The Economics of Imperfect Labor Markets

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The Economics of Imperfect Labor Markets
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Chapter 6. Retirement Programs

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

What are we talking about?

- From a historical perspective large-scale retirement of workers rather recent phenomenon
- Until “recently”: workers worked until they died or got seriously ill
- Today, retirement = extended period of self-financed independence & leisure
- Forced retirement - mandatory retirement age
- Public pensions are pay-as-you go schemes
- Private pensions can be fully funded
- Defined benefit (DB) – contribution varies
- Defined contribution (DC) – benefits vary
- Early retirement programs - offers that cannot be refused

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Measures

- Pension wealth: present value of stream of expected pension benefits
- Benefit accrual = difference between pension wealth at retirement age a and retirement age $a + 1$
- Benefit accrual - implicit tax/subsidy
- Earliest retirement age - related to early retirement programs
- Standard retirement age - government pensions

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Pension wealth & benefit accrual

Assume constant pension benefits B, a is the date of the (early) retirement. Pension wealth PW is

$$PW(a) = \sum_{t=a}^{T} \frac{B(a)}{(1+i)^{t-a}} = B(a) + \sum_{t=a+1}^{T} \frac{B(a)}{(1+i)^{t-(a+1)}}$$

where i is the rate at which future pension benefits are discounted. If she instead decides to work an additional year

$$PW(a+1) = \sum_{t=a+1}^{T} \frac{B(a+1)}{(1+i)^{t-(a+1)}}$$

Thus, the benefit accrual BA is given by

$$BA(a+1) = PW(a+1) - PW(a) = -B(a) + \sum_{t=a+1}^{T} \frac{B(a+1) - B(a)}{(1+i)^{t-(a+1)}}$$

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Defined Benefit & Defined Contribution

Defined Benefit system:

$$B(a+1) = B(a) = B$$

hence

$$BA(a+1) = -B$$

In other words, the worker suffers a loss in her pension wealth by postponing retirement.

Defined Contribution system:

$$B(a+1) = B(a)(1+\xi)$$

where ξ is the change in the annuitization (in the yearly pension amount) brought about by an additional year of work.

For large T, $BA(a+1) \simeq -B + \frac{\xi B}{i}$.

$BA(a+1) > 0$ if $\xi > i$, i.e. if the benefit accrual associated with an extra year of work is higher than the market interest rate.

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Notional Defined Contribution

”Financial account” scheme:

- Workers contribute during working life & draw benefits based on lifetime contributions after retiring ...
- ...however, benefits not invested in financial assets: contributions flow through Social Security system to cover current pensions. It is still a pay-as-you go scheme
- Returns con contributions and annuitisation depend on growth.

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Retirement decision

- Benefit accrual = implicit tax (BA$<$0) or implicit subsidy (BA$>$0)
- Whether or not a person retires at age *a* also depends on wage and preferences for income and leisure

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Cross-country retirement

	Retirement ages							
	Earliest Males			Standard Males		Standard Females		Pension Repl Rates
	1969	2001	2011	1969	2011	1969	2011	Males
Denmark	67	65	n.a.	67	67	67	67	94.5
France	60	60	56	65	60	65	60	60.8
Germany	65	63	63	65	67	65	67	58.4
Italy	55	57	61	60	65	55	60	76.2
Netherlands	65	60	n.a.	65	65	65	65	103.3
Spain	65	60	61	65	65	55	65	84.5
UK	65	65	n.a.	65	68	60	68	48.0
US	62	62	62	65	67	65	67	53.4

Pension replacement rates: Full-career workers with average earnings – net replacement rate with mandatory retirement

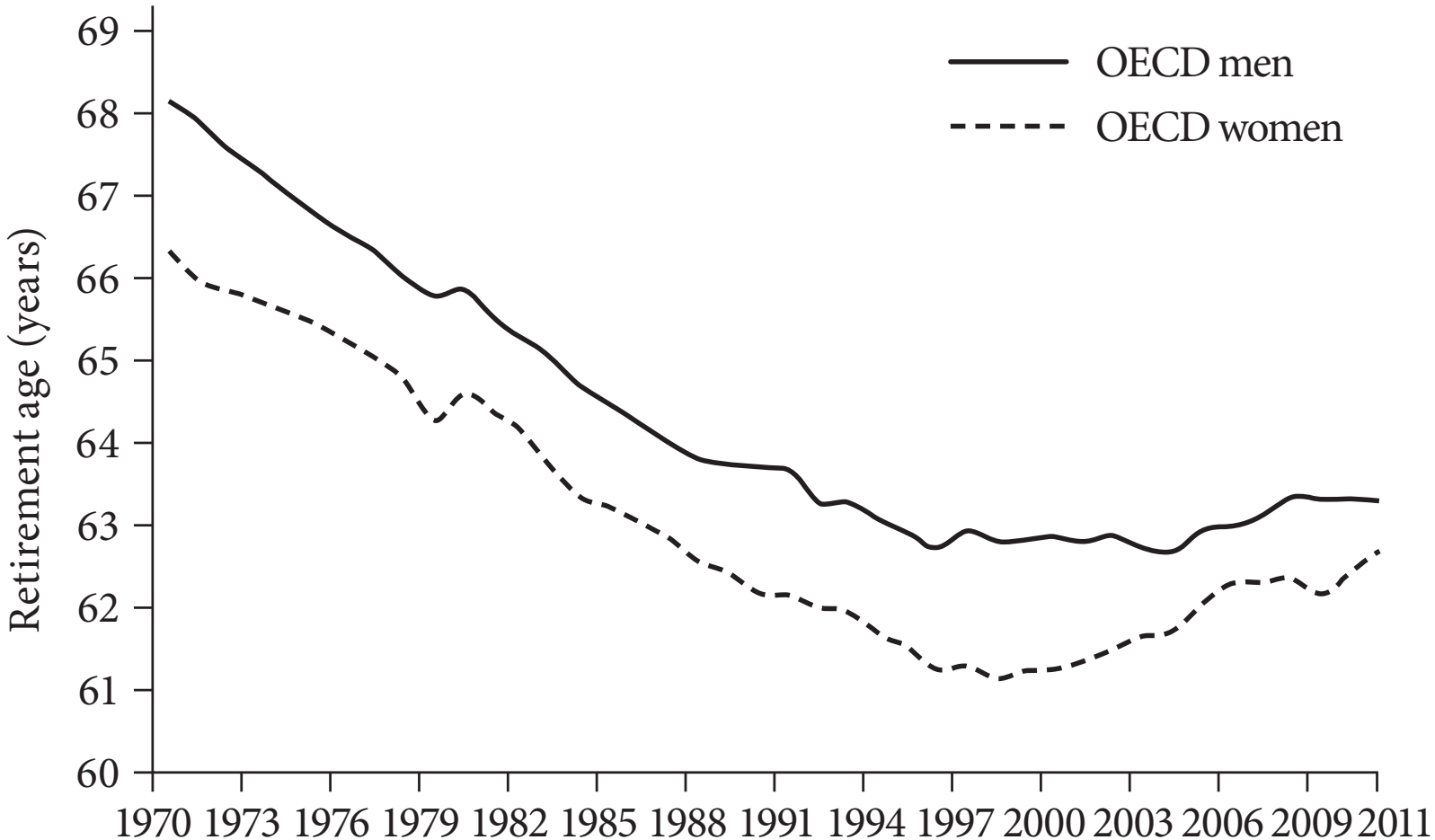
Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Cross-country comparison

