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Retirement Behaviour in Austria: Incentive Effects on Old-Age Labor Supply

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Research Question

- **To what extent are individual retirement decisions affected by financial incentives?**

- **Complex intertemporal decision**: responsiveness to financial incentives not undisputed (Duflo and Saez, 2003; Chan and Stevens, 2008; Vonkova and van Soest, 2009)
- Potentially strong dependence on behavioural assumptions, e.g. time-discounting (Vischer et al., 2013))
- Description of individual incentive structure and **quantitative evaluation of behavioural responses** based on admin. data on individual level (Gruber and Wise, 2002)

- Irreversible decision: retirement now *or* continued employment (and later retirement)
- **Option value: maximum utility gain from staying in the labor market**; forward-looking variable capturing intertemporal aspects in a simplified framework

Retirement and Old-age Labor Supply in Austria

- Ichino et al. (2007): older displaced workers face reduced re-employment probabilities; employment prospects catch up over the next 2 years
- Schnalzenberger and Winter-Ebmer (2009): employment protection legislation like the layoff tax reduces displacement probability of older workers
- Hofer et al. (2011): subsidisation of old-age part-time employment yields only modest increases in employment probabilities; overall reductions in labor supply
- Winter-Ebmer et al. (2011): job insecurity and dissatisfaction are main driving forces for early retirement
- **Staubli and Zweimueller (2011): increase in statutory retirement age has significant effects on employment and out-of-labor-force proportions**
- **Manoli and Weber (2011): use mandated discontinuous changes in retirement benefits (due to employer-provided severance payments) to estimate labor-supply elasticities**

Social Security Wealth

- Accounting identity not based on utility framework; serves as basis for other incentive measures

$$SSW_S(R) = \sum_{t=R}^{\infty} YRET_t^{NET}(R) \cdot \nu_t \cdot \delta^{t-S} - \sum_{t=S}^{R-1} INSC_t \cdot \nu_t \cdot \delta^{t-S} \quad (1)$$

- $SSW_S(R)$: net present discounted value at age S of retirement at R
- $YRET_t^{NET}(R)$: net retirement benefit at t for retirement at R
- $INSC_t$: insurance contribution at t
- Discount factor $\delta = 1/(1+r)$ with $r = 0.03$
- ν_t: probability of survival at S until t (standard life tables)

Accrual Rate and Peak Value

$$ACCR_S(R+1) = \frac{SSW_S(R+1) - SSW_S(R)}{SSW_S(R)} \tag{2}$$

$$PEAK_S(R) = \max_{T>R} [SSW_S(T)] - SSW_S(R) \tag{3}$$

- $ACCR_S(R+1)$: accrual of SSW_S if retirement is postponed by one year relative to current SSW_S
- $PEAK_S(R)$: maximum increase in SSW_S over all possible ages $T > R$
- $TAXR_S(R+1)$: accrual of SSW_S if retirement is postponed by one year relative to next years gross income

Option Value (Stock and Wise, 1990)

$$V_S(R) = \sum_{t=S}^{R-1} u\left(YLAB_t^{NET}\right) \cdot \nu_t \cdot \delta^{t-S} + \alpha \cdot \sum_{t=R}^{\infty} u\left(YRET_t^{NET}(R)\right) \cdot \nu_t \cdot \delta^{t-S} \quad (4)$$

$$OV_S(R) = \max_{T>R} [V_S(T)] - V_S(R) \quad (5)$$

- Instantaneus utility function in after-tax income $u(Y) = Y^{\gamma}$; α relative utility increase due to leisure (for $t \geq R$); $\alpha \geq 1$ and $0 < \gamma \leq 1$
- Discount factor $\delta = 1/(1+r)$ with $r = 0.03$; ν_t prob. of survival at S until t (standard life tables)
- $YLAB_t^{NET}$: after-tax labor income at t; $YRET_t^{NET}(R)$: net retirement benefit at t for retirement at R
- $V_S(R)$: present disc. utility value at age S obtained from retirement at R; $OV_S(R)$: maximum increase in V_S obtainable by retiring at ages $T > R$

