

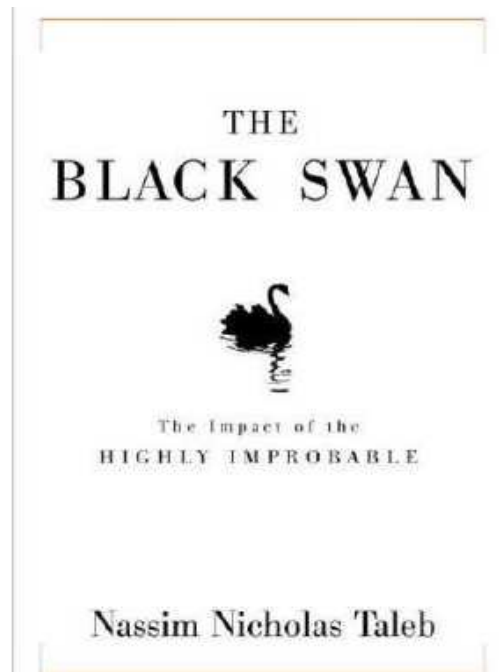
Surviving Black Swans - Managing Tail Risks in Insurance

IMAS 13th Annual Conference, 14 March 2012

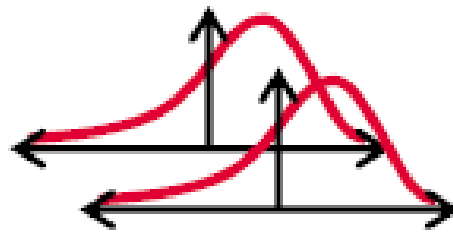
Kate Chiew
Chief Risk Officer

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“... We do know who society’s winners will be: those who are prepared to face Black Swans, to be exposed to them, to recognize them when they show up and to rigorously exploit them..”



What are the Tail Risks in Insurance?



Black Swans in Insurance



A large-impact, hard-to-predict, and rare event beyond the realm of normal expectations

Ability to Pay Claims ← → Capital Adequacy

Insurance Risks

General Insurance:

- Catastrophes (*Natural disasters / Terrorist attacks*)

Health Insurance:

- Morbidity (*pandemics*)

Life Insurance:

- Mortality (*mass claims*)
- Longevity (*significant mortality improvement*)

Market Risks

- Liquidity (*run-on-bank*)
- Equity / property market crash
- Interest rate movements (*mismatched A&L positions*)
- Credit spread spikes

Managing Insurance Risks



"There must be some mistake. According to our actuary tables I'm going to live to 83."

Catastrophe Risks

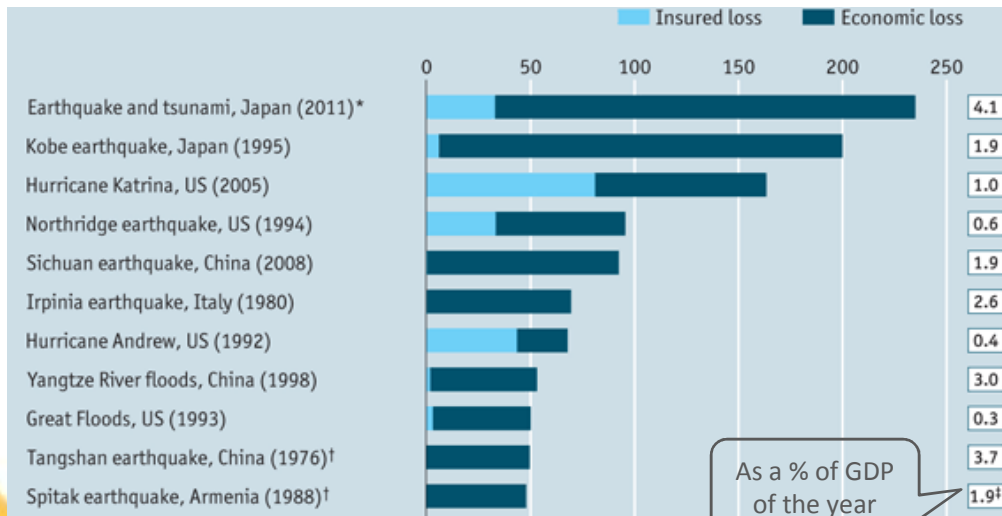
Non-Predictable; Non-Diversifiable



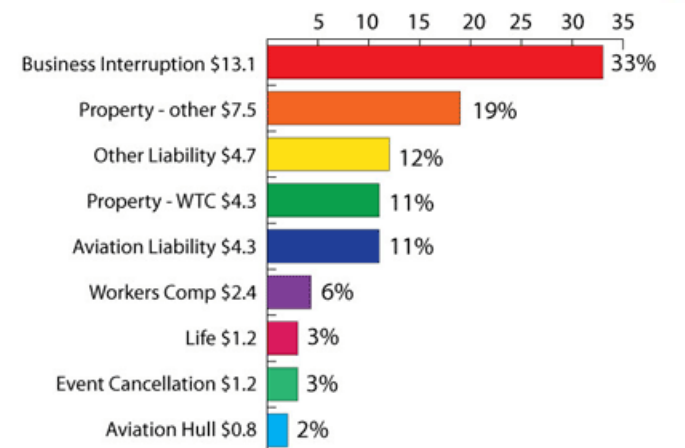
World's Costliest Natural Disasters 1976 – 2011 (\$ billion)



