Institut für Finanz- und Aktuarwissenschaften

Innovative Products for the Retirement Phase

- Dr. Alexander Kling
- Convention A
- Ulm University & ifa Ulm
- September 2022

Question 1: Why innovation?

Traditional annuities exactly fit the demand of policyholders during the retirement phase.

Why do you think that innovative products for the retirement phase will emerge?

Why innovation?

Many people are not willing to annuitize their savings, although this would be rational in most cases.

- cf. Guarantees in Retirement Planning: How can we help consumers to want what they need

Nevertheless, the market for annuities will grow.

- increasing target group "50+"

Since people are different (particularly with regard to their risk aversion), a greater variety of products will emerge in the annuity payout phase.

For insurers, traditional (with-profit) annuities are very capital-intensive under Solvency II.

- This leads to incentives for product development also from the insurer's perspective.

Question 2: Where is room for innovation?

Where do you think that innovative products in the retirement phase are possible?

Where is room for innovation?

We see potential for products that

- **reduce investment risk** from the insurer’s perspective and simultaneously **provide some capital market participation** for the policyholder during the retirement phase,
- **reduce longevity** risk from the insurer’s perspective,
- **take into account the health status** or other criterions of the annuitant in the calculation of the annuity amount, and
- **increase flexibility** from a policyholder's perspective.

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Innovative Rentenbezugsphasen in der Lebensversicherung

Marktüberblick über aktuelle Produktangebote

Januar 2021

- cf. also market overview over innovative retirement products in Germany
  - download at www.ifa-ulm.de/innovative-renten

Question 3: Unit-linked annuities

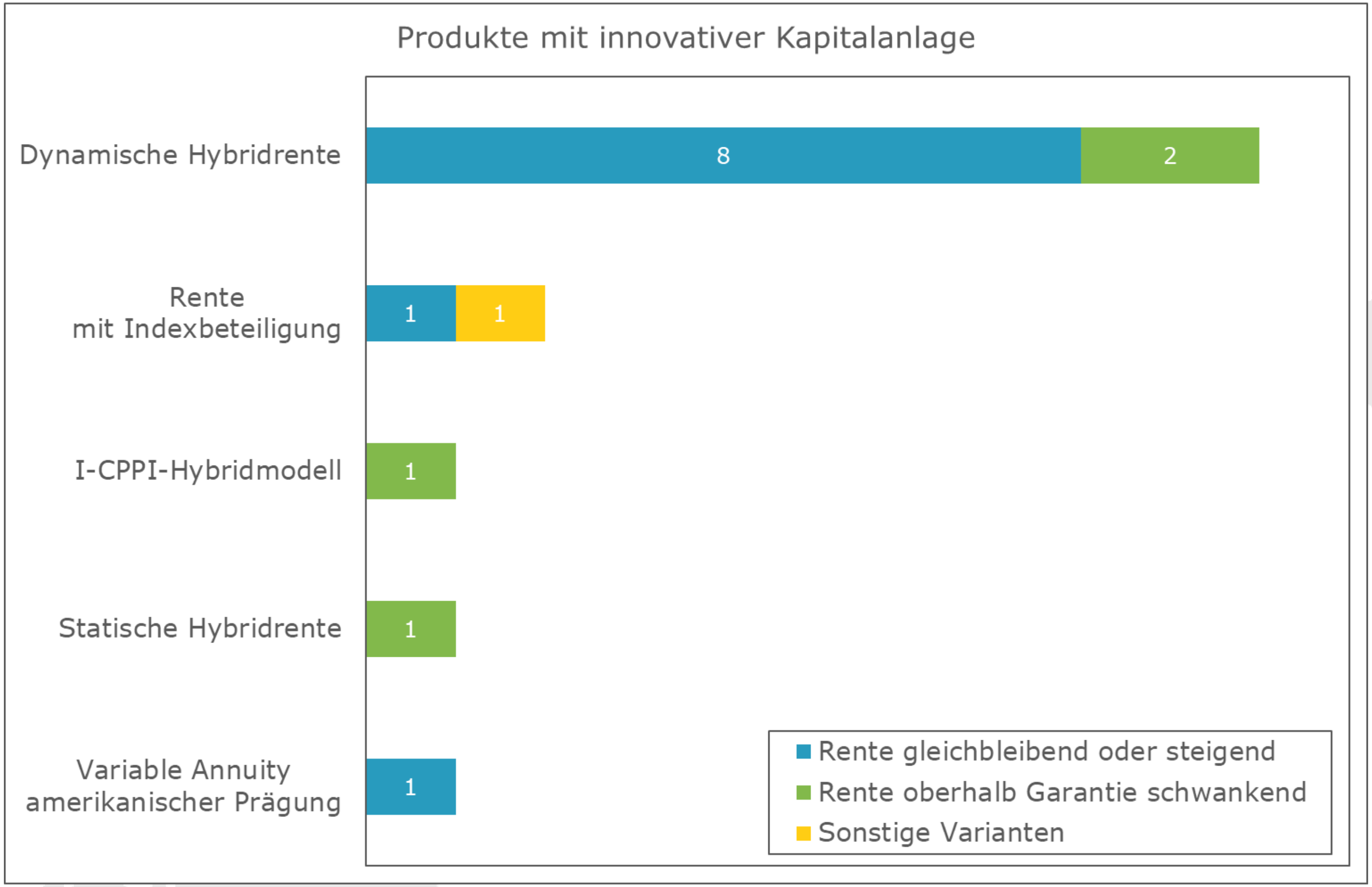
Can you give us an example of how capital market participation during the retirement phase is possible?

