Life Convention, Amsterdam

Modelling persistency risk

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Overview

Same processes for all decrements:

- Mortality
- Critical Illness
- Lapse
- PUP

Model

- Variables often correlated

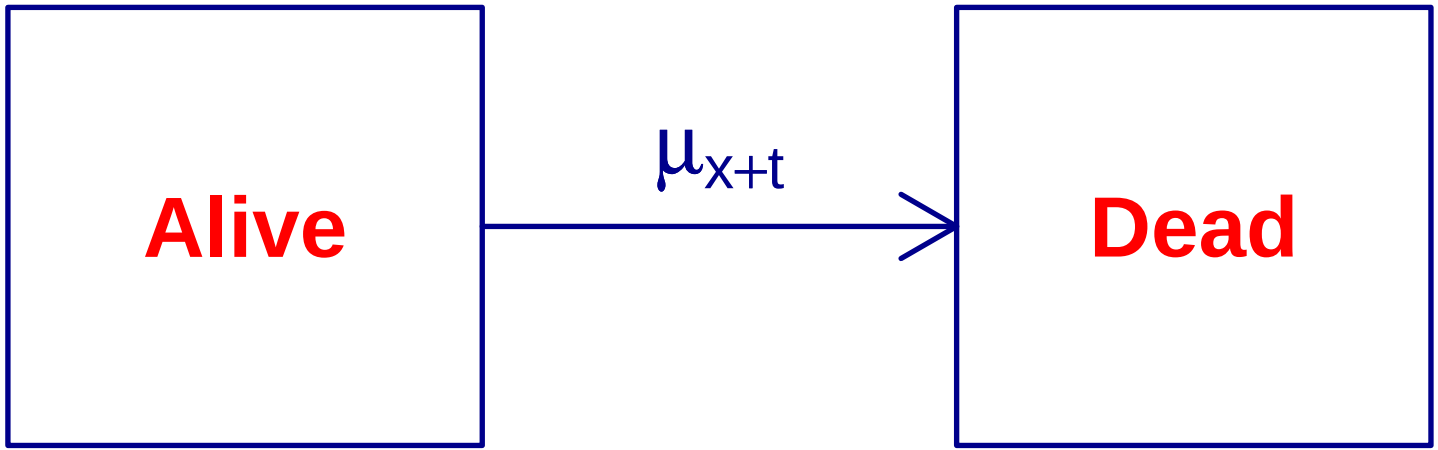
  e.g. product code and time of sale

- Need to separate effects of each
- Need statistical model to measure *independent* effects

Data preparation

- Statistical models demand independent observations
- People have multiple policies
- Decide handling strategy:
    - overdispersion parameter
    - deduplication

Mortality model for annuities



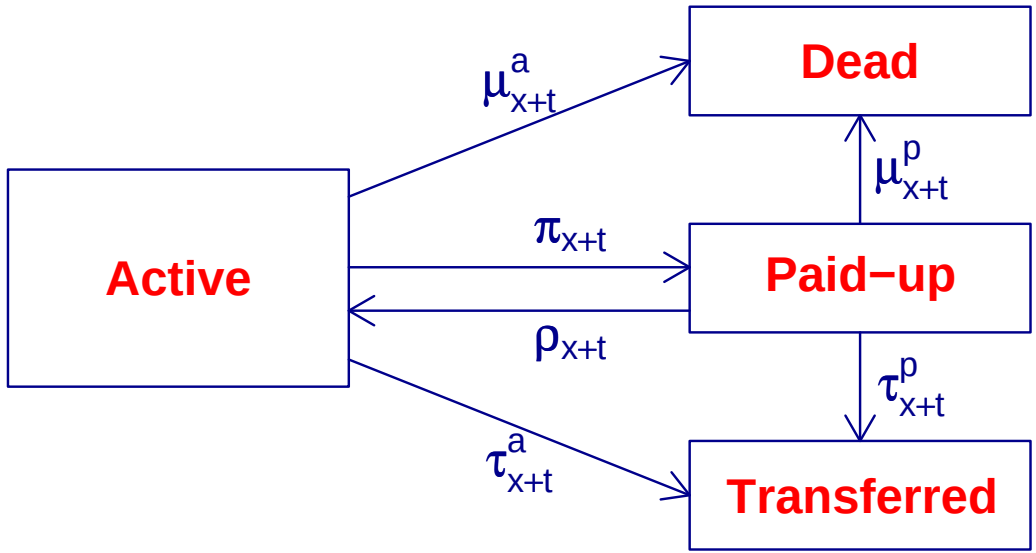
Source: Longevitas Ltd.

