Institute of Insurance Economics

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Valuation of the Riester Pension Scheme

Presentation at the annual conference 2013 of the DVfVW

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Agenda

1. **Introduction**

2. Research question and model framework

3. Key results

4. Further research and discussion

The German Riester pension scheme has been heavily discussed since the introduction in 2001

Nachteile bei der Altersvorsorge

Die Fallstricke der Riester-Rente

Handelsblatt

Schlechte Noten für Riester-Versicherungen

Die Kritik an Riester-Renten der Versicherer reißt nicht ab. Nur fünf von 29 untersuchten Riester-Versicherungen sind „gut". Zu diesem Ergebnis kommt die Zeitschrift „Finanztest". Worauf Kunden achten sollten.

Süddeutsche.de

Teuer, riskant, renditeschwach

Als Antwort auf die Erosion der Gesetzlichen Rentenversicherung ist die Riester-Rente bislang kaum umstritten. Doch nun muss sie von Ökonomen Kritik einstecken.

Capital

Altersvorsorge

Riester-Rente besser als ihr Ruf

DIE WELT

Mathematiker kritisiert Abzocke bei Riester-Rente

Negative contributions overweight!

Riester products are often characterized as being highly risky, complex and having low return rates

- How risky are Riester products?
- What are the main criteria in which Riester fund and Riester life insurance products differ?
- Which impact does the cost structure of Riester products have on the product performance?
- Which performances have substitute non-Riester products?

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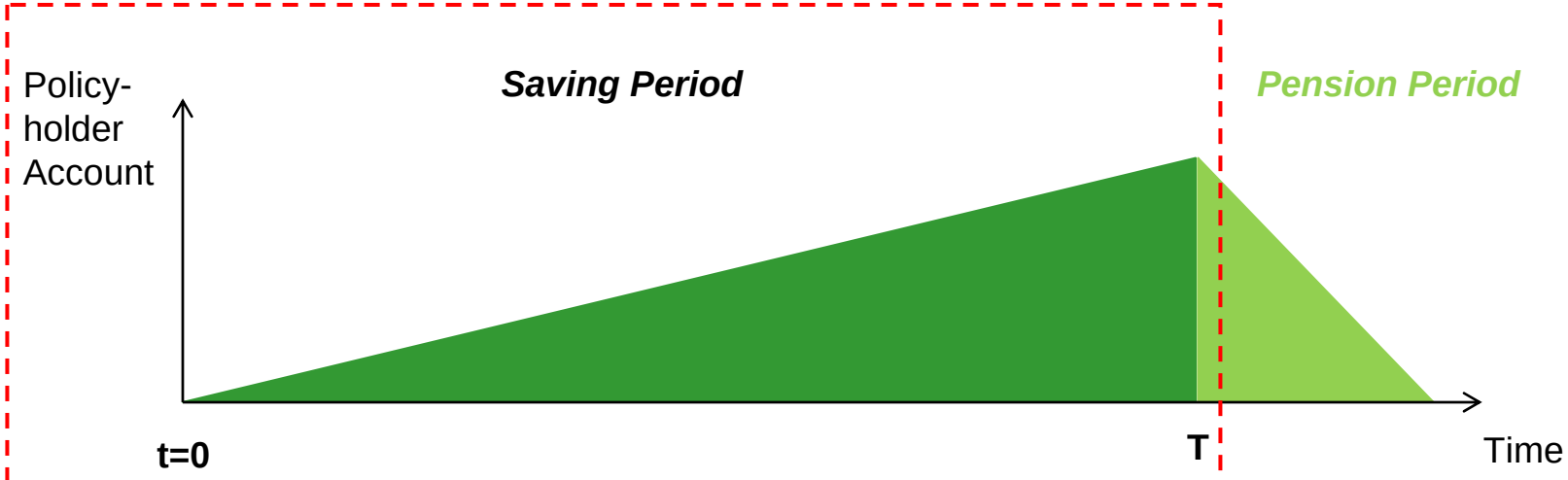
Our model considers Riester fund and Riester life insurance as well as non-Riester products

