

Institute of Insurance Economics



University of St.Gallen

## Investment Guarantees: The Perspective of Providers and Customers



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### 1. Introduction

- Increasing demand for investment products with financial guarantees
- Importance of financial guarantees from the customers' point of view

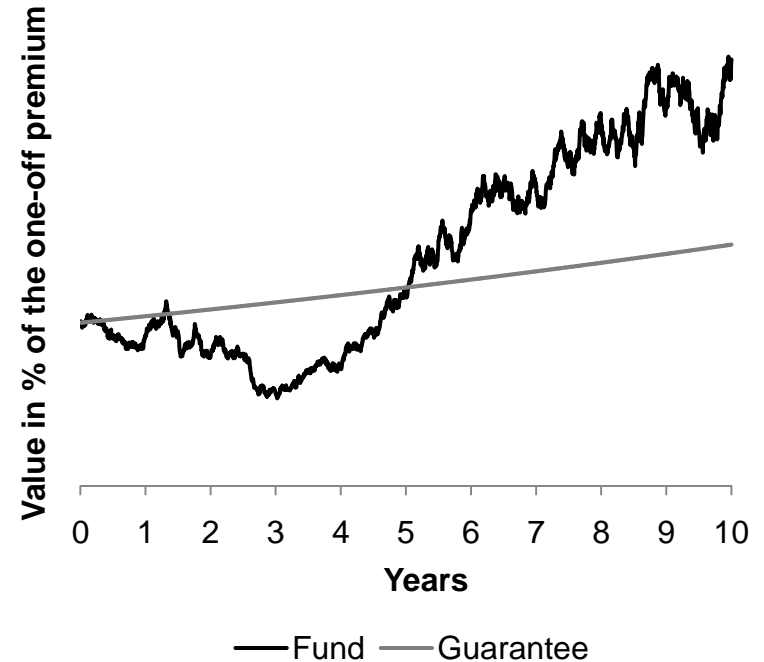
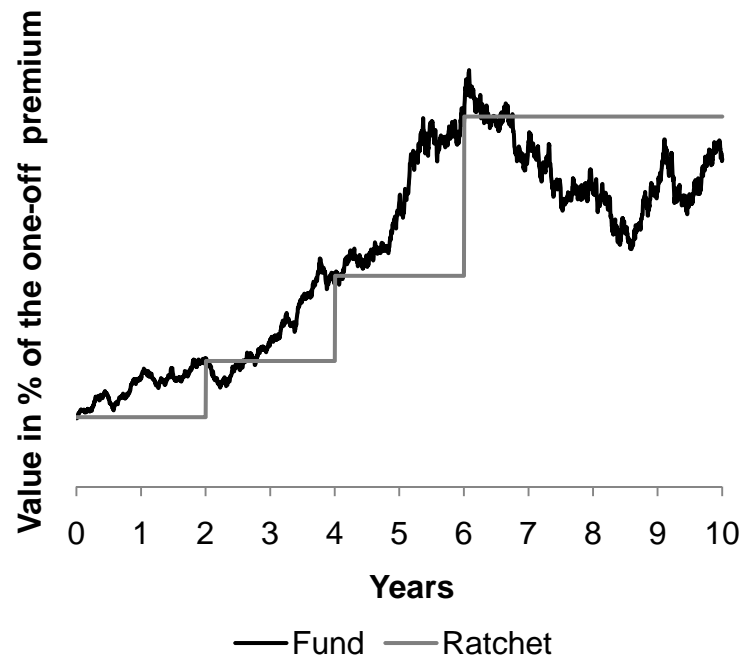


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- Aim
  - We compare risk and return profiles of two actual products with embedded guarantees currently offered on the Swiss capital market:
    - Interest rate guarantee of 2% on the premiums paid into the contract, given a conventionally managed underlying fund
    - A lookback guarantee ("ratchet") secured by a Constant Proportion Portfolio Insurance (CPPI) strategy with respect to the underlying fund
  - Compare the perspective of the provider with the viewpoint of the customer

## 2. Comparison of functionality





### 3. Model framework and data used

- Basis: Swiss unit-linked life insurance contract: life insurance contract + mutual fund investment with embedded guarantee
- Customer provides regular premium payments  $P$  into the mutual fund (focus on mutual funds part)
- Payoff of the savings component

