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Risk Analysis and Valuation of Life Insurance Contracts Combining Actuarial and Financial Approaches

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Agenda

- Traditional life insurance products
- Model and Methodology
- Conclusion

Traditional life insurance products

- Often equipped with minimum interest rate guarantees

- Types of guarantee
  - point-to-point guarantee → only relevant at maturity
  - cliquet guarantee → relevant on a year-by-year basis

- Plus some additional surplus participation
  - regular and terminal surplus participation

The paper‘s title

- Valuation:
  - use risk-neutral valuation
- Risk Analysis:
  - investigate the (real-world-) risk exposure
- Combination:
  - [Barbarin and Devolder, 2005] propose a methodology of combining above paradigms

What's new?

- Extension to cliquet guarantees
- Discuss methodology proposed by [Barbarin and Devolder, 2005]
  - when does it work in practice?
- Derivation of risk-minimizing asset allocations
  - what is a 'good' risk-measure?

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Model and Methodology

- Financial market:
  - Gaussian framework modeling stochastic interest rate and stock markets
- Insurer’s assets:
  - Stocks, bonds and cash

Model and Methodology

- Liabilities:
  - point-to-point guarantee
  - cliquet guarantee
    - minimum surplus participation according to German regulatory framework
    - model mirroring actually applied surplus policy

Model and Methodology

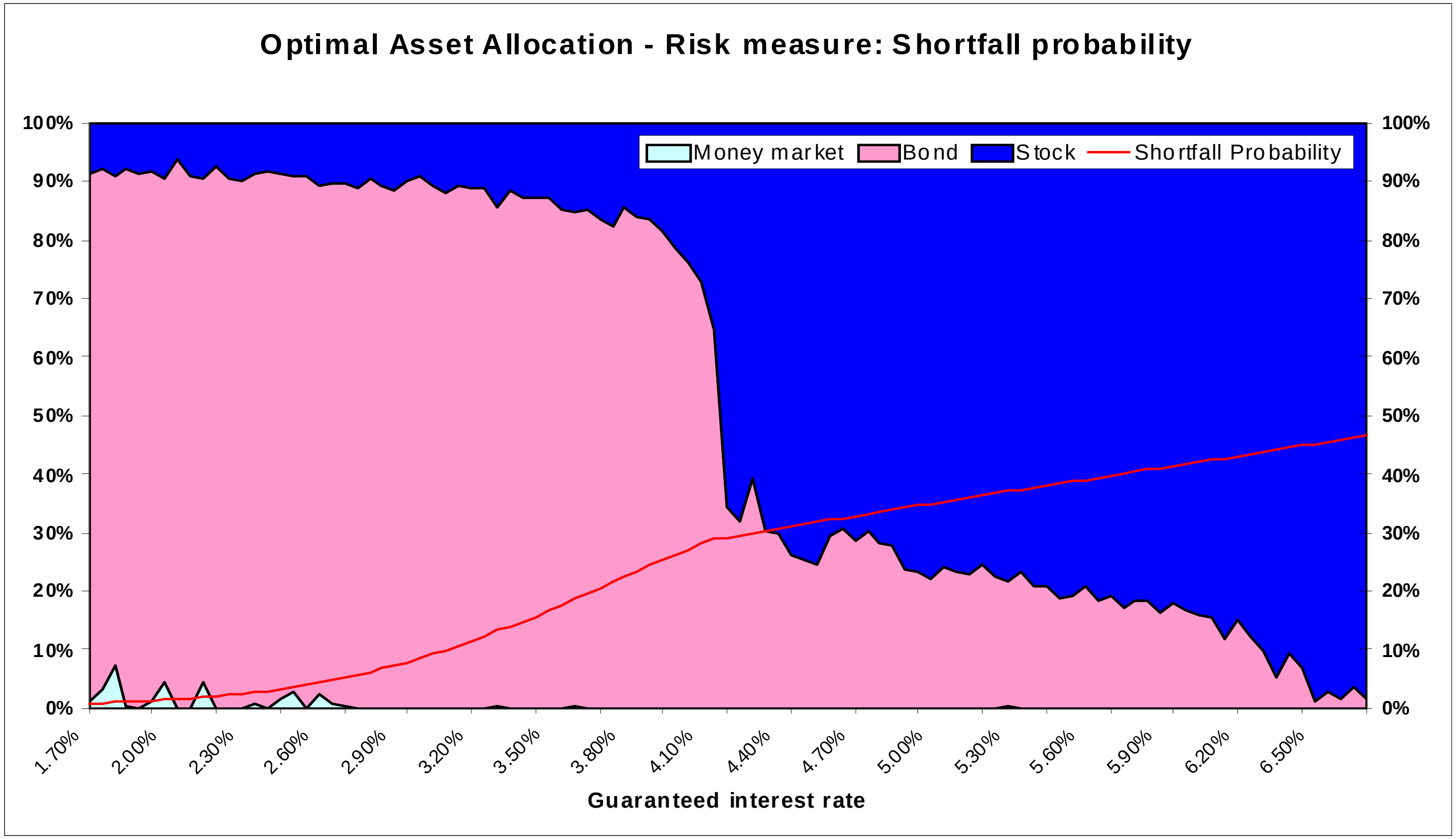
- Proposed methodology works fine in arbitrage-free market
- Yields following pricing approach:
  - Determine risk-minimizing asset allocation
  - Adjust terminal bonus participation rate to ensure fair contract

Model and Methodology

- Determine risk-minimizing asset allocation
  - using a heuristic search algorithm based on Evolution Strategies

Pitfalls

- Which risk measure to choose?



