Institut für Finanz- und Aktuarwissenschaften

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The Impact of Inflation Risk on Financial Planning and Risk-return Profiles

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Agenda

Motivation

Nominal and inflation-adjusted risk-return profiles

Ideas on inflation-linked products

Conclusion

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Motivation

Government-run pay-as-you-go systems suffer from demographic changes

➔ demand for private old age provision increases

How to choose "optimal" products?

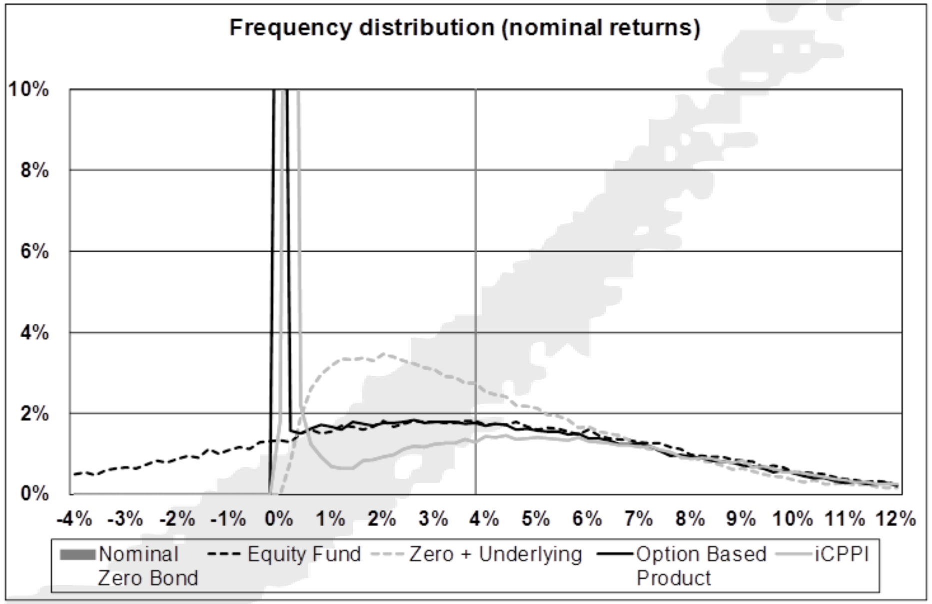
- Vast body of literature on determining optimal (often dynamic) asset allocations mostly using expected utility approaches
- Really practicable for "typical" client?
    - Graf et al. (2012) introduce risk-return profiles of old age provision products by means of stochastic modelling, focussing on nominal returns

But: Purchasing power of benefits much more relevant than nominal returns.

Contribution

- Extend the model of Graf et al. (2012) by including stochastic modelling of inflation.
- Quantitative analysis of real, i.e. inflation-adjusted returns, especially focussing on (existing) products equipped with nominal investment guarantees
- Proposal of product modifications taking inflation risk into account

(Nominal) risk-return profiles, e.g. following Graf et al. (2012)



Risk-return profiles
Methodology

- Enhance the capital market model applied in Graf et al. (2012) by modelling inflation
  - Equity returns: Heston, S. L. (1993)
  - Term structure of interest rates: Cox, J. C., Ingersoll, J. E. and Ross, S. A. (1985).
  - Inflation: Vasiçek O. (1977)
- Quantitative analyses of nominal and inflation-adjusted returns of different old age provision products applying Monte-Carlo simulation.
  - Sample capital markets
  - Model different asset classes: equity, bonds, funds, …
  - Model asset allocation within the old age provision products taking into account charges, payment pattern, potential guarantees, etc.

  ➔ Estimation of the probability distribution of nominal/real returns

Risk-return profiles

Products under consideration

„Standard“ products

- Products without nominal investment guarantees
  - Investment in equity fund
  - Investment in fixed income (modelled as zero-coupon bond)
- Different products with nominal guarantee
  - OBPI: Option based portfolio insurance
  - CPPI: Constant proportion portfolio insurance
    - with different multipliers

