



# Stress Testing

**Singapore Actuarial Society**

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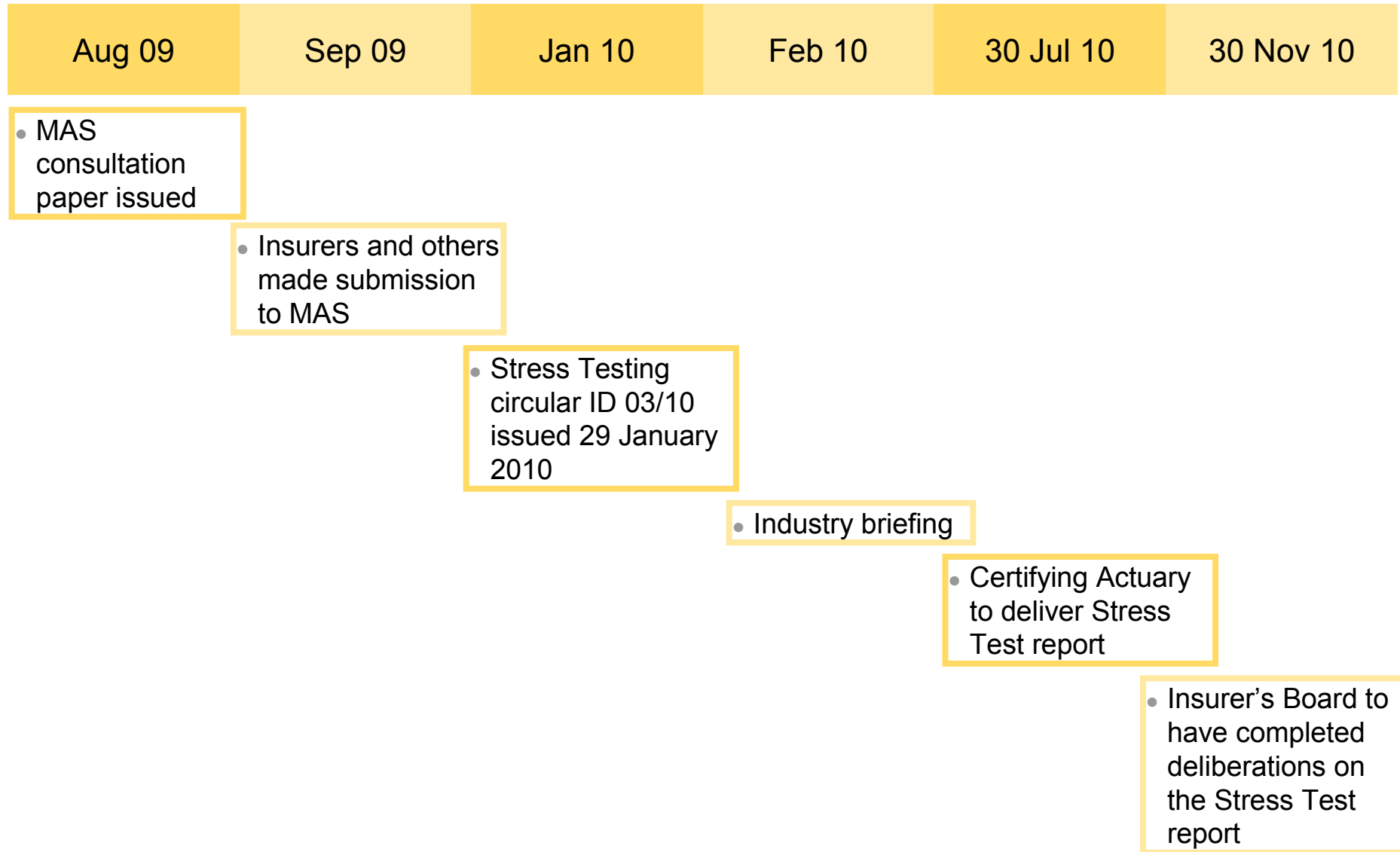
# Table of contents

- Overview
- Requirements in brief
- Our approach
- Some observations (so far)
- Key issues
- Overseas examples
- Final remarks - questions and discussion



# Overview

# Overview





**Requirements in brief**

## Requirements (for a direct GI company)

- Base case projections for 2010, 2011 and 2012
  - Projections of UW, P&L, Balance Sheets and Capital Adequacy
  - Detailed calculations by 13 LOB, separately for SIF and OIF
- Stress Tests (carried out only in respect of the 2010 calendar year)
  - Macroeconomic Scenario – prescribed and include
    - 40% drop in equities and properties
    - 200 basis point movement in Sing Govt Bonds
    - 500 basis point movement in Sing Corp bonds
  - Large Loss – to be determined individually for each Company
  - Stress to Failure – to be determined individually for each Company