Total Insured Losses from 9/11 (\$billion)

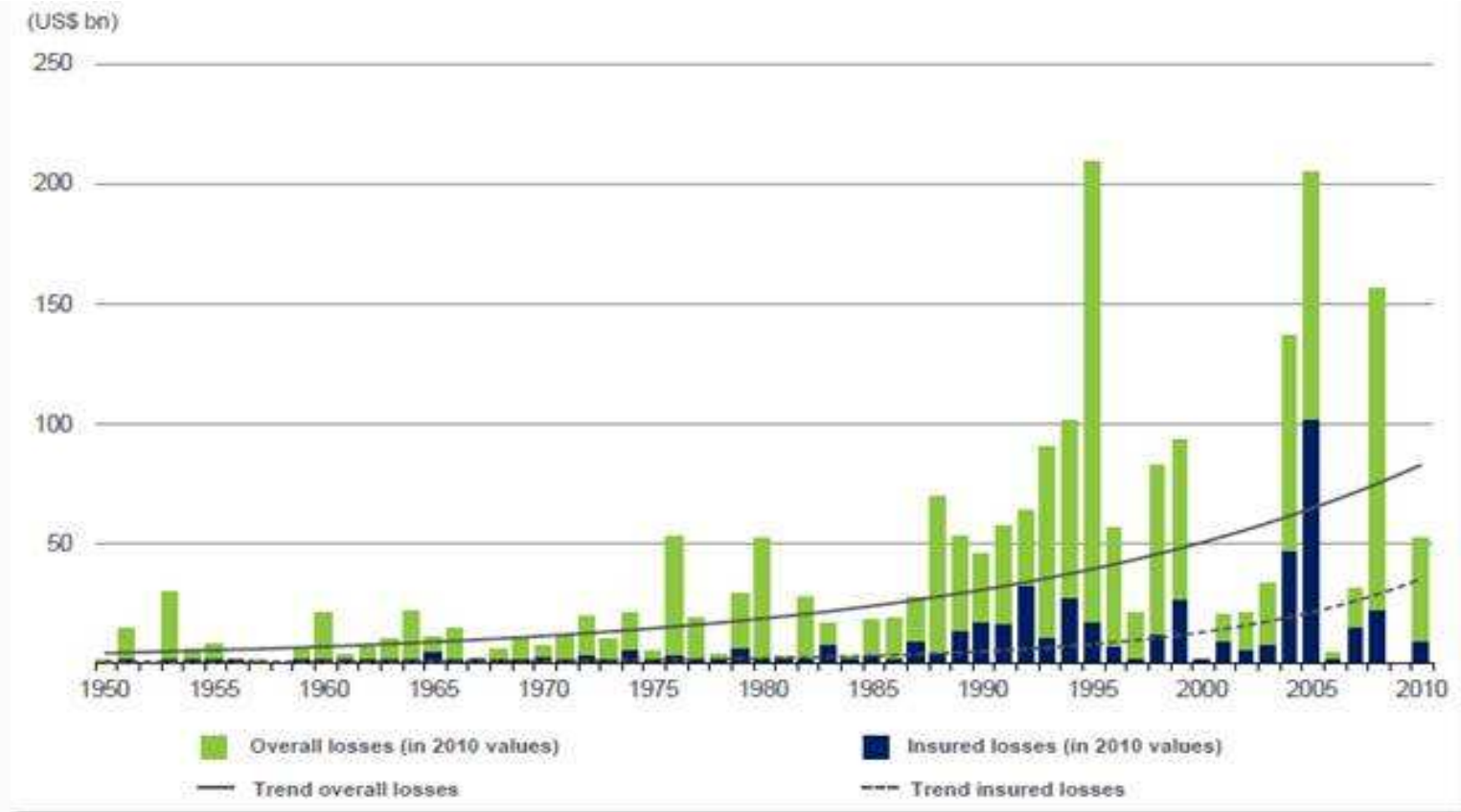


Source: Munich Re; IMF; *The Economist*



Can the RISK be Hedged / Managed?

Great Natural Disasters Worldwide since 1950



© 2011 Münchener Rückversicherungs-Gesellschaft, Geo Risks Research, NatCatSERVICE – As at January 2011

Source: Munich Re

Increasing trend and volatility of Natural Disasters in the last decade....

