Distributional Effects of Subsidizing Retirement Savings Accounts: Evidence from Germany

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Underlying works

Funded by Research Network Old-age Provision of German Pension Insurance (FNA).

- Corneo, C., Koenig, J., and Schroeder, C. (forthcoming): Distributional Effects of Subsidizing Retirement Savings Accounts: Evidence from Germany, *Public Finance Analysis*.
- Koenig, J., and Schroeder, C. (forthcoming): Inequality-minimization with a given Public Budget, *Journal of Economic Inequality*.
- Corneo, C., Koenig, J., and Schroeder, C.: Cui Prodest – The Distributive Effect of the Riester Scheme, *Final Report for FNA*.

General Issue

Many countries provide financial incentives to stimulate private savings for retirement.

- Germany's incentive system, introduced in 2002: **Riester scheme**
  - A "compensation" for lowered replacement rate in statutory system.
  - Focused on low-income households (with children).

Basic Features of the Riester Scheme

- **Entitled**: dependent employees
- **Participation**: voluntary
- **Accounts**: individual and capitalized
- **Subsidization designed to particularly stimulate savings of low-income households**
  - (a) Basic (€154) and child allowance (€180); (b) income tax rebate (favorable for high income households).
  - Full subsidy requires minimum savings effort (4% of earnings).
- **Riester pension:** part of taxable income; charged against basic provision

Research Question

Does the Riester subsidy reach the low-income households?

- **Cross-sectional view focusing on households before retirement**

Basic comparison

Net equivalent household income[1] distribution
including Riester subsidy
vs.
Net equivalent household income distribution
excluding Riester subsidy

The more of the subsidy goes to low income households, the more progressive is the Riester scheme.

[1] Equivalent net income is the ratio of net income, y_i, and the household's equivalence scale, e_i.

Dataset for cross sectional analysis

Panel on Household Finances (PHF)

Why PHF?

- Detailed individual-level information on Riester contracts (amount saved) allows direct computation of subsidy.

Cross Section – Distributive Effect

Overall Population				
Measure	*woR*	*wR − woR*	*wD*	*wR − wD*
Gini	32.960	-0.014*	32.899	0.048*
	(0.173)	*(0.002)*	*(0.173)*	*(0.002)*
Theil	18.534	-0.018*	18.461	0.054*
	(0.234)	*(0.002)*	*(0.233)*	*(0.003)*
HCR	12.237	0.798*	12.052	0.983*
	(0.166)	*(0.158)*	*(0.196)*	*(0.124)*
IGR	35.589	-2.144*	35.692	-2.248*
	(1.172)	*(0.382)*	*(1.232)*	*(0.291)*
Sen	6.236	0.153*	6.145	0.244*
	(0.205)	*(0.036)*	*(0.202)*	*(0.032)*

Note. PHF 2010. Own calculations. * Significance of differences at 5%-level. Standard errors in parentheses. *wR* (*woR*) refers to the income distribution with(out) Riester subsidy; *wD* : demogrant (about €50 in equivalent inc. units).

Cross Section – Distributive Effect

For the **overall population** ...

- distributional effect is almost zero.
- subsidy is even less targeted than a demogrant.
- subsidy slightly **in**creases **incidence** and **de**creases **intensity of poverty.**

Qualitative results are the same for the **eligible population**.

Cross Section – Proximate Causes

Key for the distributional effect is how the **subsidy rate** changes along the deciles of equivalent income (pre subsidy).
The **subsidy rate** of a decile is,

$$\sigma = \frac{\sum_{i=1}^{N} s_i}{\sum_{i=1}^{N} y_i},$$

- s_i: subsidy amount received by beneficiary i
- y_i: pre-subsidy income
- N: number of observations in a decile.

Cross Section – Proximate Causes

Decomposing the decile-specific subsidy rate:

$$\sigma = \underbrace{\frac{\sum_{i=1}^{M} s_i}{\sum_{i=1}^{M} y_i}} \times \underbrace{\frac{M}{N}} \times \underbrace{\frac{N}{\sum_{i=1}^{N} y_i} \times \frac{\sum_{i=1}^{M} y_i}{M}}$$

$$= \quad \sigma_M \quad \times \quad \mu \quad \times \quad \frac{\bar{Y}_M}{\bar{Y}}.$$

- N: number of households in decile; $M \leq N$: beneficiaries
- σ_M: subsidy rate among M beneficiaries in decile
- μ: participation rate in decile
- $\frac{\bar{Y}_M}{\bar{Y}}$: mean eq. inc. of beneficiaries to mean in decile

