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EM Lyon
Lyon | March 2013

Financial Planning and Risk-return Profiles

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Agenda

Motivation and existing approaches

Risk-return profiles by means of stochastic modeling

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

Examples from practice

Conclusion and future research

Motivation and existing approaches

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

- demand for private old age provision increases

Guarantees …

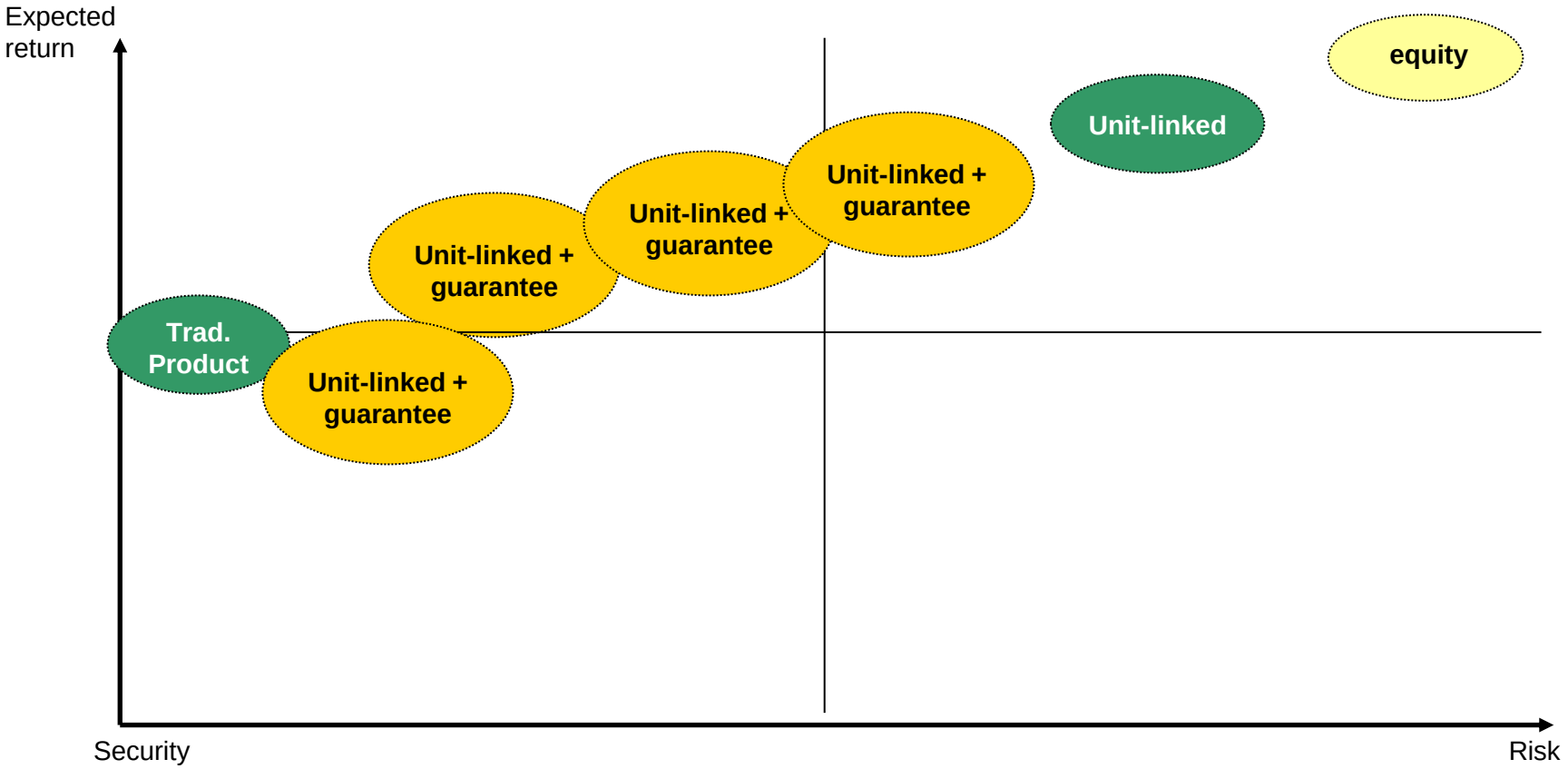
- are legally prescribed in many areas and demanded by clients.

The “evolution of guarantee models“ was a key issue in product development of recent years.

- It becomes more and more difficult to assess advantages and disadvantages of different guarantee models.
- The question of the key characteristics is key for clients and advisors.

Motivation and existing approaches

Risk and return expectations of different products



Motivation and existing approaches

How to choose the “optimal” product? - **The academic’s approach**

- **using expected utility**

some examples on annuitizing

- Yaari (1965), Milevsky (1998), Milevsky et al. (2005), Gerrard et al. (2010)

vast body of literature on determining optimal (often dynamic) asset allocations, e.g.

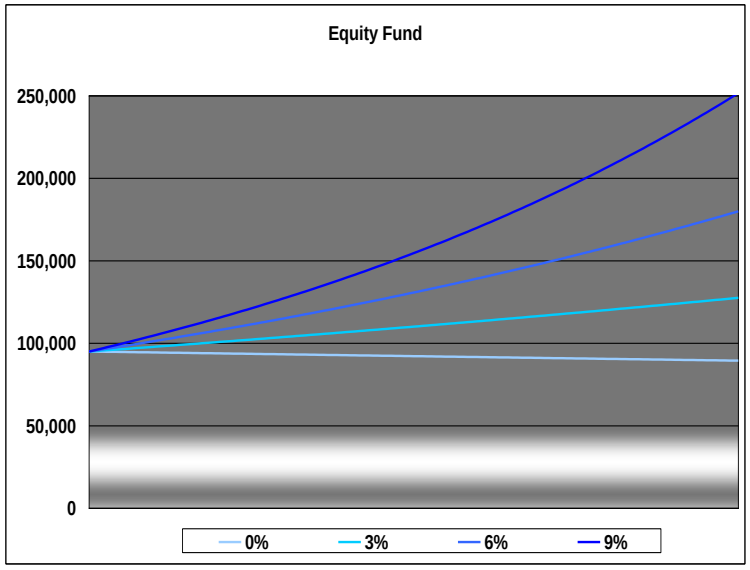
- Cairns et al. (2006), Boyle and Tian (2009)

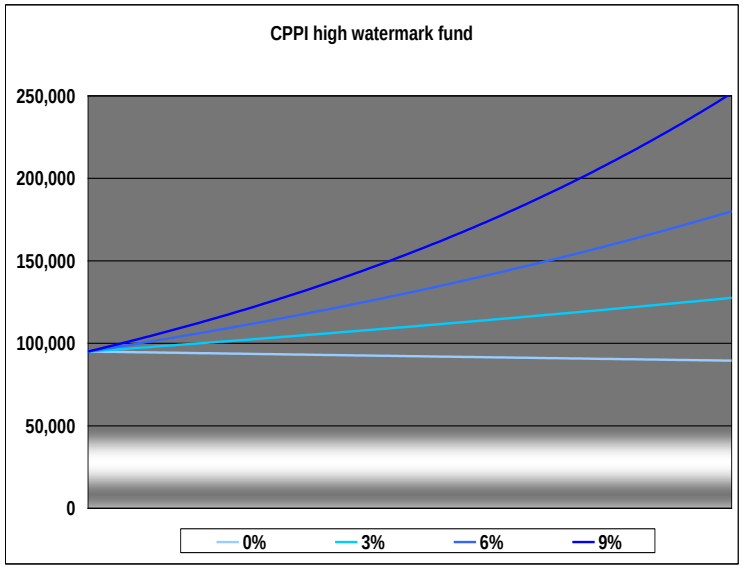
Really practicable for a “typical” client?