Microsimulation: Data

- **ASSD**: labor market states, un-/employment and sick leave (days/year), age, gender, migration, industry, retirement (1980-2011)
- **VVP**: Retirement plan and gross benefit, assessment base (Bemessungsgrundlage), insurance carrier (Versicherungstraeger), dates (Stichtag/Bescheid)
- Complete insurance records on monthly basis (Beitrags-/Ersatzzeiten), annualised gross income until retirement (Beitragsgrundlage)
- Retirement plans: old-age pension (AP), pre-retirement (VAPL, KOP) and disability pensions (BU, EU, IP); Cohorts from 1936 (males) and 1944 (females)
- **Entries in 2002-2009: after reductions 314,805 indiv. with unique retirement date in 2002-09 (ca. 75%)**
- No systematic deviation in observable sociodemographics w.r.t. official data on entries into retirement (per year and retirement plan)

Microsimulation: Computations

- Calculate (counterfactual) net pensions for every retirement plan and each year 2002-2014

1. *Project annualized gross incomes* after observed retirement based on indiv. income time-series
2. Calculate individual *assessment bases* and *gross benefits* based on insurance records, childcare periods and retirement plans
3. Calculate *net benefits* and *net labor income* based on income taxes and social insurance contributions of the planning year

- Double-check pension calculations: e.g. **ratio of simulated to actual net pensions**

	mean	sd	p10	p25	p50	p75	p90	N
women	**1.010**	0.461	0.927	0.980	**1.054**	1.125	1.164	161,351
men	**1.018**	0.499	0.944	1.001	**1.042**	1.122	1.140	153,393

- **Calculate net pensions for** $\forall S \in (2002, 2009)$ **and** $\forall R \in (2002, 2014)$ **where** $R \geq S$
- Calculate (expected) **incentive measures** for every valid combination of planning and retirement ages (S, R)

Eligibility: Regular Retirement

- Retirement age is well-defined for old-age (AP) and pre-retirement plans (VAPL, KOP) depending on age, cohort and insurance record
- **For regular retirement plans $SSW_S(R)$ and $OV_S(R)$ are defined by equations (1), (4) and (5) given parameters $\nu, \delta, \alpha, \gamma$**

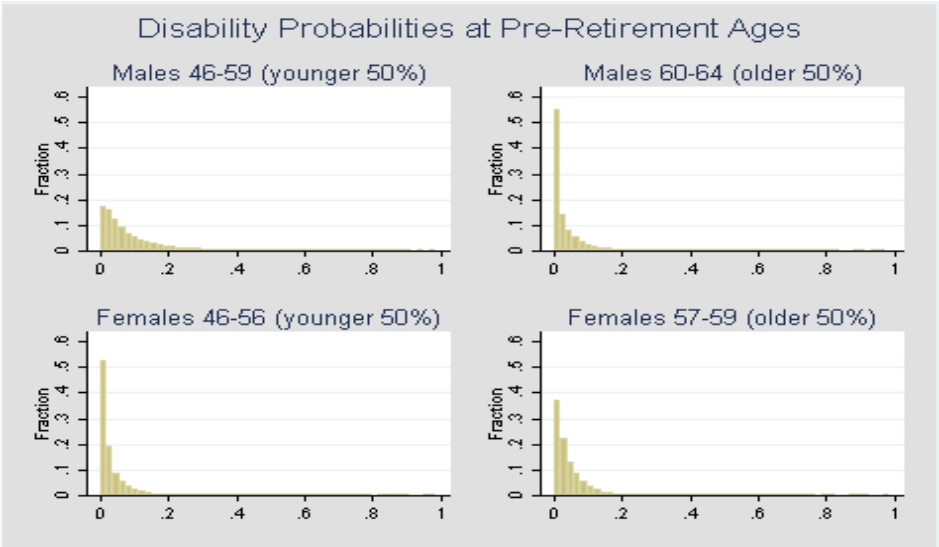
Eligibility: Disability Pensions

- Disability pensions (IP, BU, EU) are *not conditional* on insurance records, only on health and (presumably) individual effort (approx.30%)

$$E[SSW_S(R)] = p \cdot SSW_S^{DIS}(R) + (1-p) \cdot SSW_S^{DIS}(\hat{R})$$

- **Incentive measures interpreted as expected value**: weighted average of disability pensions at R and earliest regular retirement age $\hat{R}$