	Assets	Costs	Inputs
Riester fund product	▪ Stochastic asset development ▪ GBM distribution	▪ Market cost data	▪ Market data from largest three product issuers
Riester life insurance product	▪ Average of sur-plus distribution (historical market data)	▪ Market cost data	▪ Market data from largest 34 product issuers
Non-Riester fund product	▪ Stochastic asset development ▪ Performance of Riester fund	▪ Market cost data ▪ ETF-cost struc-ture and classic cost structure	▪ Market data

The development of the policyholder account is simulated for the saving period



Assumptions:

- Constant annual premium payments
- Three investment cases (1 = continuing investment, 2 = surrender before maturity, 3 = death before maturity)
- Reinvestment at risk-free rate in cases 2 and 3
- Fair pension payments during pension period

Each period of the pension period considers premium payments, costs and asset endowments

$0+$	Period 1	$-1+$	Period t	$-t+$	Period T	$-T$	Time
0							Initial account
$+P$		$+P$		$+P$			Premium payments
$-\sum K_0$		$-\sum K_1$		$-\sum K_t$			Sum of costs deducted
P_{0+}		P_{1+}		P_{t+}			Policy account beginning of period
	$+P_{0+} \cdot \frac{A_1}{A_0}$		$+P_{(t-1)+} \cdot \frac{A_t}{A_{t-1}}$		$+P_{(T-1)+} \cdot \frac{A_T}{A_{T-1}}$		Endowment at end of product
	P_{1-}		P_{t-}		P_{T-}		Policy account end of period
						P_T	Final account (end of contract)

Example: Consideration of costs and asset endowments for the Riester life insurance product

Costs

Case	Category	Cost calculation $K_t^{(\mathrm{A})}$			Times
1	issuance	$K_t^{(\mathrm{A1}),\mathrm{iss}}$	$=$	$k_t^{(\mathrm{A1}),\mathrm{iss}} \cdot P$	$t = 0, 1, \ldots, T-1$
1	acquis.	$K_t^{(\mathrm{A1}),\mathrm{acq}}$	$=$	$k_t^{(\mathrm{A1}),\mathrm{acq}} \cdot P$	$t = 0, 1, \ldots, T-1$
1	depot	$K_t^{(\mathrm{A1}),\mathrm{dep}}$	$=$	$k_t^{(\mathrm{A1}),\mathrm{dep}}$	$t = 0, 1, \ldots, T-1$
1	admin.	$K_t^{(\mathrm{A1}),\mathrm{adm}}$	$=\begin{cases} \\ \end{cases}$	$k_t^{(\mathrm{A1}),\mathrm{adm}} \cdot (P - K_t^{(\mathrm{A1}),\mathrm{iss}} - K_t^{(\mathrm{A1}),\mathrm{acq}} - K_t^{(\mathrm{A1}),\mathrm{dep}})$ $k_t^{(\mathrm{A1}),\mathrm{adm}} \cdot (P_{t^-} + P - K_t^{(\mathrm{A1}),\mathrm{iss}} - K_t^{(\mathrm{A1}),\mathrm{acq}} - K_t^{(\mathrm{A1}),\mathrm{dep}})$	$t = 0$ $t = 1, \ldots, T-1$
2	surrender	$K_t^{(\mathrm{A2},t^*),\mathrm{sur}}$	$=\begin{cases} \\ \end{cases}$	$k_t^{(\mathrm{A2}),\mathrm{sur}}$ 0	$t = t^*$ $t \neq t^*$
3	mortality	$K_t^{(\mathrm{A3},t^{**}),\mathrm{mor}}$	$=\begin{cases} \\ \end{cases}$	$k_t^{(\mathrm{A3}),\mathrm{mor}}$ 0	$t = t^{**}$ $t \neq t^{**}$

Asset

$$A_t^{(\mathrm{A})} = A_{t-1}^{(\mathrm{A})} \cdot \exp[\mu_{t,\mathrm{GBM}} - \sigma_{t,\mathrm{GBM}}^2/2 + \sigma_{t,\mathrm{GBM}}(W_t^{\mathbb{P}} - W_{t-1}^{\mathbb{P}})],$$

Policyholder Acc.

