Pension Reform with Entrepreneurial Choice

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Overview

- Motivation and literature
- Structure of stochastic OLG model
- Calibration and initial equilibrium
- Simulation results
- Conclusions and extensions

Motivation

- Entrepreneurial activities are important drivers of innovation, growth and economic development (Schumpeter, 1942)

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- Entrepreneurial activities are important drivers of innovation, growth and economic development (Schumpeter, 1942)
- Main mechanism: Higher saving rates and lower risk aversion of entrepreneurs
- Governments around the world try to encourage self-employment with different tax subsidies
- However: Main driver of entrepreneurial choice are by far not clear (borrowing constraints? tax progressivity? heterogeneity of entrepreneurs)

Motivation

Research question: How do different fiscal reforms affect

- entrepreneurial choice
- short and long run macroeconomic aggregates
- welfare of workers and self-employed
- welfare of current and future cohorts
- aggregate economic efficiency

Previous literature

- Models that focus on wealth concentration
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Note: Most of these models compare only steady states! No consideration of aggregate efficiency!

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- Why this might be interesting?
  - In Germany (and some other countries) self-employed are excluded from the PAYGO pension system
  - As a consequence some former self-employed end up in old age poverty
  - Reform proposals to force self-employed into the public system

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- Present paper adds to this literature by analyzing the interplay between entrepreneurial choice and the pension system
- Why this might be interesting?
  - In Germany (and some other countries) self-employed are excluded from the PAYGO pension system
  - As a consequence some former self-employed end up in old age poverty
  - Reform proposals to force self-employed into the public system
- We also consider the full transition path and compute an aggregate efficiency measure

Structure of OLG model

- Households
  - work for 8 periods (40 years)
  - live for maximum of 16 periods (age 100)
  - assigned to three different skill types
  - have variable (fixed) labor supply as workers (entrepreneurs)
  - start as workers but then may become entrepreneurs
  - face borrowing constraints
  - are uncertain about future labor productivity, managerial skills and life span
  - are forced to exit labor market at retirement as workers

Structure of OLG model

- Government
  - dual income tax
  - adjusts consumption tax to balance budget
- Pension system
  - individuals accumulate earning points when working
  - pension benefits related to income
- Closed economy, constant population growth rate
- Cobb-Douglas production with capital and labor

Structure of OLG model

State vector of an age-j agent: $z_j = (s, a_j, ep_j, \eta, \theta, o_j)$.

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Optimization problem of worker:

$$V_j^W = \max_{c_j, l_j, a_{j+1}, o_{j+1}} \left\{ u(c_j, 1 - l_j) + \beta \psi_{j+1} \left(\mathbf{1}_{o_{j+1}=W} E_j[V_{j+1}^W | \eta, \theta] + \mathbf{1}_{o_{j+1}=E} E_j[V_{j+1}^E - \Phi | \eta, \theta] \right) \right\}$$

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subject to the constraints

$$\begin{aligned} a_{j+1} &= (1 + r)a_j + y_j^w + b_j + p_j - \tau \min[y_j^w; 2\bar{y}] - T(\cdot) - (1 + \tau^c)c_j \\ & c_j > 0, \quad 0 \leq l_j \leq 1, \quad a_{j+1} \geq 0. \end{aligned}$$

where $y_j^w = we_j \eta l_j$.

Structure of OLG model

Optimization problem of entrepreneur:

$$V_j^E = \max_{c_j, k_j, a_{j+1}, o_{j+1}} \left\{ u(c_j, 1 - l_j) + \beta \psi_{j+1} \left(\mathbf{1}_{o_{j+1}=W} E_j[V_{j+1}^W | \eta, \theta] + \mathbf{1}_{o_{j+1}=E} E_j[V_{j+1}^E | \eta, \theta] \right) \right\}$$

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Optimization problem of entrepreneur:

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which is subject to the constraints

$$\begin{aligned} a_{j+1} \quad = \quad & a_j + r\max[a_j - k_j; 0] + y_j^e + b_j + p_j - \phi\tau\min[y_j^e; 2\bar{y}] \\ & - T(\cdot) - (1+\tau^c)c_j, \\ & c_j > 0, \quad 0 \le k_j \le (1+d)a_j, \quad a_{j+1} \ge 0. \end{aligned}$$

where $y_j^e = \theta_j[k_j^\alpha(e_j\bar{l})^{1-\alpha}]^\nu - \delta k_j - r\max[k_j - a_j; 0]$.

