

CROP INSURANCE – RESERVING & CAPITAL MANAGEMENT

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FOOD FOR THOUGHT

Typical characteristics of insurable risk

- High frequency low severity – Large spread of similar risks
- Low frequency high severity – Over a reasonably long period several low claim years interspersed with a few years of high claims

Where does crop fit in – Indian experience

- Difficult to achieve spread in tender driven business
- Loss ratios in good crop year exceeding 80% despite stiff pricing
- High claim years interspersed with higher claim years 😊
- Premiums often in excess of 10% of sum insured

SNAKE & LADDER RATHER THAN CHAIN LADDER

Past trends not representative of future trends – each crop year brings its own set of uncertainties

Information sources for actuary

- Underwriter(s)
- Claim handling offices
- Company staff/agencies hired by company taking part in CCEs
- Reinsurer(s)
- Brokers
- News papers?
- Met department forecasts – monsoon progress reports
- Past behavioral patterns of the region
- Others

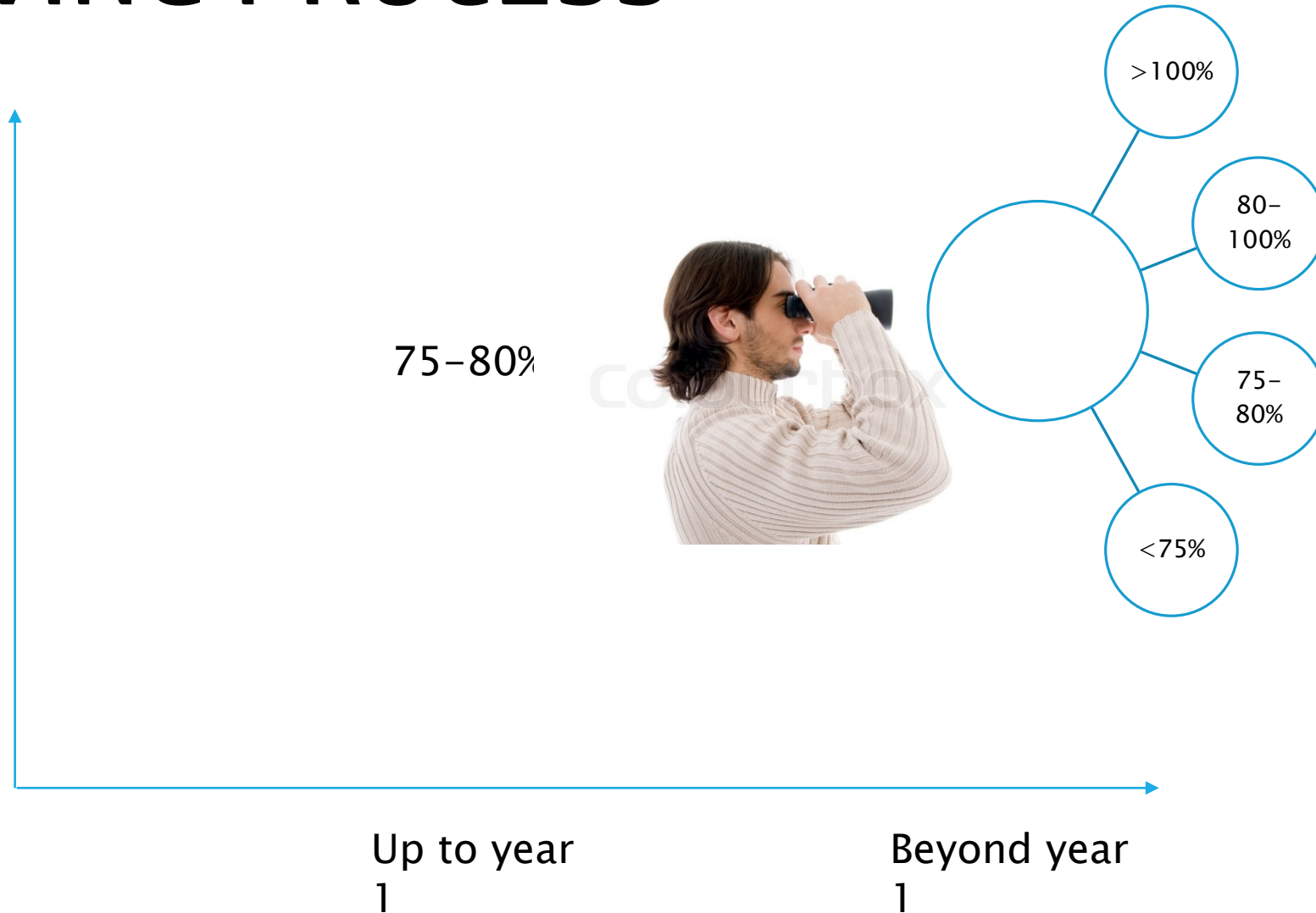
WHERE TO BEGIN?

