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Saving, employment and the design of public pension programmes

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Pension programmes, employment and saving

- Public pension programmes (social security) affect aggregate economic activity – specifically:

- Employment (LFP)
  - As part of ‘tax wedge’
  - Specific taxes on work late in life

- Life cycle saving profile
  - Level of saving
  - Timing of saving/dissaving
  - Date of retirement

The standard literature

- What indicators of impact of public pension programme on economic activity are used in existing studies?
  - Generosity of programme (typically proxied by expected replacement rate)
  - Average cost of programme (as part of OECD ‘tax wedge’)
  - Specific ‘implicit taxes’ on work at or around retirement age (e.g Gruber-Wise, Blöndal-Scarpetta)

- Typical empirical findings:
  - Adverse impact of ‘tax wedge’ on unemployment/economic activity rates
  - Adverse impact of public programme on private saving (measured by the ‘offset’ coefficient)

What this paper does...

- It argues that design of public programme matters
- Contributions to public pension programmes are not a pure ‘tax’ – people expect something back in the future for their contributions
- The ‘tax component’ of the programme depends on how (dis)similar the programme is to an ‘actuarial-based’ retirement saving programme.
- This component differs across countries and over time.
- Likewise the offset to private saving depends on design features
- The paper measures the ‘tax component’ in various dimensions
- It examines the impact on economic activity and saving rates using cross-country panel

Some basics

(following notation of Lindbeck & Persson, *JEL*, 2003)

- Generations denoted by *t* and periods of the life by i=1,2.
- The household works in period 1 and is retired in period 2, with known date of mortality and no bequests.
- Public pension programme pays *b* and levies proportional payroll contribution τ

$$c_t^2 = [y_t^1(1-\tau) - c_t^1](1+r) + b$$

- The public pension programme is financed on a PAYG basis:

$$n_t \hat{b}_t = \tau_{t+1} n_{t+1} \hat{w}_{t+1} \hat{l}_{t+1}$$

- where hats over variables denote population averages and *n* denotes the size of the generation.

The average ‘return’ to contributions to a public pension programme

$$\hat{b}_t / \tau_t \hat{w}_t \hat{l}_t = (1 + G)$$

- the internal rate of return on contributions, G, depends on the average stream of benefits relative to the average total value of contributions paid by a member of that generation.
- The ‘Aaron-Samuelson’ condition determines that in the long run G = G*
- But G can diverge from G* by generation (especially earlier generations)
- With dynamic efficiency, there’s an ‘implicit tax’ as $r > G^*$ (and, usually, >G)

Design of public pension programme

- Affects G for each cohort (I calculate this)
- But also G differs *within* cohorts
- Casammatta, Cremer and Pestieau (2000) describe a part ‘Beveridge’ part ‘Bismarck’ programme:

$$\hat{b}_t = \alpha(1+G)\tau y_t + (1-\alpha)\bar{b}$$

- The benefit has two components: a fraction proportional to earnings, weighted by α, and a flat proportion (Beveridge) weighted by $(1-\alpha)$

Continued...

- Insert benefit formula into two period choice model
- There are now potential deviations from an ‘actuarial’ programme in (at least) 2 dimensions:
- *G* not equal to *r* *(intergenerational)*
- α not equal to 1 *(intragenerational)*
- See paper.
- Note in particular that if G=*r*, α =1 *and* the individual is not liquidity constrained, then τ drops out of budget constraint.
- Conversely, when G < *r*, α < 1, programme has a ‘tax component’. We can measure tax components empirically

Impact of ‘tax component’ on economic activity and saving

- *(Arguably, existing literature is inconsistent in how it treats impact of public pension programmes - whether as a ‘tax’ or as ‘saving’)*
- A higher ‘tax component’ affects economic activity rates adversely (this is a preferable test to simply adding whole payroll component to ‘tax wedge’)
- But a higher ‘tax component’ means less substitutability for private retirement saving.
- [if the economic activity impact is primarily over length of working life e.g. as in Sheshinksi (1978), this is Feldstein’s (1974) induced retirement effect].
- *Within* cohort, deviations from ‘actuarial scheme have different effects on different households – note that richer households tend to save more.