Interest guarantee

$$L_T^G = \max(F_T, G_T) = \max\left(P \cdot \sum_{j=0}^{N-1} \frac{S_T}{S_{t_j}}, P \cdot \sum_{j=0}^{N-1} e^{g(T-t_j)}\right) = P \cdot \max\left(\sum_{j=0}^{N-1} \frac{S_T}{S_{t_j}}, \sum_{j=0}^{N-1} e^{g(T-t_j)}\right) = P \cdot \tilde{L}_T^G.$$

$$L_T^G = \max(F_T, G_T) = F_T + \max(G_T - F_T, 0)$$

Payoff mutual fund + put option

## Investment Guarantees

- Payoff of the savings component

Lookback guarantee (ratchet)

$$L_T^H = N_T \cdot H_T = P \cdot \sum_{j=0}^{N-1} \frac{\max_{j \in \{0, \dots, N-1\}} S_{t_j}}{S_{t_j}} = P \cdot \tilde{L}_T^H$$

Note: leads to a minimum interest rate of 0%

- Valuation in a Black/Scholes Framework

$$\Pi_0 = E^{\mathbb{Q}}(e^{-rT} L_T) - P \cdot \sum_{j=0}^{N-1} e^{-rt_j} = P \cdot \left( E^{\mathbb{Q}}(e^{-rT} \tilde{L}_T) - \sum_{j=0}^{N-1} e^{-rt_j} \right)$$

- Input data (selection)

$$T = 10$$

$$P = 100 \text{ per month}$$

Parameter for the traditional funds and the CPPI underlying

- How compare the two products?



## 4. Valuation and Performance Measurement

- Case 1: Conventional underlying funds

|               | Interest                   | Lookback                |
|---------------|----------------------------|-------------------------|
| $\Pi_0$       | 492                        | 492                     |
| Guarantee     | 14,374<br>( $g = 3.48\%$ ) | 12,000<br>( $g = 0\%$ ) |
| $\psi$        | 4.63%                      | 62.57%                  |
| $E(L_T)$      | 18,181                     | 18,384                  |
| $\sigma(L_T)$ | 2,410                      | 2,323                   |
| Sharpe ratio  | 1.55                       | 1.70                    |
| Sortino ratio | 247.96                     | 47.04                   |
| Omega         | 1,121.48                   | 390.93                  |
| FSD, SSD, TSD | none                       | none                    |



## Investment Guarantees

- Case 2: CPPI managed underlying funds

|               | Interest                | Lookback                |
|---------------|-------------------------|-------------------------|
| Guarantee     | 12,000<br>( $g = 0\%$ ) | 12,000<br>( $g = 0\%$ ) |
| $\psi$        | 0%                      | 0%                      |
| $E(L_T)$      | 16,109                  | 15,157                  |
| $\sigma(L_T)$ | 1,103                   | 449                     |
| Sharpe ratio  | 1.51                    | 1.59                    |
| Sortino ratio | 112.11                  | 86.23                   |
| Omega         | 19.93                   | 14.44                   |
| FSD, SSD, TSD | none                    | none                    |

Result:

Same value from the provider's point of view

Different perception from the customer's perspective (depending on individual preferences)