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Insuring against Catastrophes

Traditional Solution

Catastrophe Reinsurance



Pros

- **Diversification** – reinsurers spread their exposures over many insurers and many regions
- Sophisticated **catastrophe models** by reinsurers – wide geographical scale and more data

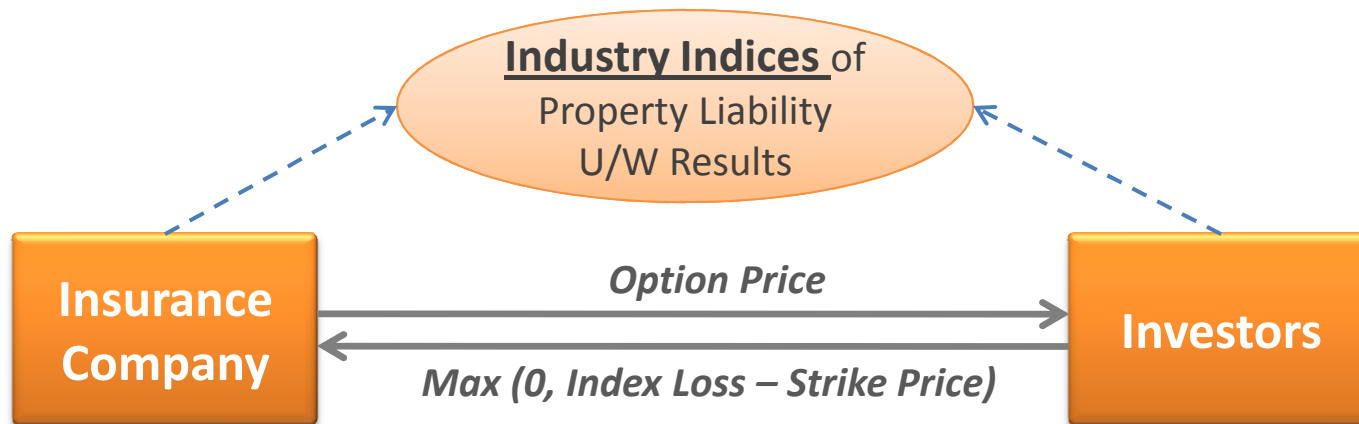
Cons

- **Credit Risk** – default of reinsurers due to abnormally large losses
- **Moral Hazard** – relaxed loss settlement

Insuring against Catastrophes

Capital Market Solution

Catastrophe Option



- Lower Moral Hazard → Lower Transaction Costs

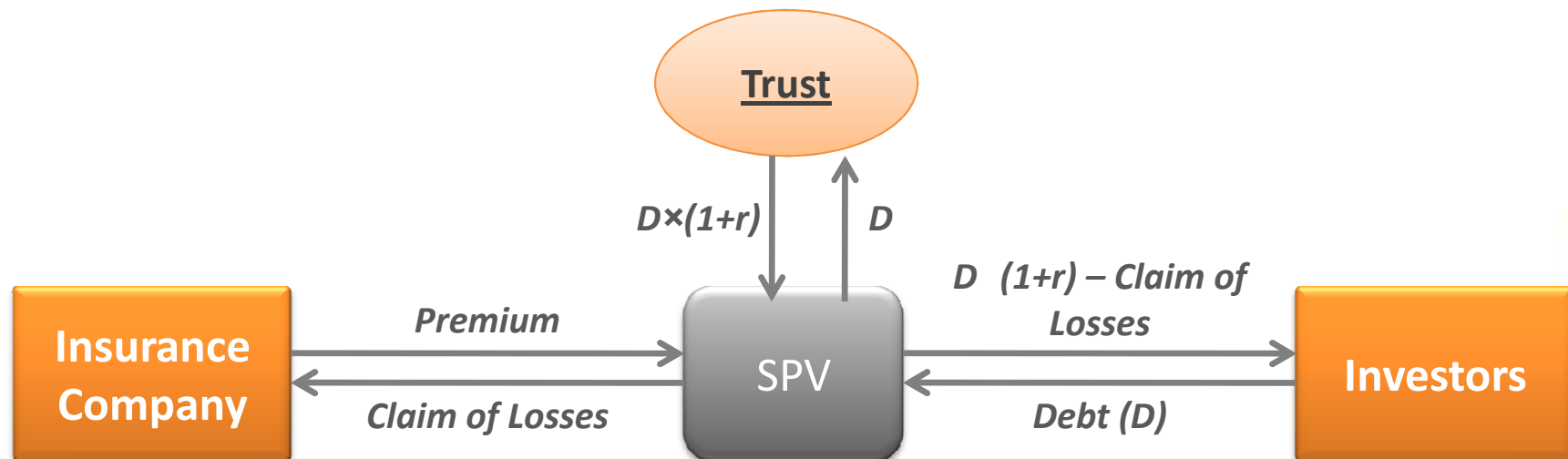
Basis Risk

- Standard Index is used instead of Insurer's own liabilities
- Losses under Strike Price is not covered

Insuring against Catastrophes

Capital Market Solution

Catastrophe Bond (*securitization of Catastrophe Risk*)



