Guarantees: Past, Present, Future?

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Motivation I:

Nov. 2011: DGVFM/DAV launched the “Topic of the Year 2012”

The Future of the Interest Rate Guarantee in German Life Insurance

Nov. 2012: DGVFM/DAV launched the “Topic of the Year 2013”

Alternative (to) Guarantees

Workshop on “Alternative Guarantees” at TU München, 9.9.2013
(see also https://aktuar.de/dgvfm/topic_of_the_year/)

Motivation II:

The current situation (interest rates, Solvency II, ....)
Motivation III:

Work of the group “Altersvorsorgeprodukte” of the *EI-QFM in Kaiserslautern* (including members of ERGO, Swiss Life, Canada Life, MLP, Franke und Bornberg, Fraunhofer ITWM, Univ. Ulm, ... ) that discusses all aspects of guarantee products

Symposium “Zukunft der Garantien – Garantien der Zukunft”
at EI-QFM in Kaiserslautern on August 22 (information: info@ei-qfm.de)

See: [www.ei-qfm.de](http://www.ei-qfm.de)
0. Some preliminary remarks

- **Guarantees are the basis of every insurance deal**
- Guarantees have a **price**
- Guarantees can result in different challenges
  - Guarantees for a collective („Law of large numbers“)
  - Singular guarantees (Single contracts, reinsurance, ...)
  - ....
- Guarantees cannot be canceled (at least not without an enormous loss in the public image of the corresponding insurer)

But also:

- There is no arbitrage opportunity on the financial market
- Hope for a better future is no basis for a guarantee
- Are there possibilities to reshape (not cancel!!!!) given guarantees?
1. *Motivation*: Some aspects/problems of Life Insurance

**Aim:**
- Save today for the retirement period

**Problems:**
- Long time lag between premium and pension payments
  - *Duration matching*
- Uncertainty about the amount of money needed in the future
  - *Interest rate and inflation risk*
- Uncertainty on the duration of the payment period
  - *Longevity risk*

⇒

Typical problems in financial mathematics with non-hedgeable risks

**Danger for the insured:**
Errors will typically be realized when they can no longer be corrected!
1. **Motivation: Basic forms of pension**

**Defined Benefit** – The insurer takes the risk
- payment (often just a lump sum),
- insurer invests and finally pays the guaranteed amounts

**Defined Contribution** – The insured takes the risk
- customer pays,
- insurer invests, customer gets the result

**Best (?) of both worlds** – The German system ...
- mixture of a Defined-Contribuition-System
- and a performance guarantee (free of charge !!!)

⇒ Unique selling property compared to bank products (?)
⇒ *Can that work?*
1. *Motivation*: Average yield ↔ guarantee rate (“Höchstzinssatz”)
1. **Motivation: The historical interest rate date**

Evolution of the German termstructure of interest rate curve in recent years
2. Main problems – Practical point of view

- **Longevity risk** => will not be considered today

- **Are older (and more expensive!!!) contracts fully hedged?** => will not be considered today (**but might be the biggest problem!**)

- **How long will the interest rate stay low?**
  - Hard to predict
  - Given today’s term structure curve: still some time.
  - Model based: be very careful!
  - No good economic forecasting models available !!!
  - .....

2. Main problems – Practical point of view

Valuation of financial products

- **There are no arbitrage opportunities** (“Arbitrage-free markets”)
  - A riskless (!) gain above the riskless interest rate is not possible
  - Guarantees have a price:
    - Implicit costs (Reduction in return => CPPI)
    - Explicit costs (Costs for derivatives=> OBPI)

Modelling problems

- There do not yet exist tractable models for the **long term** evolution of stock prices and interest rates

Conceptual problems

- Understanding guarantees?
- How to advertise guarantees?
- Future concepts for guarantees?
2. Main problems – Understand that a classical product is a good product

A very simple example

Initial capital  
100 €

Index with rate of return  
µ = 5%, volatility σ = 20%  
(Black-Scholes model)

Money market account  
r = 2%  
(constant interest rate)

**Alternative 1:**

Costs of an option based guarantee (i.e. index fund plus put on the fund) with a

- Lower bound of 101,01 € (i.e. 1% minimum rate of return), full upside potential

=>

**Costs** of the additional put option: 7,44 €

Is this just a bad example, can the costs be reduced, ... ?
Costs of lower bounds
Option based guarantees – some numbers 1

Figure C1: Costs of an additional put option (y-axis) as a function of the guarantee expressed in the equivalent interest rate (x-axis)
Reduced costs via upper bounds
Option based guarantees – some numbers

Figure C2: Costs of a guarantee of 2% (y-axis) as a function of the sacrificed guarantee expressed in the equivalent upper bound for the percentage yield (x-axis)
Additional mean wealth via reduced guarantees
An alternative – some numbers 3

Figure C3: Additional mean wealth above the guarantee (y-axis) as a function of the guaranteed minimum interest rate (x-axis)
Lessons learnt

- An interest rate guarantee is hard to beat impressively
- There is not so much room if an interest rate guarantee is very close to the maximal achievable rare
- Simple modifications will not solve current problems

Hence

- It needs a new understanding of the quality of classical products (*No reasons to hide*)
- It needs a radical conceptual change if one wants a new quality of products
- In particular: new kind of guarantees ?!