Reinsurer driven pricing

- Reinsurer assumes 70–80% of the risk
- Pricing guidelines provided by reinsurer requires 75%–80% as expected loss ratio
- Unfavorable conditions imposed on insurer if pricing not to satisfaction of reinsurers
- Insurers not in a position to afford this risk



RESERVING PROCESS



REINSURANCE ARRANGEMENT ADJUSTMENT

Companies usually have a combination of quota share and stop loss

Reinsurers monitor pricing at which tender is won versus their own internal models

Additional conditions imposed if there is a major deviation say imposition of a loss corridor

Stop loss treaties usually on a crop year rather than for a state/season

Instances when upper limit of stop loss breached

Area correction factor adjustment if applicable and its impact on ULR

ILLUSTRATION

Company XYZ has underwritten say Kharif crop in a state with gross premium of 200 for FY 19-20

Company retains 20% and rest is ceded under a quota share treaty

Steps for reserving in March 2020

Not much information available – use priced loss ratio of 75%

Gross incurred claims (expected) – $200 \times 0.75 = 150$

Paid losses = 0

Gross claim o/s = 150

Ceded claims = $150 \times 0.80 = 120$

Net o/s claims = 30

ILLUSTRATION (CONTD.)

March 2021

- More information available – expected loss ratio is now say 150%
- Gross incurred claims (expected) – 300
- Gross Paid losses (say) – 100
- Gross o/s claims – 200
- Ceded o/s claims – 160
- **Net o/s claims – 40**
- Net ultimate loss = $100 \times 0.2 + 40 = 60$
- Net ULR = $60 / (200 \times 0.2) = 150\%$

ILLUSTRATION (CONT'D)

March 2021 – suppose there was a loss corridor between 130% and 150% and expected ultimate loss ratio is 150% based on information available

- Gross incurred claims (expected) – 300
- Gross Paid losses (say) – 100
- Gross o/s claims – 200
- Between 130% and 150% loss is fully in the books of the insurer
 - Ceded premium – $200 \times 0.8 = 160$
 - Max. Claims that can be ceded = $160 \times 1.3 = 208$
 - Max. o/s that can be ceded = $208 - 100 \times 0.8 = 128$
- Ceded o/s claims = 128



- Ceded ultimate loss = $100 \times 0.8 + 128 = 208$
- Ceded ULR = $208 / (200 \times 0.8) = 130\%$
- **Net o/s claims = $200 - 128 = 72$**
- Net UL = $100 \times 0.2 + 72 = 92$
- Net ULR = $92 / (200 \times 0.2) = 230\%$

STOP LOSS ARRANGEMENT

Stop loss treaty usually for a full crop year

State wise / season wise ultimate loss ratio estimated

Based on the aggregate experience of the crop year the ultimate loss ratio for the whole crop year is calculated

If the calculated ULR for the crop year exceeds the attachment point of the stop loss cover and recoveries can be expected credit maybe provided

COINSURANCE

Further delay in availability of information

Especially when lead insurer closes his account after the coinsurer

Actuary uses the information sources mentioned earlier

It will be a good idea to have a written confirmation from documentation point of view – satisfy peer reviewer 😊