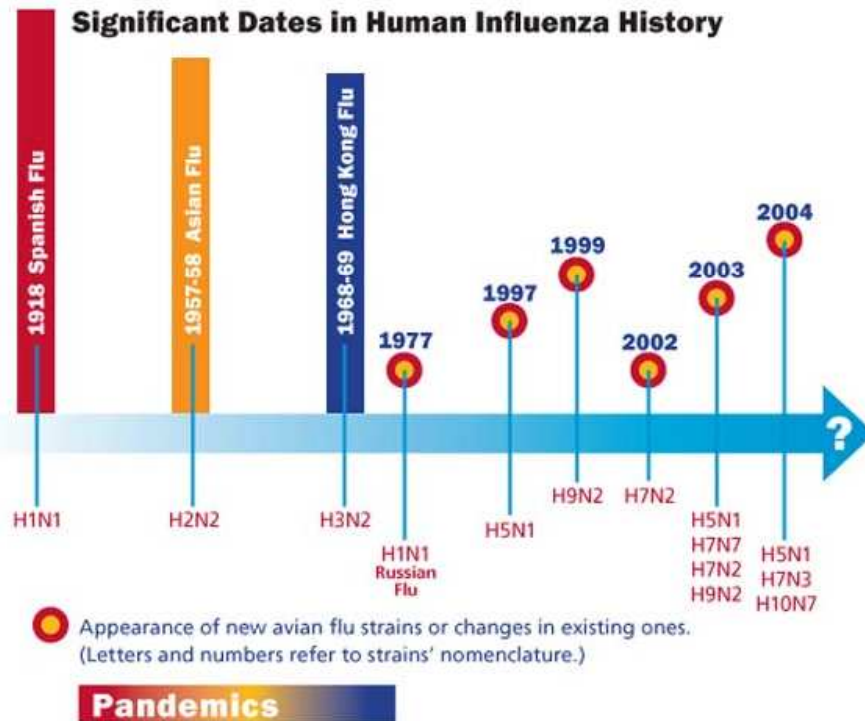
Claim of Catastrophe Losses can be based on EITHER

- Indexed Trigger → Higher Basis Risk
- Indemnity Trigger → Higher Moral Hazard

Insurance Risks

Health Insurance:

More & More Frequent Pandemics

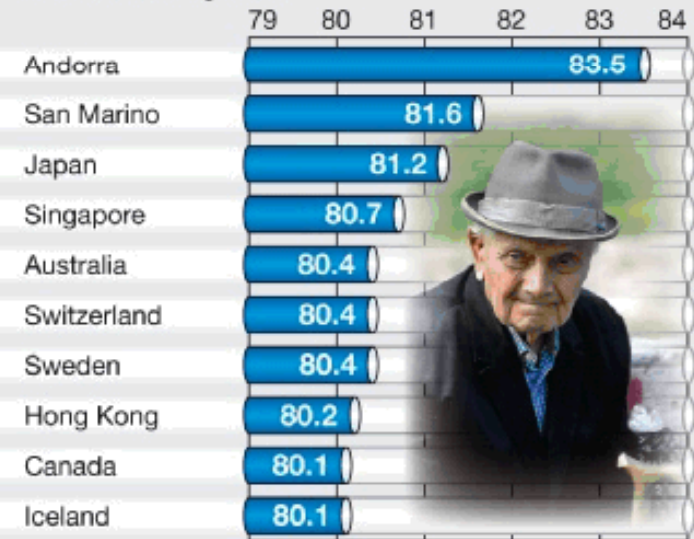


Life Insurance:

Significant Mortality Improvement

Top Ten Countries with Highest Life Expectancy

Indication in years



Do we have sufficient Capital / Liquidity to pay the Claims?

Managing Insurance Risks

-
- Hold Sufficient Capital**
- Sufficient Capital to cushion liability increments from sudden changes in expected future benefits
 - Sufficient Capital to absorb model risks in valuation

-
- Manage Business Mix**
- Pool large number of sufficiently independent risks, to diversify claims
 - E.g. mortality risk is naturally hedged by longevity risk

-
- Reinsurance**
- Transfer / mitigate insurance liabilities to reinsurers, thus reducing and fixing the liabilities
 - Subject to counterparty exposures and transaction costs