- Standard and earliest retirement age ↓
- Most common standard retirement age: 65
- Variation in retirement incentives
- Net replacement rate for public old-age pensions
  - About 50% in UK
  - About 100% in the Netherlands

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Men-women comparison



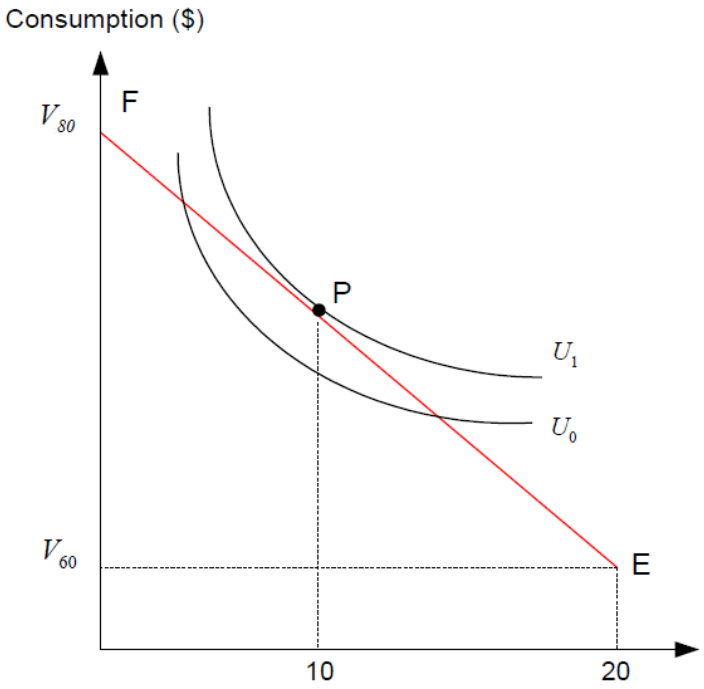
Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Retirement theory static – defined benefits

- Lifetime incomes are higher the longer workers put off retirement
- If pension benefits are constant, wage increases have a substitution and income effect, so lifetime income may not be altered
- An increase in pension benefits reduces the price of retirement, increasing the demand for leisure, encouraging the worker to retire earlier: Income effect & substitution effect work in the same direction

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

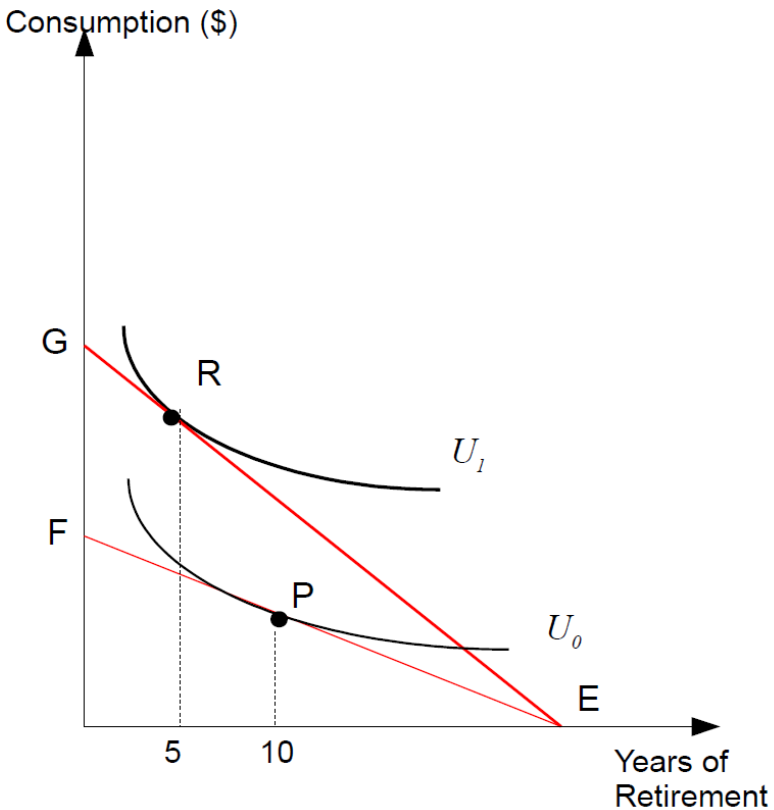
The retirement decision



Death at 80:
Point E leisure-consumption bundle if retirement at age 60.
Point F if the worker never retires.
A utility-maximizing worker chooses point P, and retires for 10 years.