Motivation and existing approaches

How to choose the “optimal” product? - **The practitioner’s approach (1)**

- **sample calculations**
  - Product’s maturity benefit calculated assuming a constant fund growth
  - Asset allocation neglected
  - Lack of volatility conceals path-dependant effects, reallocation of risky and riskless assets in CPPI products

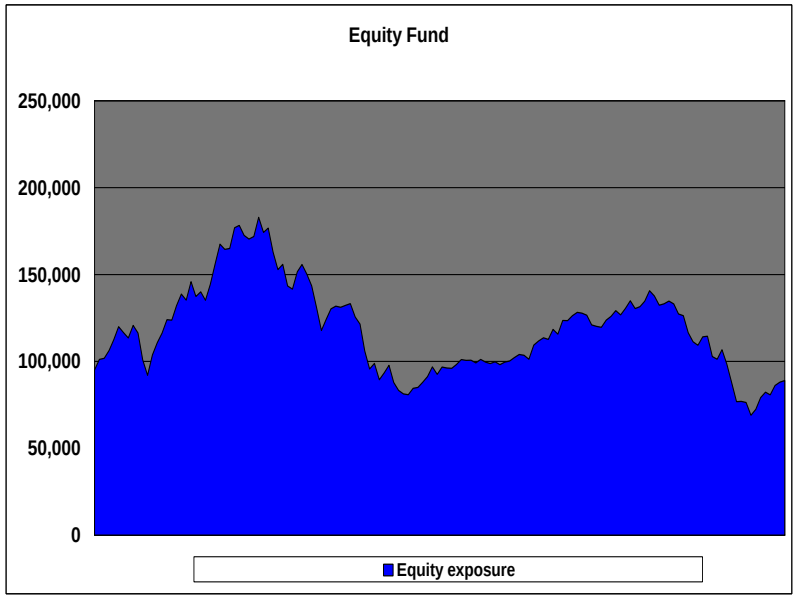


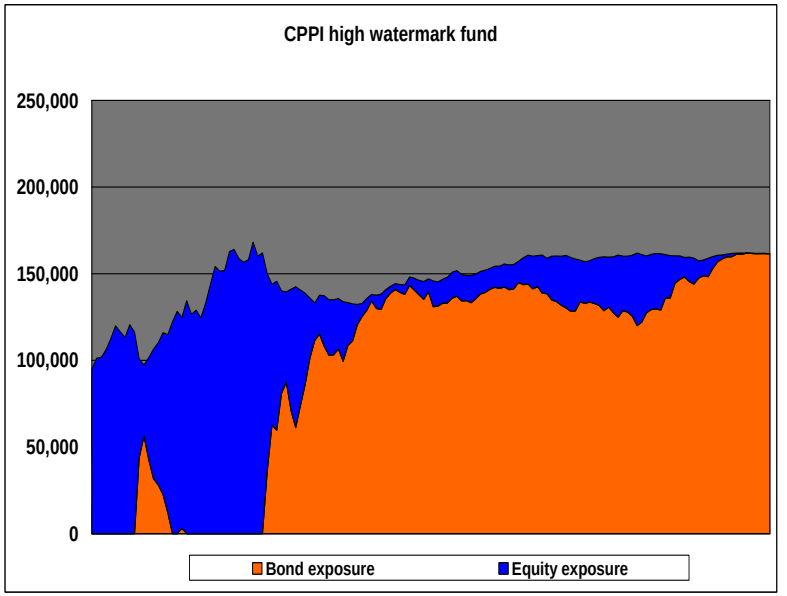


Motivation and existing approaches

How to choose the “optimal” product? - **The practitioner’s approach (2)**

- **backtestings**
  - Underlying investment vehicle is projected assuming it had been invested in the past (according to some time series)
  - “Each product can win” by choosing appropriate time-series and time-frame





Motivation and existing approaches

Our Contribution

- Introduce methodology on how to derive risk-return profiles
- Quantitative analyses of common products with and without investment guarantees
- Analyze existing products under inflation risk
- Modify products in order to reduce inflation risk

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Motivation and existing approaches

Risk-return profiles by means of stochastic modeling

- general approach & model framework
- considered products
- results

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

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Risk return profiles by means of stochastic simulation

1) stochastic simulation of the capital market
   - Equity (modified (Heston, 1993))
   - Interest rates (Cox et al., 1985)
2) for each scenario determine the performance of the considered product
   - Modelling fund management decisions
   - Modelling products investing in various funds
   - including all product charges and product mechanisms
3) Assess product's risk-return profile by estimating the probability distribution of maturity benefits (or returns)

Products under consideration

Products without embedded guarantees

- Investment in equity, balanced fund or zero bond

Products with “money back guarantee”

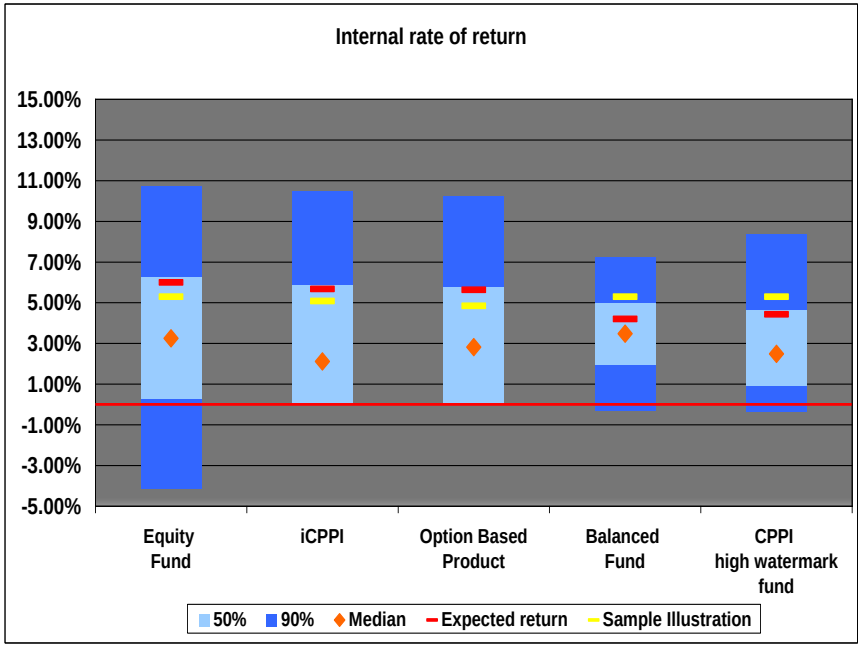
- Static option-based product (“underlying + put”)
- Zero plus Underlying
- (Dynamic) CPPI strategy on a client individual basis (iCPPI)

Products with “savings premium guarantee”