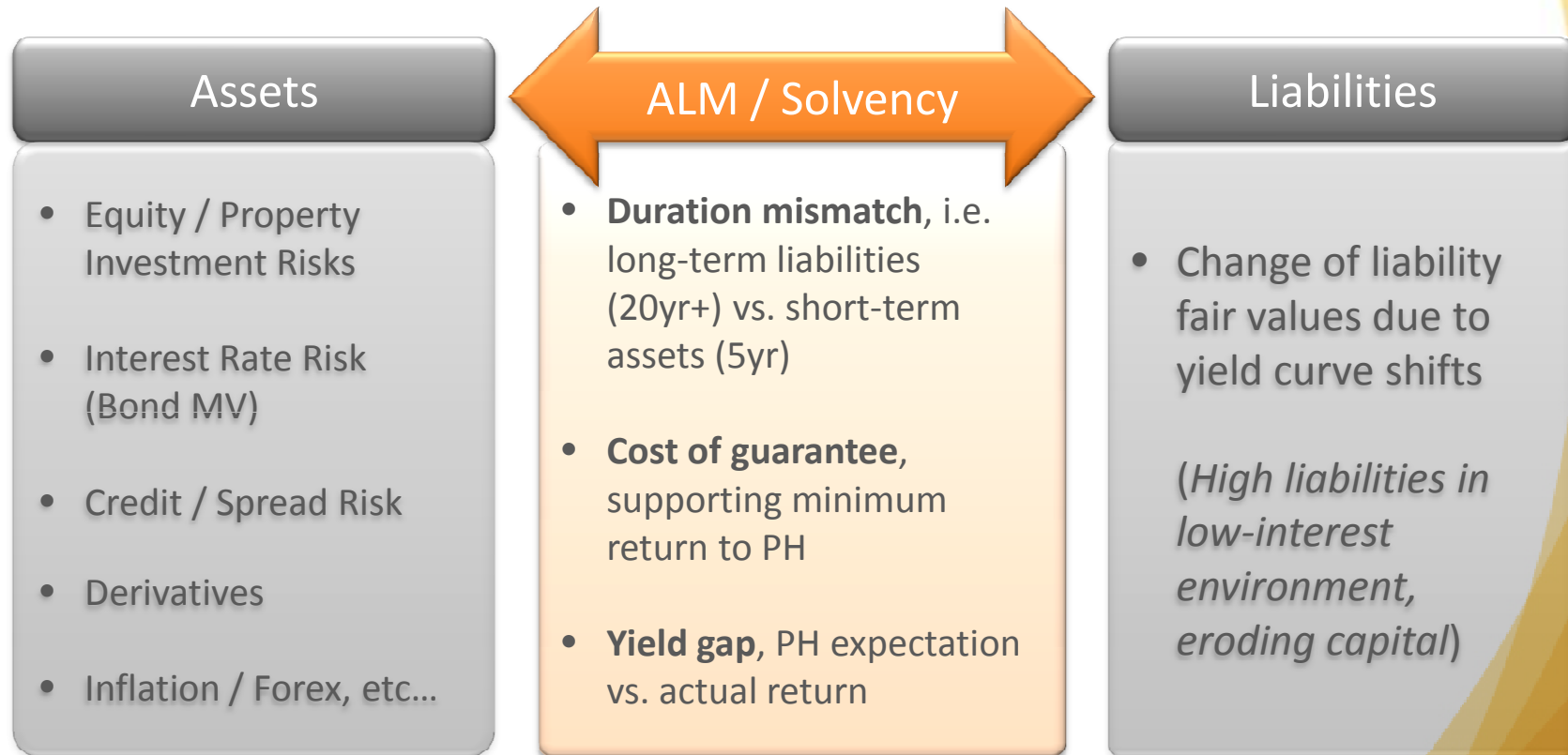
-
- Capital Market**
- Securitize and transfer insurance liabilities to capital market, thus reducing and fixing the liabilities
 - E.g. Mortality Bonds, Longevity Bonds
-

Managing Market Risks

(Insurance Company ALM)



Market Risks of an Insurer



Do We Hold Sufficient Capital?

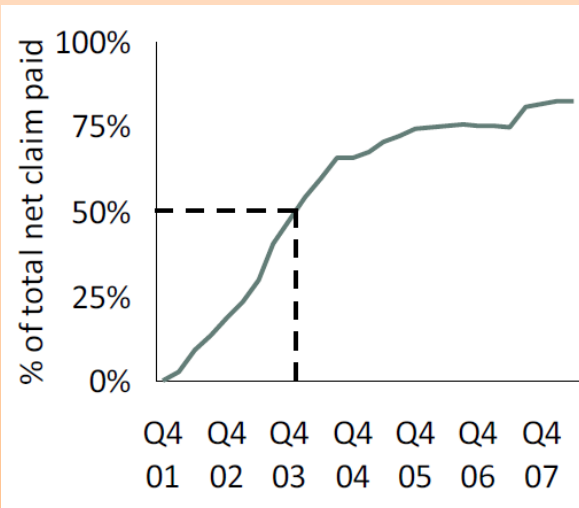
Liquidity – Ability to Pay Claims

Sufficient spot liquidity under stressed conditions?

Core insurance business need time to react in a severe loss events

→ Claim payments are time deferred

Claims Settled after '9/11'



Source: IMF conference on operationalising systemic risk monitoring Washington DC, 27 May 2010