Probabilities of Obtaining Disability Pension (Berkel, 2006)



- Estimation: age-cubicle, gender, sick leave, unemp., migration, industry, avg. lifetime inc.
- Males 10.1% (age 46-59) and 4.1% (60+); Females 3.7% (46-56) and 4.9% (57+)
- Mean probabilities per age: rising until 56 (women) and 57-59 (men), then declining

Incentive Structure: Empirical Patterns

- Incentive structure summarised (for each S) including expected incentive measures
- $SSW_S(R = S)$ measures current wealth, $ACCR_S$ considers changes from current to next year; $PEAK_S$ and OV_S have a 5-year planning horizon

- **Empirical patterns are very diverse**: incentive measures strongly dependent on individual characteristics (i.e. eligibility and contributions)
- Structure is *not actuarially fair*, SSW_S is often declining once a person becomes eligible for pre-retirement
- Larger increases in SSW_S typically observed for (i) old-age retirement plan and (ii) in case of jumps from disability to regular retirement

Econometric Specification

- **Binary probit with retirement in the planning year as dependent variable**
- Independent variables: age, socio-demographics, SSW_S and one of the additional incentive measures $ACCR_S$, $PEAK_S$ or OV_S
- Age: either linear (LA) or as indicators (AD); in total 6 different specifications
- Parameters: $\delta = 1/(1+r)$ with $r = 0.03$; $\alpha = 1.92$ and $\gamma = 0.56$ (from grid search)

- Intertemporal effects are (partially) captured through *forward-looking* character of OV (Lumsdaine et al., 1992; Boersch-Suppan, 2001)
- **Extensions:** (a) flexible correlation patterns over time (Boersch-Suppan, 2000), (b) dynamic programming (Rust and Phelan, 1997; Karlstrom, 2004; Heyma, 2004) or (c) structural estimation of utility parameters α and γ (Samwick, 1998; Asch et al., 2005)

Option Value and Linear Age: Men

#	MEN	coeff. estimate	std. error	t-stat	p-value
1	**social security wealth**	3.1e-06	3.4e-07	9.06	0.000
2	**option value**	-0.00079	0.00004	-17.86	0.000
3	age	0.04903	0.00881	5.56	0.000
4	migration	0.14649	0.03655	4.01	0.000
5	sick leave	0.00065	0.00015	4.22	0.000
6	regular employment	0.00002	0.00002	1.37	0.171
7	self-employment	0.00003	0.00002	1.57	0.117
8	fragmented employment	-9.5e-06	0.00009	-0.11	0.911
9	unemployment	-0.00007	0.00002	-2.91	0.004
10	avg. monthly income	-0.00046	0.00005	-9.89	0.000
11-30	nace-indicators	-.-	-.-	-.-	-.-
31-36	year-indicators	-.-	-.-	-.-	-.-
37	Constant	-2.56043	0.57722	-4.44	0.000

Summary statistics

Number of observations	=	8867
$\mathcal{L}(\hat{\beta})$	=	-3632.4976
LR chi2(36)	=	2526.08
ρ^2	=	0.2580

Option Value and Linear Age: Women

#	WOMEN	coeff. estimate	std. error	t-stat	p-value
1	**social security wealth**	8.5e-06	3.9e-07	21.63	0.000
2	**option value**	-0.00036	0.00003	-10.86	0.000
3	age	0.19999	0.00812	24.64	0.000
4	migration	0.15433	0.03338	4.62	0.000
5	sick leave	0.00069	0.00014	4.83	0.000
6	regular employment	-2.9e-06	0.00001	-0.25	0.801
7	self-employment	-1.5e-06	0.00001	-0.12	0.906
8	fragmented employment	-0.00009	0.00004	-2.17	0.030
9	unemployment	-0.00006	0.00002	-2.56	0.010
10	avg. monthly income	-0.00141	0.00008	-18.44	0.000
11-29	nace-indicators	-.-	-.-	-.-	-.-
30-35	year-indicators	-.-	-.-	-.-	-.-
36	Constant	-11.13621	0.49956	-22.29	0.000