Unit-linked annuities

Starting point: Fully unit-linked annuity (**annuity in fund units**).

- The insurance company makes regular (e.g. monthly or annual) lifelong payments to the annuitant. However, each payment is given by a certain number of fund units (as opposed to a fixed amount).
  - consequence: Annuity payments fluctuate with fluctuations of the fund units' price.
- This is still an annuity product for the insurance company.
  - The number of fund units paid out regularly is guaranteed by the insurance company.
  - calculation of this product like a traditional calculation assuming an interest rate of 0%
    - The insurance company still carries longevity risk.
- However, investment risk is carried by the annuitant.
  - If any of the unit-linked guarantee concepts of the accumulation phase is used within the annuity payout phase, parts of the investment risk are taken by the insurance company.
- Capital market participation can be combined with guarantees.
  - cf. examples from Germany

Unit-linked annuities



13 providers

15 products

Unit-linked annuities

- Rente gleichbleibend oder steigend
- Rente oberhalb Garantie schwankend
- Sonstige Varianten

Anbieter und Produkt	Kapitalanlagemodell
Alte Leipziger: ALfonds – Fondsrente mit Garantien	Dynamische Hybridrente
AXA: Rentenversicherung mit Auszahlphase Performance	Rente mit Indexbeteiligung
AXA: Rentenversicherung mit Auszahlphase Performance Flex	Rente mit Indexbeteiligung
Canada Life: GARANTIE INVESTMENT RENTE	Variable Annuity
Continentale: Investmentorientierter Rentenbezug	Dynamische Hybridrente
Feuersozietät: SofortRente Invest Chance	Dynamische Hybridrente
HDI Leben: Flexibler fondsgebundener Rentenbezug	Statische Hybridrente
Saarland Versicherungen: SofortRente Invest Chance	Dynamische Hybridrente
SIGNAL IDUNA: SIGNAL IDUNA Global Garant Invest – SIGGI	Dynamische Hybridrente
Swiss Life: Fondsgebundener Rentenbezug für Swiss Life Investo und Swiss Life Maximo	I-CPPI-Hybridmodell
Versicherungskammer Bayern: SofortRente Invest Chance	Dynamische Hybridrente
Volkswohl Bund: Fondsgebundene Rentenphase	Dynamische Hybridrente
VPV: Flexible Rente der VPV Freiheits-Rente	Dynamische Hybridrente
VPV: Flexible Rente des VPV Zukunftsplans	Dynamische Hybridrente
Württembergische: Fondsgebundene Verrentung	Dynamische Hybridrente

Question 4: Transfer of longevity risk to policyholders

Can you give us an example of how longevity risk can be transferred to policyholders?