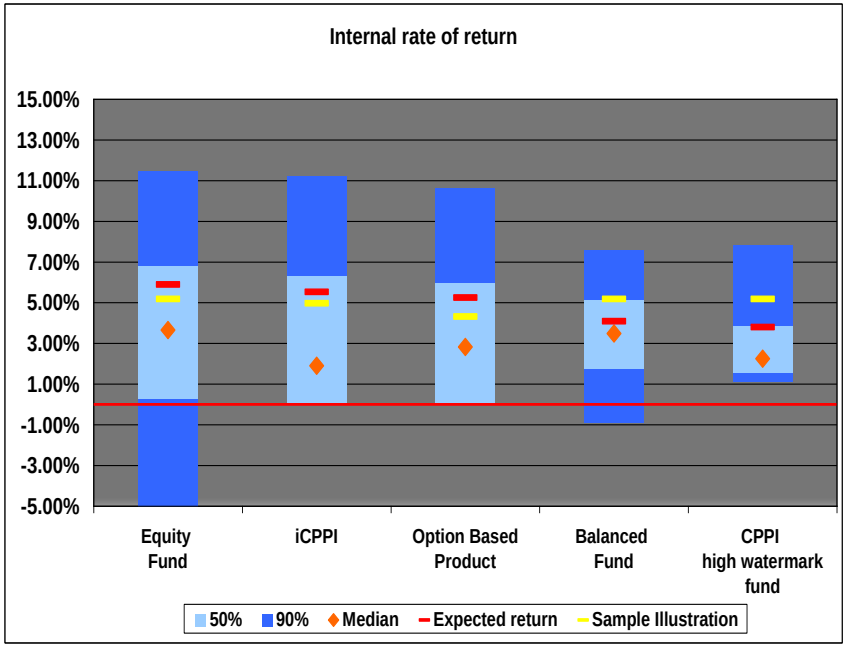
- (Dynamic) CPPI strategy implemented in a mutual fund and thus managed on a “collective” basis (CPPI high watermark fund)

