

ओरिएण्टल  
इंश्योरेंस

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## Adequacy of Premiums - FCR

Financial Condition Assessment Report Workshop, Hyderabad – 3rd December 2014

Nikhil Gupta  
Appointed Actuary

# Agenda

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- ▶ Measures to assess Adequacy of Premiums
- ▶ IRDA circular on Commercial Lines Technical Pricing
- ▶ Technical Pricing – Commercial Lines

# Measures to Assess Adequacy of Premiums

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- ▶ Actual Price/ Technical Price
- ▶ Net Combined Operating Ratio v/s Target Combined Operating Ratio
  - ▶ Loss Ratio - Adequacy of Reserves
  - ▶ Expense ratio
  - ▶ Commission Ratio
- ▶ Underwriting Result v/s Investment Income
- ▶ Underwriting Cycle and Investment Cycle

# Measures for assessing Adequacy of premiums

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# Actual price/ Technical Price

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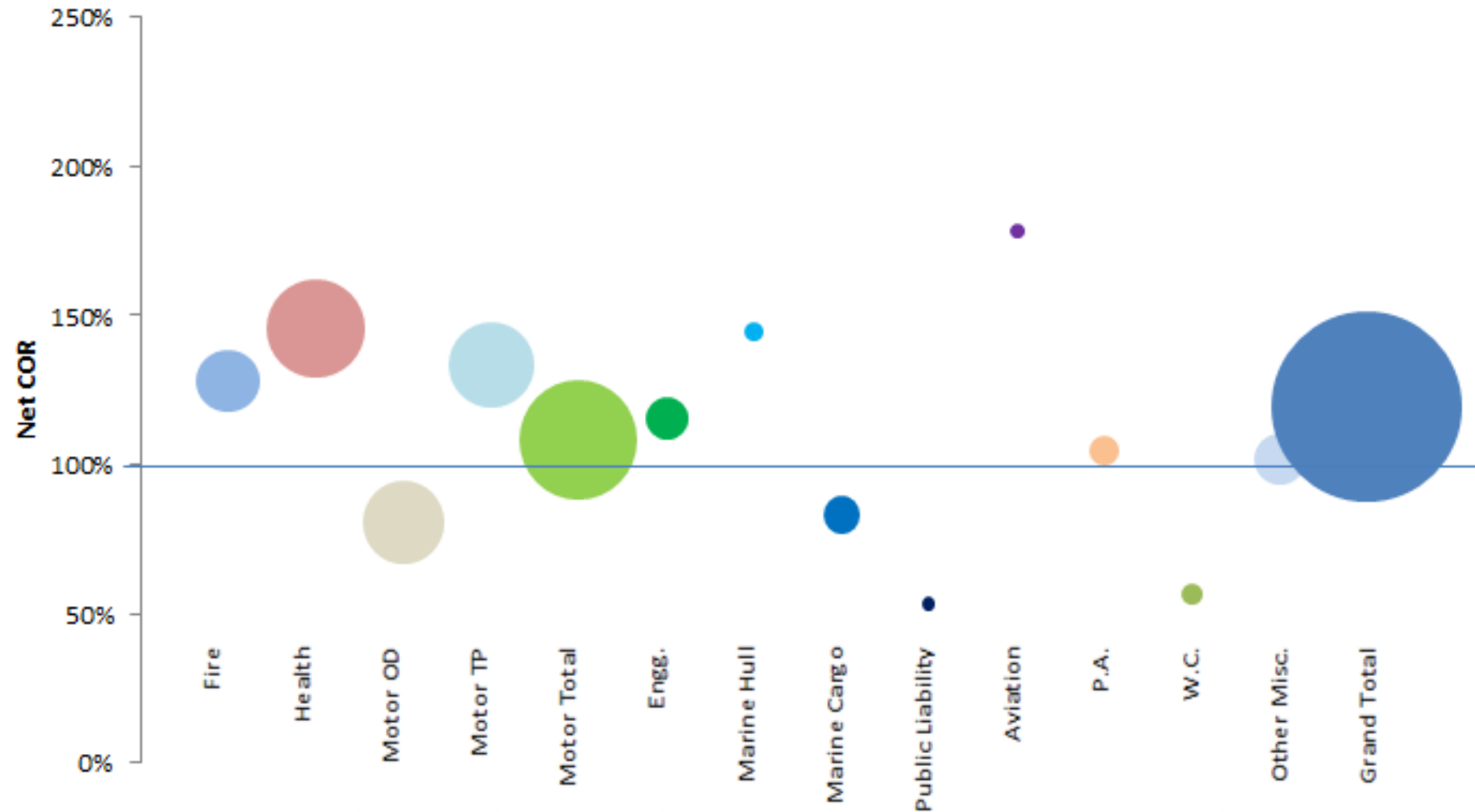
- ▶ Important Ratio (AP/TP) to address the adequacy of premiums
- ▶ Target of 100%
- ▶ Calculated on:
  - Individual Account basis
  - Portfolio basis
- ▶ Business mix and growth, change in terms, etc. alter the ratio accordingly

