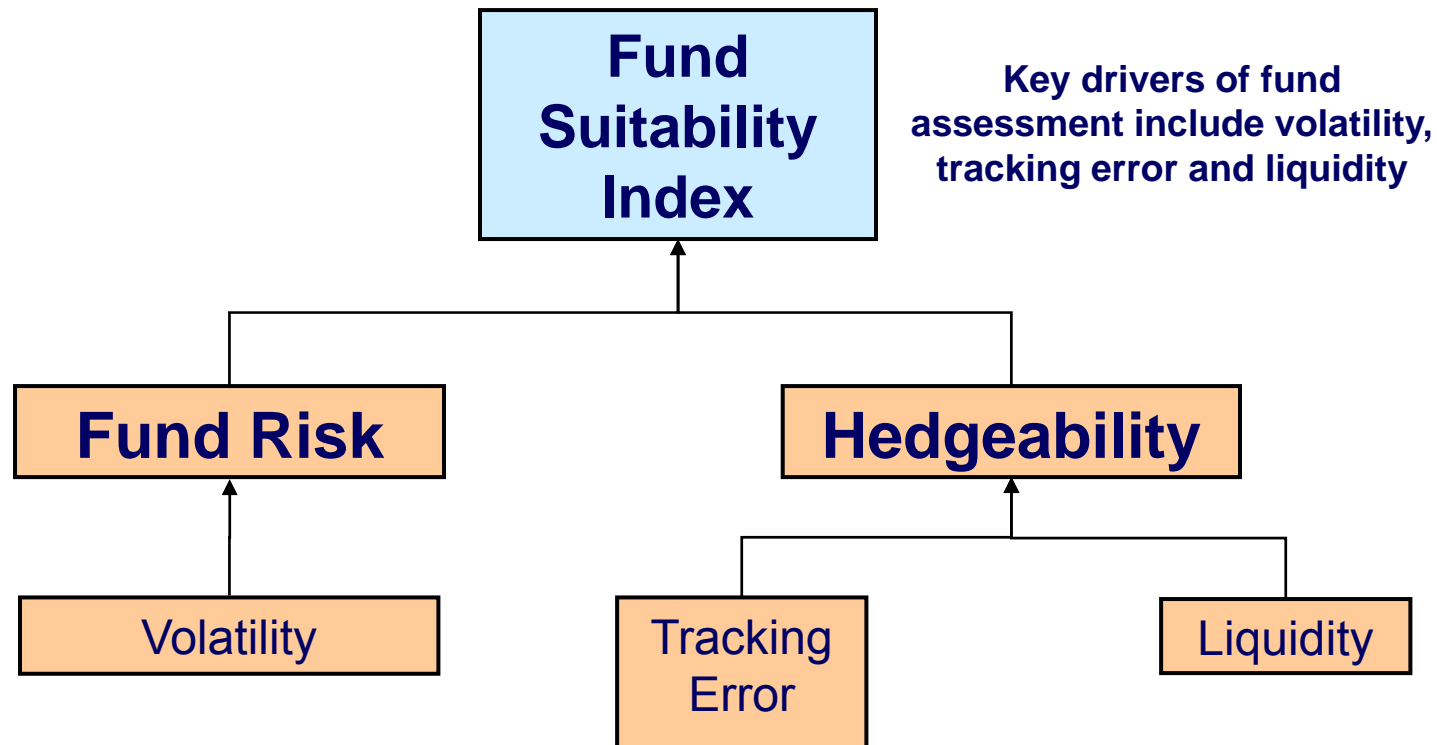


Tools to Help Manage VA Risks

Technique	Explanation
Underlying Fund Selection	Fund selection needs to balance the interests of both the policyholder and the shareholder.
Capital Markets Hedge	Leverage capital market option pricing and hedging techniques to mitigate the exposure introduced by the VA embedded guarantees.
Product Features	The richness of the protection has a positive correlation with the inherent risk.
Reinsurance	Ceding the risk, actuarial and/or capital markets to a reinsurer who can more readily spread the risk across the globe.
Longevity Swaps	Longevity swaps (bespoke and index) are a burgeoning field that can help insurers manage their longevity risk.
Natural Internal Hedge	To the extent there are alternative products with opposite exposure to the markets, these can act as a natural hedge.