Summary statistics

Number of observations	=	10405
$\mathcal{L}(\hat{\beta})$	=	-3877.4475
LR chi2(35)	=	3570.01
ρ^2	=	0.3152

Discussion: Parameter Estimates

- **In all 6 specifications parameter estimates of incentive measures have the expected signs and are highly significant**
- SSW_S increases, while OV_S, $ACCR_S$ and $PEAK_S$ decrease prob. to retire at planning age
- Age, migration and sick leave have positive, unemployment, fragmented employment and income potential negative effects
- Incentive effects generally stronger in LA-specifications, OV/AD and PEAK/AD show highest log-likelihoods and ρ^2; results qualitatively the same for other values of α and γ
- Age: hazard rates increase continuously in linear specifications; age indicators reproduce peaks at statutory (pre-)retirement ages

- **Quantitative effects of a given reform generally depend on changes in both incentive measures**
- Simulated reforms based on specifications with *option value* and *linear age* (OV/LA)

Simulated Reforms

Strengthening Financial Incentives (CR)

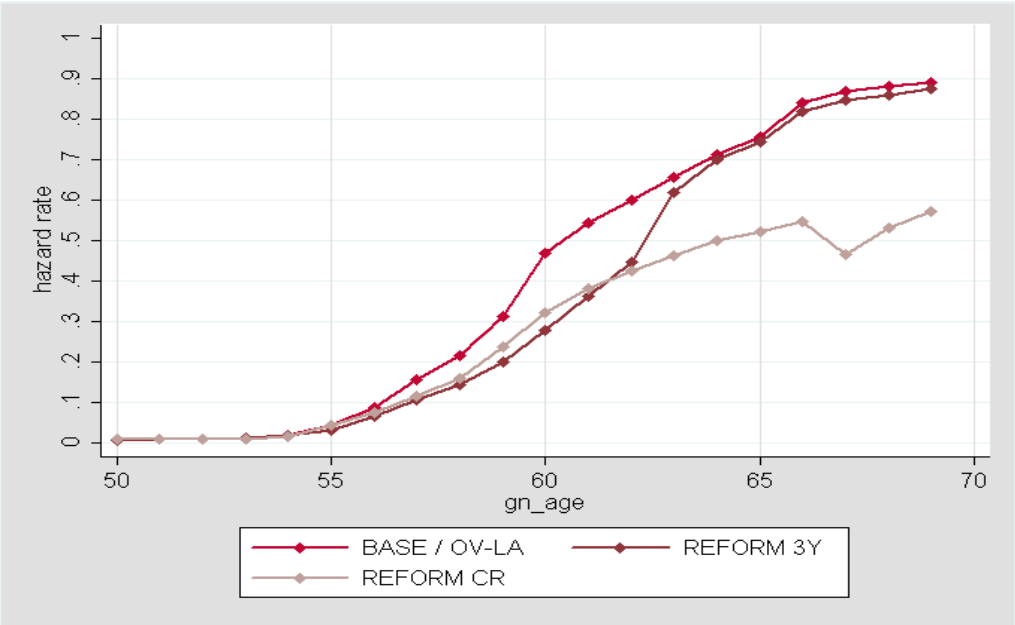
- Regular retirement age at 65 for males and females at 60% of last income
- 6% bonus p.a. for retirement after 65; 5-year pre-retirement period with 6% reduction p.a.
- Disability option: retirement before 60 still feasible, but with further reductions of 6% p.a.