# Measures for assessing Adequacy of premiums

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# Net COR





# Target COR

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- ▶ **Based on Business Strategy**

- ▶ Strategy for a particular line of business may call for a target COR of 110% owing to increase in market share, top line performance, etc.

- ▶ **Based on Return on Capital**

- ▶ Back calculate the COR that you can sustain given a certain target return on capital for shareholders.

- ▶ **Compare Target CORs with Actual CORs to assess the adequacy of premiums**

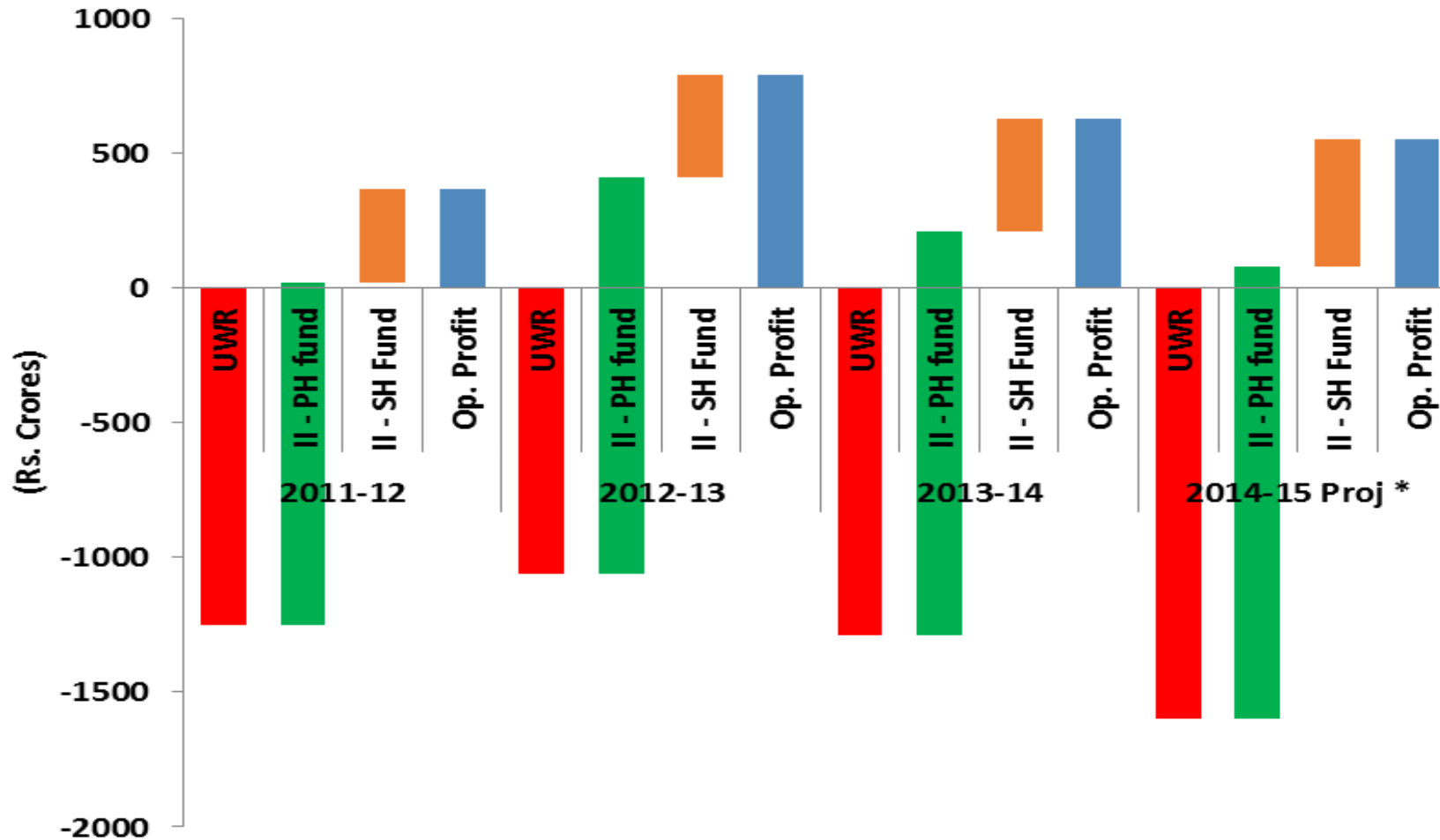
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# UWR vs Investment Income