# Our approach

# Our approach

## Planning

- Assign a project team
- Agree deliverables and approach
- Evaluate work requirements and responsibilities
- Discuss preliminary data request
- Set timetable

## Data supply, research and initial analysis

- Collection and analysis of data
- Identification of potentially significant risks
- Meet with market experts eg. lawyers, brokers, reinsurers
- Preparation of discussion paper on risks identified and their potential financial impact

## Consultation

- Discussion with Project Team and other Company management on risk scenarios
- Input from Company on their risk scenarios
- Selection of agreed scenarios
- Estimation of financial effects
- Discussion of Management Responses

## Reporting

- Documentation in line with requirements of the framework
- Clear discussion on considerations made and reliances and limitations of the Report



## Initial data request

- Financial Statements for last 3 years and Calculation of Regulatory Solvency
- Business Plan for next 3 years including:
  - details of any planned changes to capital structure e.g. future capital injections etc
  - details of any planned corporate strategy changes over next 3 years
  - details of any planned large capital expenditure over next 3 years e.g. new IT systems
- Reinsurance program for current year and details of any planned changes:
  - structure
  - reinsurers and shares
  - outstanding recoveries
  - rating by S&P or AM best etc.
- Details of any other large 3rd party credit exposures, e.g. to affinity partners, intermediaries or large policy holders
- Latest Outwards Reinsurance renewal presentation

## Initial data request (cont)

- Policy risk profiles (for each class):
  - no of risks
  - sums insured / EML
  - single risks: details of 10 largest gross insured exposures
  - single risks: details of 10 largest net exposures
  - detail of Aggregate Exposures at the finest detail (e.g. by postcode, type of risk covered etc)
  - split of exposure by country
- Any historical large loss information maintained e.g. top 10 largest losses over past 20 years or details of any catastrophe losses over past 20 years. Any updating on an “as if” basis if these events were to occur again today
- Asset information
  - Current and future assumed asset mix in as much detail as possible
  - Details of investment arrangements e.g. 3rd party portfolio manager or in-house?
  - Individual details of bonds (country of issue, nom value, duration coupon market value, credit rating)
  - Details of concentration of assets e.g. any single assets with greater than 5% of portfolio.
  - Details of all assets in foreign currency
  - Information on the liquidity of current investments i.e. are there any investment assets that would require greater than 1 month to liquify

## Initial data request (cont)

- Distribution/ Major source of business information
  - Details of dependencies on major brokers/ agents or other distribution arrangements
  - Details of dependencies of the business on major clients
  - Details of any known dependence on certain industries
- Risk Management Assessments
  - Copy of the latest Risk Management audit carried out on the whole company including risk registers, risk modeling, action plans etc. These should take into account external and internal risks including political, country risks
  - Further details relating to other “operational risks” including prevention systems in place. Operational risks to consider include fraud, IT failure, brand risk, regulation, severe disruption, loss of key personnel etc. This will include details of the company’s business continuity plan (BCP)



**Some observations (so far)**

# Observations

- State of preparedness
- Strong capitalisation of Singapore insurers
- Aggregate exposures
- Desire for consistency across companies