Annuity Pools and Mortality-Indexed Annuities

Motivation of annuity pools

Basic idea of annuity pools

- transfer of systematic mortality risk to the policyholders
  - Unsystematic mortality risk is still managed by pooling of individuals.
    - historical notion: tontine (Lorenzo de Tonti, 1653)

Tontine (Lorenzo de Tonti, 1653, historical definition)

- conversion of a single premium of all members of the tontine into an infinite annuity payment stream (coupons)
  - e.g. coupon of 5% p.a. of the single premium
  - annual payment of all coupons to the (remaining) members of the annuity pool
    - increasing annuity payments for the surviving members
- example (King William‘s Tontine, 1693)
  - shares in the tontine sold for ₤ 100
  - coupon payments of 10% of the single premium in the first 7 years, afterwards coupon payments of 7% of the single premium

Annuity Pools and Mortality-Indexed Annuities

Motivation of annuity pools

Basic idea of annuity pools

- The issuance of tontines is permitted by the directive 2002/83/EC of the European Parliament and of the Council of 5 November 2002 concerning life assurance which defines tontines whereby
  - […] associations of subscribers are set up with a view to jointly capitalising their contributions and subsequently distributing the assets thus accumulated among the survivors or among the beneficiaries of the deceased;
  - Tontines are admissible business under European regulation.
- Le Conservateur (French) still offers a tontine very much based on Tonti's original ideas:
  - cf. https://www.conservateur.fr/nos-produits/tontine/
- However, nowadays adaptions of the pure tontine approach that share longevity risk by the tontine members seem more appropriate.
  - group self-annuitization, pooled annuity fund, annuity pool (cf. following slides)

Annuity Pools and Mortality-Indexed Annuities

calculation of the first annuity

Group self-annuitization

- basic idea given in Wadsworth et al. (2001)
- detailed math given in: Piggott et al. (2005): The Simple Analytics of a Pooled Annuity Fund. The Journal of Risk and Insurance, Vol. 72, No. 3, 497-520.

calculation of the first annuity

- assumptions about future mortality rates and expected capital market performance (interest rate)
  - l_x: expected number of survivors at age x
  - ${}_tp_x = \frac{l_{x+t}}{l_x}$: t-year survival probability of an x-year old insured person
  - r: interest rate
- For each individual, calculate an initial annuity $\boldsymbol{R_0}$ which can be paid lifelong for a single premium payment SP under the given assumptions, i.e. (formula without charges)

$$SP = \sum_{t=0}^{\omega} \boldsymbol{R_0} \cdot \frac{1}{(1+r)^t} \cdot {}_tp_x = R_0 \cdot \ddot{a}_x$$

  - **Assumptions can be chosen on a best-estimate basis.**

projection of fund values and annuities

annuity adjustment (in general)

$$R_t^* = R_{t-1}^* \cdot \frac{{}_1p_{x+t+1}}{{}_1p_{x+t+1}^*} \cdot \frac{1+r_t^*}{1+r}$$

- Is the realized mortality in the pool higher or lower than expected?
  - adjustment factor for realized mortality (so-called "mortality experience adjustment")

$$MEA_t = \frac{{}_1p_{x+t+1}}{{}_1p_{x+t+1}^*}$$

- Is the asset performance higher or lower than expected?
  - adjustment factor for realized asset return (so-called "interest rate adjustment")

$$IRA_t = \frac{1+r_t^*}{1+r}$$

The total annuity adjustment is given by the product of both adjustment factors.

$$R_t^* = R_{t-1}^* \cdot MEA_t \cdot IRA_t$$

Question 5: Transfer of longevity risk to policyholders

Can you give us an example of annuities depending on the policyholders' health status?