Topics discussed in further detail in subsequent slides

Underlying Fund Selection Process



Key drivers of fund assessment include volatility, tracking error and liquidity

Fund volatility indirectly leads to P&L volatility. A high vol fund would become a concern if it is not being hedged.

Higher tracking error refers to basis risk between the hedge portfolio and the hedge target.

Liquidity refers to ease in entering derivatives contracts without materially influencing market prices.



Dynamic Hedging: Ingredients for an optimal hedging strategy



VA Market Risks and Hedges

Delta

- Equity Index Futures

Rho

- Interest Rate Swaps
- Bond Futures
- Swap Futures
- Swaptions

Vega

- Index Options
- Variance Swaps

FX

- Currency Futures & Forwards

Other:

- Gamma/Realised Vol
- Basis
- Liquidity



Daily Liability Valuations

Policyholder
Data



Admin System

Liability Valuation System

$$P(S, t) = Ke^{-r(T-t)}N(-d_2) - SN(-d_1).$$
$$C(S, t) = SN(d_1) - Ke^{-r(T-t)}N(d_2)$$

Capital Market
Parameters

*Calibration
Models*

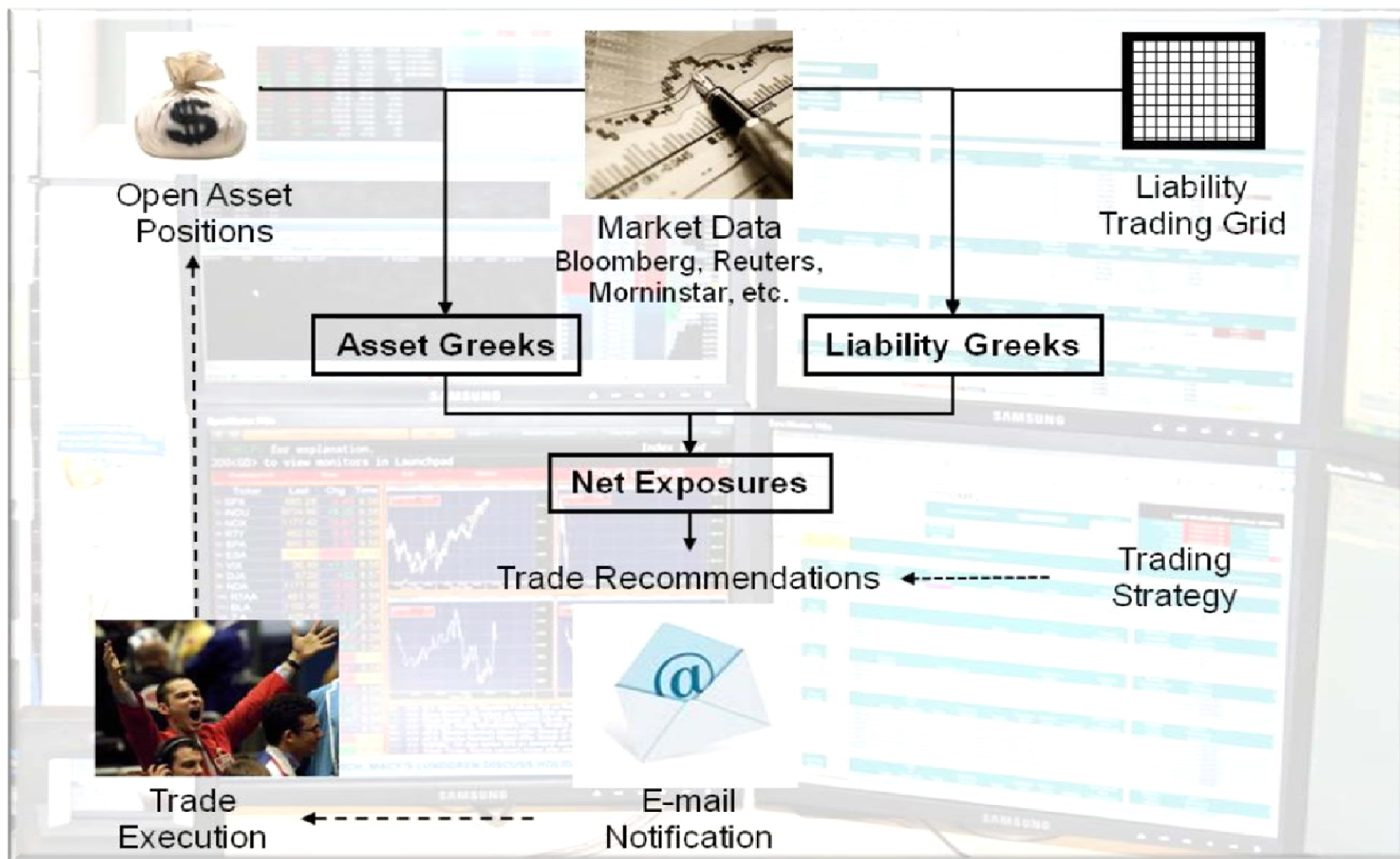
Demographic
Assumptions



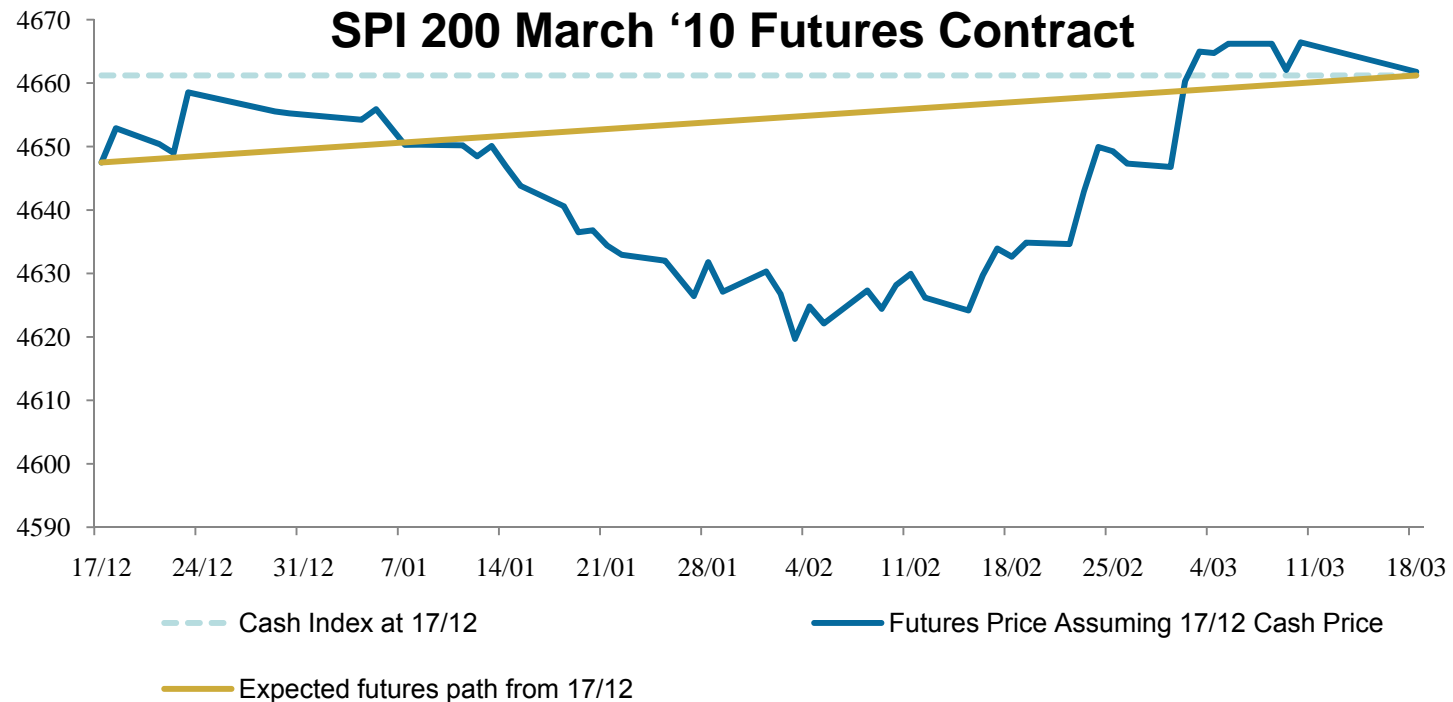
Distributed Computing



Asset-Liability Management

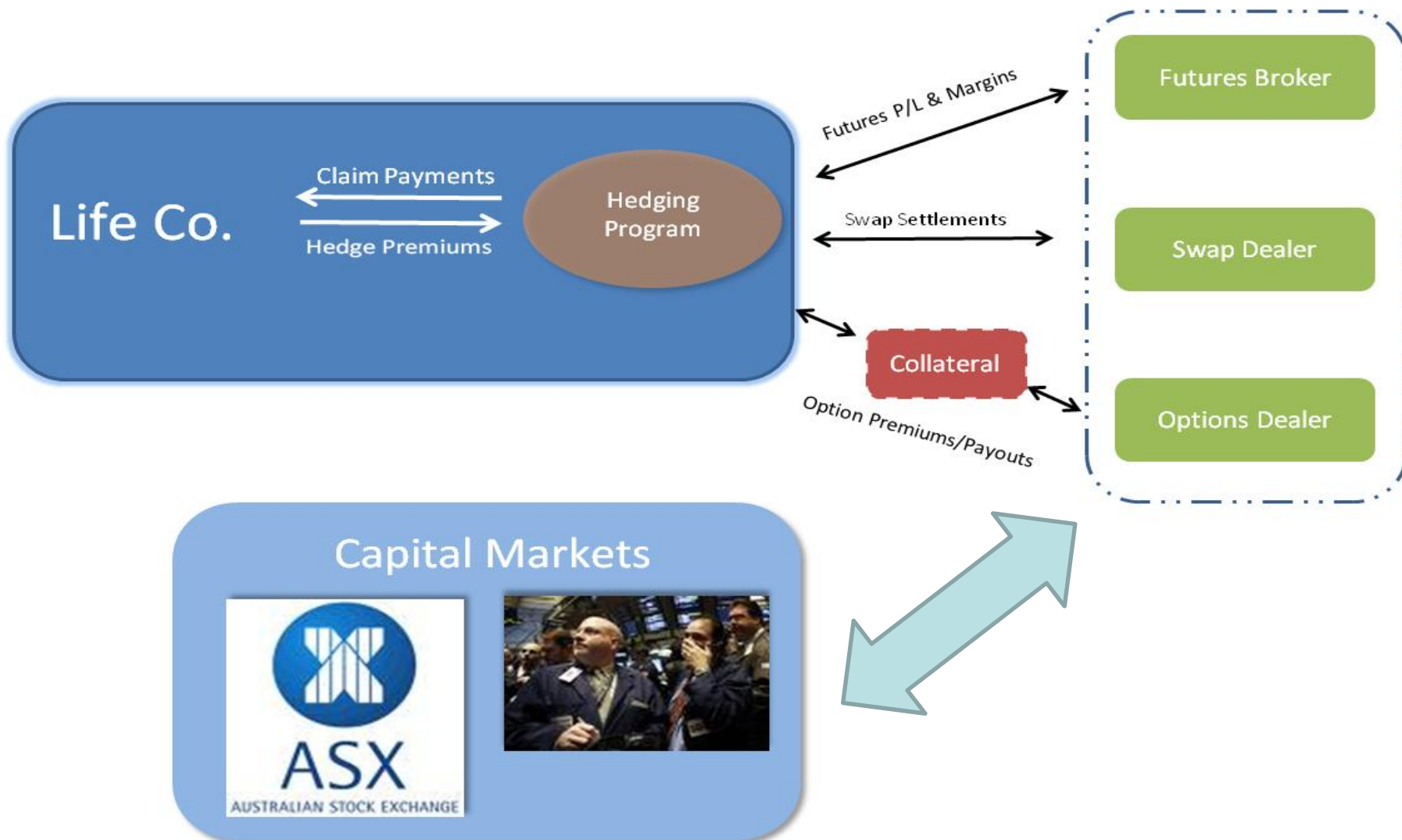


Australian Market Observations



- High interest environment
- High dividends, tax advantaged due to franking credits
- ASX gov't bond future contracts are cash settled only

