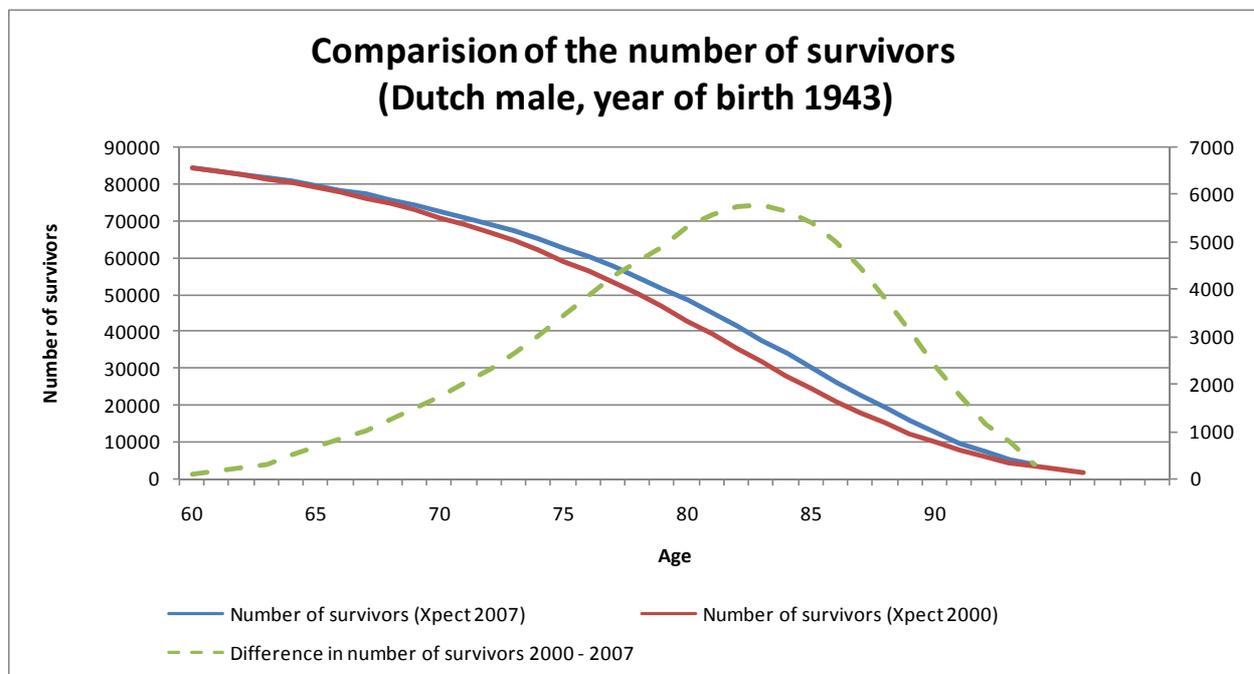LIFE / AFIR Colloquium 2009 - 2nd Call for Papers

Index-linked longevity risk transfer – reduced basis risk with sociodemographic parameter

Longevity Risk Situation:
Longevity risk is currently more in focus of pension funds and life insurers than before. In the recent past many educated observants were of the opinion, that the increase in longevity risk could be compensated by higher returns on investments. Recently, pension funds and life insurance companies were confronted with a sudden decrease of asset values causing solvency problems in countries where the solvency ratio is calculated based on fair value. Subsequently no indexation of the benefits is allowed anymore and in some cases even lower future benefits are discussed.

It is quite clear that risk transfer can be a solution to reduce the longevity risk of pension funds or life insurance companies. The existing gap cannot be transferred, but the rest exposure can. The exposure is calculated based on the number of people living longer than expected. In actuarial terms this number can be described as l_x. E.g. the following picture shows the following differences for the male birth cohort 1943 in the period 2000 – 2007 in the Netherlands (based on population data):

**Comparision of the number of survivors
(Dutch male, year of birth 1943)**

Legend:
- Number of survivors (Xpect 2007)
- Number of survivors (Xpect 2000)
- Difference in number of survivors 2000 - 2007

Figure 1: Delta number of survivors in male birth cohort 1943 (NL)

For each delta l_x measured over a predefined period of time the certain amount will be paid by the risk taker in the index-linked transaction. This amount is calculated based on the characteristics found in the securitised portfolio compared the population data.

Longevity Risk Transfer With Indices
Longevity Indices act as generic evaluation benchmark for longevity risks as well as for financial products of longevity risk transfer. These indices are parametric or portfolio-specific and provide all necessary neutral and real-time base values (underlyings).
In order to serve customers needs the indices are calculated for closed portfolios (e.g. Xpect Cohort Index), for open portfolios (e.g. Xpect Age Index) and for customer portfolios (e.g. Xpect Portfolio Index). Nevertheless, basis risk of a transaction still exists because a portfolio population always differs from the overall population that is selected as basis for the indices. The basis risk of longevity is defined by the difference of expected to effective payments of the portfolio contracts.

Solution for Basis Risk Reduction

By customising the portfolio indices to the customer portfolio contracts taking into account additional parameter like annuities, bereaved protection, date of contract, etc the portfolio indices approach is very close to the real guarantee payments of the portfolio. Based on a comprehensive study of appr. 400.000 data records the authors jointly with Deutsche Börse AG have analysed the effect of socio-demographic parameter on longevity in Germany. A discriminate analysis methodology (CHAID) was selected. Over all cohorts separated between male and female the data of deads records have been compared with the data of the corresponding population.

As a result, profile adjusted q_x und e_x based on socio-demographic parameter are now available. A pension fund or insurer annuities portfolio can re-evaluate on insurance policy level with these sociodemographic q_x and e_x. The basis risk of a transaction (e.g. securitisation or transfer of longevity risks) can be reduced significantly.

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about ValueData7 GmbH

ValueData7 collects, cleanses and analyses data, develops quantitative statistical models and structures the development of financial products and indices for various asset classes. Data are collected from public and proprietary sources.
ValueData7 is the development and calculation agent of Deutsche Börse AG for Xpect.

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