Risk-return profiles

Quantitative sample results



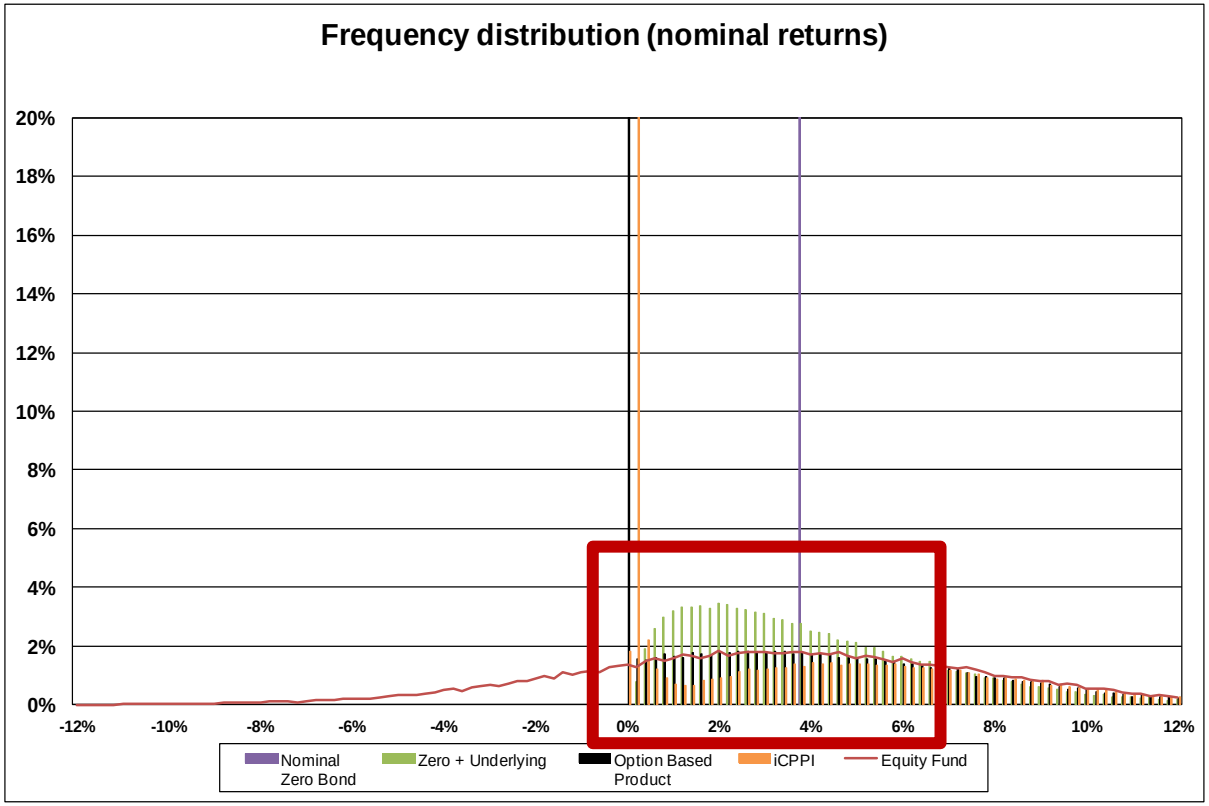
Single premium



Regular premium

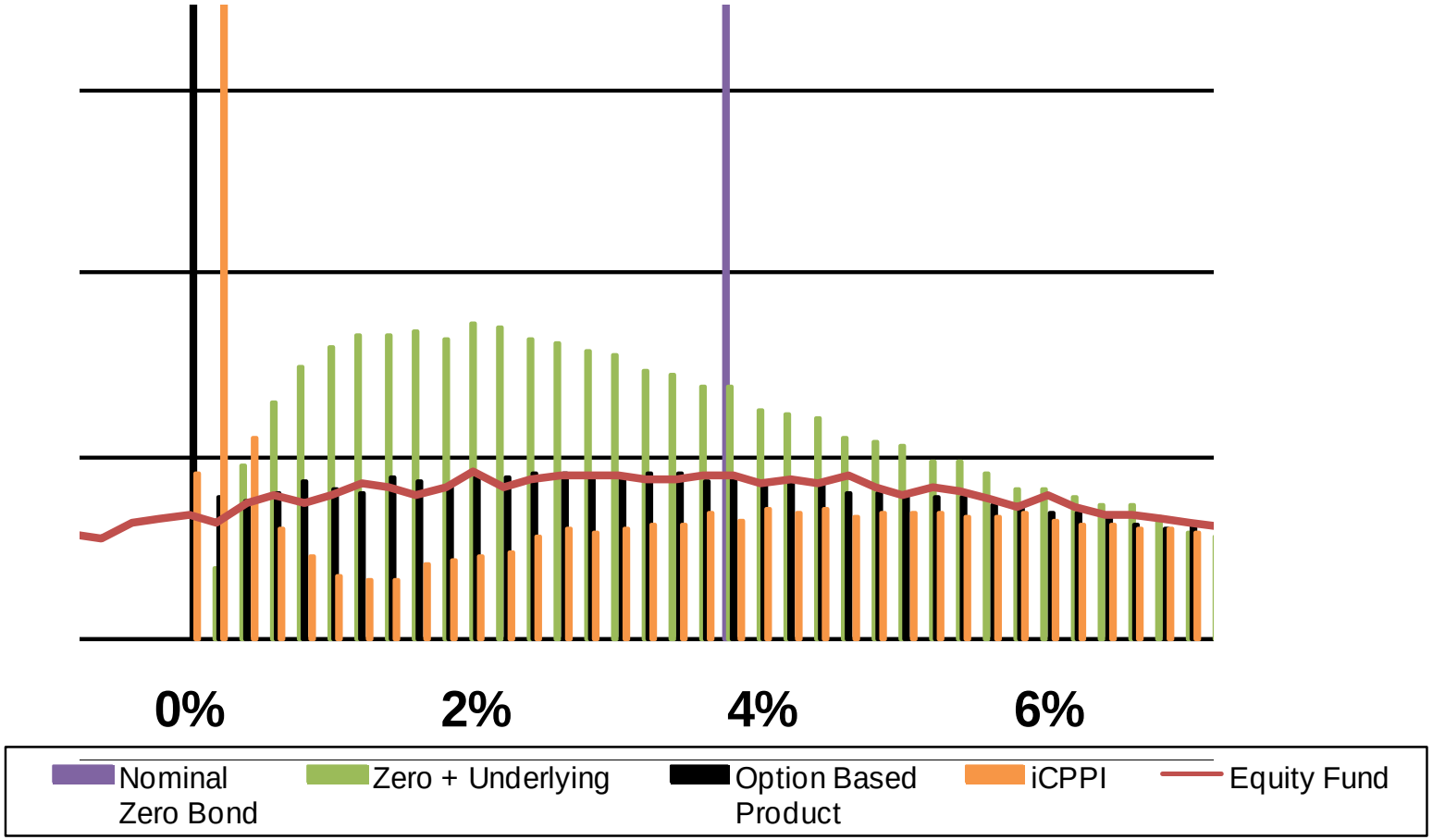
Risk-return profiles

Quantitative sample results



Risk-return profiles

Quantitative sample results



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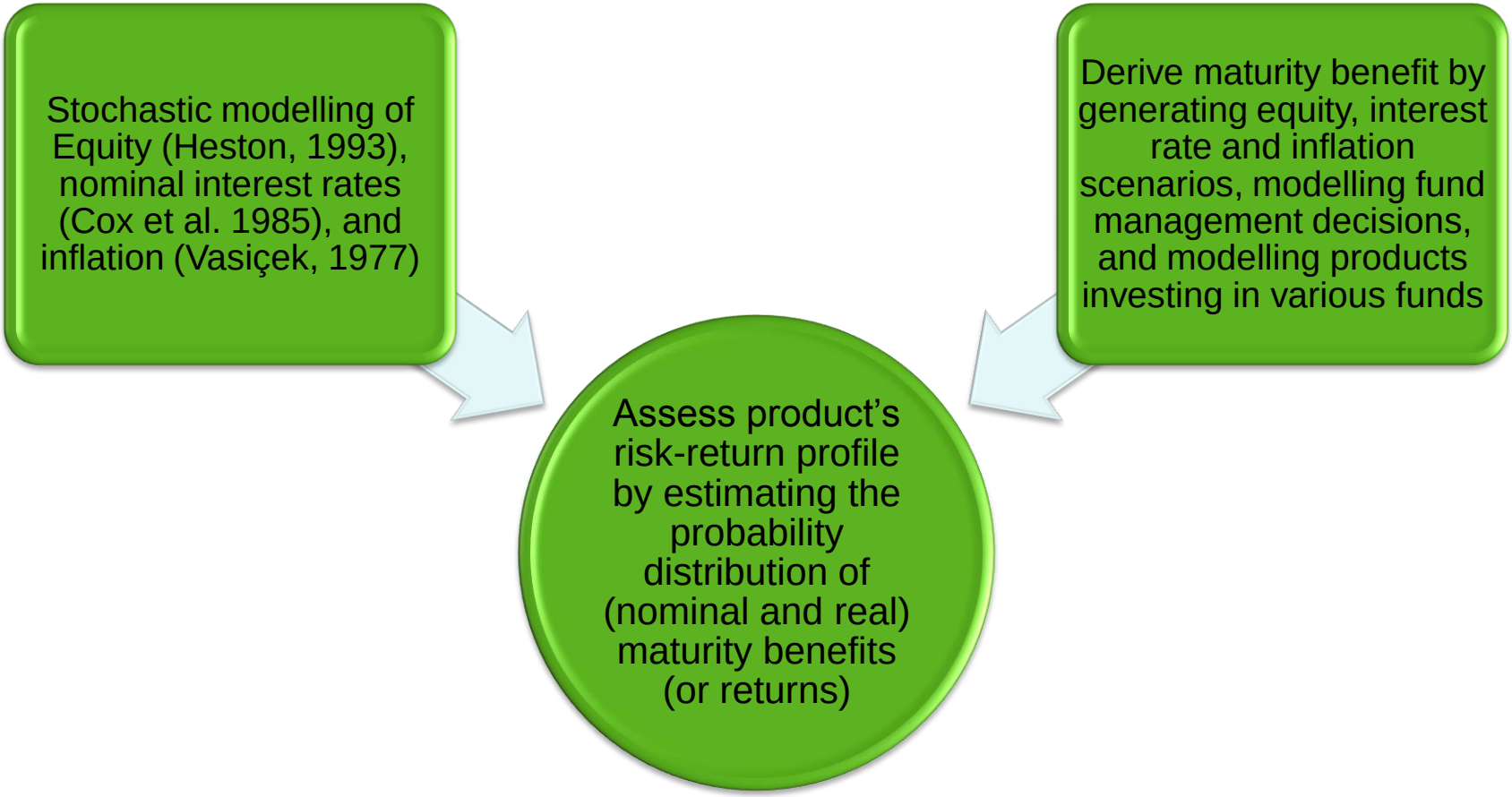
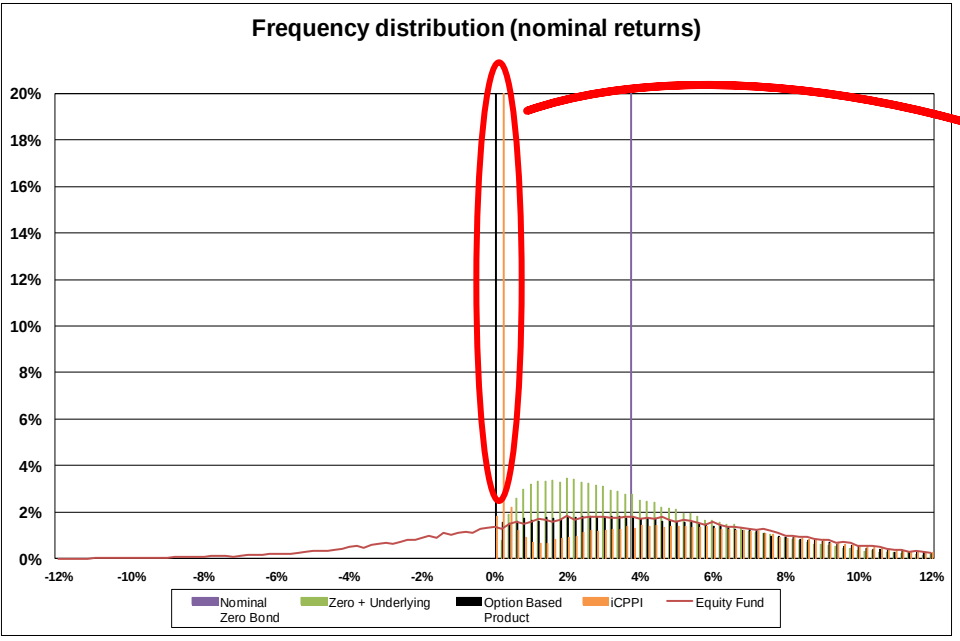
Risk-return profiles