Cross Section – Decomposition of subsidy rate

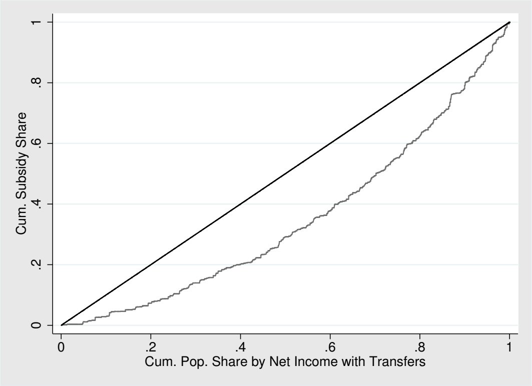
Decile	Overall Population				Eligible Population			
	σ	σ_M	μ	$\bar{Y}_M/\bar{Y}$	σ	σ_M	μ	$\bar{Y}_M/\bar{Y}$
1	0.449	4.982	0.077	1.160	0.712	4.652	0.147	1.038
	(0.081)	*(0.599)*	*(0.006)*	*(0.043)*	*(0.095)*	*(0.313)*	*(0.012)*	*(0.034)*
2	0.215	3.166	0.066	1.021	0.505	2.749	0.182	1.013
	(0.048)	*(0.292)*	*(0.011)*	*(0.011)*	*(0.054)*	*(0.125)*	*(0.018)*	*(0.009)*
3	0.280	2.153	0.127	1.020	0.610	2.132	0.286	1.003
	(0.032)	*(0.108)*	*(0.013)*	*(0.007)*	*(0.055)*	*(0.136)*	*(0.024)*	*(0.004)*
4	0.294	2.049	0.144	0.998	0.493	1.742	0.282	1.001
	(0.023)	*(0.131)*	*(0.014)*	*(0.006)*	*(0.054)*	*(0.130)*	*(0.013)*	*(0.004)*
5	0.324	1.914	0.168	1.007	0.507	1.489	0.341	0.998
	(0.024)	*(0.120)*	*(0.005)*	*(0.003)*	*(0.025)*	*(0.055)*	*(0.012)*	*(0.004)*
6	0.242	1.286	0.191	0.984	0.417	1.352	0.306	1.008
	(0.022)	*(0.069)*	*(0.011)*	*(0.003)*	*(0.025)*	*(0.062)*	*(0.013)*	*(0.002)*
7	0.318	1.312	0.243	0.999	0.328	1.085	0.302	0.999
	(0.010)	*(0.051)*	*(0.005)*	*(0.002)*	*(0.020)*	*(0.056)*	*(0.003)*	*(0.002)*
8	0.267	1.187	0.224	1.004	0.423	1.261	0.336	0.998
	(0.012)	*(0.038)*	*(0.009)*	*(0.003)*	*(0.025)*	*(0.035)*	*(0.019)*	*(0.004)*
9	0.298	1.272	0.237	0.991	0.402	1.323	0.305	0.997
	(0.008)	*(0.065)*	*(0.014)*	*(0.005)*	*(0.020)*	*(0.058)*	*(0.020)*	*(0.003)*
10	0.247	1.098	0.225	1.000	0.337	1.068	0.317	0.996
	(0.007)	*(0.044)*	*(0.004)*	*(0.018)*	*(0.010)*	*(0.038)*	*(0.011)*	*(0.018)*
Average	0.293	2.042	0.170	1.018	0.473	1.885	0.280	1.005

Cross Section – Pattern of Subsidy Rate

- **Declining subsidy rate**, σ and σ_M, works in favor of a **progressive** effect.
- **Increasing participation rate**, μ, works in favor of a **regressive** effect.

$\Rightarrow$ Net distributional effect is almost zero.

Cross Section – Concentration of Subsidy



Almost 40% of aggregate subsidy accrues to top two deciles; only 7% to bottom two deciles.

Cross Section – Participation Decisions

While subsidy level is determined by law, participation is a choice variable. Here we study the drivers of participation w.r.t.