Insurance companies DO NOT rely on short-term funding of investments

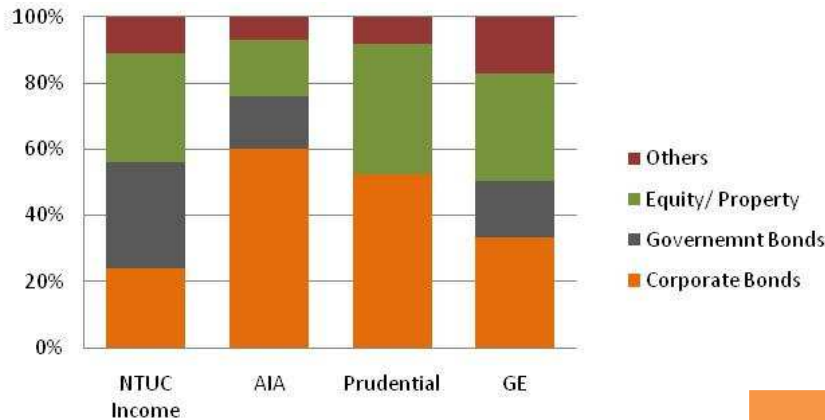
→ Sensitive to Liquidity Risks

Insurance Company Default due to Liquidity Problems

Company	Country	Year	Reason of Default
Executive Life	US	1991	Primarily due to losses in investment in junk bonds
Kentucky Central Ins.	US	1993	Default on loans from other people; Loss in risky assets..
Equitable Life Assurance	UK	2000	Forced to pay guaranteed annuities at high rates
HIH Insurance	AU	2001	Illiquid, with 7.8bil of assets, but only 133 mil of liquid assets
AIG	US	2009	Financial Crisis

2008 GFC – from Insurers' Perspective

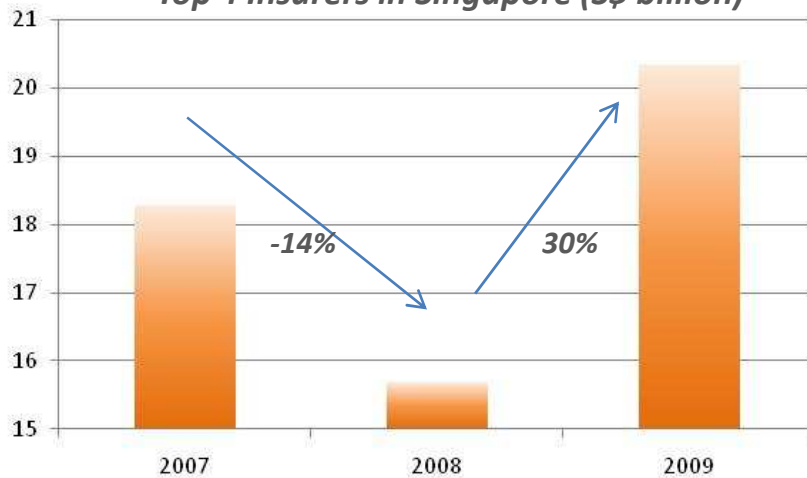
Asset Mix of Key Insurers in Singapore (Dec'07)



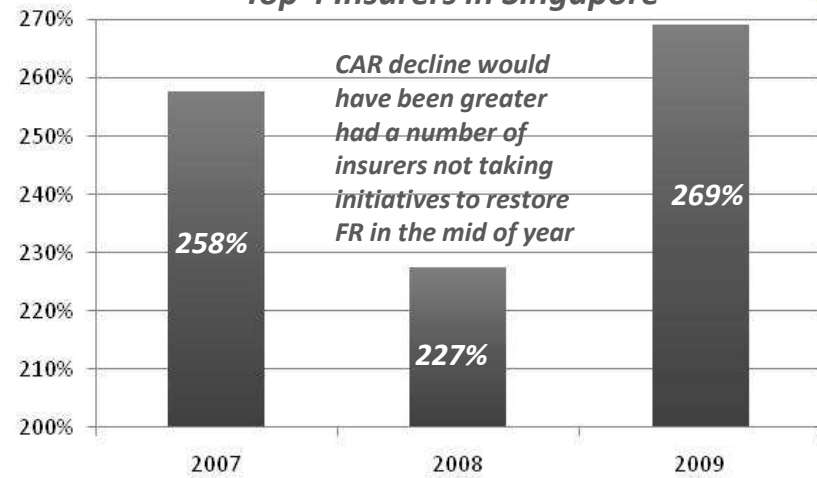
- The insurers' capital positions are sensitive to market risks;
- Tail events, such as market crash or interest/spread spike in 2008 can substantially reduce insurance companies' capital.



Total Regulatory Capital (RBC) of Top 4 Insurers in Singapore (\$ billion)



Average Capital Adequacy Ratio (CAR) Top 4 Insurers in Singapore



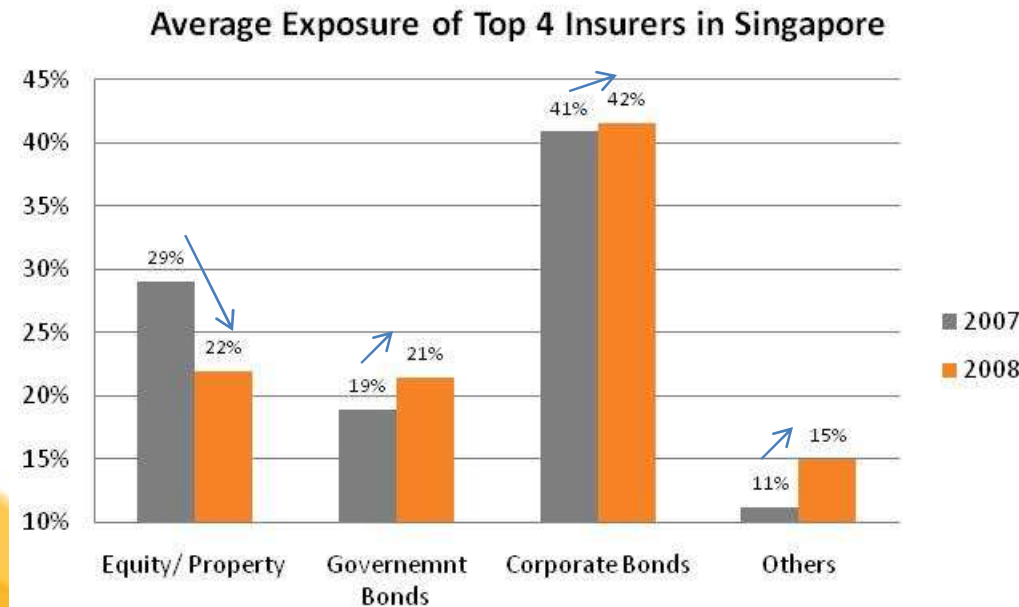
Source: MAS Annual Return, Form 23. The top 4 Insurers are Prudential, AIA, Great Eastern and NTUC Income.