(Split by Policyholder Fund and Shareholder Fund)

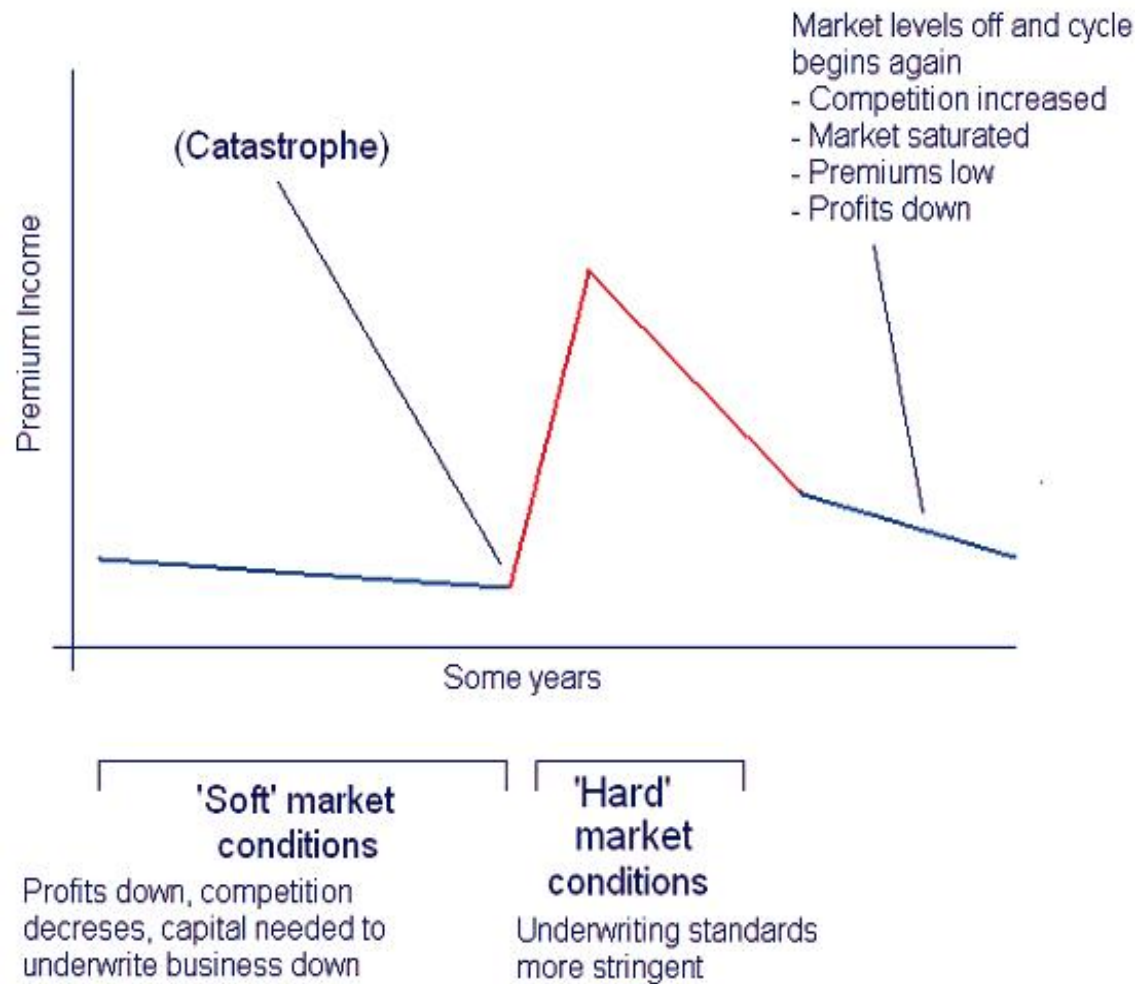


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- ▶ **Underwriting Cycle and Investment Cycle**