Note:

*So far we only argued in terms of single contracts !!! Where is the collective ???*
3. How to deal with the current situation?

- Promise, take the risk and hope => Not really a strategy ...  
- Improve the reputation of the classical guarantee and compare the costs/yields of a classical collective product with a single, personalized bank product

- Alternative guarantees  
  - Variable annuities are a step in the right direction, because they are expensive!  
  - Paid guarantees vs. guarantees for free

- Personalized CPPIs  
  - Similar problems as classical products (hard to generate attractive guarantees at the current situation!)  
  - More or less a bank product!

- Temporary fixed guarantees  
  - Reasonable, but will they be accepted?
3. How to deal with the current situation?

- A step in the wrong direction:
  - Construct a **very complicated product** and try to **explain it in all details** to the customer, such as e.g. complicated cliquet options

\[
(*) \quad P + \max \left\{ \min \left\{ \sum_{i=1}^{n} \max \left\{ \min \left[ \alpha_i \frac{S(t_i) - S(t_{i-1})}{S(t_{i-1})}, C_i \right], F_i \right\}, C \right\}, F \right\} \quad \text{paid in T}
\]

- **Suggestion:** Only communicate the important details, otherwise trust will be lost!
4. Aspects for future generations of guarantees - requirements

Some requirements on future generations of guarantees
(my personal view/recommendation):

A. A guarantee should be constructed in such a way that it is always possible to generate it

B. A guarantee should be fair to the whole of the collective

C. A guarantee in life insurance should make use of the advantages of the collective

D. Guarantees should be flexible in the sense that they should be quoted in relative form with respect to an index i.e. as a percentage (“Compare to the economy and not to numbers”)
4. Aspects for future generations of guarantees – some suggestions

Suggestion 1: Classical guarantees with a moving benchmark

“Guaranteed return of x % of the return of an index (such as REX, DAX, ....)”

Advantages:

- Can always be satisfied by construction of the guarantee and leaves room for working with the contributions (“safe” and “potential”)
- Attitude towards risk of the customer is mirrored in the choice of the benchmark (“flexible”)
- Same local returns for all members in the same risk class of the collective (“fair”)

Disadvantages:

- Needs arguments (such as historical simulation or model simulations) to be accepted
- Has to offer a lower guaranteed interest rate than the one offered at the moment
- Great flexibility results in smaller (different) collectives
4. Aspects for future generations of guarantees – some suggestions

“Suggestion” 2: Make use of longevity risk

- No new product, more a suggestion for ingredients of ways to generate guarantees or attractive products
- Life insurers face longevity risk anyway and can maybe eliminate/swap parts of the longevity risk
  - Mortality bonds, mortality derivatives, ...
  - Direct investment in the “retirement industry” (medical industry, care centers, ....)
- Main problems so far:
  - reliable modeling necessary
  - deep and liquid markets

Note the innovation:
Investment as a part of true asset-liability management !!!
4. Aspects for future generations of guarantees – further aspects

“Suggestion” 3: 100% guarantees or not?

- Combination of a very basic 100% guarantee (say for 60% of the paid premia) and a very likely – say – 95% guarantee on the remaining premia plus participation in the surplus

- Note:
  - 100% guarantees do not exist anyway ...
  - Difference in the long term evolution between variance and capital-at-risk of stock investments can be made use of!

“Suggestion” 4: Idea behind universal portfolios (T. Cover (1991))

- Highest possible degree of diversification
- Use a variant for the collective
- Still very vague idea
5. Concluding remarks

I believe in a future for life insurance if

- Life insurers believe in their own product ("No lamentations about the low guarantee, about the own wrong investment strategy, ...")
- Future guarantee concepts will be generated more flexible and easier to fulfill
- Life insurers concentrate on their advantages compared to banks (i.e. the collective, the competence on hedging mortality, smoothing returns...)
- Politics remains in favour of life insurance by setting/keeping the appropriate legal/political framework
- Insurance/financial mathematics considers relevant scientific problems:
  - Optimal investment for large investors
  - Long-term interest rate modelling
  - Optimal asset-liability management strategies
  - .....
Thank you for your attention!

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