The Effects of a Low Interest Rate Environment on Life Insurers
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Contents

Background

- Low yield environment
- High minimum returns guaranteed by (German) life insurers
- Recent reform of the regulatory framework (mitigation of financial and mortality/other profits or losses)
- Solvency 2

Investment assets

Investment assets dynamics:

- Interest rate: CIR (non-negative nominal short rates)
- Spread / credit risk: non-modeled
- Stocks and real estate: GBM

Dependency: linear correlation

Liabilities

Stylized life insurance portfolio:

- 25 years maturity saving contracts
- one-year regular premium
- each year new cohorts replace maturing cohorts
- neither mortality nor surrender risk are considered
- fees and loadings are not considered
- each cohort has a minimum guaranteed rate equals to the maximum allowed (at inception)

Behavioral assumptions

Management actions:

- Asset and liability management: static asset allocation
- Additional distribution is broadly automatic and not actively managed/anticipated (e.g. by managing financial assets in order to reach a target)

Policyholder behavior:

- no surrender
- no sensitivity to the crediting rates
- new arrivals automatically replacing the oldest cohort

Measurement

- On the asset side: both book and market values are considered
- On the liability side:
    - local GAAP value corresponds to the policyholder account
    - *market value of liabilities* only considers the minimum guaranteed crediting rate (i.e. not a best estimate as defined by Solvency 2)
- Solvency Requirements: based on a Solvency 2 framework

Some technical observations

About the asset side:

- the drift (under the real probability) of both stocks and real estate is constant, i.e. the risk premium is not constant (it automatically adjusts itself to compensate the interest rates variations)
- Calibration of drifts and volatility of stocks and real estate
- relatively strong (constant) correlation between interest rates and stock / real estate prices
- Euler discretization of the Feller process (CIR): a Milstein scheme enables a higher order of convergence (without the need to generate more random numbers)

Some technical observations / questions

About the solvency requirements:

- does eq. (61) imply that there is no surplus beyond the SCR?
- market consistency?
    - calibration (e.g. common volatility of the GBM for both real-world and risk-neutral dynamics)
    - best estimate valuation does not seem to be market consistent (TVOG does not seem to be captured by the measurement approach)
    - link between market values, risk-neutral and real-world dynamics should be disclosed

Clarifying the research purposes

"Our results suggest that a prolonged period of low interest rates would markedly affect the solvency situation of life insurers, leading to a relatively high cumulative probability of default, especially for less capitalized companies."

If both economic and regulatory background are well described, the authors should clarify the kind of contribution the paper highlights :

- Impact of the German regulatory reform on the long-term default probability?
- Stylized model for supervisory purposes in order to assess long-term equilibrium?
- Macro-economic considerations about designing new regulations?

Recommendations

Depending of this clarification...

- policyholder behavior regarding paying future premiums and lapses (considering level playing field with bank accounts)
- management actions: dynamic strategic asset allocation, additional return, usw
- considering credit risk which appears to be prominent in Solvency 2

Some thoughts

"Formally, there is no obligation for life insurers either to provide a minimum guaranteed return or to provide it at the maximum allowed. However, it has become common practice within the industry to provide long-term insurance products that include yearly guaranteed return set at the maximum allowed"

Maybe a challenge for regulators : boomerang effect of a priori prudential rules?