Inter-Cohort Risk Sharing with Long-Term Guarantees: Evidence from German Participating Contracts

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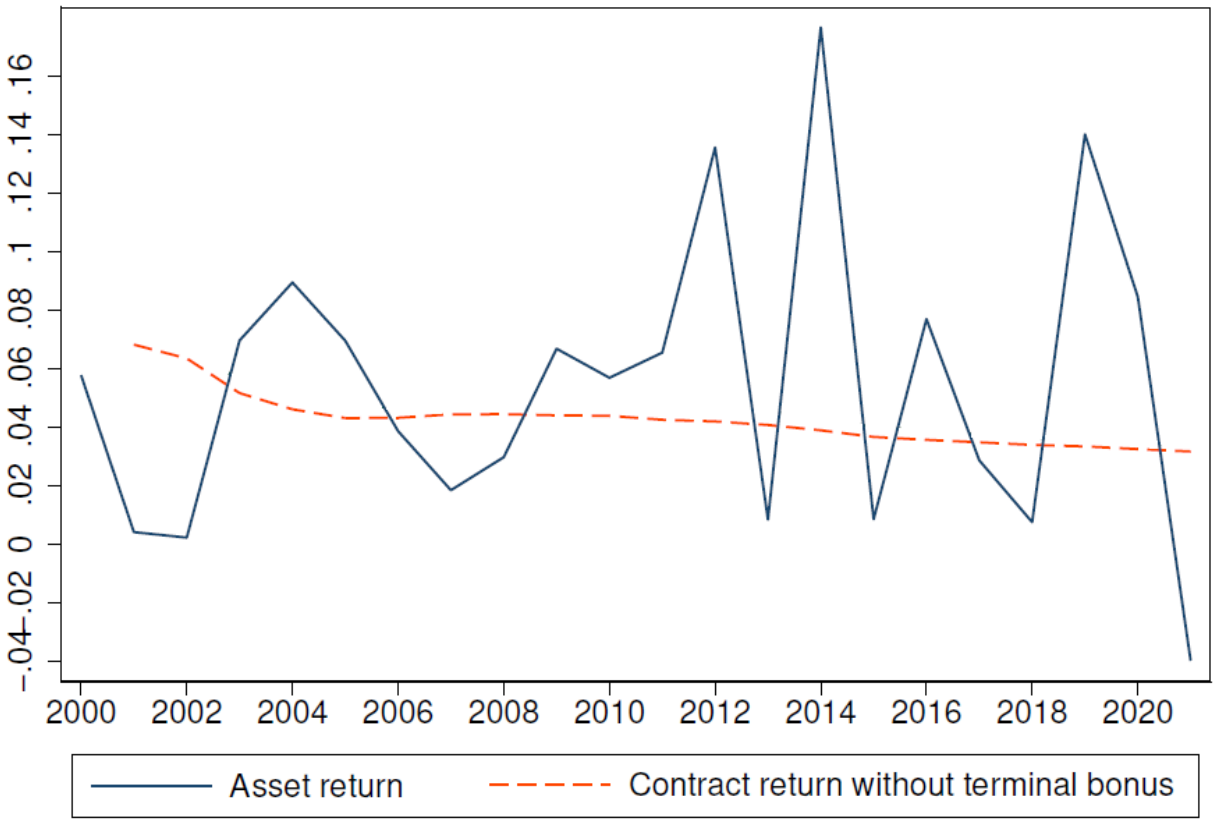
Motivation

- €1.2 trillion of assets in German life insurer's participating contracts
- Embed two market risk sharing schemes
  1. Return smoothing through reserves
  2. Minimum return guarantees
- which generate financial stability concerns
  - Until 2021: return guarantees when interest rates are low
  - Since 2022: low reserves and surrender risk when interest rates increase
- **This paper**
  - How much risk sharing take place through these two schemes?
  - What determines flows into and surrenders from contracts?