## State of preparedness

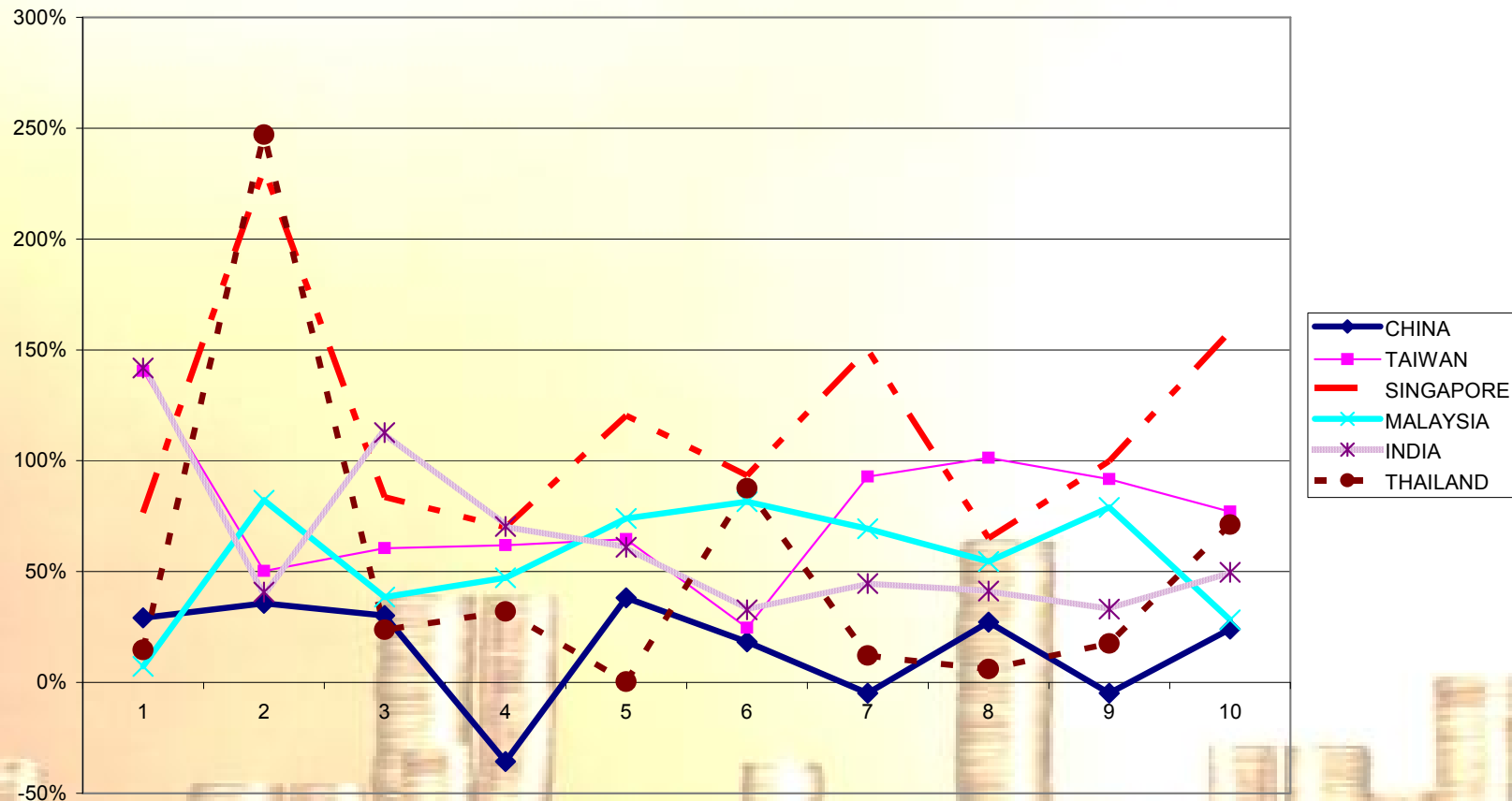
- Base scenarios
  - Companies all have budgets for 2010 and most have forecasts for 2011 and 2012
  - For 2010, these are commonly Profit and Loss statements split into major classes and not in the finer detail required
  - For 2011 and 2012 if available, generally P&Ls in total (not by lob)
  - Projections of Balance Sheet items and Estimated Capital Adequacy are not there
- Macroeconomic scenarios
  - Some companies through their past work on IFRS disclosures can readily carry out these calculations
  - Our experience is that mostly fixed interest investments are held
  - Some companies just hold cash – very easy to deal with

## State of preparedness

- Large loss scenarios
  - Many have considered such scenarios as part of their existing risk management process
- Stress to failure
  - This is new
- Preliminary data request list
  - Not seeing major problems in the compilation of this list
- Risk registers/ ERM procedures in place
  - Roughly half of our clients have risk registers
  - These tend to focus on processes rather than estimation of possible losses
  - All appear to have business contingency plans

# Strong capitalisation of Singapore insurers

Ratio of Net Assets to NWP



Prepared in June 2009 based on latest industry data



## Aggregate exposures and cat modeling

- For Companies writing OIF business in SEA we understand Cresta Zones are used for compiling aggregates in Philippines, Indonesia and India
- Our understanding is that it is however not usual practice for records to be kept for Malaysian and Singaporean exposures
- In assessing cat limits we understand that there are models for Singapore Thailand and Malaysia however we have no information on how widely these are used
- We believe current practice in Singapore is to consider catastrophe limits according to fairly simple formulae eg some multiple of net retention and/or to use disaster scenarios

## Consistency across companies

- Many companies have expressed the desire for a broadly consistent approach to be taken in setting up the loss scenarios
- Concern that an overly conservative assessment may lead to a Company being forced by the MAS to take actions to mitigate risks that are not viewed as being material
- A particular example may be the use of Singapore scenario such as a devastating earthquake or windstorm
- The adoption of this could lead of high levels of catastrophe protection being bought (which may or may not be sensible in the context of a destroyed city)