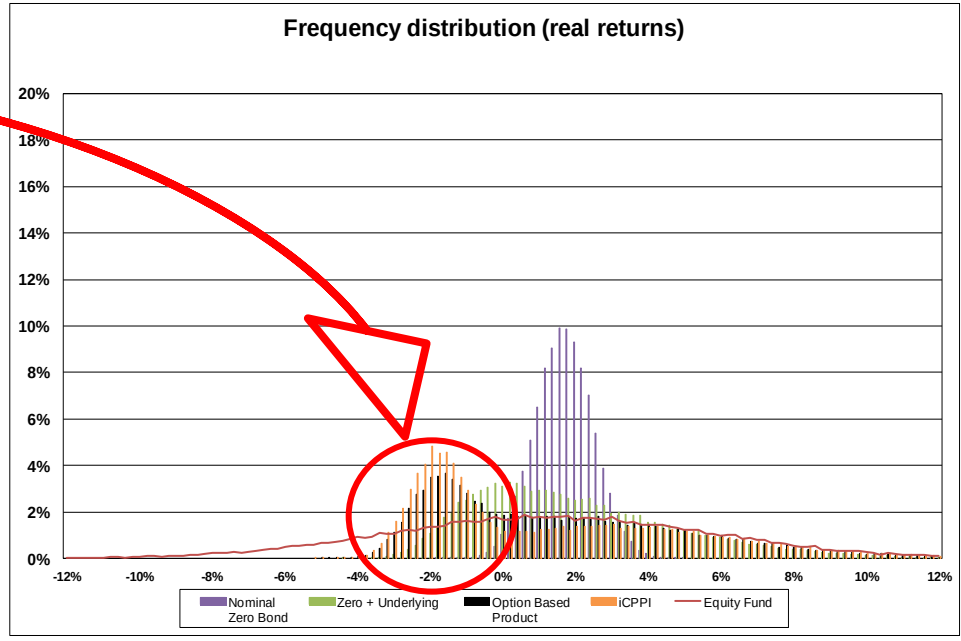


- In the paper, we analyze the risk-return profiles of all considered products for single and regular premium payment and perform a large number of sensitivity analyses.
- In this presentation, we look at single premiums and a „base case“ scenario only.

Nominal vs real risk-return profiles of standard products

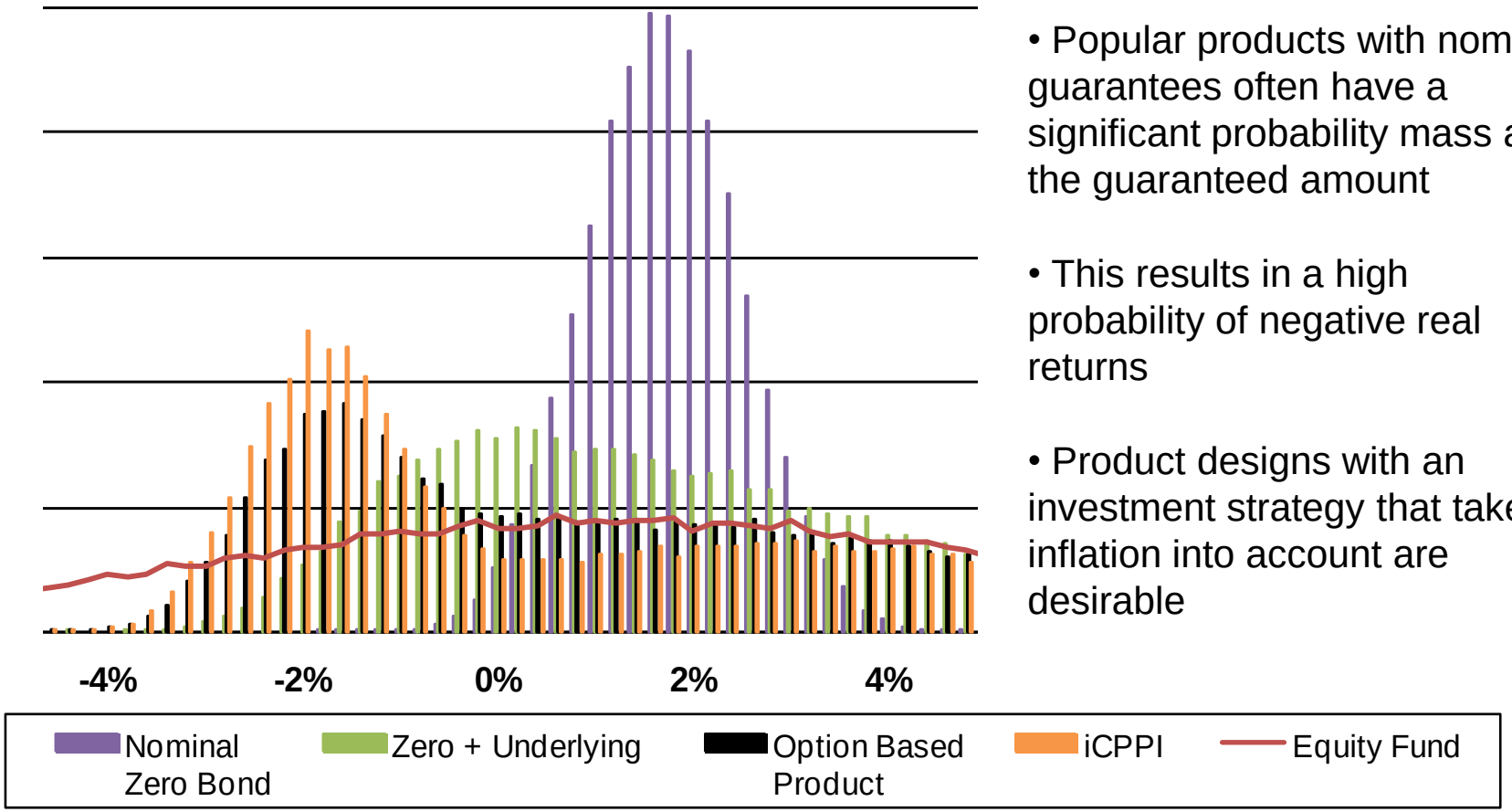
Single premium with 30y investment horizon





Nominal vs real risk-return profiles of standard products

Single premium with 30y investment horizon



- Popular products with nominal guarantees often have a significant probability mass at the guaranteed amount
- This results in a high probability of negative real returns
- Product designs with an investment strategy that takes inflation into account are desirable

