

5 Topics

1. Risk models (Collective) Week 1-4

• MGF $M_X(t) = E[e^{xt}] = \int e^{xt} f(x) dx$

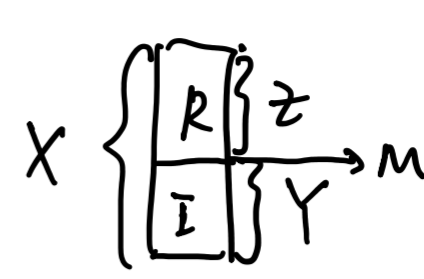
• Distributions PDF, CDF, mean, med, skewness

- Poisson
- Exponential

• Estimate parameters MLE, Moments, percentiles
 Goodness of fit

• Reinsurance mean, var, skew \int $X, Y, Z = \begin{cases} 0 & X \leq M \\ X-M & X > M \end{cases}$

- Proportional Reins
- XOL Reins



slide 12 Week 2 $g(u)$

• Tricks

• Features of insurance Slide 27-33

• Collective Risk models

$S = \sum_{i=1}^N X_i$

• $E(S) = E[E(S|N)]$

$Var(S) = E[Var(S|N)] + Var[E(S|N)]$

• Compound Poisson / Binomial distribution

• $E(S), Var(S) \rightarrow \lambda m_1, \lambda m_2 \dots$

• MGF $M_S(t) = M_N(\ln M_X(t))$

• Reins + Compound distribution

Examples

• Hetero / Homo portfolio

↑ slide 35/37 ↑ slide 46
 Week 4

• CW + Eg slides

2. Extreme Value Theory Week 5

• Intro: ^{main idea} when to use, why we use it

EVT ≠ Copula

• GEV slide 6.7 week 5

↑ $X_M = \max\{X_1, \dots, X_n\}$ block maxima

CDF slide 8

$H(x)$

- Fréchet
 - Weibull
 - Gumbel
- } slide 13 γ
 egs

• GPD

• $X-u | X>u \quad F_u(x)$ on slide 17

• $G(x)$

• Measures of tail weight
 4 ways

• CW Questions + example on slides

3. Copula tail dependence Week 6

• Intro ≥ 2 r.v.s

Def slide 10-11

• Sklar's theorem - exit

• Lower tail dependence / Upper tail dependence

• Different types of copula

a. Fundamental copulas

a.1 Independence product

a.2 Perfect positive co-monotonic / min

a.3 Perfect negative counter-monotonic / max

b. Explicit Copulas

b.1 Archimedean copulas

b.1.1 Gumbel

b.1.2 Clayton

b.1.3 Frank

Eg. slide 24-25 steps $\psi(0) = \infty$

c. Implicit Copulas

c.1 Gaussian

c.2 student's t

Table slide 35 appropriately apply

• CW + Eg slides

4. Ruin Theory Week 8-9 $N \rightarrow N(t) \quad S \rightarrow S(t)$

• Intro: model what? Notations

$S(t) = \sum_{i=1}^{N(t)} X_i$

• The Surplus process $U(t) = U + ct - S(t)$

story?

• $\psi(\cdot)$ continuous / discrete

t / ultimate

slide 10, 12

• Poisson process

• Lundberg's inequality

$\psi(u) \leq e^{-Ru}$

$c = (1+\theta)\lambda m_1$

slide 32 X

• Eg slide 33-39

• Upper / lower bound of R proof

• parameters ↑, $\psi(\cdot)$? impact

• CW + Eg slides

5. Run-off triangle

• Discussions: Assumptions

Critically evaluate

• Calculation

✓ Basic chain ladder why in this way weighted average

✓ Inflation-adjusted Chain Ladder

• ACPC ←

✓ BF