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

The retirement decision

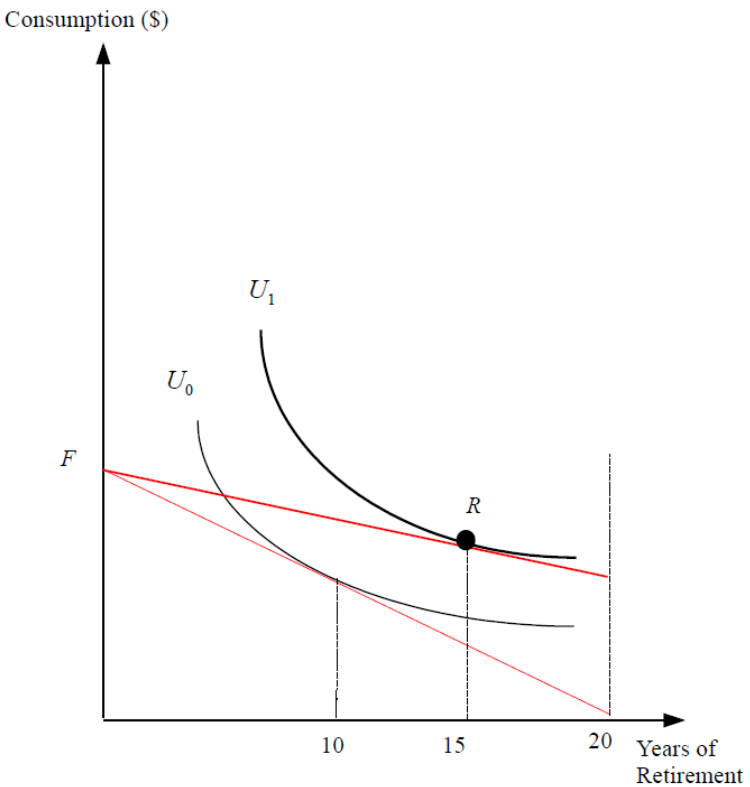


An increase in the wage rotates the budget line around point E, and generates both income effects and substitution effects as the worker moves from point P to point R.
The figure assumes that substitution effects dominate and the worker delays his retirement.

SE $>$ IE : work longer

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

The retirement decision



An increase in pension benefits rotates the budget line around point F.
It too generates income and substitution effects, but both effects encourage the worker to retire earlier.

Both effects same direction: work shorter

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Theory option value

- Continue to work if expected present value of continuing work is greater than expected present value of immediate retirement
- Option value of work: positive - postpone retirement; negative - retire
- Eligibility for early retirement: downward shift in option value - offer you can't refuse
- Incentives may depend on benefit systems:
  - DB: retire later: no effect on pension benefits
  - DC: retire later: higher pension benefits

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

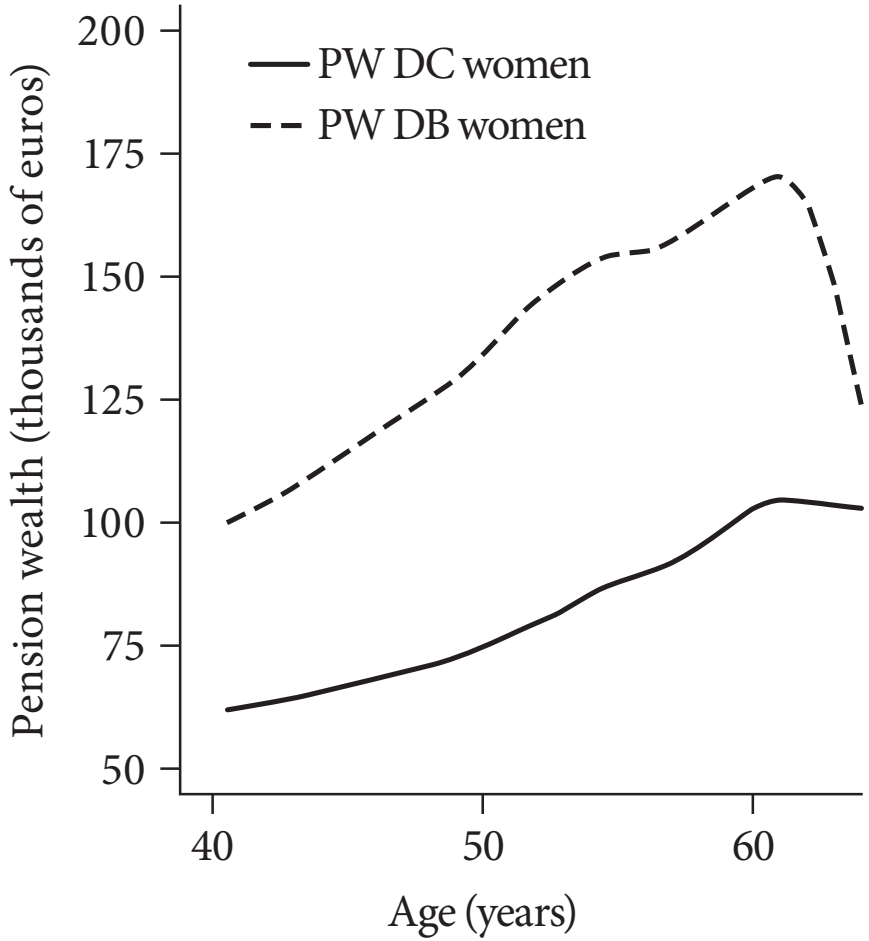
Average age of transition to inactivity

	Men			Women		
	1967	2002	Change	1967	2002	Change
Denmark		65.3			62.1	
France	67.3	59.3	-8.0	66.8	59.4	-7.4
Germany		60.9			60.2	
Italy	64.3	61.2	-3.1	59.6	60.5	0.9
Netherlands		61.0			59.1	
Spain		61.6			61.3	
UK		63.1			61.2	
US	69.9	65.0	-4.9	68.6	61.9	-5.7