Enhanced / Impaired Annuities

Motivation

From a letter sent to the Financial Times:

- *I will be 70 next birthday, am 6ft 6in, weigh 18.5 stone and have had high blood pressure for 15 years (I'm on the maximum daily dose of my drug). I have had malaria three times, cancer of the larynx five years ago and now have apnoea, which surgery in 1993 has relieved but not cured. So, I am a low health prospect, according to life offices. I agree.*
  But let me seek an annuity – and hey presto! I am a normal life with an expectation in line with the standard tables.

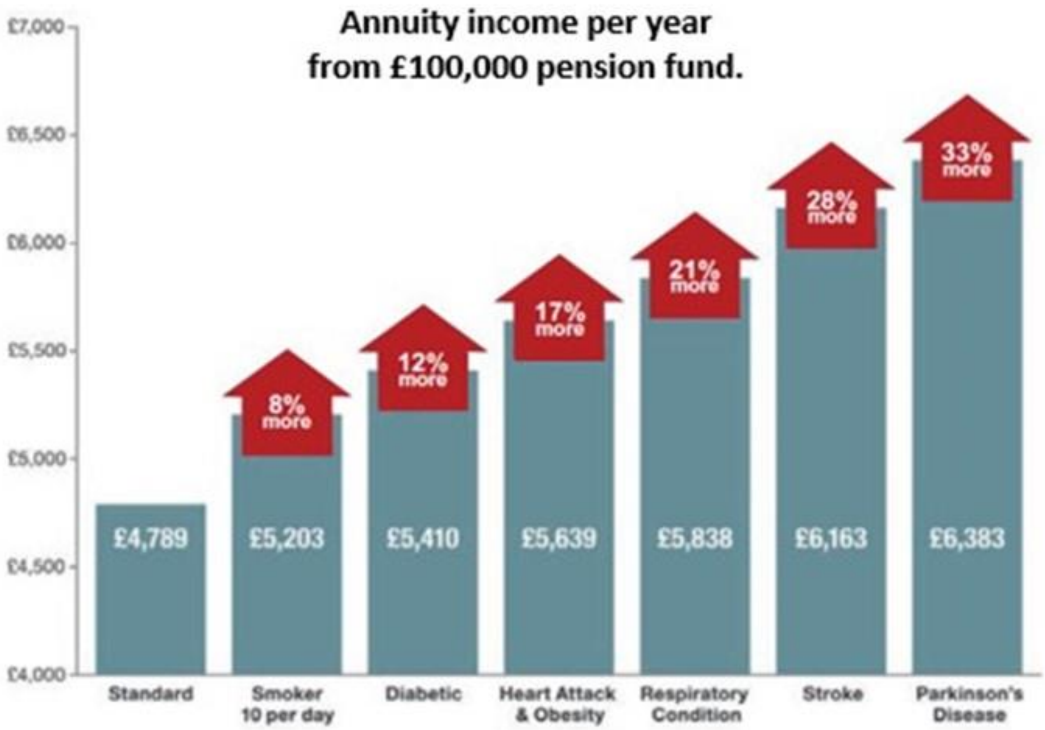
Enhanced / impaired annuity

- An enhanced / impaired annuity is an annuity that provides a higher level of income if the annuitant's state of health or medical history is such that their life expectancy is lower.
  - Qualifying conditions could include
    - certain diseases, e.g. diabetes, cancer, high blood pressure, liver condition, heart attack, high cholesterol levels, Parkinson's disease, etc.
    - or definitions of long term care products, e.g. inability to perform certain activities of daily living
    - or living habits (e.g. smoker status, BMI)

Enhanced / Impaired Annuities

example from UK

Real life example (source: https://www.angloifa.com/blog/enhanced-annuities/)



Source: Just Retirement rates from 23 February 2017. All quotes are based on an individual aged 65, £100,000 purchase price, average postcode, payable monthly in advance, single life, no escalation with a 10 year guarantee period.

Enhanced / Impaired Annuities
example from UK

Real life example (source: http://www.sharingpensions.co.uk/pension_annuity3.htm)

Question 6: flexibility during the payout phase

Can you give us an example of annuities allowing for flexibility during the payout phase?