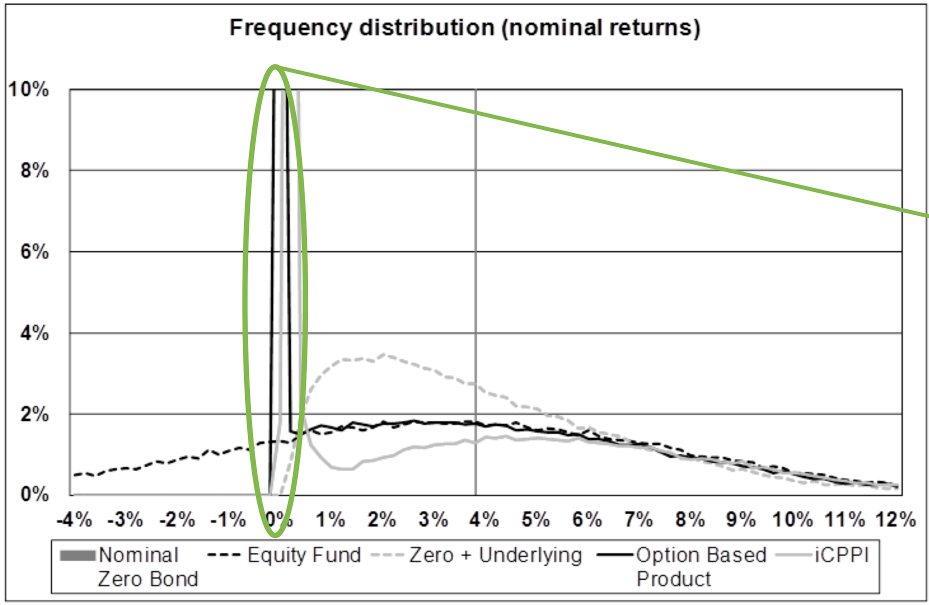
“Modified” (inflation-linked) products

- “Fixed income”
  - Inflation-linked bond
- Modified versions of CPPI
  - Adjustment of floor based on realized inflation
  - Market based adjustment of floor
  - Inflation-linked bond as a safe asset

