Life Insurance Options: Pricing and Reserving

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Agenda

- Definition of the option
- Antiselection
- Types of options
- Mathematical model

  - Behaviour of policyholders during the decision process

  - Pricing

  - Reserving

Definition of the option

Policyholder’s opportunity (offered by the insurance company) to change his/her insurance cover in accordance with in advance guaranteed rules, opportunity to choose from defined possibilities or guaranteed acceptance of new insurance cover.

Subject of the paper

Analysed options:

- Where no further underwriting is needed for the increase or the prolongation of insurance cover.

Issues:

- Additional premium for the option,
- Additional reserving for policyholder, who could use the option in the future,
- Additional reserving for policies altered by or written based on the option (rather than policies written after the underwriting).

Antiselection

Groups of lives according to the health status:

- Standard risks

  - 90 % population, 70 % of „standard“ mortality
- Substandard risk

  - 6,5 % population, 200 % of „standard“ mortality
- Refused risks

  - 3,5 % population, 686 % of „standard“ mortality

Antiselection (cont'd)

- <u>Selection period </u>: 5 years

- At the beginning of the selection period everybody classified as „standard risk“ (option is offered only to standard risks)

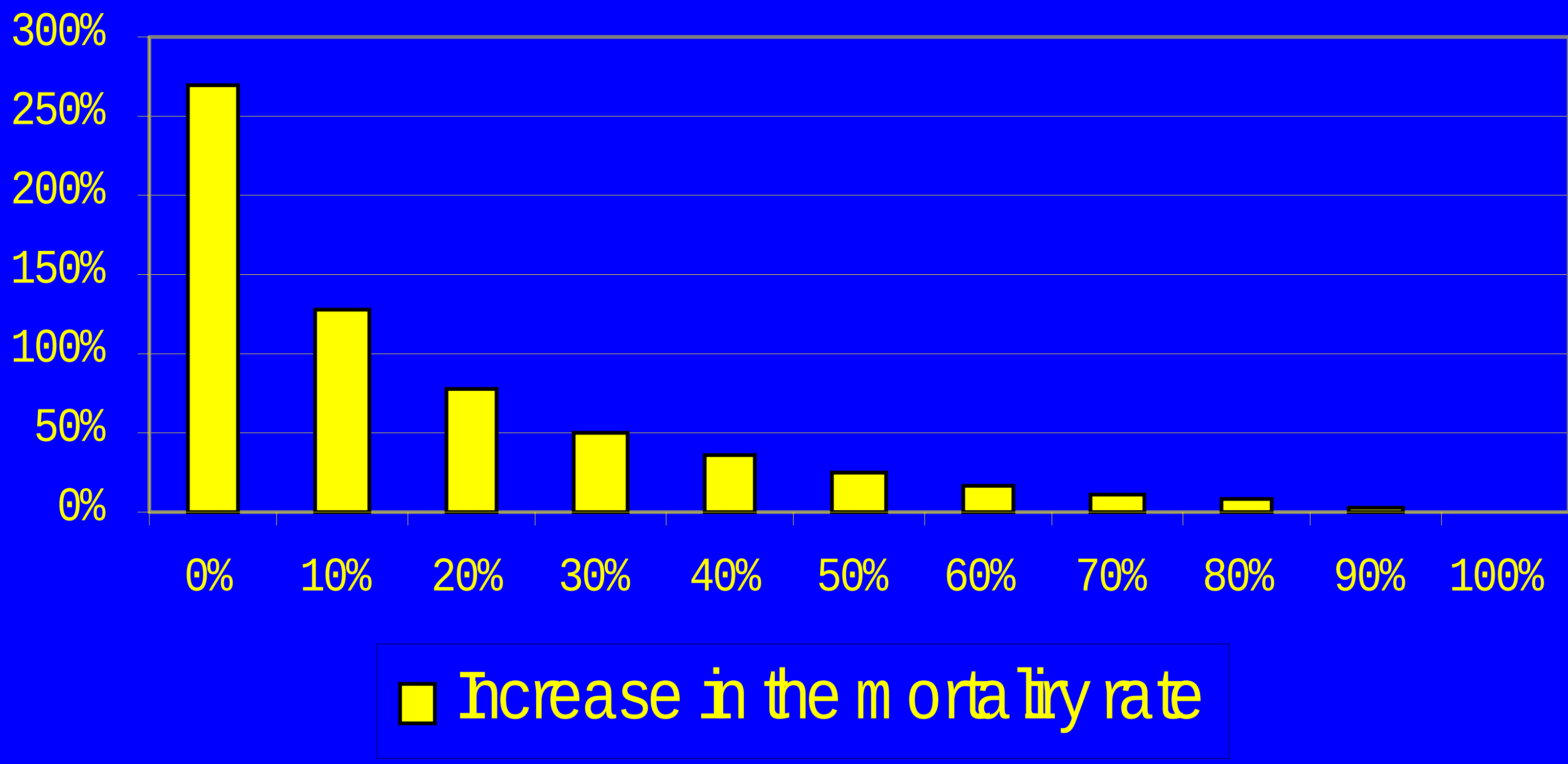
- All „unhealthy“ insured realise the option, while the option realization of all „healthy“ insured is uncertain

Types of options

Renewal Option

Increasing option

Relation of mortality of the realization of the option by the "healthy" people



How to solve the problem?

- Design only such options, where the additional premium is negligible
- Charging additional premium after the option realisation
- <u>Increase in the premium from the beginning of policy duration (premium for the option)</u>

Mathematical model

Model of the behaviour of policyholders

- Defined transition matrices for groups with different health status
- Special transition matrix for the selection period
- Transition matrices for each option

Mathematical model (cont'd)

Pricing and reserving

- Modelling of reserves for policies with no option

  ➡ premium for the basic cover

- Modelling of reserves for policies with the option

  ➡ premium for the option

- Reserve of the option

  = reserve of policies with option – reserve of the basic cover

Next opportunities of the model

- Recurring option
- Pension option
- Different transition matrices

Summary

Potential use in practice

- Model to be adjusted for the option design
- It is essential to follow and analyse real option realisation rate and resulting mortality changes
- Potential using in the cash-flow modelling

Discussion

Any standard model for insurance options?

Assumptions:

- Does the policyholders decision depend on his/her health?
- Is it adequate to split of insured into groups?