Return smoothing

- Return smoothing: contract return $\neq$ return of invested assets



NB: Every investor receives the same contract return, except if the return guarantee binds $\rightarrow$ more on this later

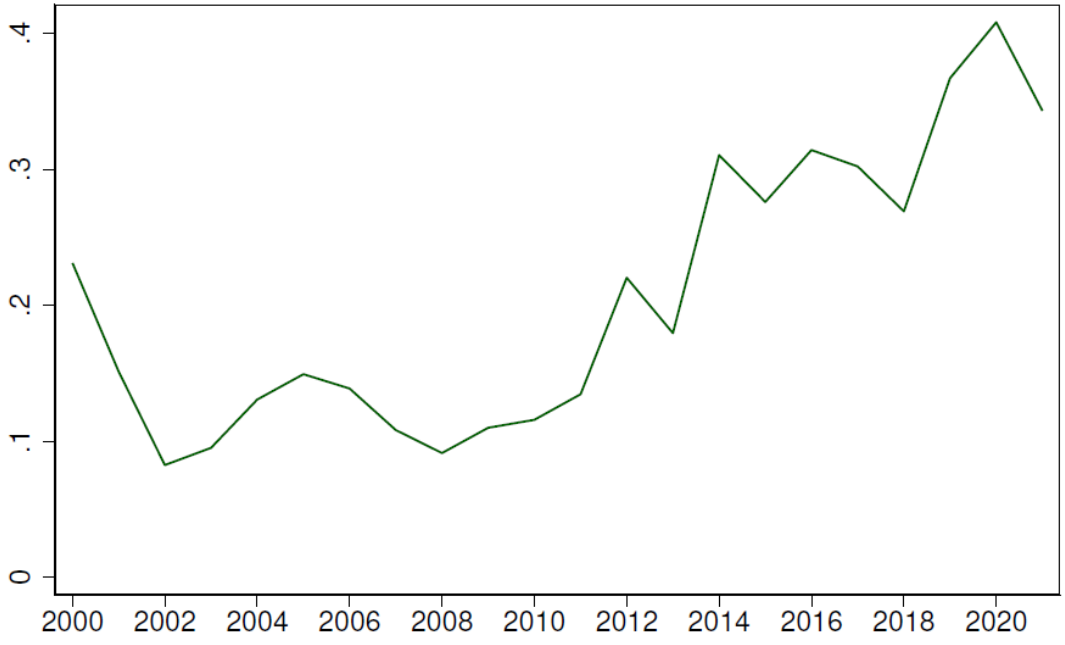
Reserves

- Accounting identify:

  Asset return = Contract return + ΔReserves + Insurer income

- Most of the difference between contract return and asset return is absorbed by reserves $\Rightarrow$ Reserves fluctuate widely

Reserves in % of account value



Redistribution

- Reserves are carried over across investor cohorts $\Rightarrow$ Wealth redistribution between investor cohorts

- Theoretically: Risk sharing between investor cohorts (Allen&Gale'97, Gollier'08)

- Empirically over the period 2000–2020:

  interest rates $\downarrow$

  $\Rightarrow$ large bond returns

  . . . hoarded as reserves, to be distributed to future cohorts of investors

  $\Rightarrow$ redistribution from early cohorts to later cohorts

Inter-cohort risk sharing

- Quantify inter-cohort redistribution (methodology: Hombert&Lyonnet 2022)
  - When part of asset return is credited to reserves $\Rightarrow$ transfer from current investors
  - When part of asset return is debited from reserves $\Rightarrow$ transfer to current investors
- Net transfer to investors in year t = minus $\Delta \text{Reserves}_t$
- Sum over lifetime of a given contract weighted by account value in each year $\Rightarrow$ Total net transfer to that investor

Inter-cohort risk sharing

- Example: 20-year single premium endowment contract purchased in 2000

  $t = 2000$: premium paid by investor

  $t = 2001, \ldots, 2020$: annual contract return credited to account $\Rightarrow$ transfer to/from reserves proportional to $-\Delta Reserves_t$

  $t = 2020$: account value paid back to investor

- Net transfer to investor: **minus 1.5 percentage points per year**

Inter-cohort risk sharing

1. Without smoothing, the buyer in 2000 of a 20-year single premium endowment contract would have earned higher return by **1.5 pp per year**

2. Magnitude varies in the range 0.7 to 1.8 pp/yr depending on contract characteristics (single v. regular premium, endowment v. annuity)