Structure of OLG model

Government budget:

$$(1+n)B_{G,t+1} - B_{G,t} + T_{y,t} + T_{k,t} + \tau_t^c C_t = G + r_t B_{G,t}.$$

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Pension system:

$$ep_{j+1} = ep_j + \mu \times \left\{ \lambda + (1-\lambda) \min \left[\frac{y_j}{\bar{y}}; 2 \right] \right\} / (j_R - 1),$$

$$p_j = ep_{j_R} \times \kappa \times \bar{y},$$

Calibration and Initial Equilibrium

Demographic parameters	Preference parameters	Technology parameters	Government parameters
$J = 16$	$\gamma = 0.5$	$\alpha = 0.36$	$\tau^k = 0.15, \tau^r = 0.264$
$j_R = 10$	$\sigma = 0.32$	$\delta = 0.27$	$B_G / Y = 0.80$
		(6% p.a.)	$G / Y = 0.19$
$S = 3$	$\beta = 0.99$	$\nu = 0.88$	$d_w = 0.04\bar{y}$
$n = 0.032$	$\Phi = 0.55$	$\bar{l} = 0.41$	$d_s = 0.025\bar{y}$
(0.64% p.a.)		$d = 0.5$	$\lambda = \phi = 0.0$
ψ_j: StB (2016)			$\kappa = 0.55, \mu = 1.0$

Calibration and Initial Equilibrium

	Initial equilibrium		
	with entrepreneurs	without	Germany 2014*
Calibration targets			
Life expectancy		80.7	81.0
Dependency ratio (65+/20-64 in %)		34.6	34.6
Fraction of entrepreneurs (in %)	9.8	0.0	9.8[a]
Low skilled	1.6		–
High skilled	2.7		–
Pension benefits (% of GDP)	8.7	11.4	11.0
Pension contribution rate (in %)	19.3	19.1	18.9
Tax revenues (in % of GDP)	20.5	21.4	22.0
Capital-output ratio	3.9	3.1	3.8

Calibration and Initial Equilibrium

	Initial equilibrium		
	with entrepreneurs	without	Germany 2014*
Other benchmark coefficients			
Interest rate p.a. (in %)	2.4	3.4	–
Bequests (in % of GDP)	4.4	3.9	7.6[b]
Gini index gross income	0.492	0.388	0.485[c]
Gini index wealth	0.707	0.624	0.746[d]
Top wealth shares (in %)			
1%	14.5	7.8	23.9[d]
5%	38.3	27.3	45.4[d]
10%	54.7	40.8	59.0[d]

Simulation results

Policy reforms considered:

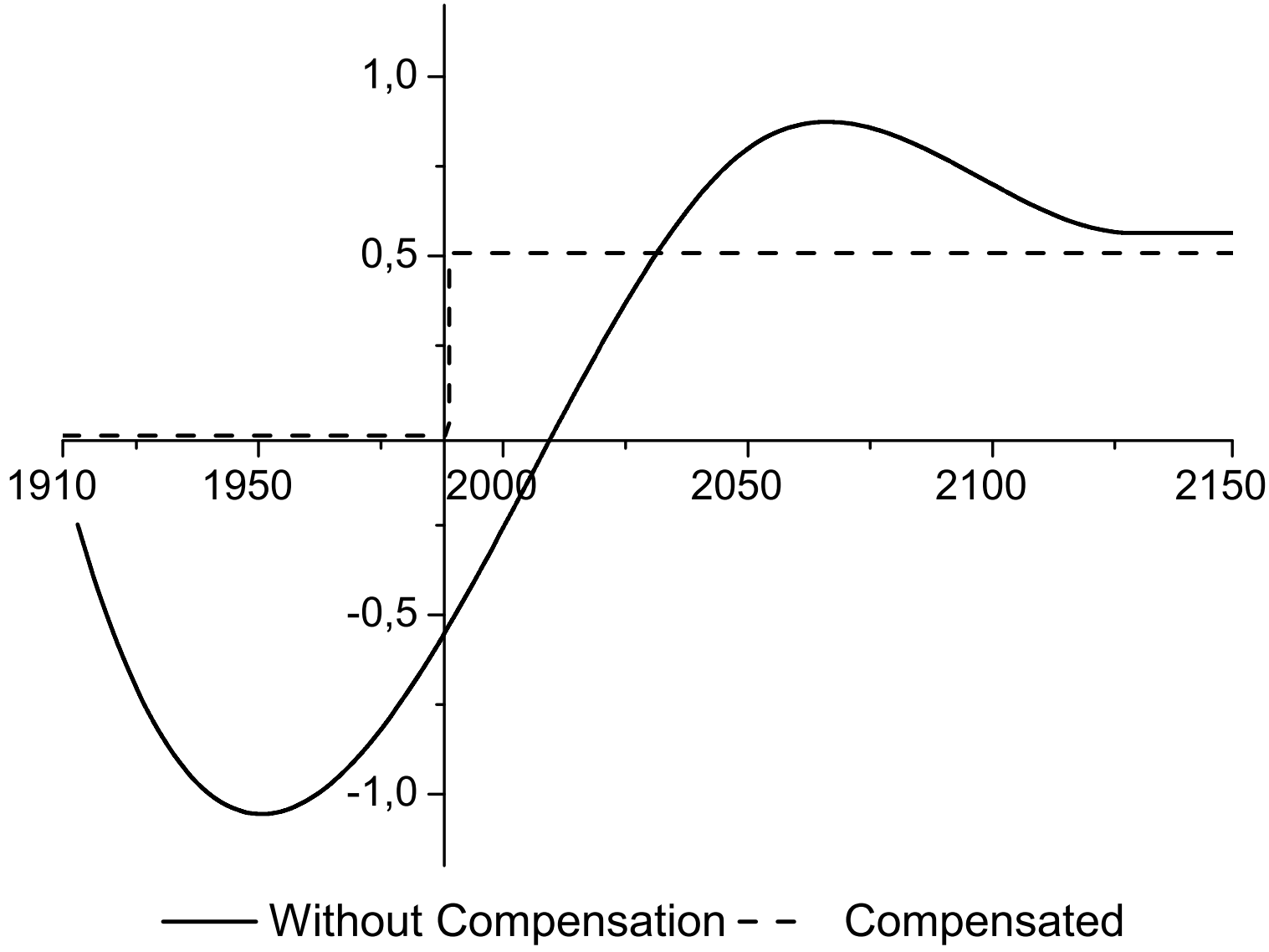
(1) ”Comprehensive paygo”, where all entrepreneurs are forced to contribute to the public pension system (i.e. $\phi = 1.0$);

(2) ”Flat benefit”, where the tight tax-benefit linkage of the paygo system is completely eliminated (i.e. $\lambda = 1.0$);

(3) ”Funding”, where the paygo system is completely eliminated (i.e. $\mu = 0.0$) so that all households have to build up own savings for retirement.

Simulation results

Welfare consequences of a reform (in % of initial resources)



Simulation results (1): Macro

Year	2015	2020	2030	∞
No. entrepreneurs[a]	0.0	0.6	0.7	0.8
low-skilled[a]	0.0	0.2	0.2	0.2
high-skilled[a]	0.0	0.0	0.0	0.0
Corp. labor hours (l)	1.0	1.0	0.7	-0.4
Corp. labor input (L_c)	0.7	0.1	-0.3	-1.3
Corp. capital input (K_c)	0.1	-0.5	-1.4	-9.9
Assets (A)	0.0	-0.4	-1.1	-7.8
Wage	-0.2	-0.2	-0.4	-3.3
Interest rate[a]	0.0	0.0	0.1	0.4
Consumption tax rate[a]	0.4	0.3	0.4	2.1
Contribution rate[a]	-3.8	-3.8	-3.3	-0.1

[a] In percentage points.