Increasing Statutory Retirement Ages (3Y)

- Statutory retirement age is increased by 3 years for non health-related retirement
- Disability options are affected through changes in future eligibility for regular retirement

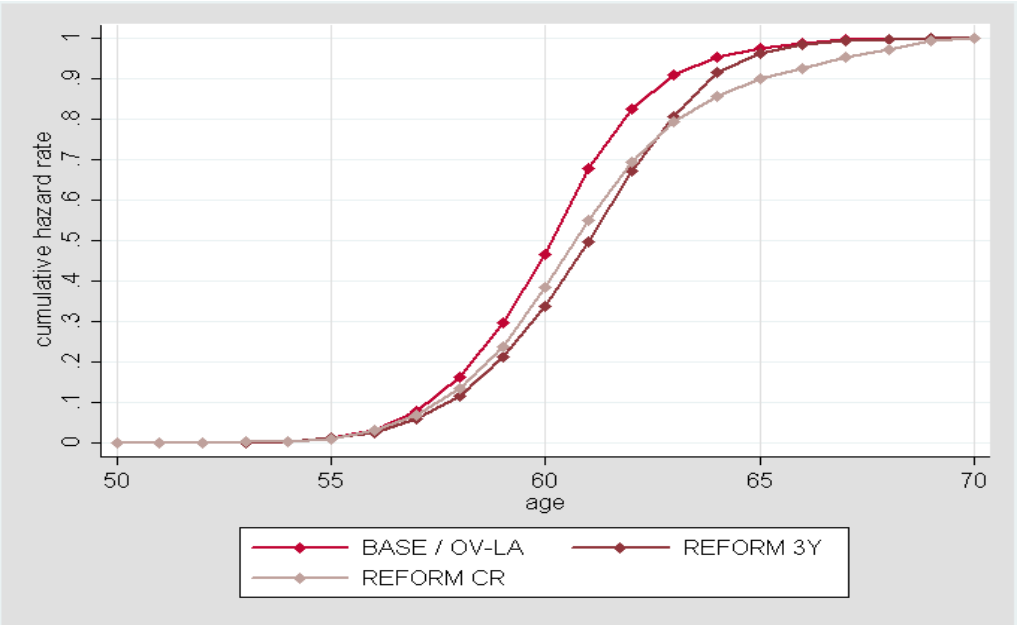
Comparison of base/reform scenarios: mean hazard rates and cumulative hazards by age and gender based on the same time frame