# Underwriting Cycle and Investment Cycle





# IRDA Circular on Commercial Lines Technical Pricing



## Calculation Approach

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1. The burning cost in a particular line of business and segment of risk for the industry as a whole as published by IIB from time to time is to be considered. In other words the industry wide Loss (Burning) cost must be the starting point for all insurers (existing as well as new) while pricing any product.
2. Burning cost of a particular risk on the company's own experience, can be considered, for all available periods.
3. Insurers can choose lower of the above.
4. Since the burning cost for property risks as published by IIB are, for perils other than Nat Cat perils like STFI and Earthquake, insurers need to consider adequate pricing for said risks, if offered.
5. The insurer's own procurement and management cost to be considered to a large extent of current levels.

## Monitoring & Compliance

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6. The Board of the company may allow acceptance of risk at burning cost lower than as mentioned in point no. 3, after considering point no. 4 & 5.
  
7. In respect of all the instances in point No.6, an exception report to be filed before the Board by the underwriter through the Chief Risk Officer of the company at its every meeting. The Authority will develop suitable reporting formats to capture the above instances on specified frequency not less than on quarterly basis.
  
8. The Board shall consider such submissions and advise the Management appropriately.





# Technical pricing – Commercial Lines





# Expected Losses

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- Remember, “expected” has a mathematical meaning
- Expected loss is calculated in two parts

Catastrophe modelling is used to calculate natural catastrophe perils



Actuarial techniques are used to calculate non catastrophe perils



- The two parts are then added together to create expected loss figure

# Gross Losses – Non Cat and Cat

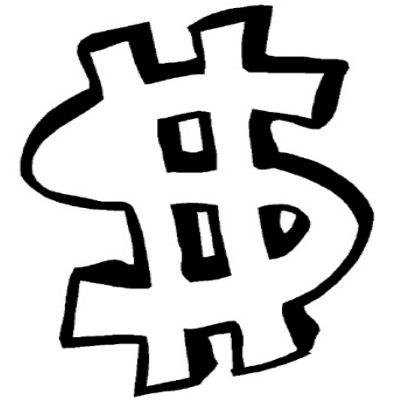
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- ▶ Apply simulated losses on defined policy structure:
  - ▶ Deductibles / excesses
  - ▶ Attachment points
  - ▶ Limits
  - ▶ Sub limits
  - ▶ BI indemnity periods (if specified in policy)
  - ▶ Aggregate caps
- ▶ From this process we get gross losses to the policy

# Expenses

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- ▶ Each policy's premium needs to cover a portion of the expenses of conducting business
  - Allocated loss adjustment expenses (ALAE)
  - Unallocated loss adjustment expenses (ULAE)
  - Operating expenses
  - Acquisition costs
- We can ignore acquisition costs and quote our technical prices “net”
- Pricing model can apply different expense loadings to different lines of business



# Return on Capital

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- ▶ We hold capital to absorb impact of our downside
- ▶ Whether or not there is a loss to the policy, it ties up part of the capital while the policy is in-force
- ▶ The capital is owned by Companies' shareholders and they demand a return on the capital
- ▶ Think of “return on capital” as a **profit loading** to compensate shareholders for depositing capital
- ▶ The more volatile the losses, the more capital should be allocated
- ▶ If we write a policy which correlates strongly with the rest of the portfolio, the policy should tie up more capital

# Pricing Approach basics

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- ▶ Two main approaches
  - ▶ Exposure rating
  - ▶ Experience Rating
  - ▶ Hybrid – Credibility approach