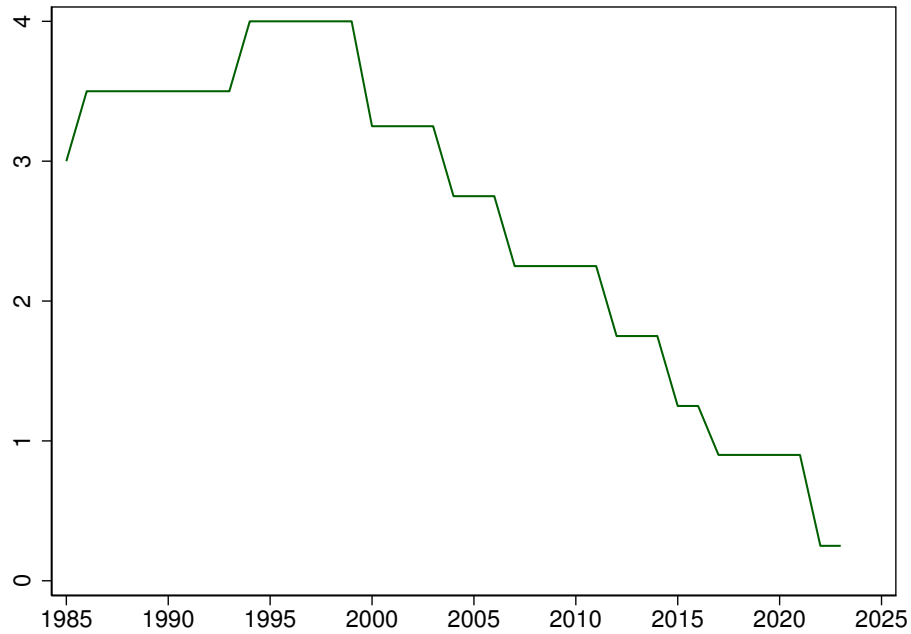
3. Back-of-the-envelop aggregation: midpoint estimate (1.2 pp/yr) $\times$ aggregate account value (€600 bn in 2000) $\Rightarrow$ **€7 bn redistributed across investor cohorts every year over 2000–2022**

4. Similar order of magnitude in France (Hombert & Lyonnet 2022)

Minimum return guarantees

- Participation contracts embed a return guarantee fixed at contract purchase

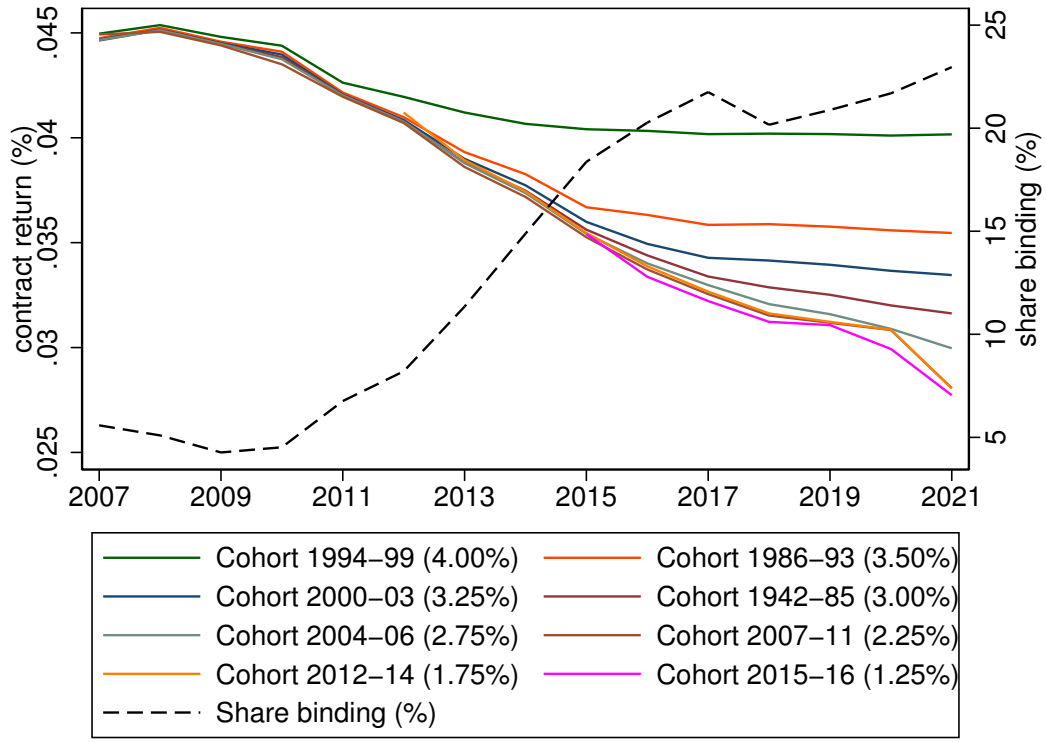
Minimum return guarantee (%) by contract vintage



- **Q:** Do return guarantees amplify or dampen inter-cohort redistribution?