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

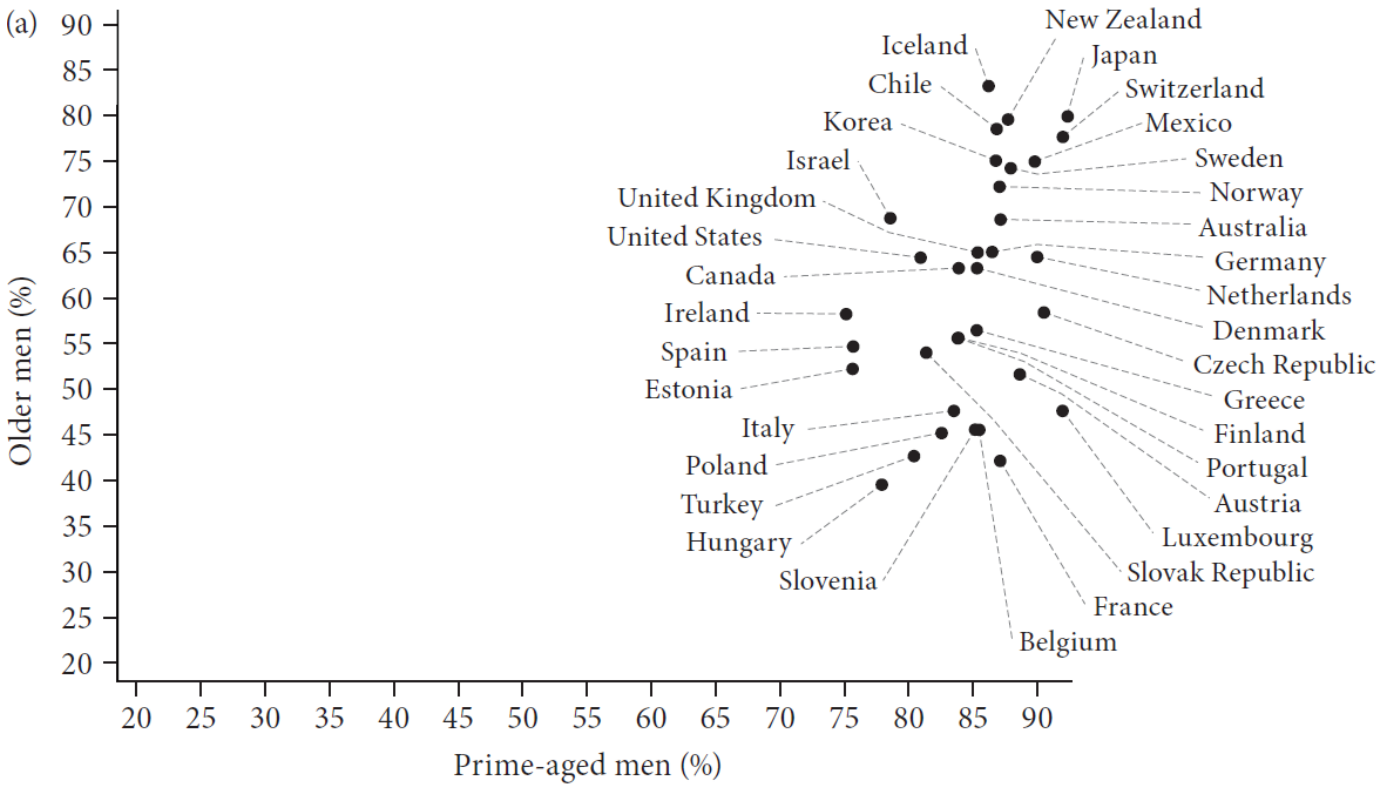
Pension Wealth

Pension wealth under the pre-reform (DB) and post-reform (NDC) rules by age. Italy, Women



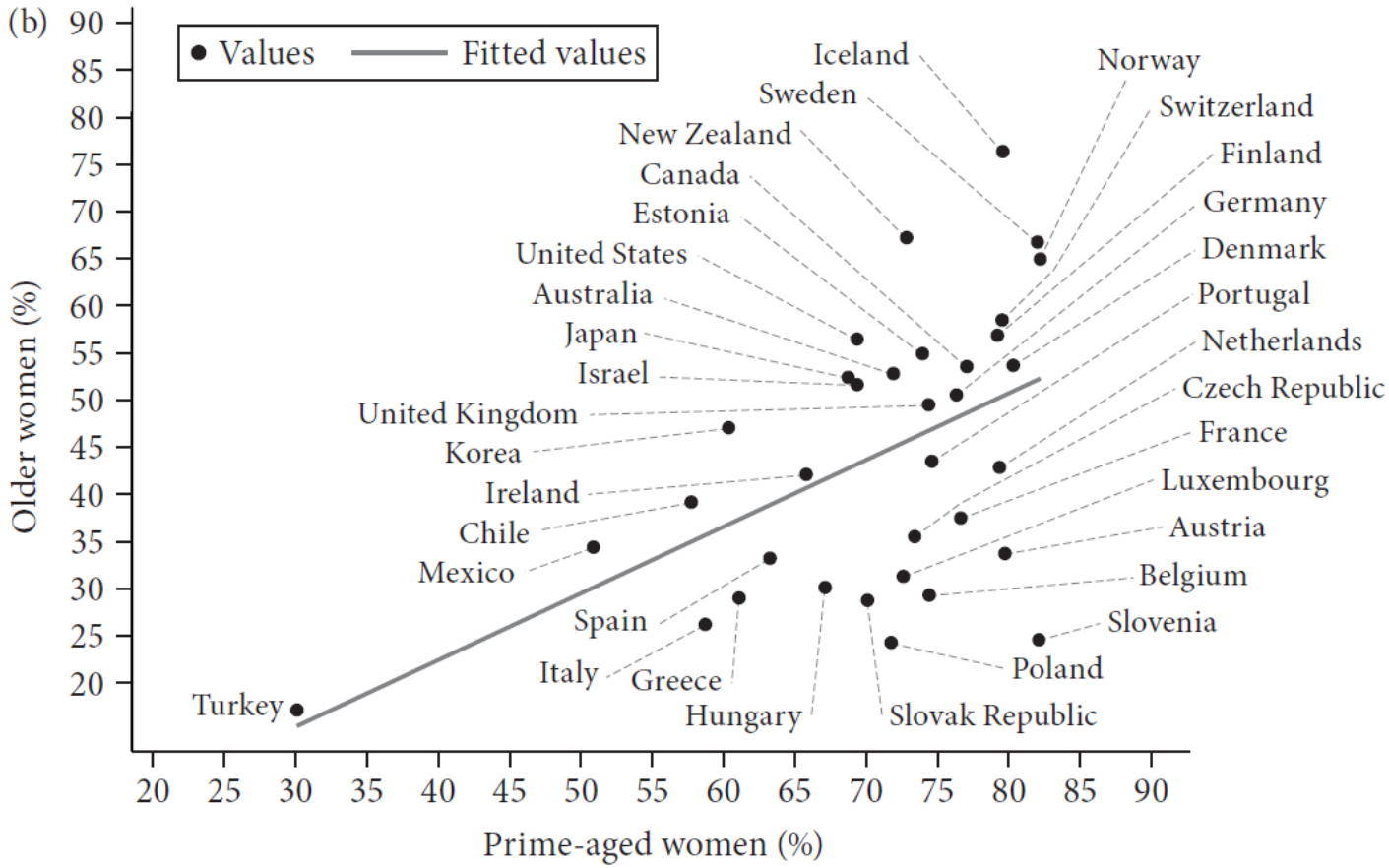
Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Employment rates men – 2005



Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Employment rate women – 2005



Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Box 6.1 Stimulating early retirement in Norway

- Standard retirement age = 67
- Entitlement to early retirement (AFP):
  - 66 up to 1990
  - 65 in 1990
  - 64 in 1993
  - 63 in 1997
  - 62 since 1998
- AFP:
  - “Dignified” exit from labor force
  - Benefits related to public benefits age 67
  - Replacement rate exceeds 100% for low incomes; 65% for medium incomes

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Box 6.1 Bratberg, Holmås and Thøgerson (2004)

- Analysis as if “natural experiment”
- Non-AFP firms and AFP firms (requires 3 years of employment at present firm)
- Identifying assumption: no selection on unobservables into the AFP firm
- October 1993: reduction eligibility age 65 to 64
- Labor market 3 months after 64th birthday:
  - Birthday January — March 1993: control group – may retire at 65
  - Birthday January — March 1994: treatment group – may retire at 64

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Results of dif-in-dif analysis

3 months after 64^{th} birthday

	Control			Treatment			
	AFP: may retire at 65			AFP: may retire at 64			
AFP	yes	no	Δ	yes	no	Δ	ΔΔ
Work	82.6	83.8	1.2	64.7	86.0	21.3	-20.1
AFP	—	—	—	26.0	—	-26.0	26.0
Other	17.4	16.2	-1.2	9.3	14.0	4.7	-5.9
Total	100	100	0	100	100	0	0

Use of AFP: largest part leaves work – only small part has more “dignified” exit

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Empirical evidence - age and productivity

- Older workers: more reliable, better skills
- Older workers: high health costs, low flexibility, less suitable for training
- Age-productivity profile not exogenous to institutions
- Age-productivity relationship difficult to establish but employers have strong opinions about the productivity of older workers

▸ Run for fun (10km)

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Run for fun 10 years (1998-2008) fixed effects estimates

	Speed (km/h)	Age effect (%)	Observations	Individuals
Men				
<1950	12.8	-1.2(8.3)**	217	74
1950-59	13.3	-0.5(6.3)**	578	170
1960-69	13.8	-0.5(3.7)**	355	125
>1970	15.5	0.2(0.7)**	133	47
Women				
<1950	11.1	-1.4(2.9)**	18	7
1950-59	12.1	-0.7(3.1)**	130	41
1960-69	11.9	0.2(0.8)	84	31
>1970	12.8	0.6(0.7)	35	7

t-statistics in parentheses

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Montizan, Cörvers, De Grip (2010)

- Aim: identify effects of exogenous changes in pension system on workers' investment in human capital
- Natural experiment, Dutch public sector (2006)
  - Workers born in 1950 or later: abolishment of pre-pension plans $\Longleftrightarrow$ postponement of retirement (treatment group, T)
  - Workers born before 1950: no abolishment of pre-pension plans (control group, C)

Results:

- Postponing retirement by 1 year leads to 1.3% higher training attendance
- Detrimental effect of early retirement on human capital formation
- However, results are only significant in large organizations

▸ Did the people understand the reform?

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Effects of the Dutch reform on training participation (%)

	Born in 1949	Born in 1950	Δ	ΔΔ
2005	50	50	0	
2006	54	57	3	+3

So: age-productivity profile = endogenous

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Schnalzenberger, Winter-Ebmer (2009)

- Austria, 1996-2000: Introduction of tax on layoff of older workers on employers: up 170% of monthly income if worker older than 50
- Does introduction of new tax decrease firing of such workers? Diff in diff approach:
  - Treatment group: workers above 50
  - Control group: workers aged nearly 50

	Men		Women	
	1996	2000	1996	2000
Displacement	1.10	1.01	1.66	1.41
$\Delta_{[>50-<50]}$	0.04	-0.28	-0.8	-0.47

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Policy issue 1: Should mandatory retirement age be increased?

- Lazear (1979): delayed compensation contracts: age-earnings profile upward sloping to prevent workers from shirking
- Issue of selection: least productive workers most likely to retire first
- U.S. study: neither job tenure nor wage profiles of older workers were affected by changes in mandatory retirement; so mandatory retirement not a unique instrument to end long-term relationships (demotion)
- Increase mandatory retirement age may be neither necessary nor sufficient to increase labor force participation among older workers – see low employment rates of age group 56–64.

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Box 6.2 Elimination mandatory retirement age US

- 1986: Age Discrimination in Employment Act - mandatory retirement abolished
- Temporary exemption for postsecondary institutions to enforce mandatory retirement at age 70
- Mandatory retirement age for college and university professors expired in 1994 - federal law
- Analysis of FRS - Faculty Retirement Survey
- Two types of institutions (according to state laws):
  - Capped: could enforce mandatory retirement
  - Uncapped: were prohibited to enforce mandatory retirement
- DC pension benefits

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Ashenfelter and Card (2002)

	Mandatory retirement	No mandatory retirement	Diff.
Probability to stay to age 70 (%)			
From age 60	26.1	25.4	0.7
From age 65	39.2	38.6	0.6
Employment outcome if work at age 70 (%)			
Leave at 70	76.6	29.6	47.0
Employed at 71	23.4	70.4	-47.0
Employed at 72	8.4	51.6	-43.2
Employed at 73	6.3	39.4	-33.1

- No effects below age 70
- Substantial reduction of retirement among 70 and 71 year olds
- Higher salary & lower wealth – less likely to retire at given age