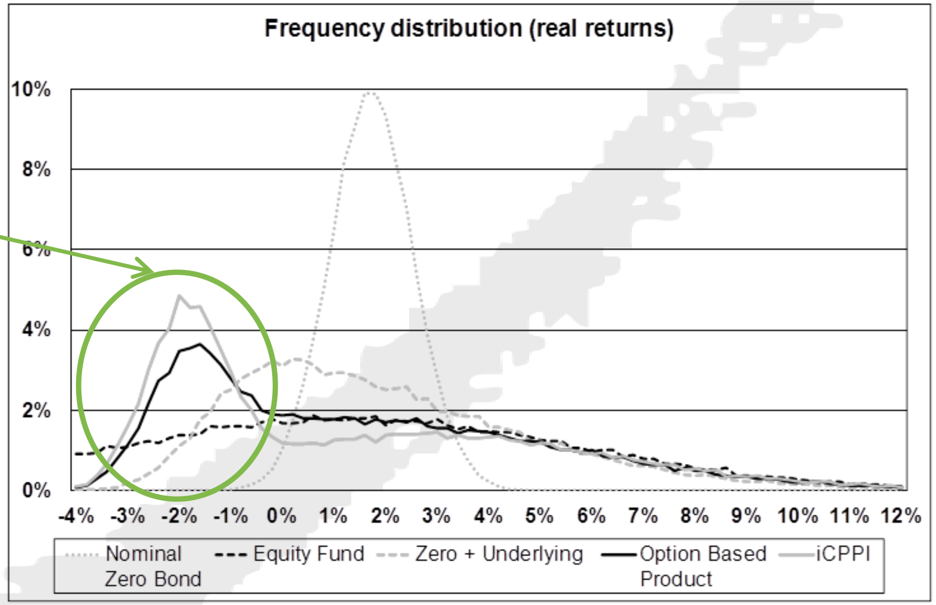
Risk-return profiles

Results – Standard products

Nominal returns



Real returns

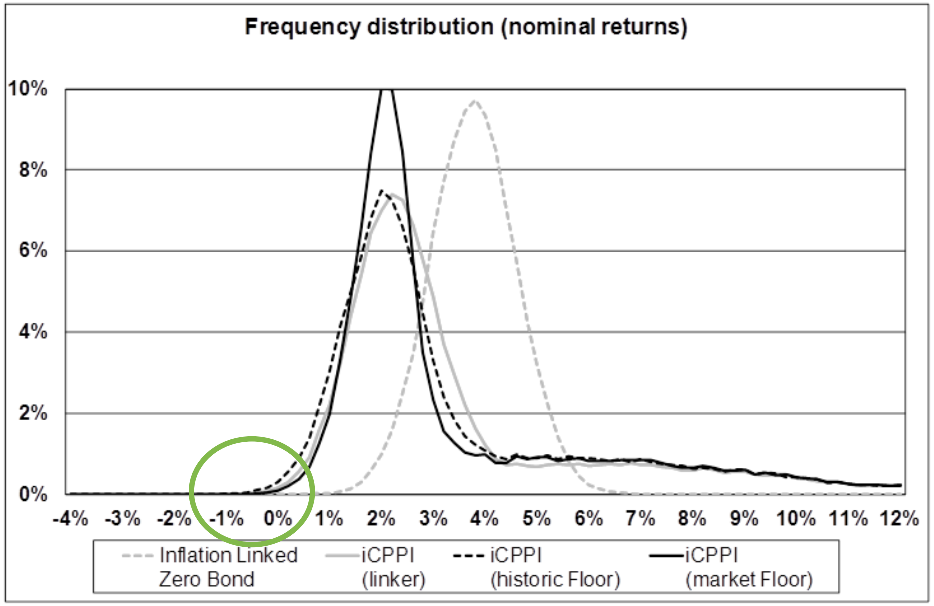


- Especially products that are considered as particularly „safe" by the clients bear a significant inflation risk.

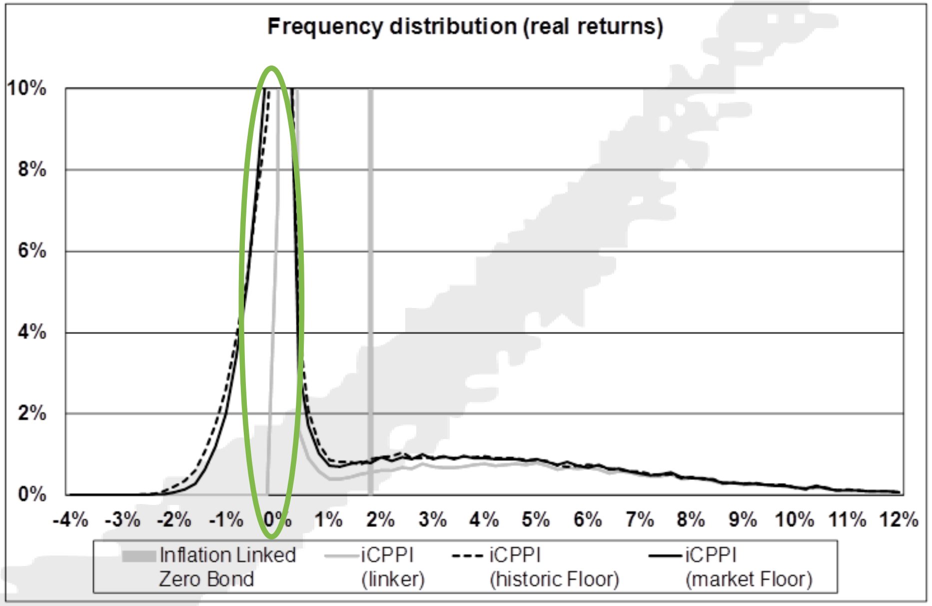
Risk-return profiles

Results – Modified products

Nominal returns



Real returns



- Inflation risk is significantly reduced when „nominal" risk-free assets are applied.
- Inflation risk can be eliminated when inflation-linked risk-free assets are applied.

Conclusion and further research

Conclusion

- Inflation risk has significant impact on existing old age provision products, in particular products that are perceived as safe due to nominal guarantees.
- Proposed product modifications reduce inflation risk significantly.
- We constructed different modified products for clients with different risk aversion.

Further research

- measure and manage inflation risk in the payout phase of different types of annuities
- derive policy implications and educate governments, regulators, financial advisors and clients about inflation risk.
  - E.g. the German case:
    - Government provides certain tax benefits only for products with nominal guarantees
    - Further, legal obligation to show nominal risk return profiles

References

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