- income
- age
- household composition
- education
- wealth

Cross Section – Participation Decisions in Logit

	Specification (1)	Specification (2)	Specification (3)
log of equivalent net income	0.5778***	0.5419***	0.4679***
	(0.1347)	(0.1429)	(0.1430)
age: 36-45	-0.2373	-0.2140	-0.2340
	(0.1955)	(0.1951)	(0.1954)
age: 46-55	-0.3157	-0.2978	-0.3355
	(0.2084)	(0.2091)	(0.2103)
age: 56-64	-1.2090***	-1.1800***	-1.2930***
	(0.2229)	(0.2244)	(0.2336)
single w/ children	0.5783	0.6016*	0.5886*
	(0.3525)	(0.3492)	(0.3470)
couples	0.0672	0.0938	0.0807
	(0.2229)	(0.2229)	(0.2226)
couples w/ children	0.6289***	0.6585***	0.6561***
	(0.2091)	(0.2130)	(0.2115)
more than two adults	0.2943	0.3774	0.3194
	(0.2654)	(0.2635)	(0.2650)
female	0.1004	0.0802	0.0774
	(0.1683)	(0.1705)	(0.1730)
east	0.1700	0.2031	0.2337
	(0.1989)	(0.2044)	(0.2074)
sec. educ. completed		0.3011	0.2627
		(0.1985)	(0.1978)
tertiary educ. completed		-0.2079	-0.2165
		(0.2347)	(0.2320)
top quintile of net wealth			0.6262***
			(0.2230)
constant	-7.0285***	-6.7657***	-6.0048***
	(1.3835)	(1.4415)	(1.4400)
observations	2043	2043	2043
Efron's R^2	0.065	0.066	0.069

Cross Section – Concluding remarks

- Almost 40% of the subsidy accrues to the top two deciles of the income distribution, but less than 10% to the bottom two.
- Nonetheless, it is almost distributive neutral because two effects offset each other: a progressive effect from the subsidy scheme and a regressive one due to voluntary participation.

Extension 1 - Maximum impact on inequality

What could have been achieved with the same budget in terms of inequality reduction?

- Optimal budget-allocation rule *seems* trivial: Donate budget to those at the bottom of the distribution, resulting in a truncated distribution.
- **Glewwe's puzzle** (JPubE, 1991): Rule is **appropriate** for **homogeneous** but **not** for **heterogeneous** distributions. "Heterogeneous" means differences in household composition and material needs.

Extension 1 - Maximum impact on inequality

Gini coefficient for homogeneous population:

$$G = \frac{1}{N\sum_{i=1}^{N}(y_i + s_i)} \sum_{i=1}^{N} \sum_{i \geq j} ((y_i + s_i) - (y_j + s_j)) \qquad (1)$$

$\Rightarrow$ Only rank, i, matters.

Gini coefficient for heterogeneous population:

$$G = \frac{1}{W\sum_{i=1}^{N} w_i \frac{y_i + s_i}{ES_i}} \sum_{i=1}^{N} \sum_{i \geq j} w_i w_j \left(\frac{y_i + s_i}{ES_i} - \frac{y_j + s_j}{ES_j} \right) \qquad (2)$$

$\Rightarrow$ Rank, i, weight, w_i, and needs, ES_i, matter.

Extension 1 - Maximum impact on inequality

- Koenig and Schroeder (JOEI, forthcoming) show how to use non-linear optimization techniques to solve Glewwe's (1991) puzzle.
  - If inequality index and set of constraints is convex, interior point algorithm solves the problem.
  - If inequality index is quasiconvex and set of constraints is convex, bisection method solves problem.

Extension 1 - Maximum impact on inequality

	Gini	%-change to pre Riester
Pre Riester	0.32960	-
Post Riester	0.32946	-0.0004
Bottom fill-up	0.32663	-0.0090
Bisection Method	0.32633	-0.0099

Extension 2 - Lifetime perspective

- Considering not only the pay-in but also the pay-out phase implies additional distributive effects:
  - Beneficiaries have to pay income taxes on the Riester pension.
    - Because income tax is progressive, effect should be **progressive** .
  - Riester pension is charged against basic provisions in old age.
    - Because the basic provision is provided to poor households, effect should be **regressive** .

Dataset for cross life cycle analysis

Socio-Economic Panel (Panel)

Why SOEP?

- Panel data tracking households and individuals since 1984 over their life cycles.
- Only overall savings rate is known. We can only estimate the subsidy.

Extension 2 - Lifetime perspective

- We use SOEP to construct the distribution of present values of lifetime equivalent incomes for the birth cohorts 1960 -1965 (base year: 2012).
- We analyze the overall effect of Riester along this lifetime distribution.
- To our knowledge, this is the first estimation of household lifetime incomes in Germany.
- Requires ...
  - backward imputations and forward prediction of household biographies.
  - modeling of tax-benefit system over the whole life cycle.
- ... and each modeling step requires assumptions.

Extension 2 - Lifetime perspective: preliminary results

	Lifetime income		Riester benefits		
	Riester		pay-in	pay-out	net
	incl.	excl.	phase	phase	
Overall population					
Mean	1,379,649	1,380,816	1,238	71	1,167
Gini	0.18738	0.18735	0.75846	0.82253	0.77025
Participating households					
Mean	1.422.834	1.424.827	2.114	122	1.993

Concluding remarks

- This research
  - Hardly any distributive effect – neither cross-sectional nor longitudinal.
- Previous researchs
  - Riester does not create additional savings as households just substitute subsidized by non-subsidized savings contracts.
  - Interest on savings in the contracts is low.
- Given limited effectiveness and high economic costs (subsidy, distortions, admin.) it is hard to justify the scheme in its present form.