Minimum return guarantees

- Each investor is paid the maximum of
  - the unconstrained contract return (same for all investors)
  - the minimum guaranteed return (specific to each cohort)
- Contract return by cohort



Guarantees & Inter-cohort redistribution

- Taking stock: over 2000–2020, earlier cohorts experienced

  1. negative transfer from return smoothing

  2. higher and binding guaranteed return

  $\Rightarrow$ Binding guarantees lean against inter-cohort risk sharing generated by return smoothing

- Quantitatively: we simulate investors' returns assuming no guarantees

  $\Rightarrow$ This reduces inter-cohort redistribution by 0.15 pp/year (relative to baseline of 1.5 pp/year)

Future research

What happens when interest rates rise?

- Redistribution should occur the other way: from future cohorts to current ones, by depleting reserves now and replenishing them later

Potential risks?

1. Negative reserves? 2022 data not available yet. Rough estimate:

   Loss = duration 8 years $\times$ interest rates rise 2.5 pp = 20% of assets

   End-of-2021 reserves: 30% of assets

   $\Rightarrow$ Reserves down to $\approx$10% of assets (on average)

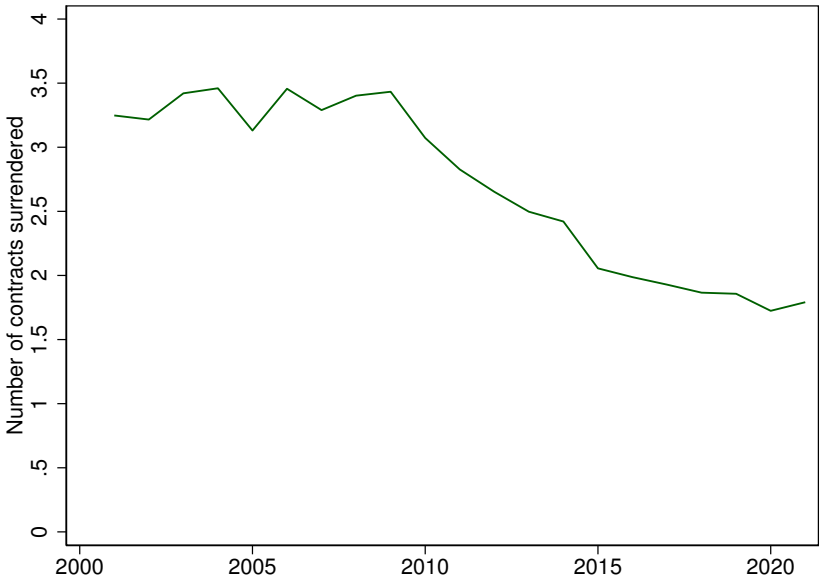
2. Surrenders and/or drop in new premiums?

   - As long as reserves are >0, surrenders raise the reserve/account value ratio
   - Surrenders become a significant risk if reserves are <0