Variable Annuities and Flexible Payout Plans
Variable Annuities

From a marketing perspective, the products come with the following features:

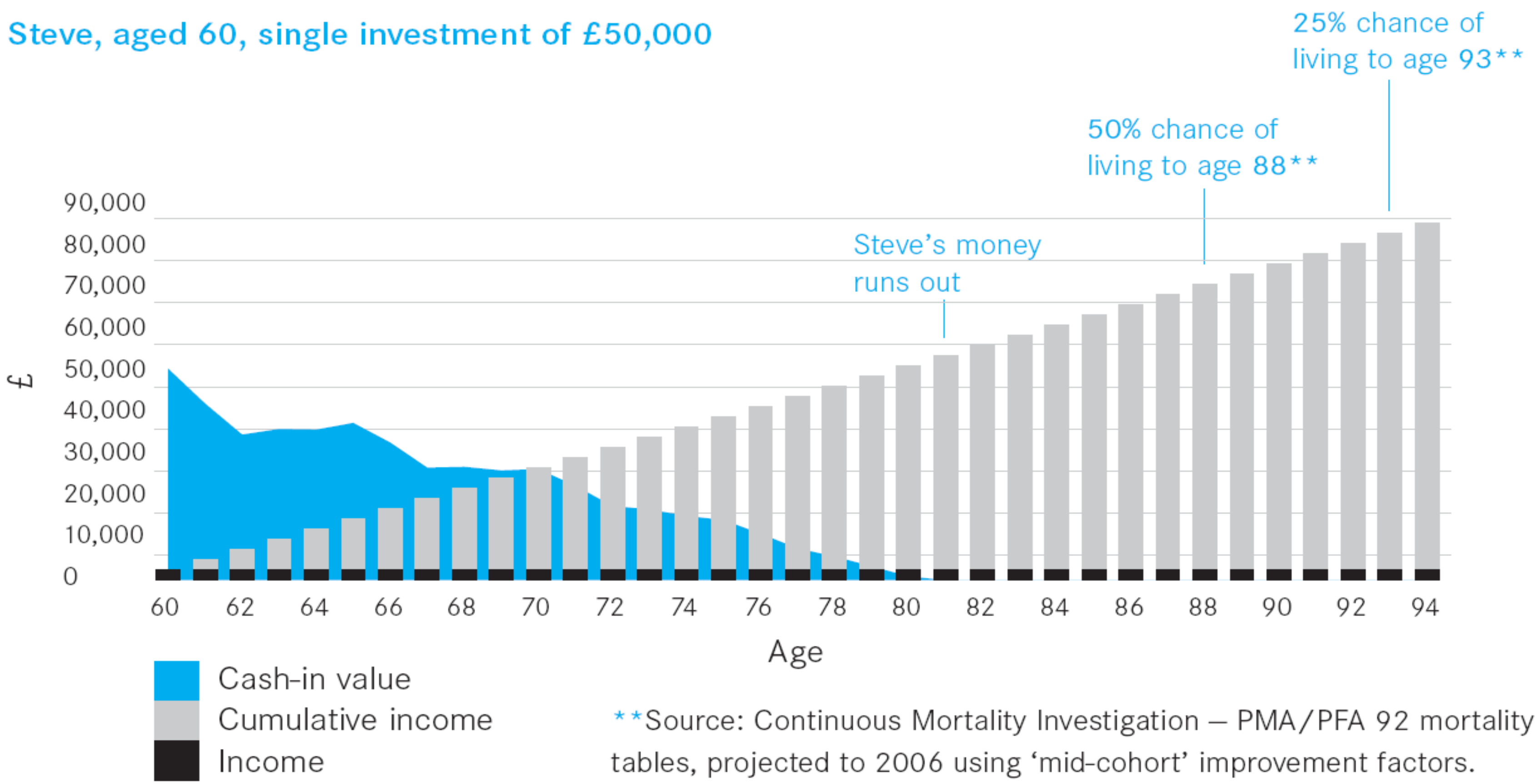
The assets of the policyholder belong to the individual policyholder, even after start of the annuity payment. From his own "account", the policyholder receives an annuity payment each month. The policyholder benefits from surpluses / increasing fund prices (account value and future annuity payments increase). The policyholder has access to his money at any time (surrender / partial surrender) – also in the annuity payout phase. In case of death, the policyholder's heirs receive the remaining account value.	As long as money is available: Typical properties of a bank account / withdrawal plan.
If the policyholder runs out of money, the insurer continues to pay the annuity until death. For this guarantee, a transparent guarantee fee is charged.	Insurance coverage when it is needed.