Existing empirical literature on economic activity and pension costs

- Standard cross-country literature focuses on tax wedge, institutions, interaction thereof (e.g. OECD, Nickell and co-authors, Blanchard & Wolfers etc) – impact on economic activity/unemployment/employment etc
- Bertola, Blau and Kahn (2002) look at age and gender-specific activity rates (as here)
- Design of public pension programme not treated as an 'institution' by any of these studies
- Ooghe, Schokkaert and Flechet (2003) examine 'tax shifting' (onto employees) in small sample of Beveridge v. Bismarck countries. More shifting onto employees in Bismarck (as above theory suggests)
- Disney (2004) *Economic Policy* is similar to here (and gives full details on how variables calculated)

Existing empirical literature on saving rates and public pensions

- Goes back to Feldstein (1974) and disputes surrounding his method and calculations. Several cross-country studies since with no clear results.
- Another issue is how to measure PV of payroll contributions and benefits (e.g. Kotlikoff, 1979).
- Feldstein (1987) examines ‘Bismarck’ v. means-tested systems and provides some theoretical predictions.
- Jappelli and Modigliani (2003) point out that it matters whether we treat payroll pension contributions as a ‘tax’ or a form of retirement saving in such studies.
- No-one (to my knowledge) exploits cross country and time design variation to predict offset although social security ‘experiments’ can be used to identify offsets e.g. Attanasio and Brugiavini (2003), Attanasio and Rohwedder (2003).

Calculation of pension variables

- 22 countries in OECD, 3 time periods so n=66
- Need contribution rates for PAYG equilibrium. But 'official' rates are largely meaningless. So calculate c* for PAYG using OECD average RRs and ILO support ratios (adjusted) and exploit PAYG condition (Table A2)
- Calculate IRRs for each generation expecting to retire in country *i* at *t* at age 65 *(note endogeneity of actual retirement age*) – see Table A3
- [Gory details in Disney, 2004 and Appendix]
- Within (intra) cohort measure derived from CofV of RRs across household types in country *i* at time *t*. Call this $(1 - \alpha)$. The measure ranges from 0 ('pure' Bismarck) to 0.4 (Australia). Then calculate $t = c(1 - \alpha)$. Call this the *pension tax* (cf *not* 'contribution rate)

Correlation coefficients for calculated variables

Correlation	Contrib. rate	Pension RR	Pension tax	Support Ratio	IRR at 65
Contrib. rate	1.0000	-	-	-	-
Pension RR	0.9500	1.0000	-	-	-
Pension tax	–0.4834	–0.5673	1.0000	-	-
Support Ratio	–0.6440	–0.3932	0.0854	1.0000	-
IRR at 65	0.0513	0.1431	–0.2586	0.1455	1.0000

Other variables

- Household average saving rates from OECD and IMF WP.
- Other controls for programme design: a measure of severity of ‘retirement test’ and age at which ‘normal’ pension benefit can first be received
- For economic activity equations: time varying measures of demand shocks (Blanchard data set) and other institutional measures
- Support ratio and other macroeconomic aggregates in saving rate equations
- Fixed effects (so identification also off changes in design – ‘reforms’)

Economic activity regressions for older workers, by tax components of pension programme

Dep. Variable: Age-activity rate	Women 50-54	Women 55-59	Men 50-54	Men 55-59
Pension tax	–1.34***	–0.35	0.20	1.60***
	(0.37)	(0.30)	(0.17)	(0.29)
Pension RR	–0.20***	–0.17***	–0.14***	–0.14***
	(0.07)	(0.05)	(0.03)	(0.05)
IRR at 65	0.91**	0.89***	–0.54***	–0.28
	(0.36)	(0.29)	(0.17)	(0.49)
Retirement test index	5.07**	4.59***	2.29**	4.39***
	(1.97)	(1.60)	(0.91)	(1.53)
Earliest pension age	0.15	–0.01	0.53***	–0.09
	(0.38)	(0.31)	(0.18)	(0.29)
Demand shocks	0.19	0.10	0.17***	0.04
	(0.12)	(0.10)	(0.06)	(0.09)
Union density	–0.07	–0.06	0.07	0.03
	(0.11)	(0.09)	(0.05)	(0.08)
Employment protection index	–2.06	–1.32	3.73***	5.38***
	(2.00)	(1.62)	(0.93)	(1.55)
1980s	8.89***	4.44***	–1.42***	–6.56***
	(1.06)	(0.87)	(0.49)	(0.82)
1990s	19.00***	11.75***	–1.01*	–6.95***
	(1.14)	(0.92)	(0.53)	(0.88)
Log likelihood	–135.40	–122.40	–86.94	–119.30
Wald $\chi^2(30)$	2360.0	3141.6	1113.6	1666.2
	(0.0000)	(0.000)	(0.0000)	(0,000)