## Key issues

## Key issues

1. Coming up with realistic scenarios
2. Actuarial issues and opportunities

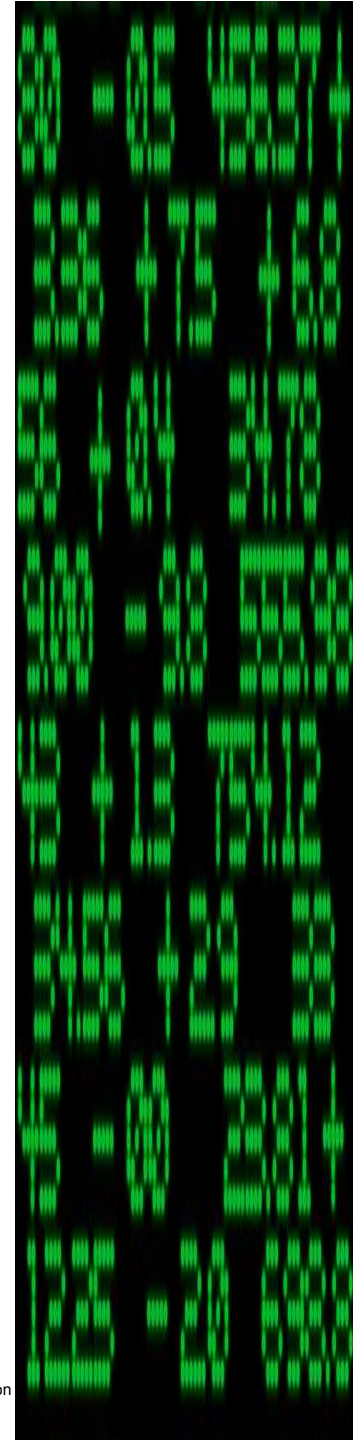
## Realistic scenarios

- Company's own work and the reasoning underlying this
- Close consultation with the Company to identify the true risk exposures
- Some examples to consider (eg Realistic Disaster Scenarios) published by Lloyds (need modification for Singapore)
- Consideration of aggregation of risks eg Fire or Explosion to include Workmens' Compensation, Business interruption, General liability etc
- Consider policy limits and reinsurance limits, reinstatement terms
- Policy exclusions
- Views of other industry professionals including lawyers, reinsurance brokers and reinsurers
- Market practice



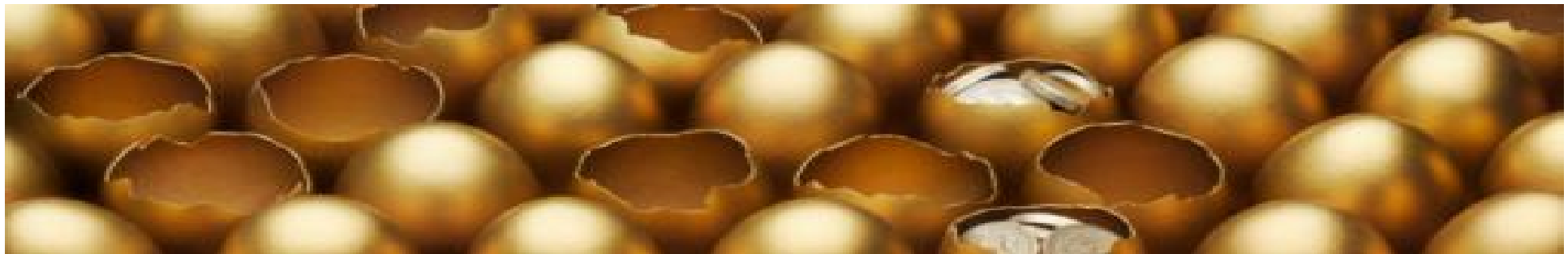
## Actuarial issues

- The actuary is preparing a stress test report the scope of which reviews an insurer's ability to withstand risks from any event – insurance/non insurance/ local and external
- It is impossible to consider all of the risks that the insurer will face
- Most actuaries will struggle in particular when dealing with operational risks
- We think therefore:
  - Very important to demonstrate a logical process and to show that a reasonable approach has been taken in formation of the risks
  - Clear communication is therefore key with emphasis on reliances and limitations attaching to the work
  - Due to the wide scope of this report the actuary should treat this task with as much importance (or more) than the regular reserve assessments



## Great actuarial opportunities

- Real opportunity to learn much more about the business than from working on outstanding claims and premium liability assessments
  - Greater understanding of key risks and how they may manifest
  - More knowledge about the composition of the classes of business which are aggregated into the actuarial data
  - Both internal and external actuaries are given the opportunity to work more closely with portfolio managers, claims, reinsurance investments and top management and hence build trust and create more opportunities for actuarial input
  - This knowledge should (in our opinion with a probability greater than 75%) improve the actuary's estimates of OS claims and premium liabilities
- There will be a real Value Add opportunity if this task is not seen by insurers as part of compliance but instead is embedded into their overall risk management process. It is inherent on the actuaries to ensure this is the case