Variable Annuities and Flexible Payout Plans

Variable Annuities

Guaranteed Minimum Withdrawal Benefits (GMWB)

- example of a former product sold in the UK (source: Aegon)



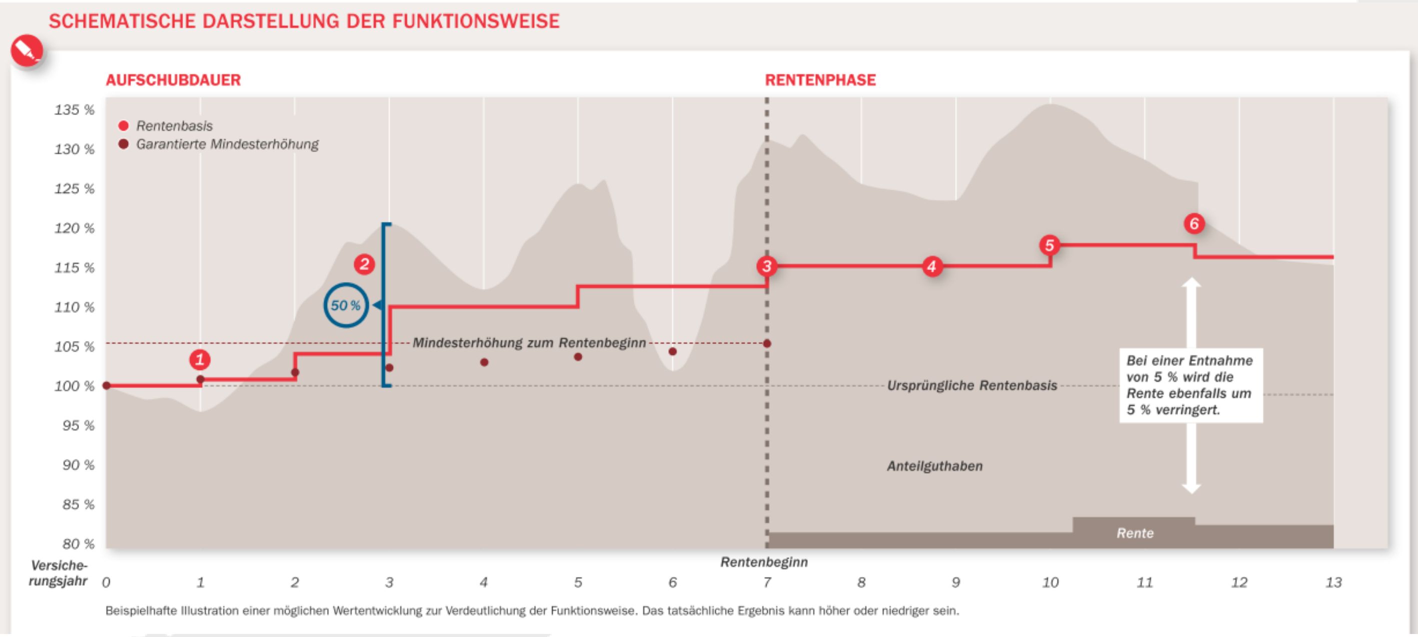
**Source: Continuous Mortality Investigation – PMA/PFA 92 mortality tables, projected to 2006 using 'mid-cohort' improvement factors.

Variable Annuities and Flexible Payout Plans

Variable Annuities

Guaranteed Minimum Withdrawal Benefits (GMWB)

- example: Canada Life GarantieInvestmentRente
  - Three different investment strategies possible (“Defensiv”, “Ausgewogen”, “Chance”)
  - Annuity payment might increase if the fund performs well.



  - increase of annuity when fund performance covers for charges and annuity payments

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