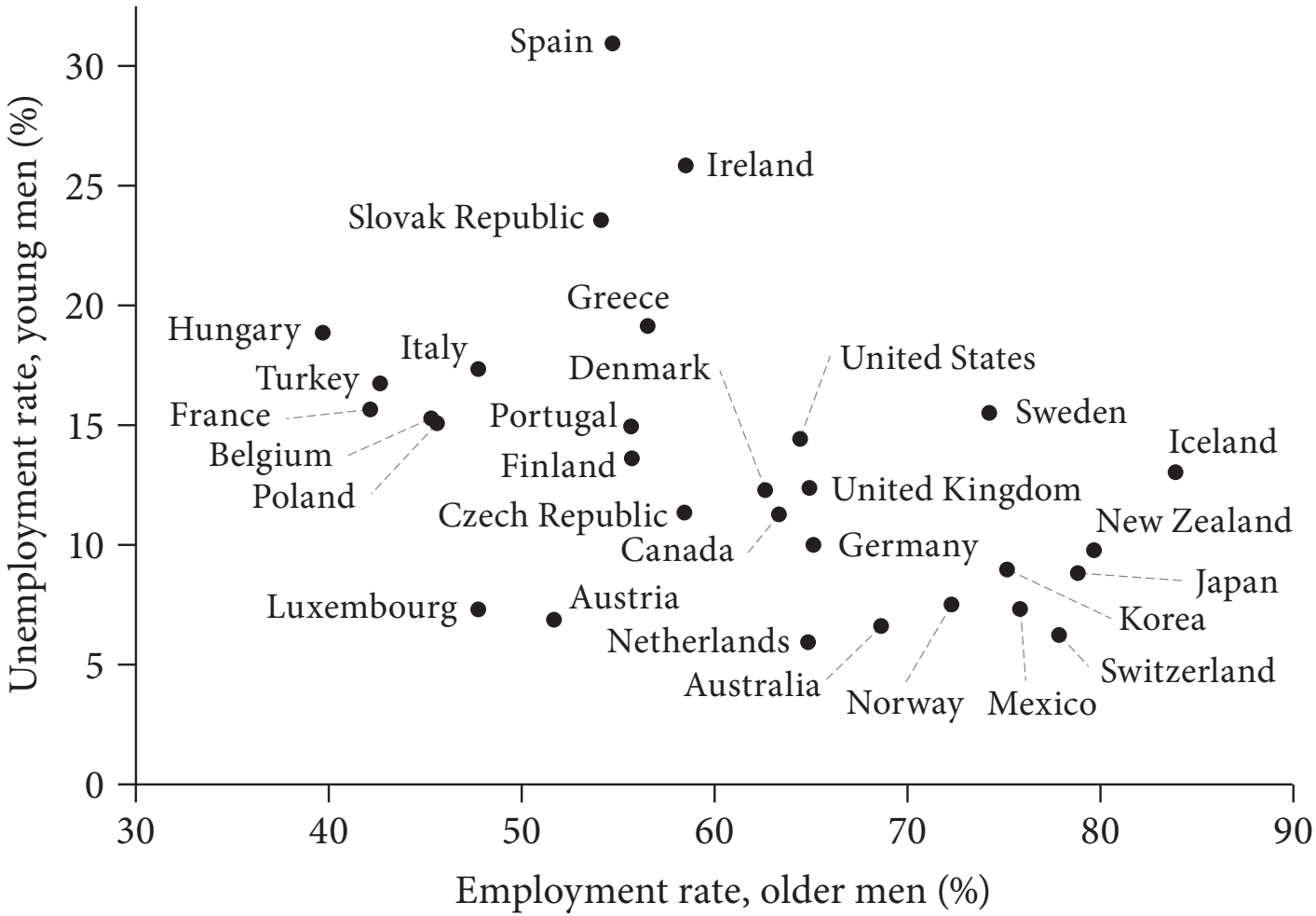
Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Policy issue 2: Should early retirement programs be phased out?

- In many countries early retirement policies introduced as a short-term policy response to combat unemployment
- Lump-of-labor fallacy: see also working hours chapter
- May have affected perception of employers and workers themselves vicious circle of perceptions that lack a solid empirical basis

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Employment older men & unemployment young men – 2006



Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Overlaps with other institutions

- Training and time horizon to retirement age
- Unemployment benefits – alternative outflow from a job
- Employment protection legislation – adjustment costs; early retirement sometimes the cheapest (only) way to get rid of older workers

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Should Public Pensions become NDCs?

NDC is new conventional wisdom in pension systems:

1. ensure long-term financial sustainability of the system
2. reduce existing distorsions in labor markets (incentives to retire early)
3. increase intergenerational equity of the system
4. makes contributions look like deferred consumption
5. reduce political interference w/pension systems, as automatic adjustments do not require government intervention
6. however not easy to understand and to introduce. design can be substantially altered (e.g., Italy)

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Why do early retirement programs exist?

- Lump-of-labor fallacy not present: countries with high employment of elderly workers have a low youth unemployment rate
- Argument in favor of early retirement programs: health problems
- However: life expectancy increased substantially & health of older individuals improved greatly
- Beneficial to workers who retire early – incumbent workers pay
  - Government: reduce youth unemployment
  - Employers: easy way to get rid of older workers
  - Unions: older members prefer to retire
- Little reason not to abolish early retirement programs

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Review Questions

1. What is the difference between a defined-benefit (DB) and a defined-contribution (DC) pension system?
2. Why do people generally retire more gradually under a DC system than under a DB system?
3. Why is early retirement not a good instrument to reduce youth unemployment?
4. In Lazear's model, why do wages increase with tenure, and how does that affect retirement programs?
5. How would an increase in the standard retirement age affect the behavior of employers and workers?

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Exercise(I)

Joe has worked until reaching the age of 60. He now has two options. The first is to work for another 5 years, earning 40,000 euros per year, retire at age 65, and collect a pension of 10,000 euros per year for the following 15 years. The second option is to retire immediately and collect a yearly pension of X euros for the next 20 years. Suppose that a euro received today is worth 1.05 euros received next year.

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Exercise(II)

1. What value of X gives the worker the same total income (earnings and retirement benefits) in net present value terms in the two options?
2. What value of X gives the worker the same pension wealth in the two options?
3. Consider a state-provided medical insurance which is provided free to persons as long as they continue to work up to the age of 65. Those under 65 years of age who are not working can purchase this health insurance for 5,000 euros per year. If Joe values retiring at age 60 over retiring at age 65 at 200,000 euros, for what value of X would he retire at age 60?

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Optimal Retirement Age (I)

A more general framework to analyze retirement decisions: the option value of retirement model (Stock and Wise, 1990). The total net present value of retirement at age a is

$$NPV_t(a) = \sum_{t=t_0}^{a-1} \left(\frac{1}{1+i}\right)^{t-t_0} U(w_t) + \sum_{t=a}^{T} \left(\frac{1}{1+i}\right)^{t-t_0} U[B_t(a)].$$

where t is an indicator of age, U is a function indicating the (indirect) utility that the person derives from the wage earnings w_t, $\frac{1}{1+i}$ is the discount factor, t_0 is the age at which the individual starts working, a is the age at which he/she retires, T is the age until he/she lives and $B_t(a)$ is the pension benefit.