**Overseas examples**

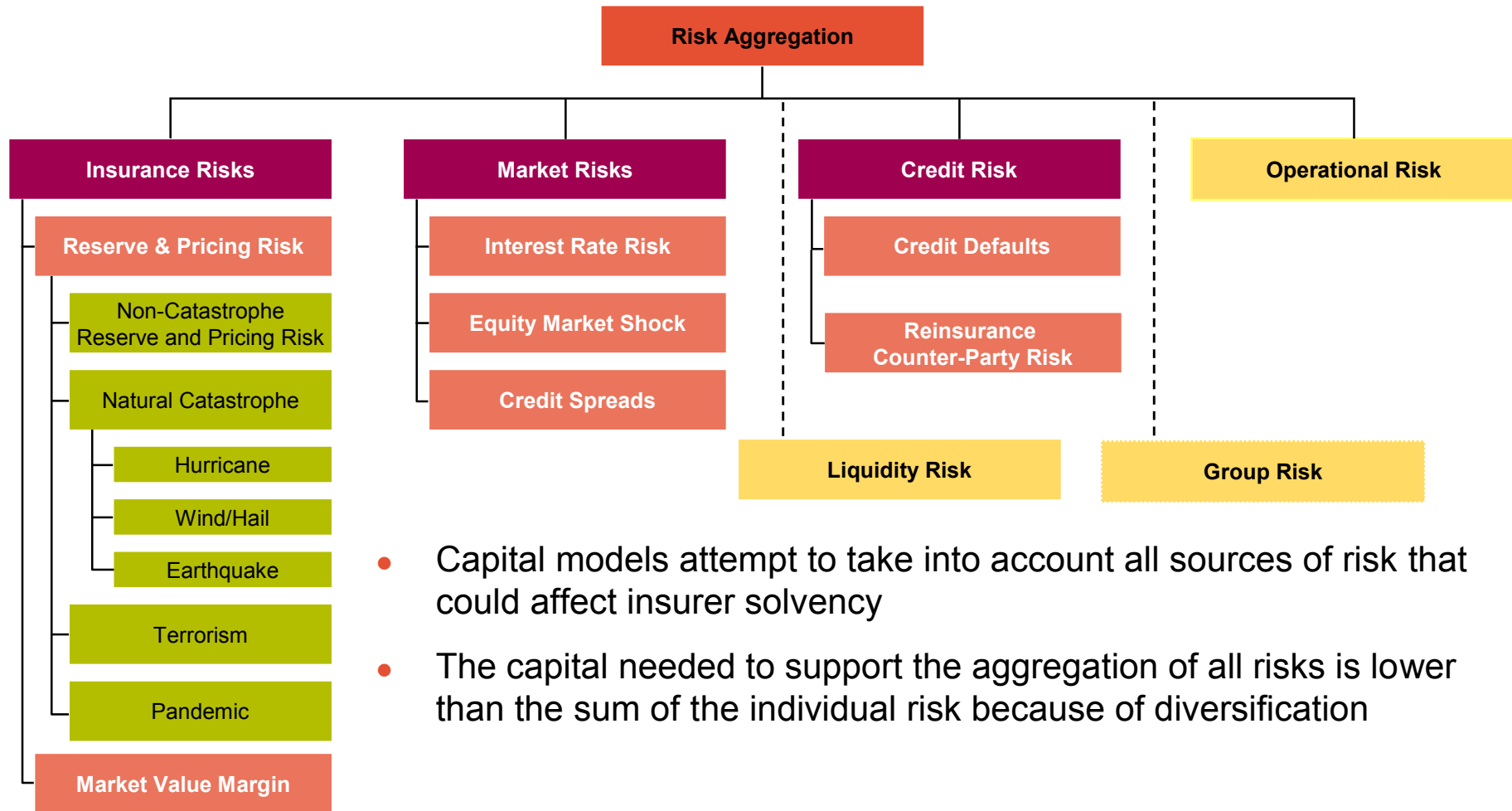


## BNM (Malaysia) stress testing requirements

- To identify potential threats due to **exceptional but adverse plausible** events
- Key step of risk management process
- Incorporate into the company's capital management plan
- Internal capital model is needed
- Tailored to each company's risk profile