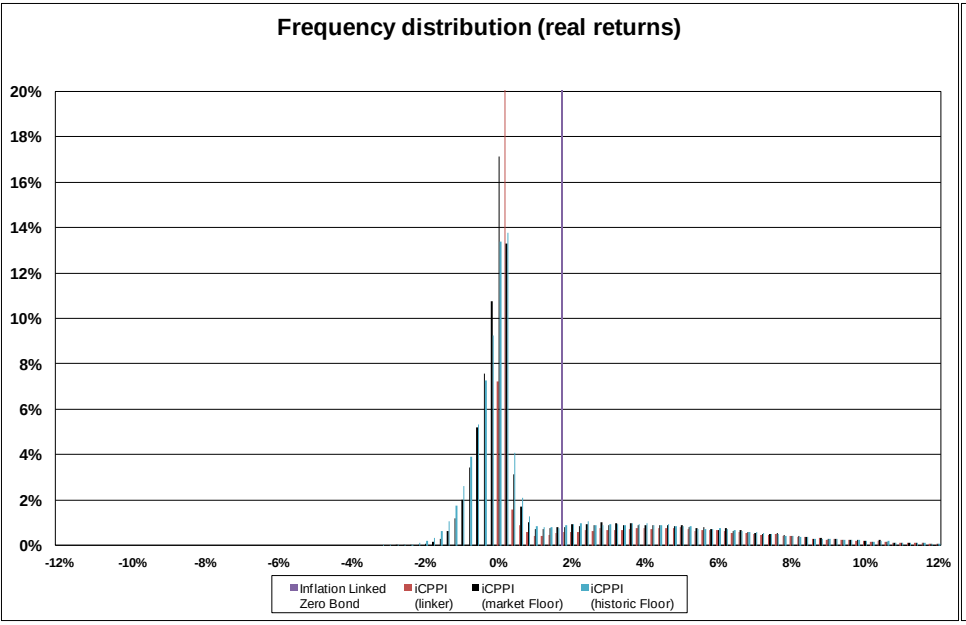
Products under consideration

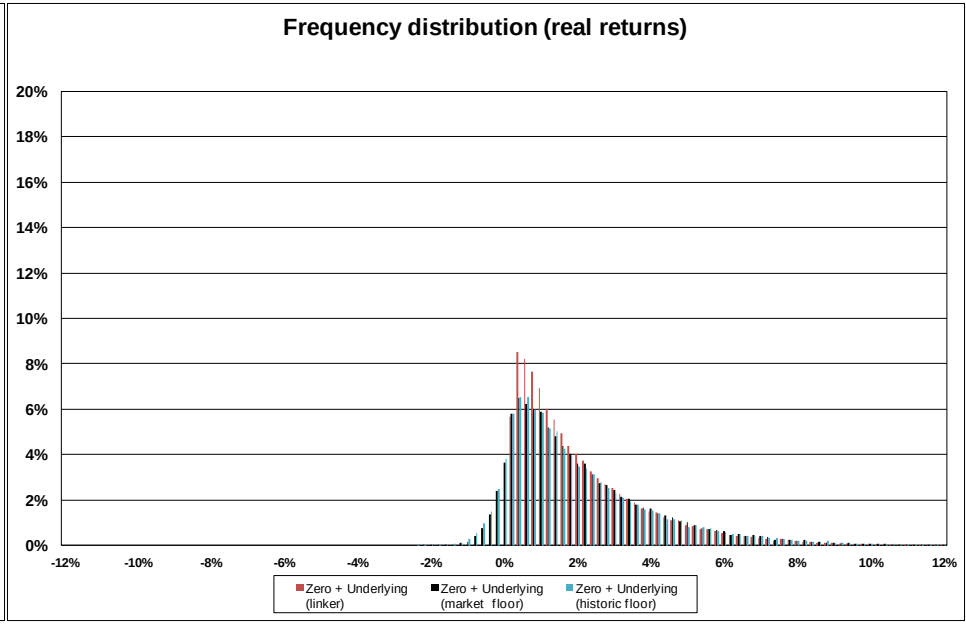
„Modified“ Products („Inflation-linked“ products)

- Inflation-linked bond
- Modified versions of Zero plus Underlying and iCPPI
  - Adjustment of floor based on realized inflation
  - Market based adjustment of floor
  - Inflation-linked bond as a safe asset

real risk-return profiles of modified products

Single premium with 30y investment horizon





- Product modifications significantly reduce the risk of negative real returns
- Using a market based floor adjustment appears to yield better resutls (changes are picked up more quickly)
- The Zero plus Underlying products are more conservative, the iCPPI products yield more upside potential but also more risk.
- This products and „combinations in between“ might provide a good starting point for offering products with some form of inflation protection.

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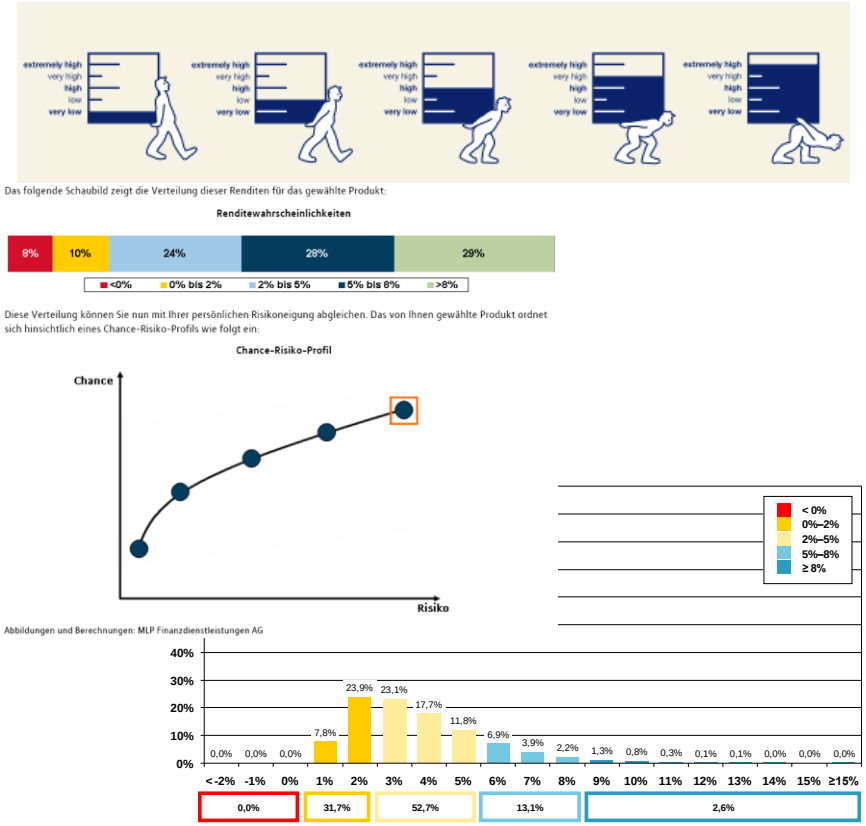
Current trends and examples from different markets

New and upcoming transparency rules in many markets

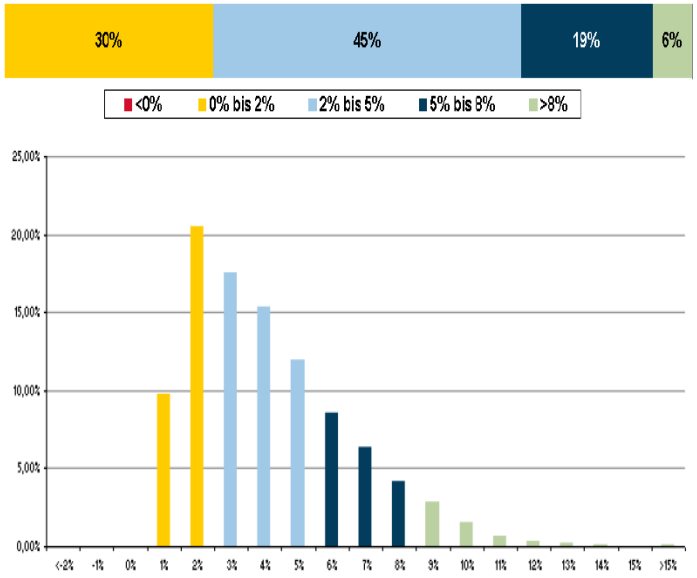
- Sometimes combined with an illustration of product risks
- Disclosure of charges
- Calculation of “risk indicators” or risk classes
- Calculation of Risk return Profiles making chances and risks from a client’s perspective transparent
- Examples follow