Cross Section – Descriptive Results Overall Population

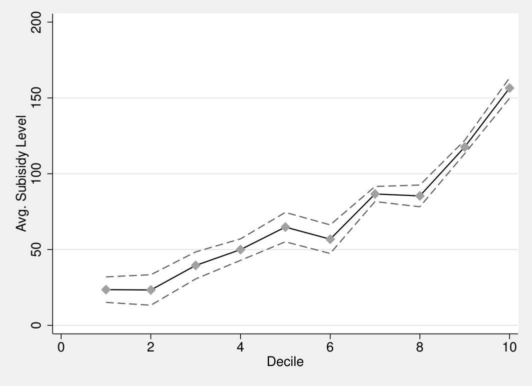
	mean	std. error	min	max	obs.
equivalent gross household income with transfers without Riester subsidy	28957	450.756	850	324800	3565
equivalent net household income with transfers without Riester subsidy	25274	334.426	518	221772	3565
number of household members	2.044	0.005	1	8	3565
married[c]	0.495	0.008	0	1	3565
age[c]	52.28	0.127	18	90	3565
female[c]	0.350	0.006	0	1	3565
completed vocational training[c]	0.518	0.011	0		3565
completed extended vocational training[c]	0.178	0.009	0	1	3565
completed university degree[c]	0.135	0.007	0	1	3565
access to tertiary education[c]	0.295	0.003	0	1	3565
estimated subsidies and subsidy rates					
fraction of households participating in the Riester scheme[a]	0.170	0.009	0	1	3565
level of Riester subsidy[b]	70.375	4.547	0	1764	3565
ratio of subsidy to net household income in %	0.184	0.017	0	17.111	3565

Note. PHF 2010. Own calculations. 1,000 bootstrap replicate weights used to compute standard errors.
[a] The participation variable is a dummy variable that indicates whether at least one household member currently pays into a Riester contract.
[b] The sum of the Riester subsidies of all tax units within a household.
[c] Variable refers to the household head.

Cross Section – Descriptives eligible population

	mean	std. error	min	max	obs.
equivalent gross household income with transfers without Riester subsidy	32168	644.275	850	324800	2106
equivalent net household income with transfers without Riester subsidy	27533	454.152	518	221772	2106
number of household members	2.364	0.018	1	8	2106
married	0.538	0.013	0	1	2106
age	43.29	0.210	18	90	2106
female	0.311	0.010	0	1	2106
completed vocational training	0.545	0.013	0	1	2106
completed extended vocational training	0.177	0.012	0	1	2106
completed university degree	0.146	0.010	0	1	2106
access to tertiary education	0.330	0.007	0	1	2106
estimated subsidies and subsidy rates					
fraction of households participating in the Riester scheme	0.280	0.014	0	1	2106
level of Riester subsidy	115.940	7.419	0	1764	2106
ratio of subsidy to net household income in %	0.303	0.028	0	17.111	2106

Cross Section – Subsidization along Income Distribution



⇒ Subsidy amount increases over deciles of net income distribution.

Cross Section – Distributive Effect

Eligible Population				
Measure	*woR*	*wR* − *woR*	*wD*	*wR* − *wD*
Gini	31.750	-0.031*	31.693	0.026*
	(0.112)	*(0.003)*	*(0.112)*	*(0.003)*
Theil	17.131	-0.035*	17.067	0.029*
	(0.173)	*(0.003)*	*(0.172)*	*(0.004)*
HCR	10.444	0.253	10.301	0.396*
	(0.286)	*(0.167)*	*(0.328)*	*(0.117)*
IGR	33.010	-0.875	33.030	-0.895*
	(2.155)	*(0.491)*	*(2.258)*	*(0.344)*
Sen	4.943	0.035	4.871	0.107*
	(0.216)	*(0.037)*	*(0.214)*	*(0.031)*

Extension 1 - Illustrative Example

Tabelle: Synthetic Data

y_i	w_i	ES_i	y_i/ES_i	$t_{\text{b. fill-up}}$	t_{opt}
180	4	2	90	73.34	100
100	1	1	100	26.66	0
400	3	1.8	160	0	0
300	1	1	300	0	0
450	2	1.5	300	0	0
800	4	2	400	0	0
600	1	1	600	0	0
1100	1	1	1100	0	0
Gini				0.3415	0.3381