## 5. Investment guarantees: The customers' perspective

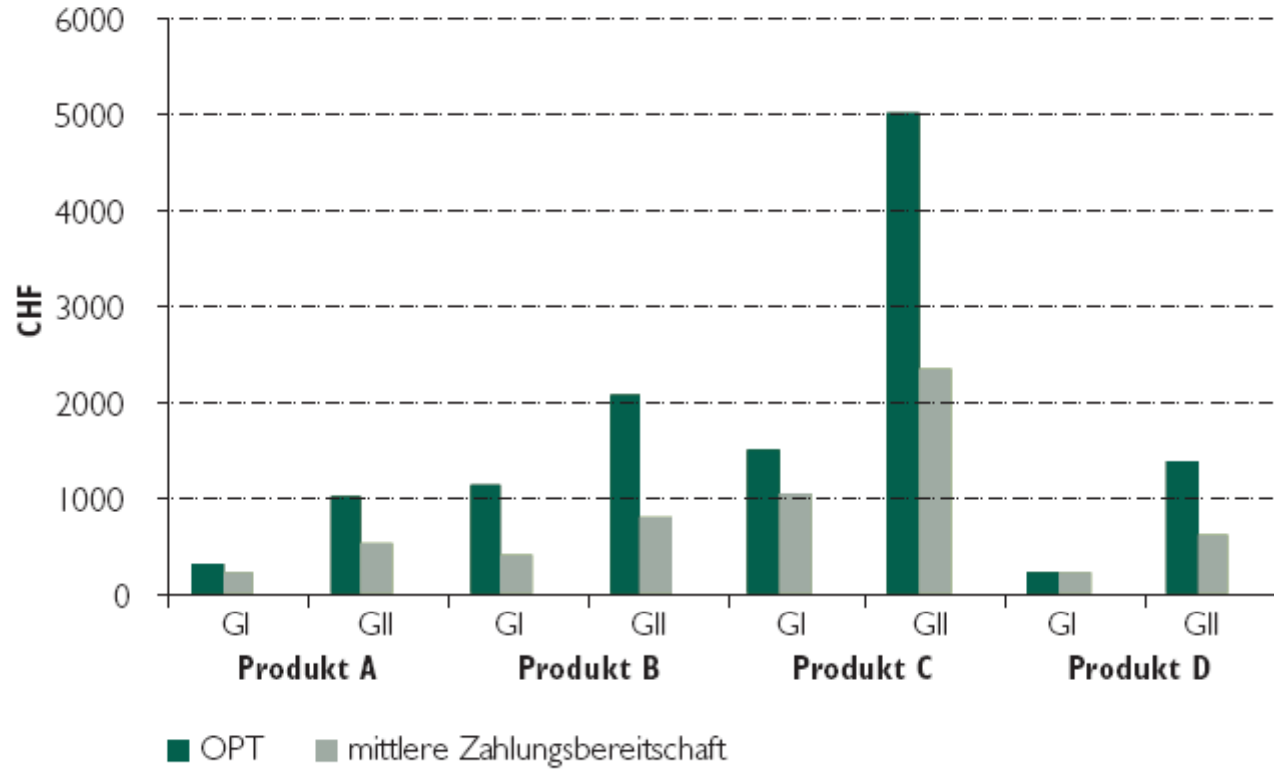
- N = 375, online questionnaire May/June 2009

| Pro-<br>dukt | Einmalprämie<br>(Sparkompo-<br>nente)<br>in CHF | Laufzeit<br>in<br>Jahren | Invest-<br>ment-<br>risiko | Garantie I                                      |                               | Garantie II                                     |                               |
|--------------|---|--------------------------|----------------------------|---|-------------------------------|---|-------------------------------|
|              |   |                          |                            | Garantierte<br>Mindest-<br>auszahlung<br>in CHF | Garantie-<br>kosten<br>in CHF | Garantierte<br>Mindest-<br>auszahlung<br>in CHF | Garantie-<br>kosten<br>in CHF |
| A            | 10000   | 10                       | mittel                     | 10000   | 300                           | 12214   | 1000                          |
| B            | 10000   | 10                       | hoch                       | 10000   | 1120                          | 12214   | 2060                          |
| C            | 50000   | 10                       | mittel                     | 50000   | 1490                          | 61070   | 5015                          |
| D            | 10000   | 20                       | mittel                     | 10000   | 205                           | 14918   | 1365                          |

**Abb. 1: Produkte und Produkteigenschaften:** Mittleres Fondsrisiko: Investition zu 50 Prozent in Aktien (SMI, Total Return Index) und zu 50 Prozent in Obligationen (Schweizer Obligationenmarkt); hohes Fondsrisiko: Investition zu 100 Prozent in Aktien; Garantie I: 0 Prozent Mindestverzinsungsgarantie p. a.; Garantie II: 2 Prozent Mindestverzinsungsgarantie p. a.