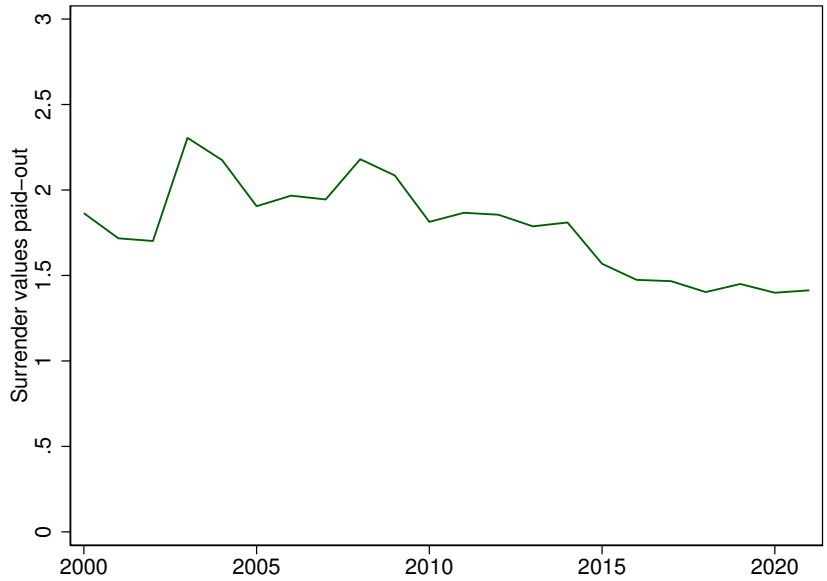
Contract surrenders 2000–2020

- **Aggregate surrenders ↓ as interest rates ↓**

in % of number of contracts



in % of account value



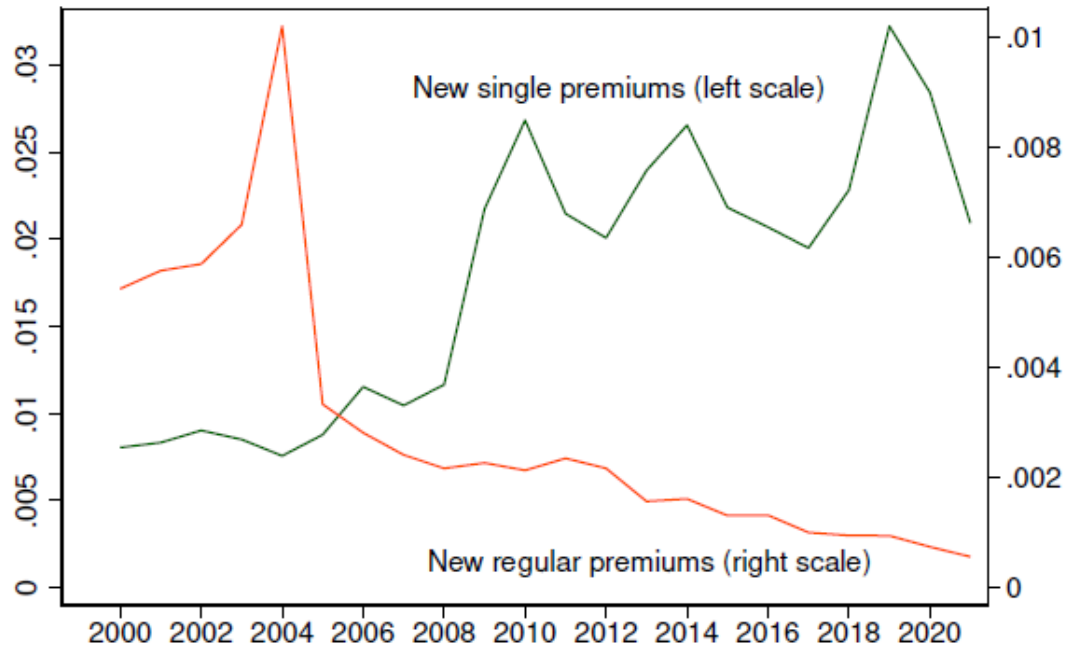
Contract surrenders 2000–2020

- Panel regressions: in the cross-section of insurers, surrenders are not sensitive to reserves, insurer equity, or outstanding return guarantees

- Potential explanations
  - Costs/difficulty of surrendering
  - Large reserves during this period, low incentives to surrender. Might change in the future and insurer heterogeneity could matter then

Purchases of new contracts 2000–2020

- Purchases of single premium contracts (=front-loaded premiums) relative to regular premium contracts



- Consistent with incentives induced by return smoothing
  - 2010–2020: low rates, high reserves, contract return above asset return ⇒ incentives to buy contracts
  - Stronger incentives when cash flow are front-loaded ⇒ single premium contracts more responsive

Purchases of new contracts 2000–2020

- Panel regressions: in the cross-section of insurers, purchases of new single premium contracts depend
  - positively on reserves
  - negatively on return guarantees on outstanding contracts
- Consistent with incentives of investors: future returns are higher if reserves are higher and outstanding guarantees are lower
- No effect on regular premium contracts: consistent with lower sophistication
- Caveat: Also consistent with supply-side response: insurers adjusting fees or marketing efforts. Empirical challenge: no data on fees

Wrap-Up

1. Large inter-cohort risk sharing through reserves and return smoothing in the €1.2 trillion participating contracts market in Germany

2. Decreasing rates: transfer from early to late cohorts

3. Increasing rates: transfer reversed. Surrender risk if reserves go below zero?

Back-Up Slide: Reserves

- Three components of reserves
  1. Profit-sharing reserves (on-balance sheet)
  2. Unrealized capital gains/losses (do not affect P&L in statutory accounting)
  3. Since 2011, "Additional Interest Provision"