# Exposure vs Experience Rating

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- Where a risk has sufficient loss history we can generate frequency and severity assumptions directly from the **historical data**
- This is **experience rating** and is particularly common in reinsurance treaty pricing
- In many situations there will be **little or no loss data** for a specific risk and hence we have to take an alternative approach
- **Exposure rating** pockets risk-types (asset types) into **homogeneous** groups and assumes that all the assets behave in a similar way
- We then assess the loss history **for every asset within that group** and apply the results to the individual asset in question

Both approaches assume the past is good guide to the future





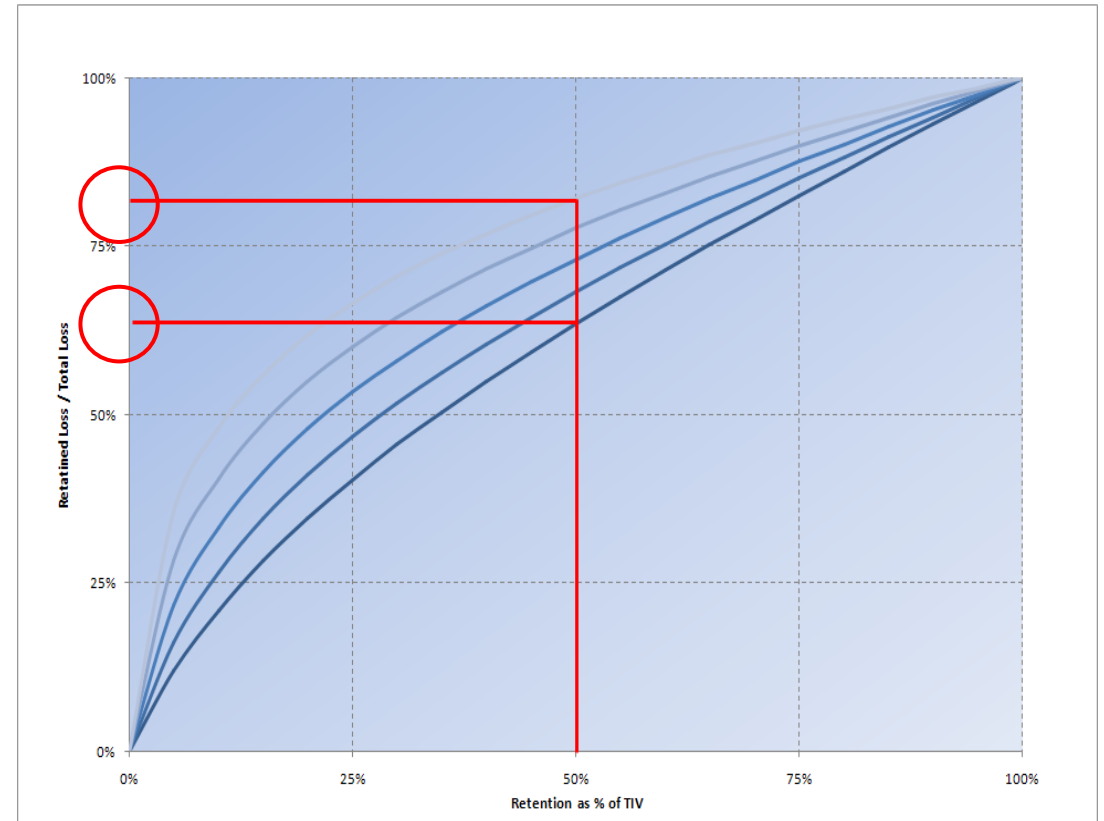
# Exposure Rating – Base Rates

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- As the name suggests, exposure rating uses a functional form based on the **exposure of the asset**
- Exposure is often expressed as **Total Insurable Value (TIV)**
- By analysing the loss history of all assets within a particular group (Ex. Petrochemical Plant) we can generate a **FGU loss rate**
- This is a measure of FGU loss per unit of exposure or TIV
- Hence, if we needed to rate an asset of type X worth INR 10 Cr and the FGU loss rate for X is 0.005 then our FGU expected loss can be calculated...
- $\text{FGU expected loss} = 10,00,00,000 \times 0.005 = 5,00,000$
- But what is the expected loss to an insurance layer of INR 5 Cr xs INR 5 Cr...?
- We can only answer this question by using **exposure curves**