Current trends and examples from different markets

Example 1 from GERMANY

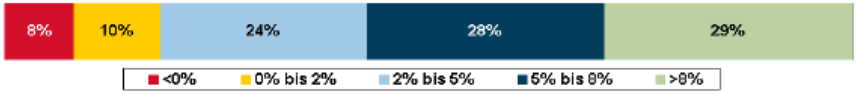
- Risk-return profiles are communicated by distributors (example of MLP)
  - as support for the broker (left)
  - Vis-à-vis the client – this is part of the consultation documentation (right)



Seite 9 Annahmen: Laufzeit 32 Jahre, mtl. Beitrag 200 EUR, Kosten berücksichtigt

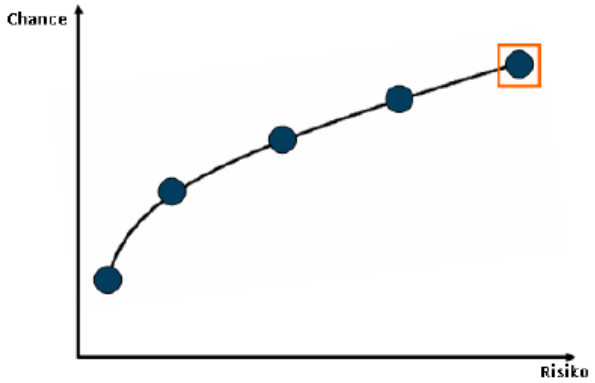
Das folgende Schaubild zeigt die Verteilung dieser Renditen für das gewählte Produkt:

Renditewahrscheinlichkeiten



Diese Verteilung können Sie nun mit Ihrer persönlichen Risikoneigung abgleichen. Das von Ihnen gewählte Produkt ordnet sich hinsichtlich eines Chance-Risiko-Profils wie folgt ein:

Chance-Risiko-Profil



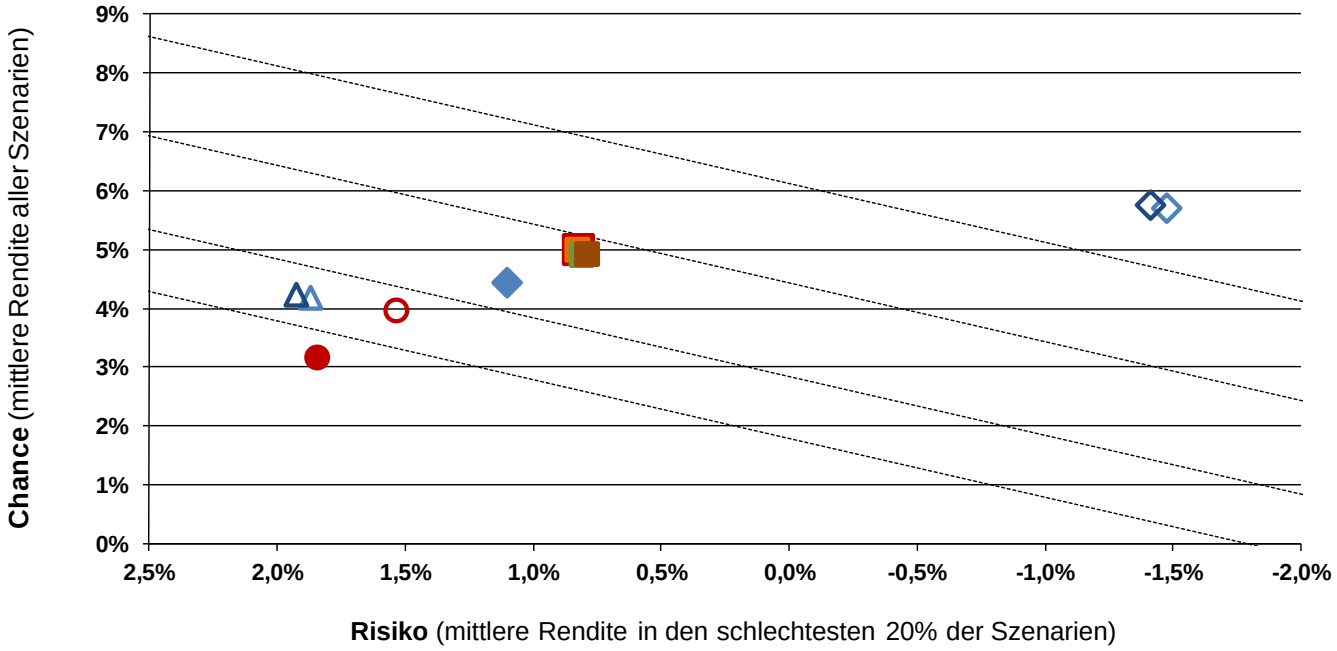
MLP

Abbildungen und Berechnungen: MLP Finanzdienstleistungen AG

Current trends and examples from different markets

Example 2 from GERMANY

- Risk classes are used by distributors (example of AWD)
  1. Risk categorization of products
  2. Risk categorization of clients
  3. Mapping of clients and products



Current trends and examples from different markets

Example 3 from GERMANY

- Risk classes and risk-return-profiles are calculated by distribution software tools (example of Morgen & Morgen Volatium)

Das Ihnen vorgeschlagene Produkt ordnet sich wie folgt ein:

Volatium®-Klasse 5 – Chance+
Hohe Chance auf Outperformance bei erheblichem Verlustrisiko und sehr hohen Ertragschancen. Es sind keine Garantien vereinbart.

Entspricht das Ihren persönlichen Chance-Risiko-Erwartungen?

Ausführliche Informationen zu Volatium finden Sie ab dem 01.01.2011 unter www.volatium.de. Auf dieser Website kann das Chance-Risiko-Profil bzw. die Volatium®-Klasse anhand der obigen ID aufgerufen werden.

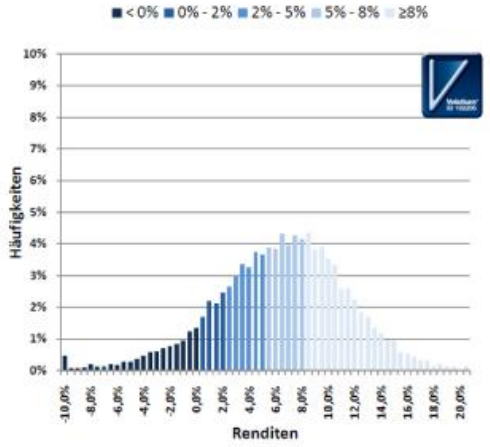
Chance-Risiko-Profil

Welche Renditechancen hat das Ihnen vorgeschlagene Produkt und welche Risiken stehen dem gegenüber?