Model structure

- Two-state model without return
- For mortality can model continuously or discretely

  i.e. model μ_x or q_x

Persistency model for personal pensions



Source: Longevitas Ltd.

Model structure

- Four-state model with return
- For multiple-state models, most sensible option is continuous-time
  as recommended by CMIB Technical Standards Working Party

Model structure

- Transfer rate, τ, modelled separately by state
- Transfer rates and risk factors different for each:
  - τ^a for direct transfer from active state
  - τ^p for direct transfer from paid-up state

Risk factors

Categories:

- Gender
- Commission type
- Premium frequency
- Product code
- Branch
- Employment status
- ...

Risk factors

Continuous:

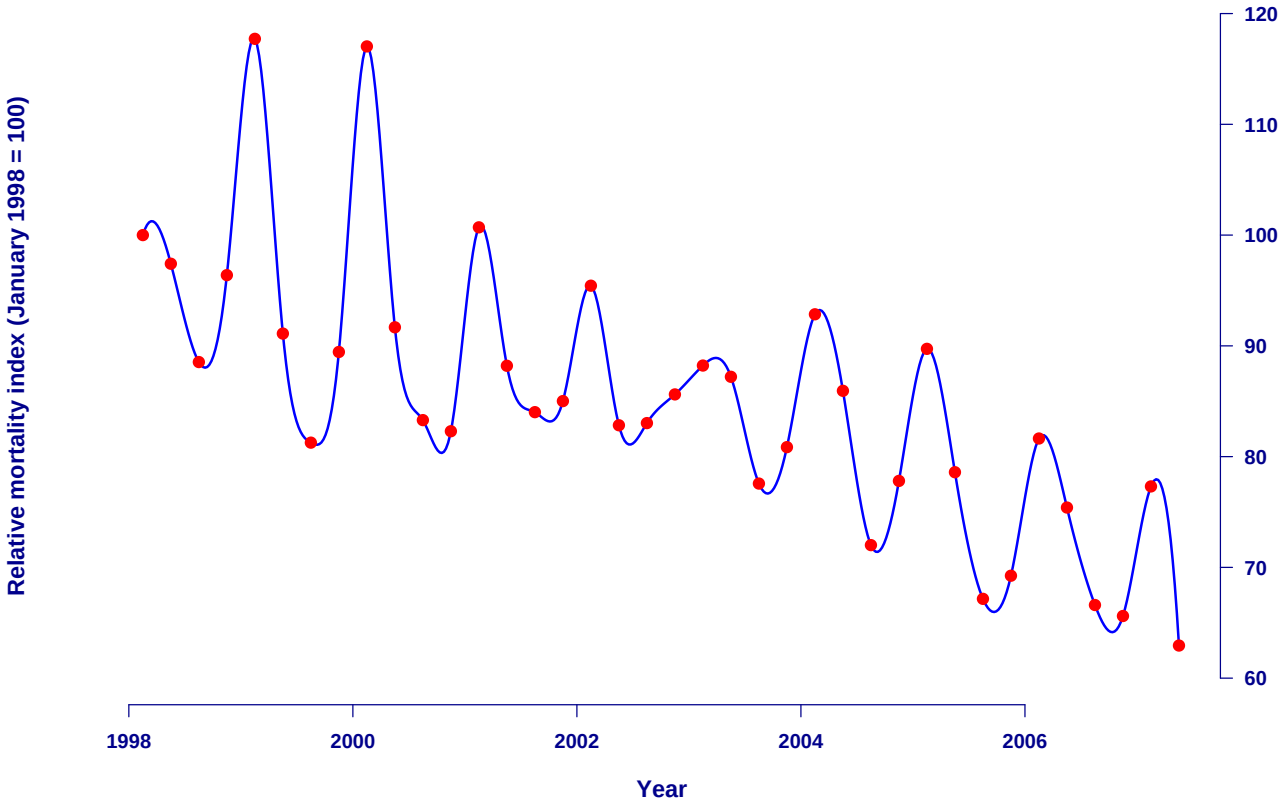
- Age
- Duration
- Year

Risk factors

Phases:

- Select period
- Calendar period

Example phase risk factor: seasonal mortality



Source: Longevitas Ltd calculations using mortality experience between ages 60–95 for an annuity portfolio. Cox survival model with age, gender and calendar period (season).

Summary

- Single unified procedure for persistency, mortality etc
- Data preparation, especially deduplication
- Continuous-time models best
- Same risk can have different drivers depending on state