Times	Value of policyholder account $P_t^{(\mathrm{A1})}$
$t = 0$	$P_{0+}^{(\mathrm{A1})} = P - \sum K_0^{(\mathrm{A1})}$
$t = 1, \ldots, T-1$	$P_{t-}^{(\mathrm{A1})} = P_{(t-1)+}^{(\mathrm{A1})} \cdot A_t^{(\mathrm{A})}/A_{t-1}^{(\mathrm{A})}$
	$P_{t+}^{(\mathrm{A1})} = P_{t-}^{(\mathrm{A1})} + P - \sum K_t^{(\mathrm{A1})}$
$t = T$	$P_T^{(\mathrm{A1})} = P_{T-}^{(\mathrm{A1})} = \max(P_{(T-1)+}^{(\mathrm{A1})} \cdot A_T^{(\mathrm{A})}/A_{(T-1)}^{(\mathrm{A})}; T \cdot P - \sum K_t^{(\mathrm{A1})}$

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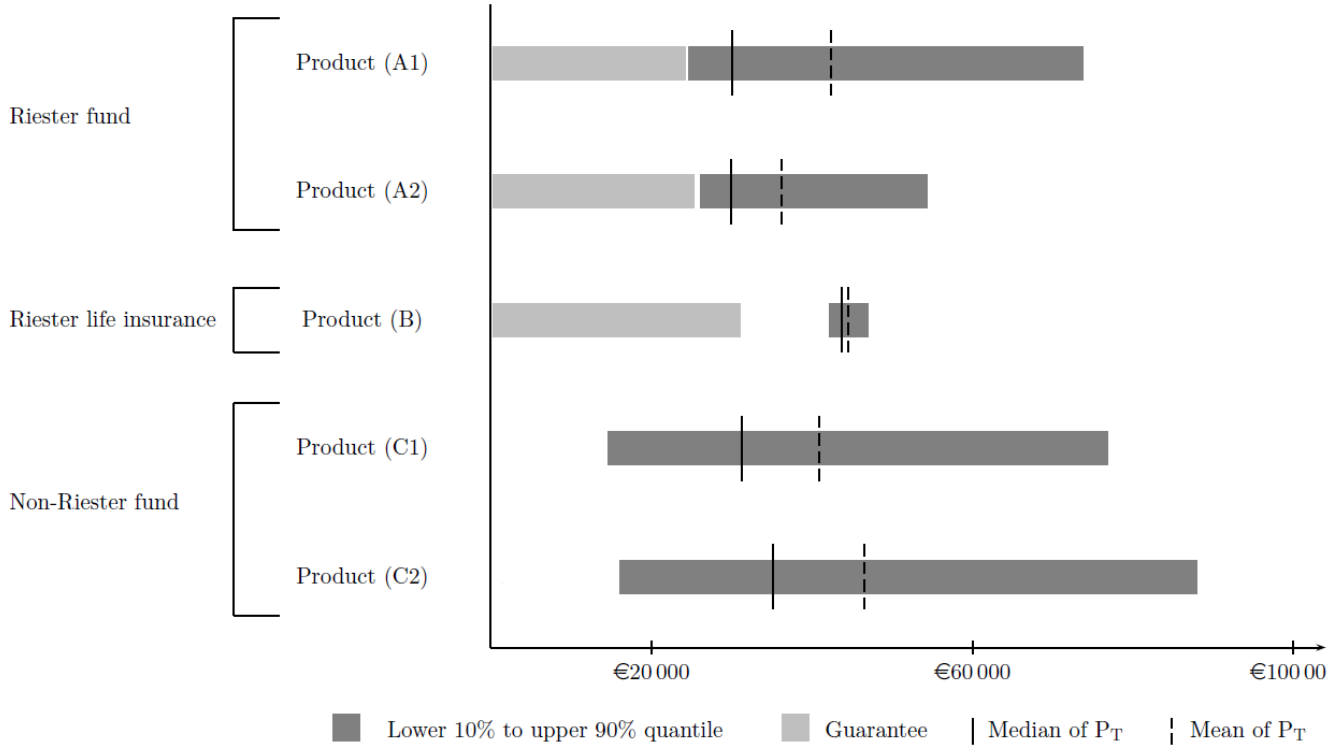
Riester fund products show a significantly higher volatility than Riester life insurance products

- T = 25 years
- Premium payments of EUR 1.200 per year



Evaluating risk measures, the Riester life insurance product is ranked highest

	(A1)	(A2)	(B)	(C1)	(C2)
Sharpe ratio	-0.02	0.36	8.50	-0.03	0.11
Sortino ratio	-0.04	-0.49	∞	-0.07	0.31