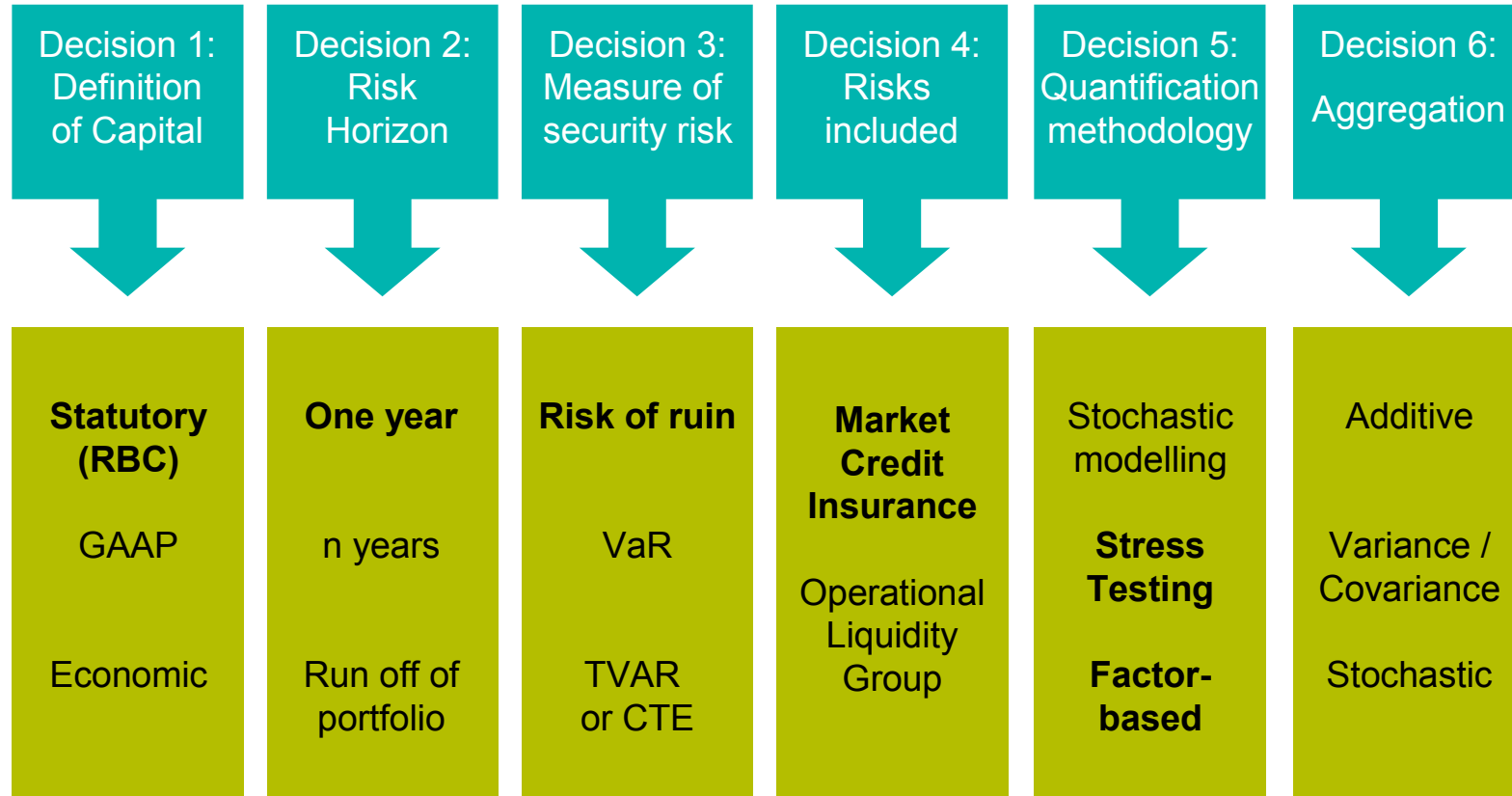
Effective dates and frequencies	
RBC	1 Jan 2009, quarterly
Stress-Testing	1 Dec 2008, half-yearly

# Understand your risks: Key risks facing P&C companies



- Capital models attempt to take into account all sources of risk that could affect insurer solvency
- The capital needed to support the aggregation of all risks is lower than the sum of the individual risk because of diversification