Damit Sie die Chancen und die Risiken besser einschätzen können, rechnen wir die möglichen Ergebnisse jetzt mit Fondsentwicklungen und Zinsüberschussbeteiligungen, die nicht über die gesamte Vertragslaufzeit konstant sind, sondern während dieser Zeit **schwanken**.

Unter möglichst realistischen Annahmen wurden dazu 10.000 zufällige Verläufe erzeugt. Für jeden einzelnen Verlauf ermitteln wir unter Berücksichtigung aller Kosten die mögliche Rendite des Produkts für einen Standardfall mit 100 Euro Monatsbeitrag. Insgesamt ergeben sich **10.000 mögliche Renditen**.

Das folgende Schaubild zeigt die Renditewahrscheinlichkeiten:



Quelle: Modellhafte stochastische Darstellung gemäß Volatium®, ID 102205, Tarif FR, Laufzeit 30 Jahre, Stand 12/2010

Wichtige Hinweise: Die tatsächlich erreichten Renditen können höher oder niedriger sein. Soweit die dargestellten Renditen über die zugesagten garantierten Leistungen hinausgehen, sind sie daher nur als möglichst realistisches Beispiel anzusehen. Bitte beachten Sie die voranstehenden Hinweise zur Überschussbeteiligung.

Current trends and examples from different markets

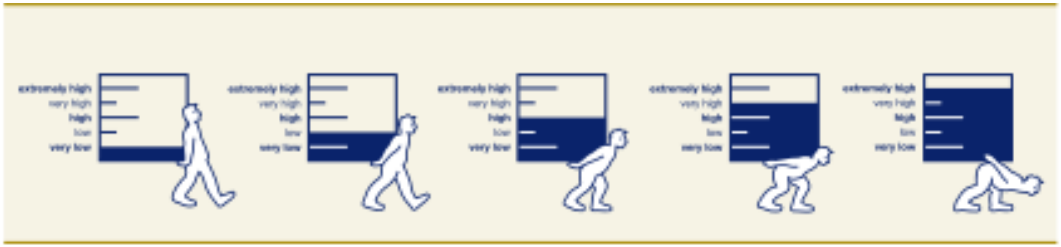
Example 4 from GERMANY

- Upcoming transparency rules for government subsidized products (Riester products)
  - Draft of a new regulation: Altersvorsorge-Produktinformationsblätter-Verordnung AVPIBVO
  - Expected content is compulsory information about the chances and risks of a product, including the calculation of risk classes

Current trends and examples from different markets

Example 5 from NETHERLANDS

- AFM - the Netherlands Authority for the Financial Markets: A quantitative risk indicator for financial products

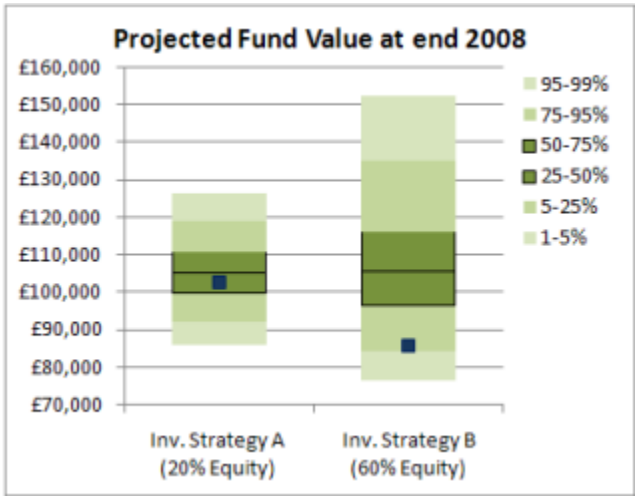


	Growth product	Debt product
Very low	Payment of deposit completely guaranteed	Repayment of debt fully guaranteed
Low	Payment of 80% or more of deposit guaranteed; *AND* GUISE percentage of 95% or greater	Repayment of 80% or more of debt *AND* GUISE percentage of 90% or greater
High	Less than 80% of deposit guaranteed; *AND* GUISE percentage of 90% or greater	Less than 80% of debt guaranteed; *AND* GUISE percentage of 80% or greater
Very high	GUISE percentage between 75% and 90%	GUISE percentage between 65% and 80%
Extremely high	GUISE percentage less than 75%	GUISE percentage less than 65%

Current trends and examples from different markets

Example 6 from UK

- Barrie & Hibbert wealth manager & wealth scenario generator
- Source: Barrie & Hibbert, AVIVA



Source:

- http://www.barrhibb.com/documents/downloads/Barrie_Hibbert_Stochastic_Modelling__in_Wealth__Management.pdf
- http://www.aviva.co.uk/pensions-and-retirement/pension-tracker.html

Current trends and examples from different markets

Example 7 from Italy

- CONSOB: Regulation implementing Italian Legislative Decree No. 58 of 24 February 1998, concerning the discipline of issuers
- Requirement to provide certain return probabilities by means of stochastic simulation

«The following table shows the probabilistic scenarios of the financial investment at the end of the recommended investment time horizon based on a comparison of the possible results of the investment in a financial asset without risk at the end of that horizon. The probability of occurrence (probability) and the final counter-value of the invested capital that represents the scenario (central values) are shown for each scenario.»

Note the probabilistic scenarios of the financial investment of the fund/sub-fund at the end of the recommended investment time horizon as shown in the following table.

PROBABILISTIC SCENARIOS OF THE FINANCIAL INVESTMENT	PROBABILITY	CENTRAL VALUES
*The return is **negative***	%	
*The return is positive but **less** than that of the financial asset without risk*	%	
*The return is positive and **in line** with that of the financial asset without risk*	%	
*The return is positive and **higher** than that of the financial asset without risk*	%	

Include the following disclaimer:

«Disclaimer: The values noted in the above table are shown to aid comprehension of the risk profile of the financial investment only.»

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Conclusion and further research

Conclusion

- Existing approaches for financial planning are not practicable or provide insufficient information
- Introduced methodology of risk-return profiles provides appropriate assessment of product's risk-return profile (under nominal and real returns)
- 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

Conclusion and further research

Further research

- Extension to retirement phase products?
- 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 + intended legal obligation to show nominal risk return profiles
  - How to communicate the information appropriately?

Thank you for your attention

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References

– Graf, S., Kling, A., and Ruß, J. (2012). Financial planning and risk-return-profiles. European Actuarial Journal, 2(1):77–104.

– Graf, S., Härtel, L., Kling, A., and Ruß, J. (2012). The Impact of Inflation Risk on Financial Planning and Risk-Return Profiles. Working Paper, Ulm University.

Backup – Model and parameters

$$r(t) = \kappa_r\big(\theta_r - r(t)\big)dt + \sigma_r\sqrt{r(t)}dW^r(t)$$
$$di(t) = \kappa_i(\theta_i - i(t))dt + \sigma_i dW^i(t)$$
$$dS(t) = S(t)\left((r(t) + \lambda_S)dt + \sqrt{V(t)}dW^S(t)\right)$$
$$dV(t) = \kappa_V\big(\theta_V - V(t)\big)dt + \sigma_V dW^V(t)$$

θ_r	κ_r	σ_r	$r(0)$	κ_V	θ_V	σ_V	$V(0)$	ρ_V	λ_S
20%	4.5%	7.5%	4.5%	475%	$(22\%)^2$	55%	$(22\%)^2$	−57%	3%

κ_i	θ_i	σ_i	$i(0)$
20%	2%	1%	2%