# Exposure Rating - Curves

- Exposure curves show **what proportion of total FGU loss** is retained under specified thresholds of exposure...
- For example, our **exposure threshold is 50%** and our total loss to be allocated is INR 5 lacs
- Under the dark curve we attribute 100% - 64% = 36% of the total loss to the INR 5Cr xs 5Cr layer...INR 1.80 lacs
- Under the light curve we attribute 100% - 82% = 18% of the total loss to the layer... INR 90k



- ▶ Insured retains 82% and 64% of total losses under the light and dark curves respectively

Exposure curves allow us to apportion total expected loss to bands of insurance coverage

# Engineering Credits and Surcharges

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- ▶ Pricing model should allow to integrate credits and surcharges for engineering characteristics of risk
- ▶ Engineering is not a separate component of price
- ▶ Model should use engineering reports and use rating factors to generate credits / surcharges
- ▶ Credits will:
  - ▶ Reduce expected loss
  - ▶ Reduce capital requirements
  - ▶ Reduce expense loadings since premiums will be less



# Return on Capital – Capital Allocation



# Capital Allocation - Intro

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- ▶ The company has capital deposited by its shareholders
- ▶ Every time a policy is written, it ties up some of that capital
- ▶ Capital allocated to each policy depends on two things:
  - ▶ Volatility of risk on a standalone basis
  - ▶ Nature of that risk in relation to the rest of the portfolio
- ▶ We then demand a return on that capital

# Capital Allocation –Definitions

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## Tail Value at Risk (TVaR)

- ▶ A fancy acronym for a very simple concept!
  1. We must first choose a percentile of interest – say 1%
  2. During the modelling process we generate different loss outcomes
  3. If we run 10,000 simulations, we have 10,000 loss outcomes
  4. We can sort these outcomes in descending order of size
  5. Then pick the top 100 losses (1% of 10,000 = 100)
  6. And take the average! Done!

# Tail Value at Risk: Example

- ▶ Results from 10,000 simulations. Concentrate on the “Total Loss” column

	Loss 1	Loss 2	Loss 3	Total Loss
Year 1	400,000	100,000	50,000	550,000
Year 2	10,000			10,000
Year 3	800,000	1,000		801,000
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...
Year 10,000	5,000,000			5,000,000

	Loss 1	Loss 2	Loss 3	Total Loss
Year 575	1,120,000	5,777,430	1,233,110	8,130,540
Year 3387	7,830,000	32,240	233,140	8,095,380
Year 10,000	5,000,000			5,000,000
...	...	...	...	...
...	...	...	...	...
...	...	...	...	...
Year 7410	0			0

- TVaR = average of first 100 entries in this column

- Sort the values in descending order

- The larger the value, the more extreme the losses in the tail of the distribution

# Rate Monitoring

## Identify Trends

- Where we are in the market cycle
- Where are we under/over pricing

## Management Information

- Provides information to management to take action based on rate movements over time
- Where should we be writing more risks

## Business Planning

- Market cycle information can feed into capital model to determine profit forecasts
- Important for wider strategic decision making





# Pricing Challenges

# Exposure Rating – Challenges

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1. Engineering data not part of methodology
2. Missing perils
3. Missing regions for catastrophe modelling
4. Missing interest / coverage types
5. Questionable parameterisation in places
6. Management information
7. Complexities surrounding multi-year contracts
8. Highly-unusual contract structures

# Pricing Model - Challenges

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- ▶ Commercial lines market lags other insurance lines of business in application of actuarial science
  - ▶ Risks are complex
  - ▶ Insurance coverage terms are complex
  - ▶ Specialised knowledge needed to understand them
- ▶ Companies should try to distinguish themselves from the competition by....
  - ▶ embedding actuarial analytics in underwriting process ....
  - ▶ to produce more informed risk selection ...
  - ▶ to create a competitive advantage

# Pricing Model - Challenges

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Actuarial models rely on segregating risks into distinct “**homogeneous**” classes

- ▶ This is difficult
  - ▶ Risks are “heterogeneous” in nature
  - ▶ Too many classes means not enough data to parameterise each class
- ▶ Actuarial models can never allow for every nuance of an individual risk
  - ▶ Underwriting judgement will always remain important
- ▶ Pricing model output should be viewed as one important tool in our armoury when assessing a new risk

**oriental**

*Thank You*

SABKI SURAKSHA  
HAMARE PAAS



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