PDR

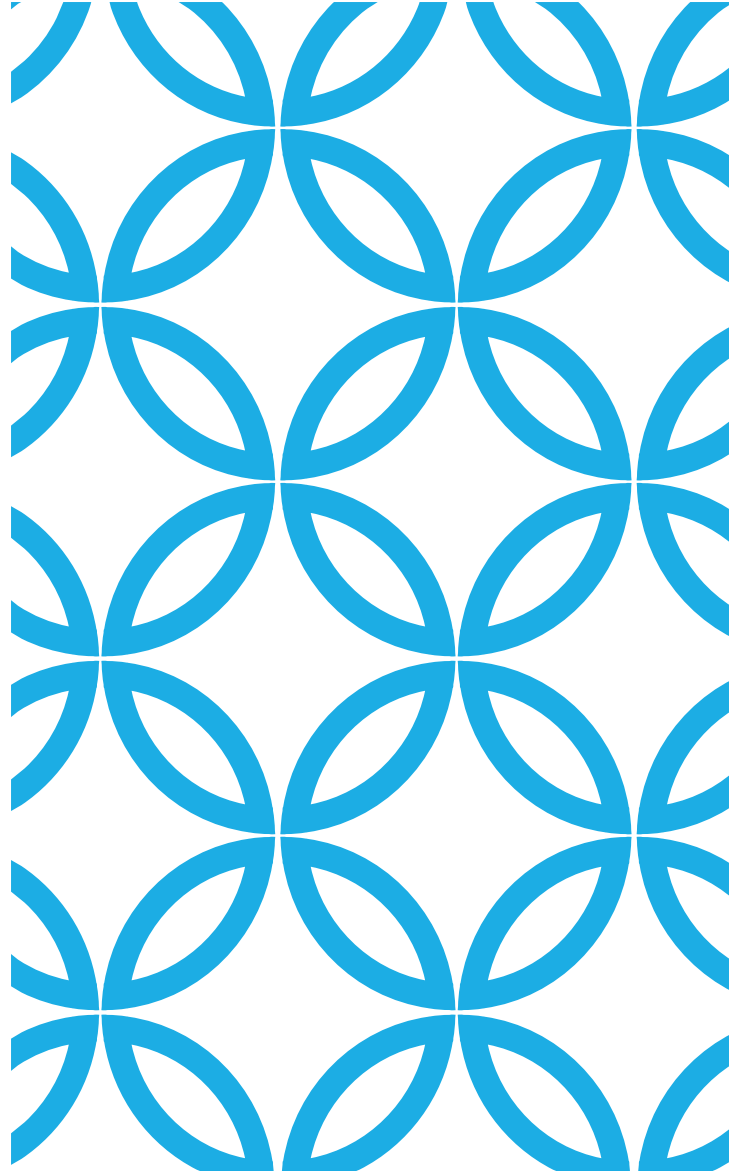
Premium deficiency provision process similar to other lines

Expected ULR on the UPR is used for estimating the need for PDR if any

Usually you have UPR for Kharif in September closing and for Rabi in December closing

Depending on accounting policy UPR can be zero by March

Even for Sep/Dec closing when priced loss ratio is used no PDR is needed unless in case of information on serious losses available that early



CAPITAL MANAGEMENT

CAPITAL CONSUMPTION BY CROP

Crop		Motor/Health etc.	
GWP	100	GWP	100
NWP @ 25% retention	25	NWP @ 95% retention	95
GIC @ 80%	80	GIC @ 80%	80
NIC @ 80%	20	NIC @ 80%	76
RSM on GWP	$0.5 \times 100 \times 0.2 = 10$	RSM on GWP	$0.75 \times 100 \times 0.2 = 15$
RSM on NWP	$25 \times 0.2 = 5$	RSM on NWP	$95 \times 0.2 = 19$
RSM on GIC	$0.5 \times 80 \times 0.3 = 12$	RSM on GIC	$0.75 \times 80 \times 0.3 = 18$
RSM on NIC	$20 \times 0.3 = 6$	RSM on NIC	$76 \times 0.3 = 22.8$
RSM for solvency	12	RSM for solvency	22.8
ASM at 1.75x	21	ASM at 1.75x	39.9