## Investment Guarantees



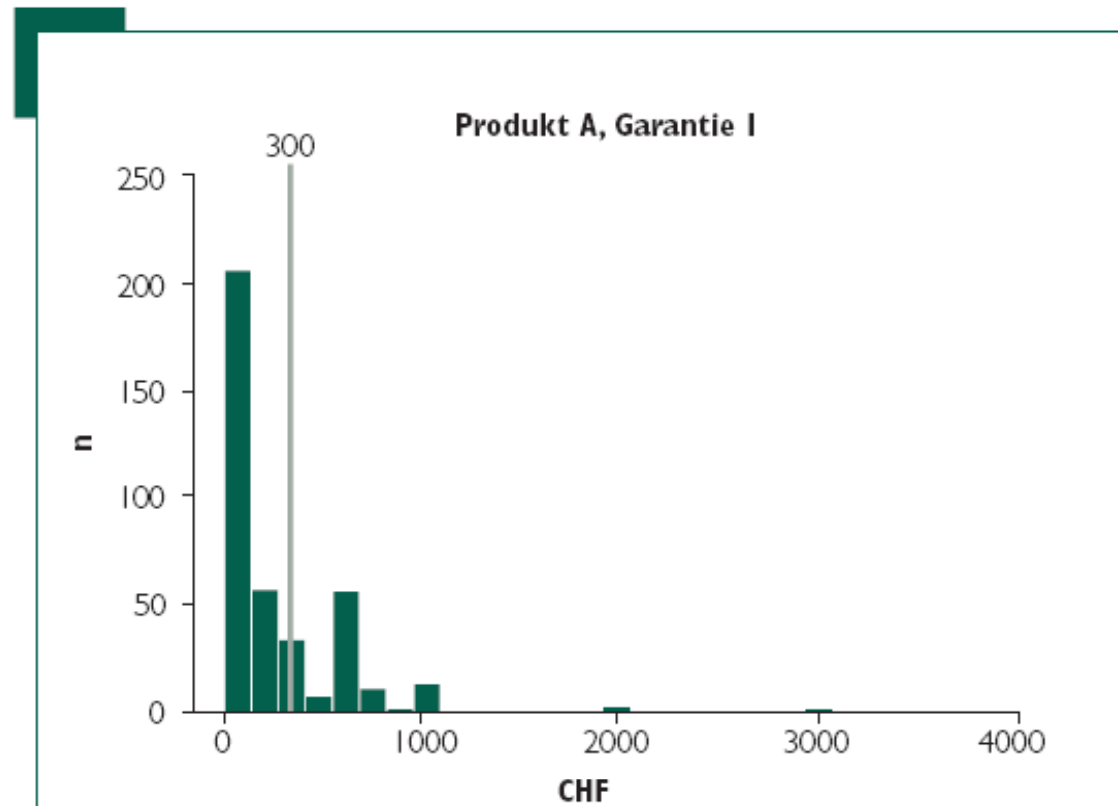
**Abb. 2: Optionspreistheoretische Garantiekosten (OPT) und mittlere Zahlungsbereitschaft**

## Investment Guarantees

| Pro-<br>dukt | Garantie I       |  |  | Garantie II      |  |  |
|--------------|------------------|--|--|------------------|--|--|
|              | Kosten<br>in CHF | ZB in CHF<br>aller Teilneh-<br>mer (n=360) | ZB in CHF<br>der Teilneh-<br>mer mit posi-<br>tiver ZB | Kosten<br>in CHF | ZB in CHF al-<br>ler Teilnehmer<br>(n=360) | ZB in CHF<br>der Teilneh-<br>mer mit<br>positiver ZB |
| A            | 300              | 219  | 294 (n=268)  | 1 000            | 516  | 582 (n=319)  |
| B            | 1 120            | 401  | 489 (n=295)  | 2 060            | 788  | 876 (n=324)  |
| C            | 1 490            | 1 045                                      | 1 330 (n=283)  | 5 015            | 2 344                                      | 2 613 (n=323)  |
| D            | 205              | 206  | 326 (n=227)  | 1 365            | 603  | 724 (n=300)  |

**Abb. 3: Mittlere Zahlungsbereitschaft (ZB) aller Teilnehmer versus mittlere Zahlungsbereitschaft derjenigen Teilnehmer mit positiver Zahlungsbereitschaft**

## Investment Guarantees



**Abb. 4: Garantiekosten (Optionspreistheorie) und Verteilung der Zahlungsbereitschaft**

### 6. Summary

- Customers' willingness to pay not sufficient to cover the costs?
- Sample
- Presentation of guarantee price (up-front, part of the regular premiums payment, absolute vs. relative) may be an important factor
- Interesting new insights using Conjoint-Analysis for future research

## Investment Guarantees

- **Kontakt**

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