# Considerations in capital modelling – 6 decisions



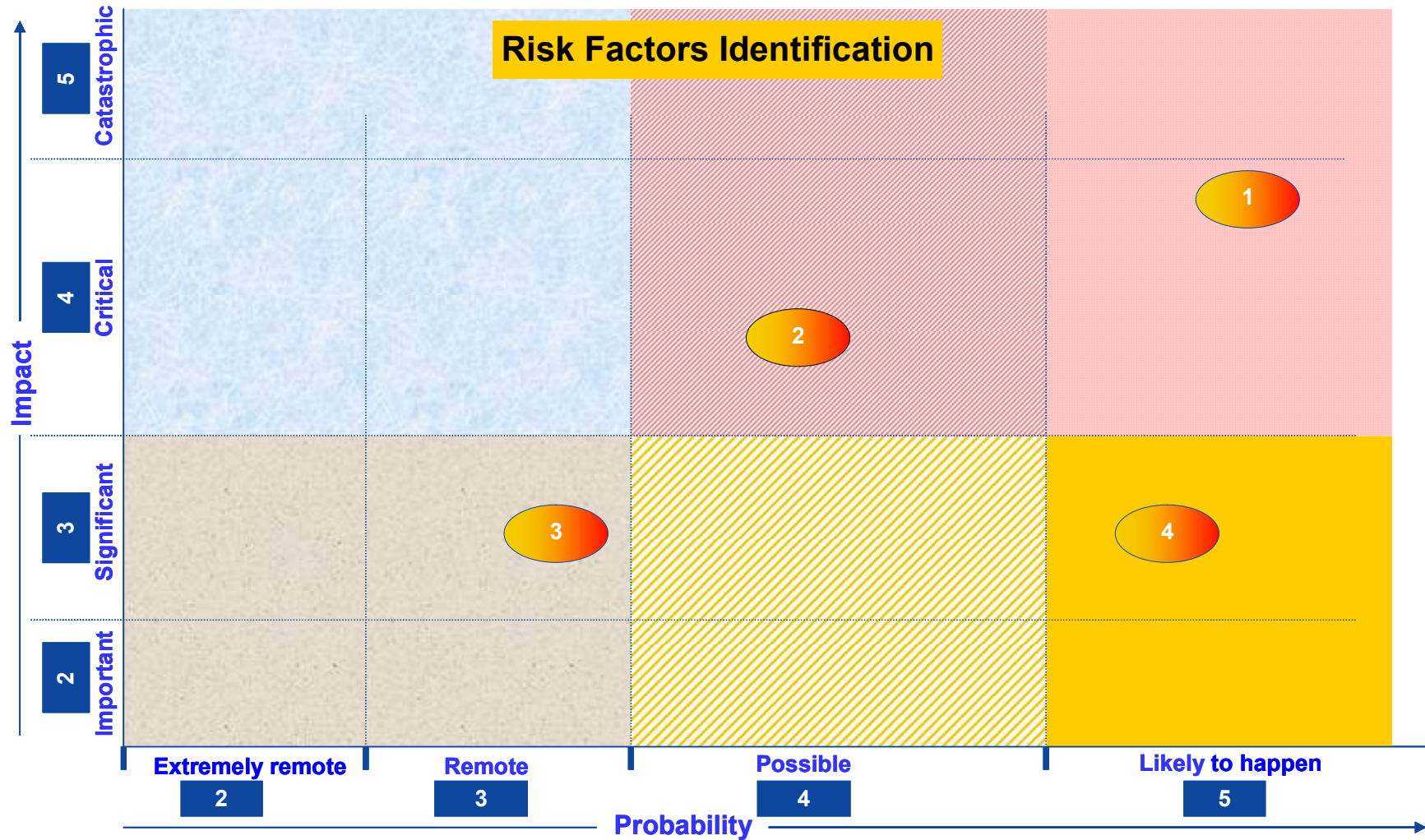
# Risk identification process

Sample

## Risk Factors Identification and Vulnerabilities Evaluation

	Categories of Risks	Risk Factors	Probability	Scale NA:1 Ex Remote: 2 Remote: 3 Possible:4 Likely: 5	Impact	Scale NA: 1 Important: 2 Significant: 3 Critical:4 Catastrop.: 5	Cumulative Points
1	<b>Market Risk</b>	1.1 Reduction in value of assets	Likely	5	Critical	4	20
2	<b>Market Risk</b>	1.2 Lower than expected investment income	Likely	5	Critical	4	20
3	<b>Insurance Risk</b>	3.1 Increase in claims costs	Likely	5	Critical	4	20
4	<b>Operational Risk</b>	5.7 Failure of general personnel management controls or inadequate controls put in place.	Likely	5	Critical	4	20

# Risk identification process - risk matrix



# Integrate risk management with the decision-making activities

## Risk Analysis

- Insurable risks
  - Mortality
  - Property/Casualty
  - Human Resources
- Market risks
  - Interest rate
  - Equity markets
  - Foreign exchange
  - Other
- Credit risks
- Operational risks
- Business risks
  - Business interruption
  - Corporate image, brands
  - Economic cycles



## Business Plan

Assets		Liabilities	
Current Assets		Current Liabilities	
Fixed Assets		Long-Term Liabilities	
		Equity	
Expenses		Revenues	
Costs		Operating Income	
Taxes			
Net Income		Other Income	
Cash Flow		Begin	End
Operation		Operation	
Investment		Investment	
Financing		Financing	

## CIRC (China) stress testing requirements

- Introduced in YE 2008 reporting
- Performed annually
- Projection forward for 1 year
- Base scenario projection: future cash flow, P&L, BS, Solvency
- Prescribed adverse scenario: less premium, higher loss ratio, higher expense, reduced stock price, etc.
- Self-defined adverse scenario: at least 1 scenario required
- Company action plan required if stressed solvency ratio < 100%
- Mainly for compliance...