CAPITAL CONSUMPTION BY CROP

Crop (Stressed scenario)	
GWP	100
NWP @ 25% retention	25
GIC @ 200%	200
NIC @ 120%	30
RSM on GWP	$0.5 \times 100 \times 0.2 = 10$
RSM on NWP	$25 \times 0.2 = 5$
RSM on GIC	$0.5 \times 200 \times 0.3 = 30$
RSM on NIC	$30 \times 0.3 = 9$
RSM for solvency	30
ASM at 1.75x	52.5
ASM to NWP	$52.5 / 25 = 2.1$ (2.5x the capital at 80% loss ratio)

ROCE ESTIMATION

Pre-tax ROCE computation (regular scenario)	
Expenses (say)	10% of NWP
Required return on ASM	16%
Investment return on ASM	7%
Insurance profit on ASM reqd.	9%
Net premium	25
ASM	21
Inv. Return on ASM	$21 \times 0.07 = 1.47$
Reqd. insurance profit	$21 \times 0.16 - 1.47 = 1.89$
Required surplus after claims	$1.89 + 2.5 = 4.39$
Implied claim ratio	82%

IFRS 17 & RBC

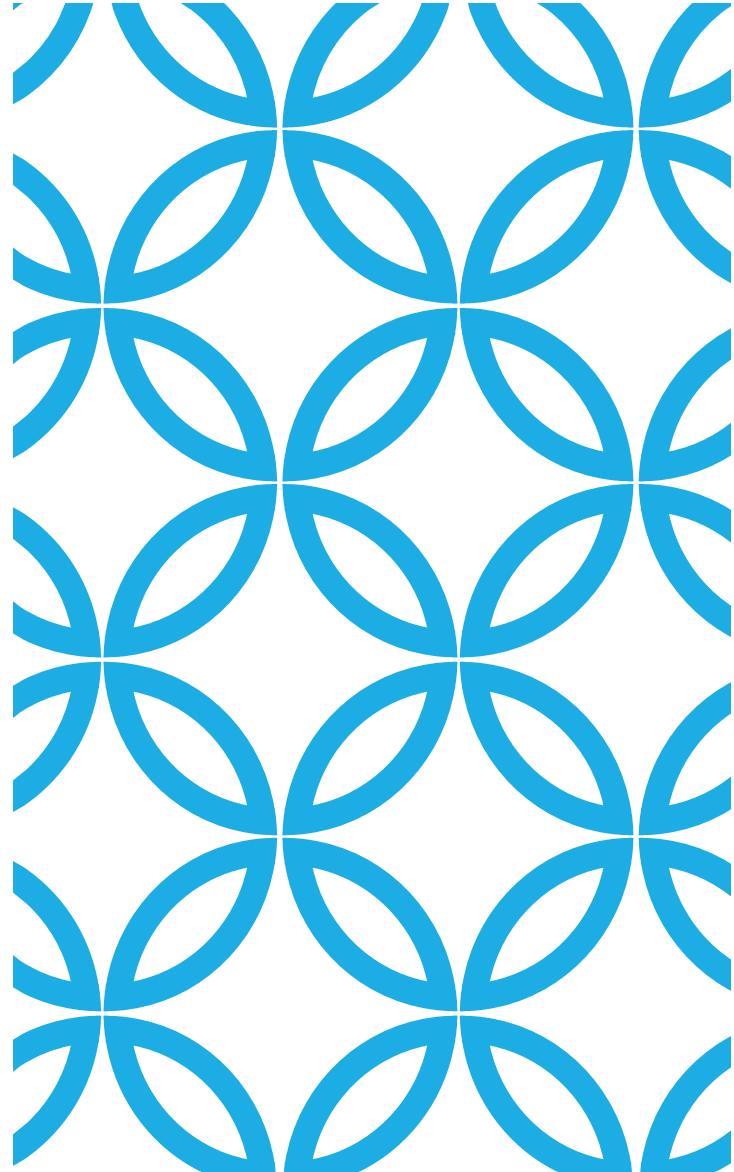
IFRS 17 requires estimate of timing of cashflows and not just the ultimate loss

- Paid claim development chain ladder maybe useful here as paid development pattern maybe more stable

Timing difference between insurance cash flows and reinsurance cashflows

- Can make income statement very volatile as reinsurance impact and direct side impact may happen at different times

RBC can lead to higher capital requirements for more volatile lines – crop may require more RSM



THANK YOU