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Otimal Retirement Age (II)

$$NPV_t(a) = \sum_{t=t_0}^{a-1} \left(\frac{1}{1+i} \right)^{t-t_0} U(w_t) + \sum_{t=a}^{T} \left(\frac{1}{1+i} \right)^{t-t_0} U[B_t(a)].$$

Postponing retirement increases the length of the first period and reduces the length of the second one, this has a positive effect on the value of retirement. However, if a person postpones retirement, she or he will have fewer years of receipt of the pension. This second effect will decrease the value of retirement. Of the two effects, the first is initially more important, but eventually the second effect dominates. Thus, there must be some age a^* where there is a maximum value of retirement.

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Otimal Retirement Age (III)

The option value OV of retirement compares the expected lifetime utility of retiring today and the expected lifetime utility of postponing the decision until the optimal retirement age a^*, that is,

$$OV_t(a^*) = E_t[NPV(a^*)] - NPV_t(a).$$

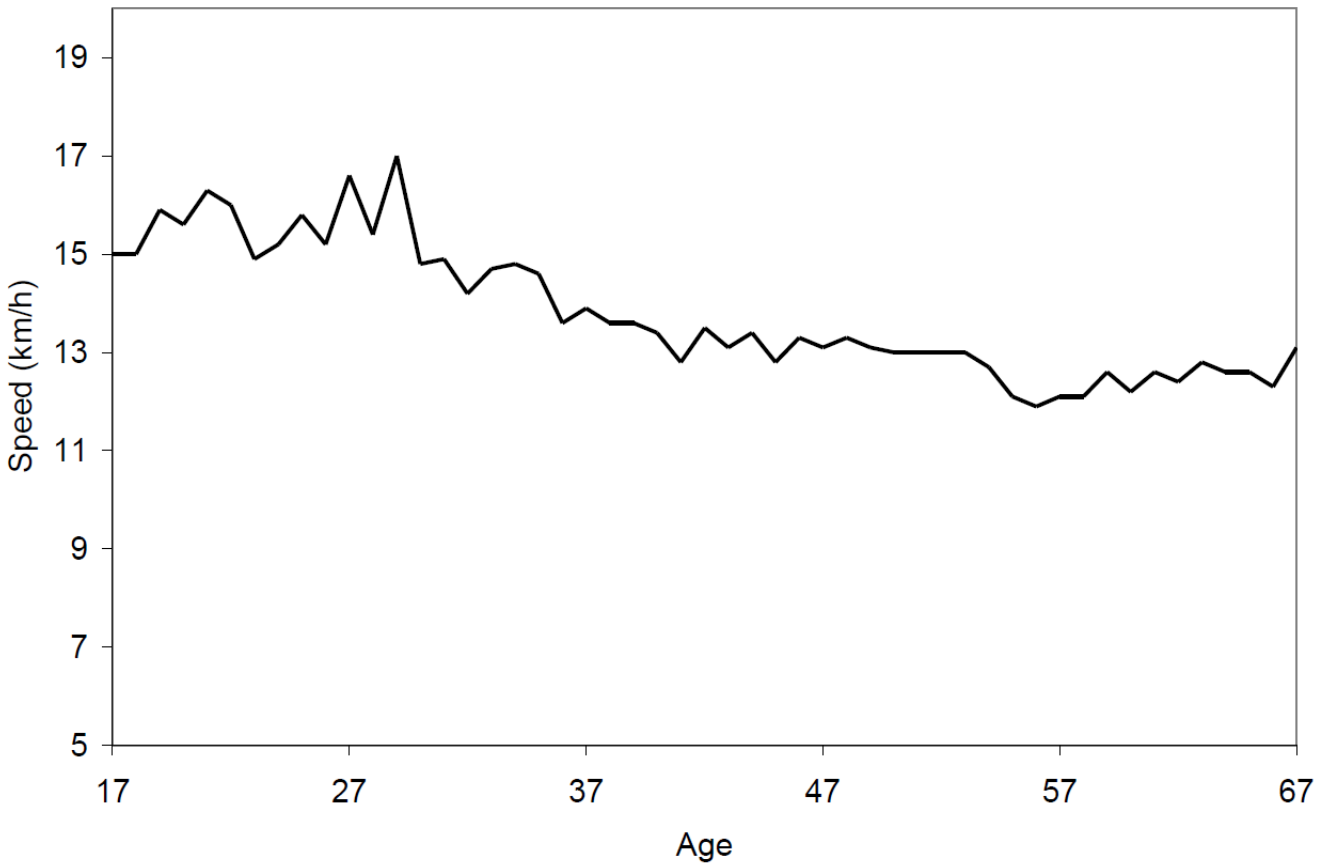
A worker is expected to retire if the utility of retiring at a^* is smaller than the utility of retiring today, that is, if the option value is negative.

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

ADDITIONAL MATERIAL:

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

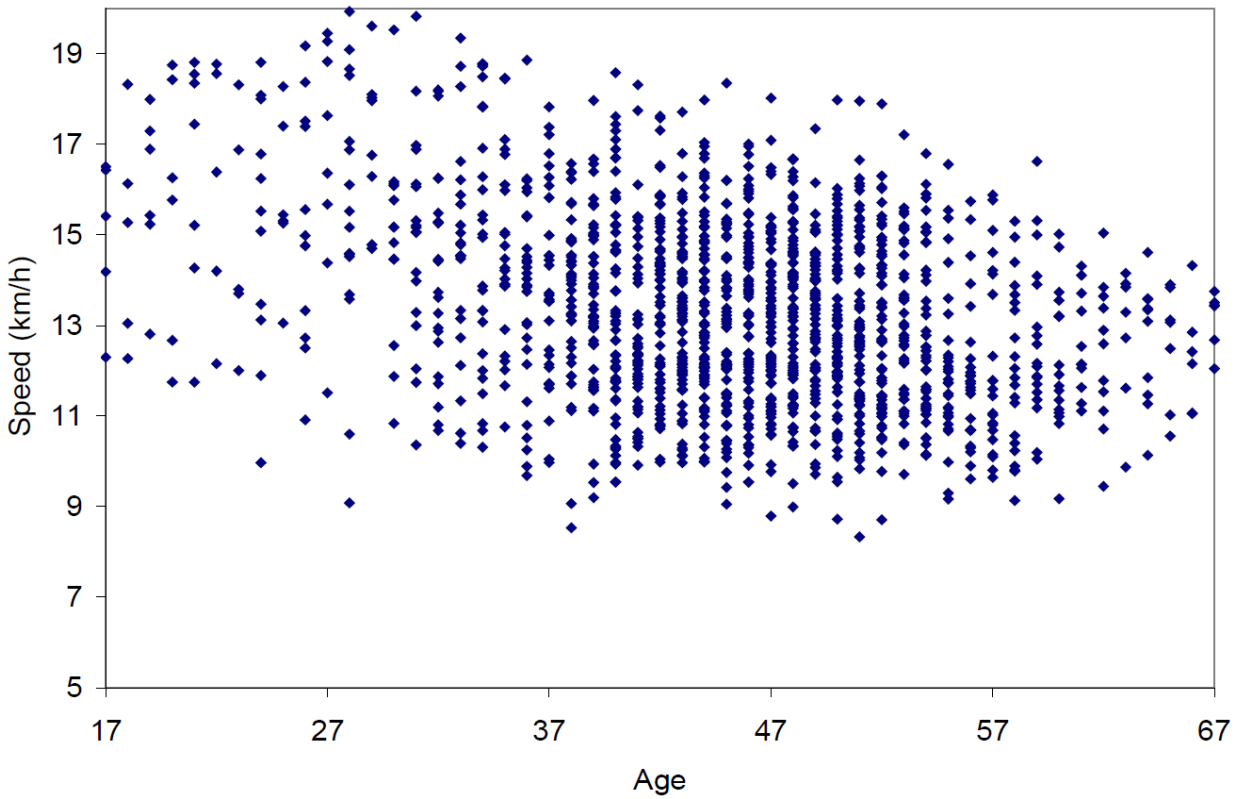
Run for fun (10 km)



◂ Empirical evidence - age and productivity

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.

Run for fun (10 km)



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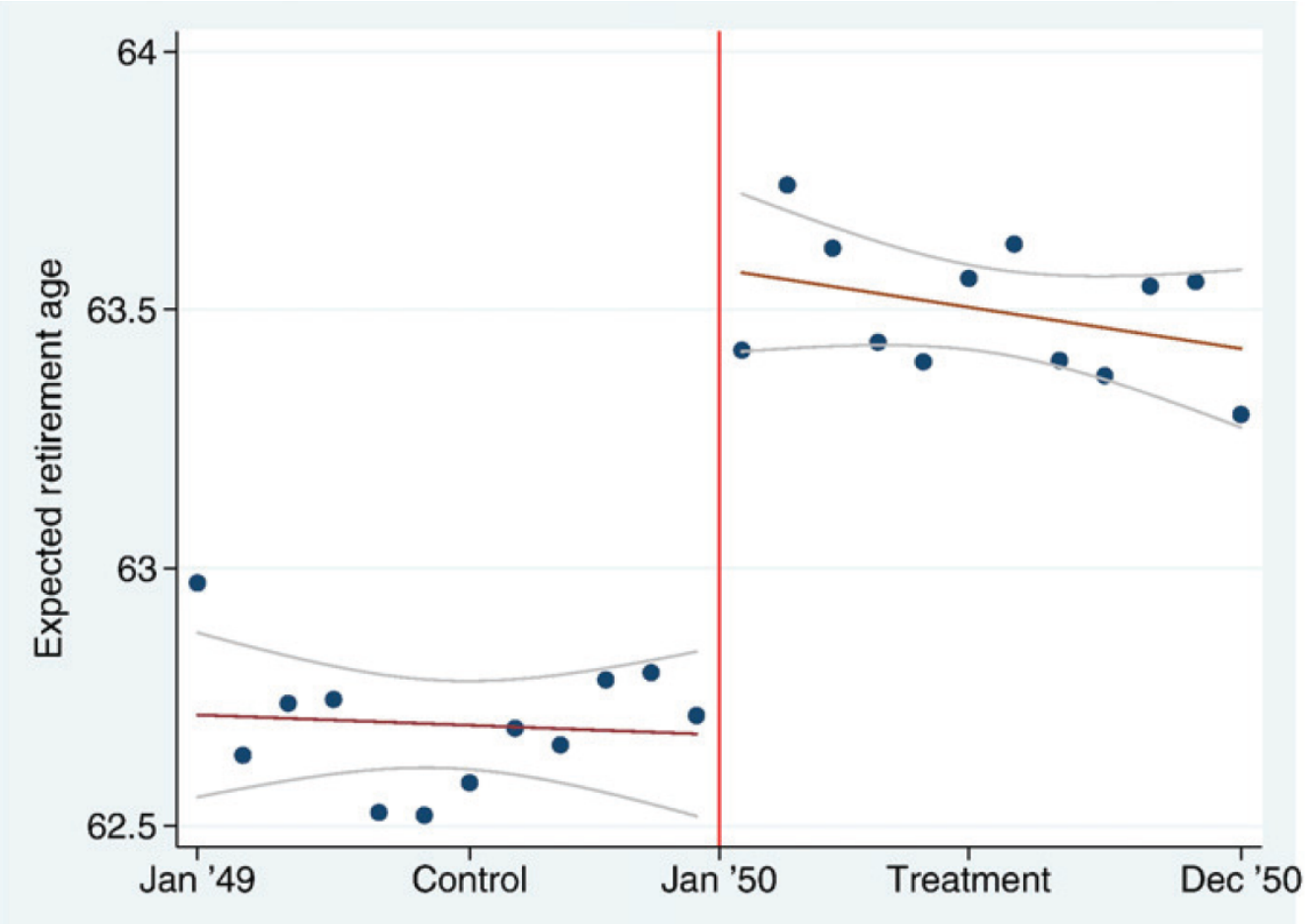
Did the people understand the reform? Expected retirement age by month of birth



◂ Montizan, Cörvers, De Grip (2010)

Source: Tito Boeri and Jan van Ours (2008), The Economics of Imperfect Labor Markets, Princeton University Press.