Pitfalls

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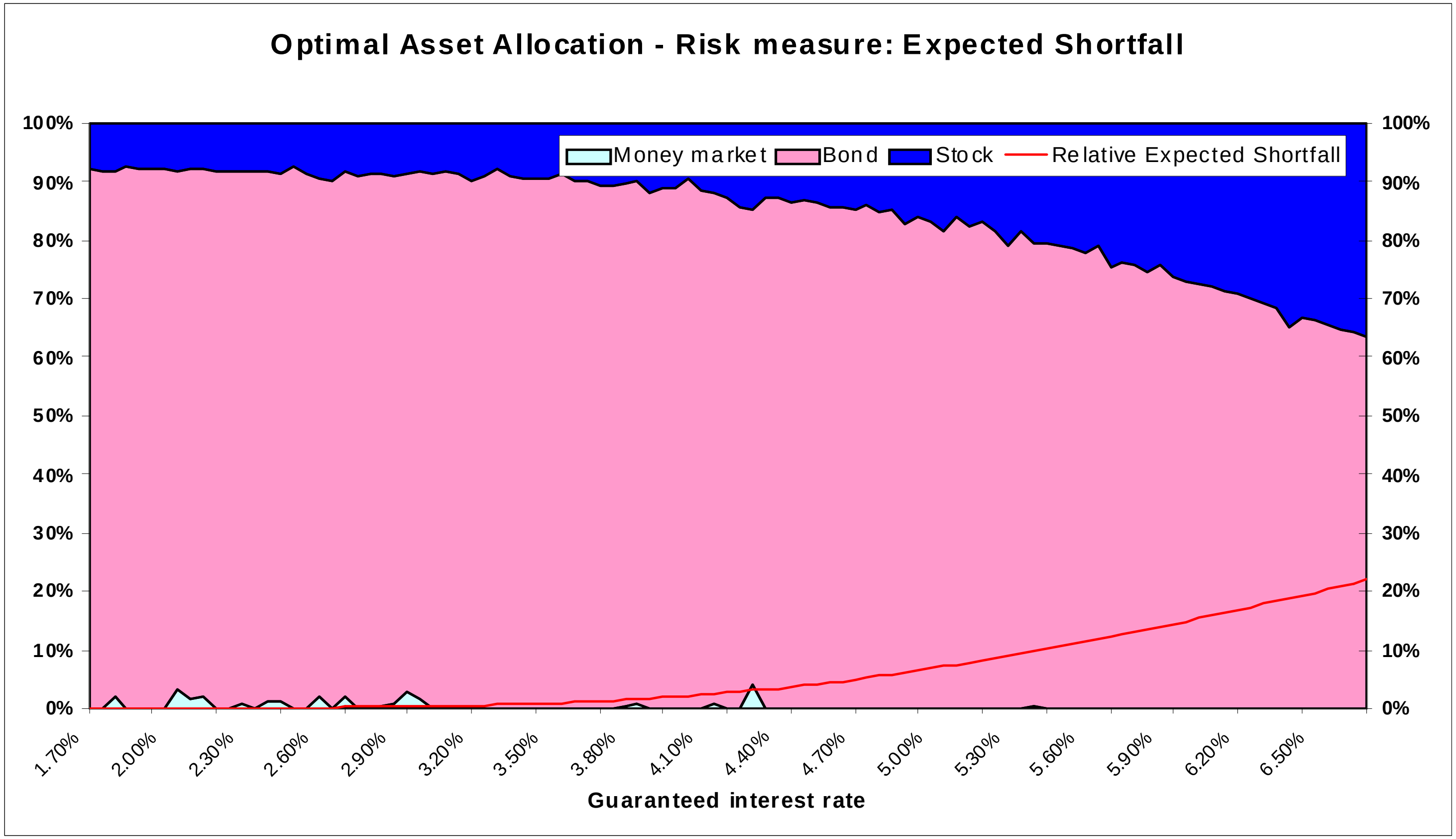

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Conclusion

- Proposed methodology allows for extension to cliquet guarantees and works fine given absence of arbitrage
- Optimal asset allocations vary dramatically using different risk measure
  - wrong incentives applying inappropriate risk-measure?

Thanks for your attention

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Coffee Break