Hedging Parties & Cash Flows





Performance Attribution

- Break down total movements in assets and liabilities into individual risk factors
- Compare performance of each hedge instruments to their respective Greeks
- Isolate changes in liabilities due to unhedged Greeks, new business, decrements, policyholder behaviour, etc.
- Determine Hedge Effectiveness
- Monitor Assumptions
- Internal Education

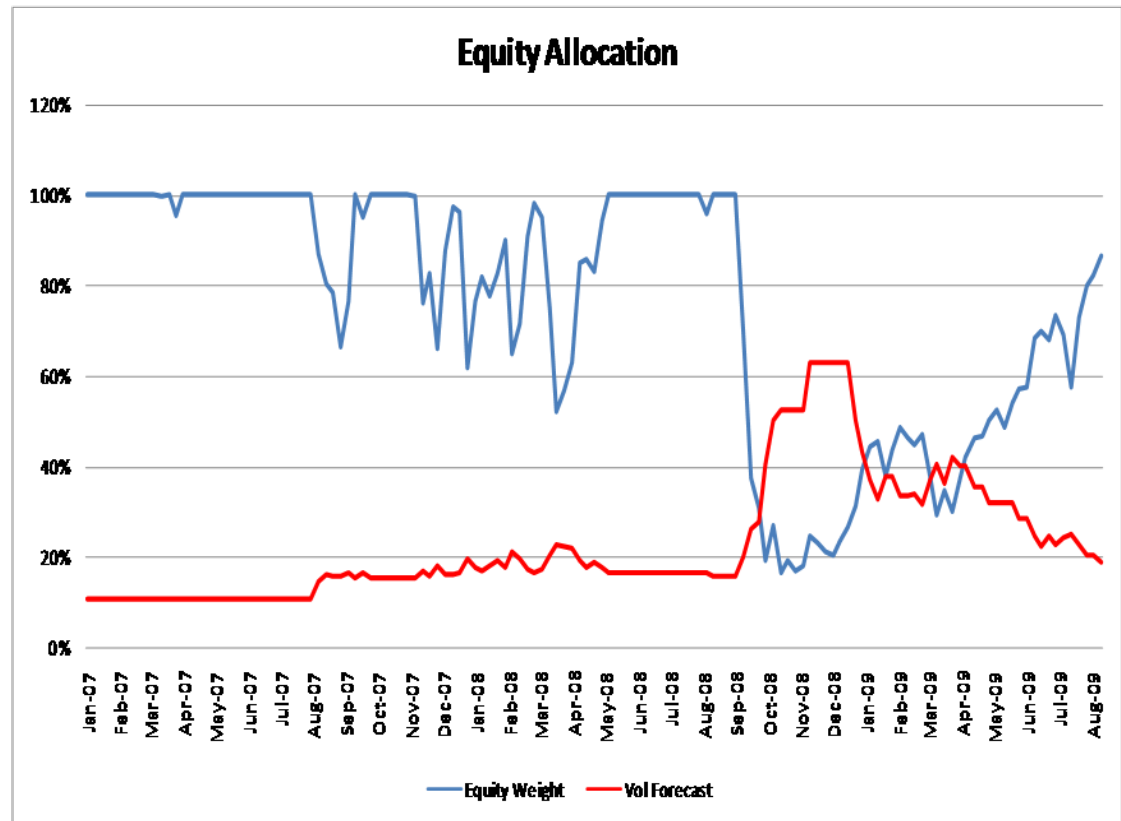
Hedging Performance





Where to Next?

- Continued risk management through innovative product design
 - Target volatility funds (graph)
 - Moving hedges from the insurer's balance sheet to policyholder assets
 - Interest rate linked withdrawal benefits





Thank You

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