Simulation results (1): Welfare

Birth year	Age in 2015	without LSRA				with LSRA
		employees		entrepreneurs		
Workforce		*low*	*high*	*low*	*high*	
1960	55	0.29	0.23	1.97	1.45	0.00
1975	40	0.47	0.43	1.80	1.57	0.00
1990	25	0.54	0.49	0.94	0.92	0.00
Future Generations						
1995	20			0.55		0.16
2015	–			-0.22		0.16
∞	–			-1.27		0.16

*In percent of initial resources.

Simulation results (2): Macro

Year	2015	2020	2030	∞
No. entrepreneurs[a]	0.0	-1.1	-0.7	0.0
low-skilled[a]	0.0	-0.3	-0.3	-0.2
high-skilled[a]	0.0	0.0	0.0	0.2
Corp. labor hours (l)	-15.1	-14.9	-15.3	-17.2
Corp. labor input (L_c)	-12.9	-11.9	-12.5	-14.6
Corp. capital input (K_c)	-1.4	-3.5	-7.3	-17.9
Assets (A)	0.0	-2.1	-5.4	-12.9
Wage	4.5	3.3	2.1	-1.4
Interest rate[a]	-0.5	-0.4	-0.2	0.2
Consumption tax rate[a]	2.3	2.9	3.8	5.8
Contribution rate[a]	1.1	1.1	2.4	9.3

[a] In percentage points.

Simulation results (2): Welfare

Birth year	Age in 2015	without LSRA				with LSRA
		employees		entrepreneurs		
Workforce		*low*	*high*	*low*	*high*	
1960	55	0.96	-1.13	-1.12	-1.49	0.00
1975	40	2.39	-0.59	0.25	-0.79	0.00
1990	25	2.07	-0.49	0.81	-0.60	0.00
Future Generations						
1995	20			1.07		-1.99
2015	–			-0.37		-1.99
2035	–			-1.46		-1.99
∞	–			-1.98		-1.99

*In percent of initial resources.

Simulation results (3): Macro

Year	2015	2020	2030	∞
No. entrepreneurs[a]	0.0	0.9	1.2	1.3
low-skilled[a]	0.0	0.2	0.2	0.3
high-skilled[a]	0.0	0.3	0.4	0.3
Corp. labor hours (l)	-4.0	-4.2	-4.5	-6.6
Corp. labor input (L_c)	-3.9	-4.7	-5.1	-6.2
Corp. capital input (K_c)	-0.5	-2.0	-2.8	6.9
Assets (A)	0.0	5.1	18.0	59.4
Wage	1.3	1.0	0.8	4.8
Interest rate[a]	-0.1	-0.1	-0.1	-0.5
Consumption tax rate[a]	-0.5	-1.1	-2.3	-4.2
Contribution rate[a]	-11.9	-11.9	-11.9	-11.9

[a] In percentage points.

Simulation results (3): Welfare

Birth year	Age in 2015	without LSRA				with LSRA
		employees		entrepreneurs		
Workforce		*low*	*high*	*low*	*high*	
1960	55	-1.21	-1.30	0.19	0.16	0.00
1975	40	-1.66	-2.42	-0.16	-0.33	0.00
1990	25	-1.10	-2.23	-0.30	-0.69	0.00
Future Generations						
1995	20			-0.98		-1.11
2015	–			0.21		-1.11
2035	–			1.18		-1.11
∞	–			1.54		-1.11

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Conclusions and Extensions

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Extensions: Micro-Calibration; skill-specific managerial risk, bequest distribution, estate taxation, entrepreneurial subsidies, shadow economy, ...