Notes

Estimated by generalised least squares, weighted by civilian employment; country fixed effects; standard errors in parentheses.

***=1%, **=5%, *=10% significance. N=66 (22 countries in 1975, 1985, 1995).

Results on economic activity and design of pension programme

- Model works ‘well’ for women:
  - More generous pension (RR) reduces activity rates among 50-54/55-59 year olds
  - Higher (within cohort) ‘tax component’ of pension reduces economic activity rates
  - Higher IRR to public pensions (across cohorts) raises activity rates
  - Tougher work test at retirement raises pre-retirement activity rates
  - Employment protection (weakly) lowers activity rates (but not men where strongly reversed)
- Model doesn’t ‘work’ for men (that is, the ‘new’ bits)

Household saving rates, by components of pension programme

Dep. Variable: Household saving rate	Mean of Var. (Std dev)	(1) Coeff. (Std. Err)	(2) Coeff. (Std. Err)	(3) Coeff. (Std. Err)
Contribution rate	25.08 (9.55)	0.14** (0.07)	-	-
Pension RR	59.84 (17.32)	-	0.06* (0.04)	-
Pension tax	3.39 (2.28)	-	-	0.64*** (0.19)
Support ratio	2.47 (0.36)	4.25*** (0.77)	3.28*** (0.66)	7.99*** (0.99)
IRR at 65	2.02 (2.22)	-	-	–1.16*** (0.21)
Retirement test index	1.24 (1.07)	-	-	–0.80 (0.87)
Earliest pension age	61.63 (3.39)	-	-	–0.25 (0.18)
Demand shocks	0.21 (7.39)	0.12* (0.06)	0.11* (0.07)	0.11** (0.05)
1980s	-	–2.02*** (0.47)	–2.08*** (0.50)	–3.98*** (0.55)
1990s	-	–2.28*** (0.52)	–2.82*** (0.56)	–3.82*** (0.46)
Log likelihood		–107.47	–101.94	–90.15
Wald χ^2(25 or 28)		1145.5 (0.000)	1127.6 (0.0000)	1668.2 (0.0000)

Notes:
Mean of household saving rate: 11.38 (6.21)

Estimated by generalised least squares, weighted by civilian employment; country fixed effects included; standard errors in parentheses.

***=1%, **=5%, *=10% significance. N=66 (22 countries in 1975, 1985, 1995).

Results on saving rates and design of pension programme

- Using 'traditional' measures of pension programme (contribution rate, average RR), only weak offset of household saving (although sign in correct direction)
- Higher support ratio strongly raises household saving in all specifications (standard LCH result)
- A higher 'pension tax' component (within cohort) *raises* household saving (This is correct sign because then public pensions are less of a substitute for private saving as α lower)
- A higher IRR on pensions (between cohort) *reduces* household saving rates (again as the theory suggests, as G is closer to *r*)
- Demand shocks and time periods also significant.

Conclusions

- Argues that existing literature does not think about design of public pension programme when modelling imapct of ‘tax wedge’, ‘offset coefficient’ etc.
- In fact studies of economic activity tend to treat public pension contributions as a pure tax, studies of saving as a pure retirement income contribution. Inconsistent.
- Show how we can construct indicators of ‘tax component’ across time and country to test these hypotheses (note that we need variation in some dimension in pension regime)
- Model works especially well for household saving (a new result) and OK for women (see my *Economic Policy* piece 2004 on latter)
- Extensions: more waves (time dimension) + think about microdata-based estimates of the household saving model.