Managing Market Risk

Playing Defensive (pro cyclical)– Changing Portfolio Allocation

Reducing Risky Asset Allocation

Upon financial crisis in 2008, insurers tend to de-risk the balance sheet by reducing exposure to risky assets.



- Upside potential is compromised
- Only temporary solution

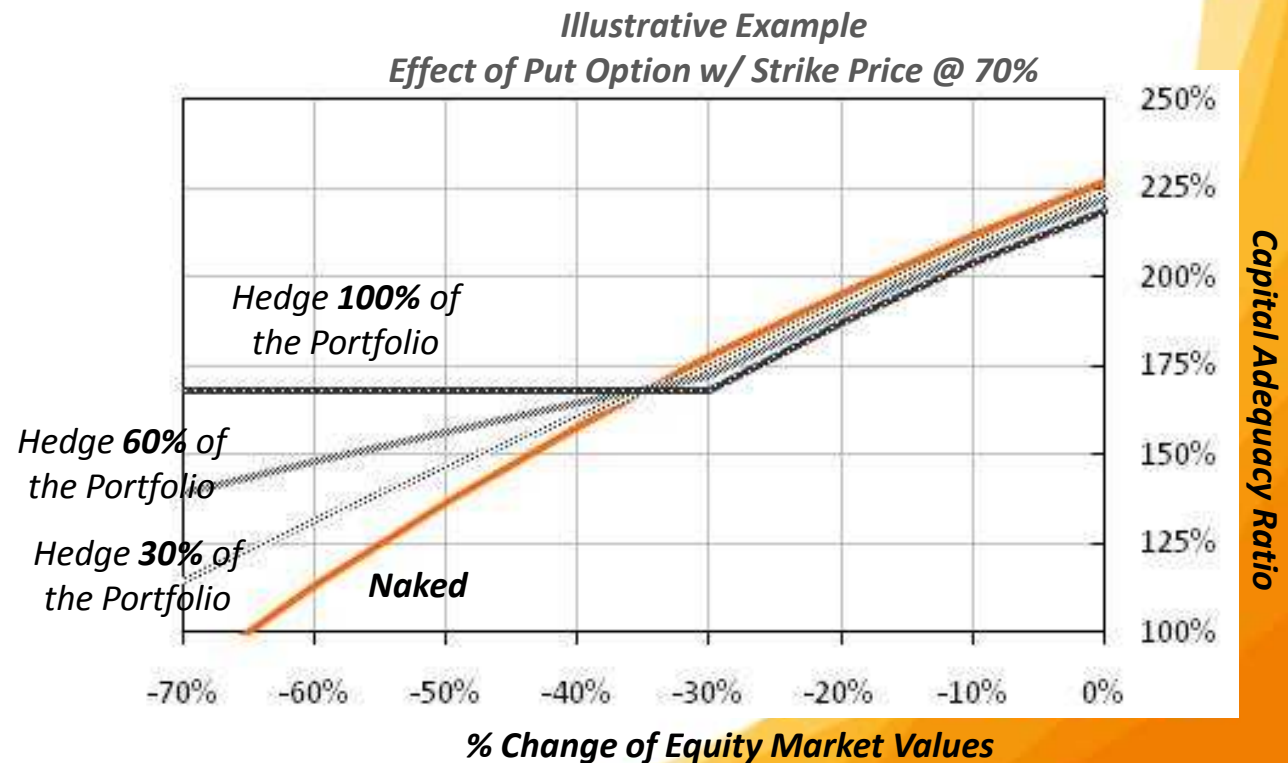
Managing Market Risk

Playing Defensive – Hedging

e.g. 1: Hedging Equity Risks through options

Ensure capital position above a desired level upon equity market crash

- Costly, especially during crisis period
- Lack of liquidity due to large notional



