

Policy-based IBNR calculation method

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The problem

- We need a method that could be flexible towards three points:
- (i) changes in portfolio like taking new (refusing some) recoverable risks in a sense of changing insurance conditions;
- (ii) different deductibles applied in different contracts in the same business line;
- (iii) character of business in a sense of changing perspectives of business (changes in sale sizes during the year (seasonal) or years (global trend))

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Reporting period

- Reporting period is a time interval between the time-moment, when insurance case was incurred and the time-moment when it was reported to the company

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Assumptions

- 1) Premium is calculated using pure risk premium principle
- 2) Claims process is a Poisson process
- 3) Distribution of claim size has not seasonal factors

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The Model

- Contract with the insurance period $[\tau_1, \tau_2]$ and the risk premium P
- Date of statement is t
- Random variable – reporting period - is with distribution function F

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The Model

- An average claim per day is $\frac{P}{\tau_2 - \tau_1 + 1}$
- A probability of not reporting during the period of i days after the insurance case has incurred
 $1 - F(i)$

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The Model

- General formula:

$$IBNR(t) = \begin{cases} 0, & t < \tau_1 \\ \frac{P}{\tau_2 - \tau_1 + 1} \cdot \sum_{i=1}^{t-\tau_1+1} (1 - F(i)), & \tau_1 \leq t \leq \tau_2 \\ \frac{P}{\tau_2 - \tau_1 + 1} \cdot \sum_{i=t-\tau_2}^{t-\tau_1+1} (1 - F(i)), & t > \tau_2 \end{cases}$$

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