# Canadian dynamic capital adequacy test

- Appointed Actuary's review of the expected financial condition
- Objectives:
  - Advise about trends in surplus
  - Identify potential threats to company's solvency
  - Identify courses of actions to mitigate plausible threats to satisfactory financial condition
- Satisfactory financial condition:
  - Meet minimum regulatory capital requirement under the base scenario
  - Remain solvent under all plausible adverse scenarios
- Methodology:
  - Project financial results under the base scenario, which are consistent with company's business plan over a three year horizon
  - Project financial results under plausible adverse scenarios, which represent scenarios to which company financial condition may be sensitive



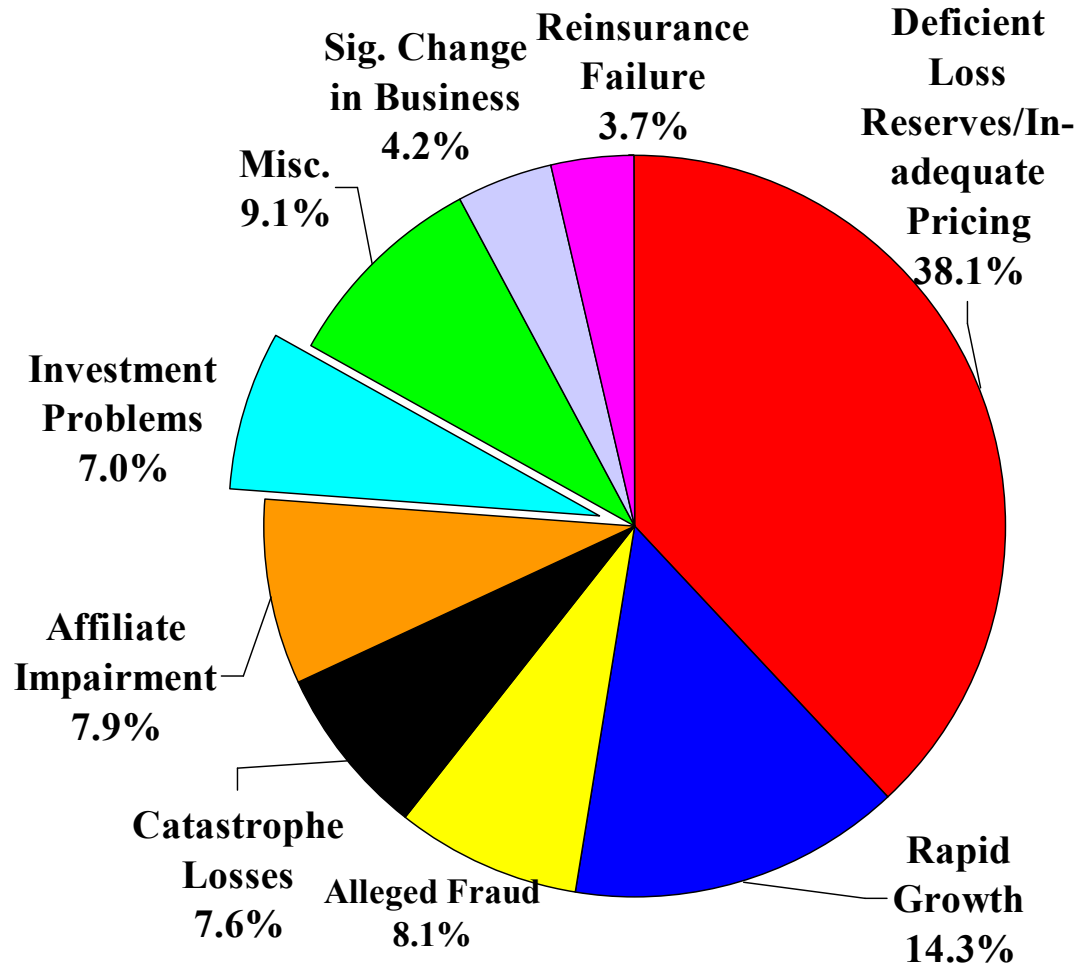
## Australia financial condition reporting

- Requires appointed actuary to prepare financial conditions report (FCR) for non-life insurance company
- Expands role of appointed actuary beyond loss and premium liabilities/reserves
- Intended to provide an up to date summary of how business is run and critical issues facing the insurer
- Broadens the actuary's understanding of the company's plans, helping him to provide more appropriate feedback and guidance

## Australia financial condition reporting (Con't)

- An FCR addresses (but not need be limited to) each of the following matters:
  - business overview
  - recent experience and profitability
  - loss liability valuations
  - adequacy of past estimates of insurance liabilities
  - pricing, including premium adequacy
  - asset and liability management
  - capital management and capital adequacy
  - reinsurance arrangements
  - risk management

# Reasons for US P/C Insurer Impairments, 1969-2008



**Deficient loss reserves and inadequate pricing are the leading cause of insurer impairments, underscoring the importance of discipline. Investments, catastrophe losses play a much smaller role.**

Source: A.M. Best: *1969-2008 Impairment Review*, Special Report, Apr. 6, 2008



**Final remarks**

**Questions and discussion**