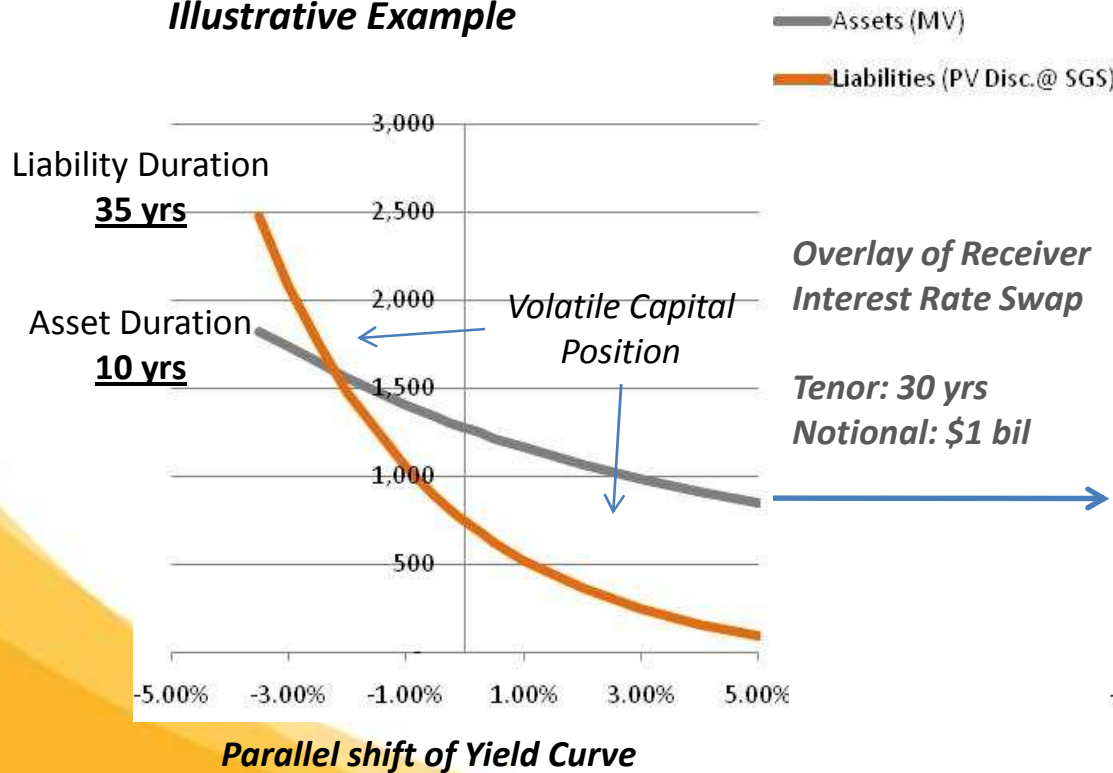
Managing Market Risk

Playing Defensive – Hedging

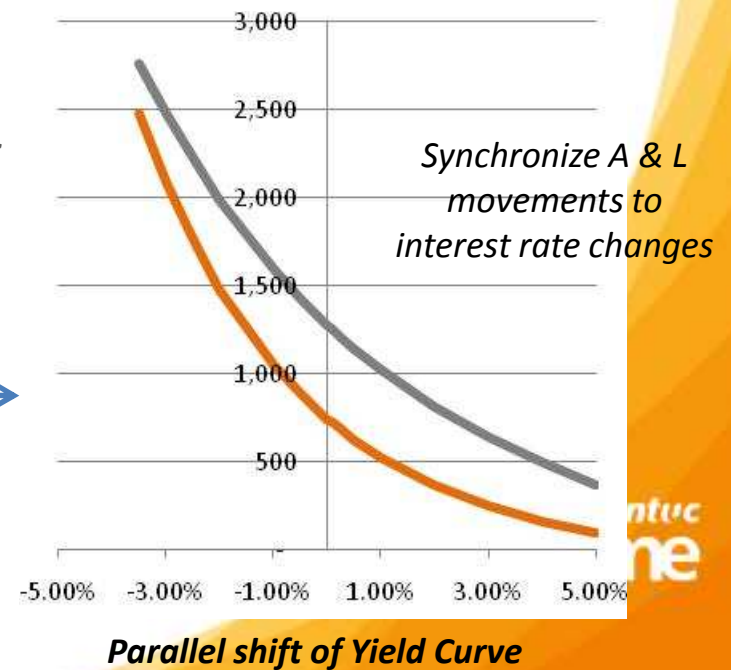
e.g. 2: Hedging Mismatch using IRS

Use Interest Rate Swap (IRS) to hedge the duration mismatch between Assets and Liabilities

Illustrative Example



- Lack of liquidity due to large notional
- Lock-in capital upon hedging → TIMING?



Managing Market Risk

Playing Offensive – Active ERM

*“Let our advance worrying become advance thinking and planning”
- Winston Churchill*

Risk and Capital Measurement

Define economic risk measures and overlay specific regulatory / rating agency capital constraints

Risk Budgeting

Controlling the level of risk taken is a holistic, top-down process. Allocation of risk and capital should be at both aggregate and line of business level

ALM & SAA

Defined risk and capital measures, allocated risk budgets and defined liquidity constraints are all inputs to ALM constraints and overall SAA

Risk Reporting

Regular and routine monitoring of risks – sensitivity, stress tests and contingency plans



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Reference & Other Readings

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