Mean Hazard Rates in Base/Reform: MEN/OV/LA

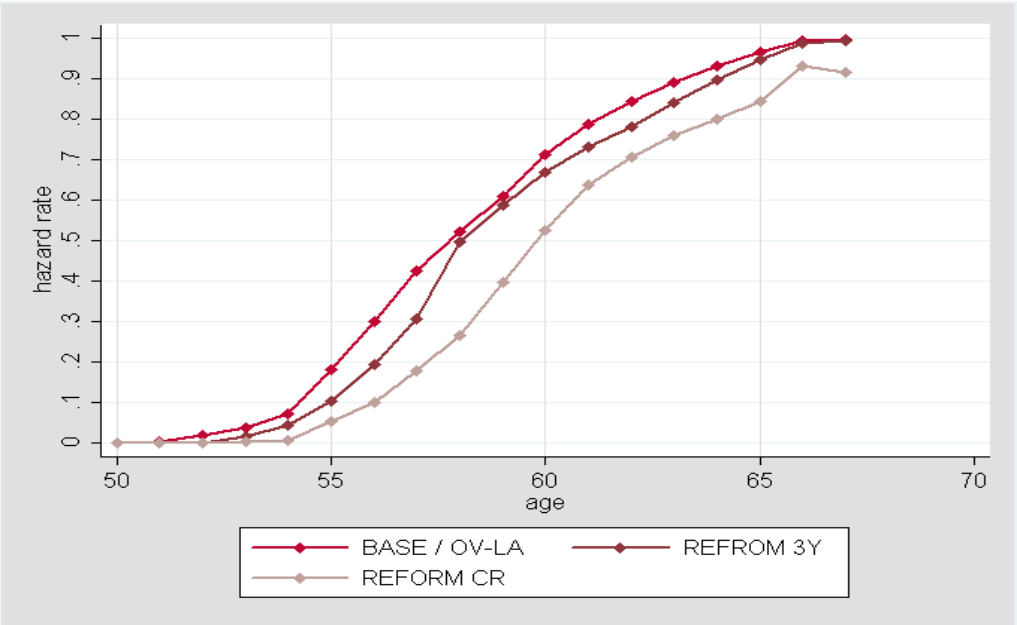


- CR: strong reductions in hazard rates; increases in old-age labor supply above regular retirement age
- 3Y: decreases out-of-labor-force (OLF) proportion mainly between 59-62; later in line with base

Cumulative Hazard Rates in Base/Reform: MEN/OV/LA

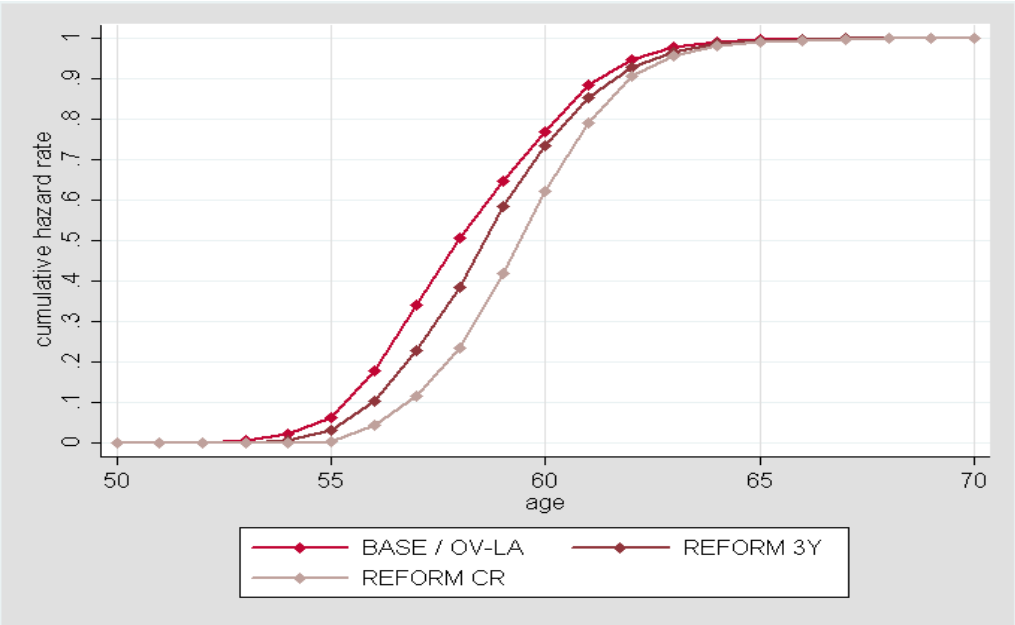


Mean Hazard Rates in Base/Reform: WOMEN/OV/LA



- CR: hazard rates shifted to the right; stronger increases in labor supply for all ages
- 3Y: reduces out-of-labor-force (OLF) proportion mainly between 55-57 and 62-64

Cumulative Hazard Rates in Base/Reform: WOMEN/OV/LA



Concluding Remarks

- Incentive structure: SSW typically declining as statutory retirement age is reached
- Financial incentives are significant and have potential to increase old-age labor supply
- **OLF-Proportion of individuals aged 56-65: decreases by 4.7 / 7.7 pp. for females/males (3Y) and by 11.8 / 7.2 pp. for females/males (CR)**
- **Robust relationship between incentives and retirement; but overall quantitative effects comparatively low (Staubli and Zweimueller, 2011; Manoli and Weber, 2011)**

- International comparison difficult due to different starting points; Austrian retirement ages among the lowest in Europe (Gruber and Wise, 2004)
- **Complex and intransparent status-quo**: Simple and transparent retirement system would strengthen the effects of financial incentives

Thank you for your attention!

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