- Considering Sharpe and Sortino ratios, the Riester life insurance product is by far ranked highest
- The Riester fund product (with fund-switch) is ranked second before the non-Riester fund product (with ETF cost-structure)

Definitions:

$$\text{Sharpe ratio} = \frac{E(P_T) - Y_T}{\sigma(P_T)}$$

$$\text{Sortino ratio} = \frac{E(P_T) - Y_T}{\sqrt{E(\max(Y_T - P_T, 0)^2)}}$$

According to a customer with a mu-sigma-preference the Riester life insurance product will not be chosen

Evaluation of customer utility

$$U(P_T) = E(P_T) - \frac{a}{2} \cdot \sigma^2(P_T)$$

a	(A1)	(A2)	(B)	(C1)	(C2)	
−1.50	59 506	45 303	41 589	61 628	**70 490**	***Risk-seeking***
−1.00	52 630	41 493	41 527	53 842	**61 446**	
−0.50	45 754	37 684	41 466	46 057	**52 402**	
−0.25	42 316	35 779	41 435	42 164	**47 880**	
−0.10	40 253	34 636	41 416	39 828	**45 167**	
0.00	38 878	33 874	41 404	38 271	**43 358**	***Risk-neutral***
0.10	37 503	33 112	41 392	36 714	**41 549**	***Risk-averse***
0.25	35 440	31 969	**41 373**	34 378	38 836	
0.50	32 002	30 065	**41 343**	30 486	34 314	
1.00	25 126	26 255	**41 281**	22 700	25 270	
1.25	21 688	24 350	**41 250**	18 807	20 748	
1.50	18 250	22 446	**41 220**	14 915	16 226	

- Customer preferences shift from Riester life insurance for a risk-averse investor to the non-Riester fund product for a risk-seeking investor
- Riester fund products are not prefered for any risk-profile

Performances of Riester life insurance products are less volatile than Riester fund products

1. The Riester Pension scheme offers products with significantly different return and performance profiles
2. Riester life insurance products are preferred by risk-averse investors due to the low performance volatility
3. Costs and performances from different Riester life insurance product issuers are on a comparable level
4. Riester fund products are much more volatile than Riester life insurance products
5. Costs and performances differ significantly between different product issuers

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Further research and extension of the current paper

1. Consideration of pension period
2. Integration of taxes and transfer payments
3. Calculation of return rates for individual investors

Discussion

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Backup - model parameters

			Provider 1		Provider 2		Provider 3	
			before	after	before	after	before	after
(A)	Performance	μ	0.80%	0.30%	1.10%	0.80%	8.70%	1.70%
		σ	24.50%	3.00%	22.10%	1.00%	18.60%	0.80%
	Costs	$k_t^{(A),iss}$	4.50%	2.70%	3.20%	0.00%	4.10%	2.70%
		$k_t^{(A),acq}$	0.50%	0.30%	0.40%	0.00%	0.50%	0.30%
		$k_t^{(A),adm}$	1.20%	0.70%	1.20%	0.70%	1.40%	0.80%
		$k_t^{(A),dep}$	€12.50	€12.50	€10.00	€10.00	€15.40	€15.40
		$k_t^{(A),sur}$	€25.00	€25.00	€50.00	€50.00	€00.00	€00.00
(B)	Performance	μ	3.90%		4.40%		4.90%	
		σ	0.10%		0.20%		0.20%	
	Costs	$k_t^{(B),iss}$	5.00%		4.00%		2.60%	
		$k_t^{(B),acq}$	9.30%		4.50%		1.90%	
		$k_t^{(B),adm}$	1.20%		0.70%		0.00%	
		$k_t^{(B),sur}$	€100.00		€33.33		€0.00	
		$k_t^{(B),mor}$	€50.00		€16.67		€0.00	
(C)	Performance	μ	1.10%					
		σ	22.10%					
	Costs C1	$k_t^{(C1),iss}$	3.50%					
		$k_t^{(C1),adm}$	1.00%					
	Costs C2	$k_t^{(C2),iss}$	1.00%					
		$k_t^{(C2),adm}$	0.30%					