Designing pension systems

DEFINING RETIREMENT-INCOME ADEQUACY
BALANCE: ADEQUACY | INCOME-REPLACEMENT SCHEMES

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PENSIONS CORE COURSE
WASHINGTON DC
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Goal of retirement-income provision

• Primary objective
  • ensuring older people have a decent standard of living in retirement

• Two interpretations
  • ‘Core adequacy’: ensuring older people meet a basic standard of living
  • ‘Broad adequacy’ or ‘income-replacement’: ensuring a reasonable standard of living in retirement relative to position before retirement
Measuring core and broad adequacy

- Core adequacy: an **absolute** measure of living standards
  - individual pension entitlement as a proportion of economy-wide average earnings
  - pension level
- Income-replacement: a **relative** measure of living standards
  - individual pension entitlement relative to individual earnings when working
  - replacement rate
International experiences

• Different degrees of emphasis on the alternative approaches: **core-adequacy** and **income-replacement**

• Analysis of **mandatory** retirement-income provision
  • using Apex models for OECD countries

• Two benchmarks:
  • universal, flat rate benefit
  • constant replacement rate
Benchmarks

Relative pension level

- Basic
- Earnings related

Replacement rate

- Basic
- Earnings related
Relative pension level

• OECD illustrations
Replacement rate

- OECD illustrations
World Bank’s multi-pillar framework

- **Zero pillar**: mandatory, public, adequacy
  - Zero pillar variations:
    - Basic
    - Resource-tested
    - DB
    - Points
    - NDC
    - Public DC
    - Minimum pensions
    - Public DB
    - Private DC
    - Private DB

- **First pillar**: mandatory, public, mainly income replacement

- **Second pillar**: mandatory private, income replacement

- **Third pillar**: voluntary private
Design of income replacement pensions

EARNINGS-RELATED SCHEMES
DEFINED-BENEFIT | POINTS | NOTIONAL-ACCOUNTS
Single, over-arching principle

• Each dollar, euro etc. of contributions should produce the same amount of benefits to all individuals

• It does not say that each contribution should deliver benefits equal to the amount contributed
Fairness

- Pension systems based on this principle are **fair**:  
  - between people at different stages of their careers  
  - between low and high earners  
  - between early, normal and late retirees

- Tunisia’s pension system is **unfair**:  
  - it favours short contribution histories over longer  
  - low earners get relatively more than higher earners  
  - early retirees receive benefits for longer, which is not adequately taken into account
Incentives

• Pension systems based on the core principle – of equal contributions for equal benefits – **minimize distortions to individuals’ economic behaviour**
  • saving, labour-supply, retirement and contribution decisions

• Gains from well-meaning policies addressing important challenges can be outweighed by their negative side-effects
Unintended consequences

- Powerful incentives to contribute for short periods and move into the informal sector
- Encourage under-declaration of earnings towards or down to the minimum wage
- Induce people to retire earlier than under a neutral pension system

- Fairness and incentives go hand-in-hand
Violating the fundamental principle

• Might be justified
• But the onus of proof must be on the violator
  • Men *versus* women
  • Clash between objective of retirement-income adequacy and strict fairness/incentives
• But many ways to ensure adequacy with different effects on fairness and incentives
Three kinds of earnings-related plan

- **Defined benefit**
  
  \[ DB = \sum_{i=0}^{R} w_i (1+u)^{R-i} a \]

  AUT, BEL, CAN, CZE, FIN, FRA, GRC, HUN, ISL, JPN, KOR, LUX, NLD, PRT, SVN, ESP, GBR, USA

- **Points**
  
  \[ PP = \sum_{i=0}^{R} \frac{w_i v_R}{k_i} = \sum_{i=0}^{R} \frac{w_i v_i}{k_i} (1+x)^{R-i} \]

  EST, FRA, DEU, SVK

- **Notional accounts**
  
  \[ NA = \sum_{i=0}^{R} \frac{w_i c}{A} (1+n)^{R-i} \]

  ITA, NOR, POL, SWE

- **Two identities**

  if \( u = x = n \)

  then \( a = \frac{v}{k} = \frac{c}{A} \)
Eleven parameter and rules

- Accrual rate
- Maximum pension/replacement rate
- Contribution years needed
- Minimum pension
- Earnings measure
- Revaluing earlier years’ earnings
- Ceiling
- Contribution rates
- Adjusting pensions in payment (indexation)
- Actuarial adjustment
- Pension eligibility age
- Adjusting pensions in payment (indexation)
Accrual rate structure
Maximum replacement rate
Accrual rates: structure

Accrual rate per cent of earnings

Tunisia
- Government employees
- Private-sector employees

Years of contributions

0 5 10 15 20 25 30 35 40 45
Accrual rates: structure

Accrual rate
per cent of earnings

Greece
Pre-reform

Greece
Post-reform

Years of contributions
Accrual rates: structure

Accrual rate per cent of earnings

Years of contributions

Finland

Luxembourg
Accrual rates: structure

Mexico
Pre-reform

Accrual rate per cent of earnings

Mexico
Post-reform

Defined-contribution

Years of contributions
Accrual rates: structure

Accrual rate
der cent of earnings

Hungary
Pre-reform

Hungary
Post-reform

Years of contributions
Accrual rates: structure

Accrual rate
per cent of earnings

Spain
Pre-reform

Spain
Post-reform

Years of contributions
Accrual rates

• Same accrual rate for all years and at all ages is fair
• It is an international norm:
  • 23 out of 27 OECD countries with a public, earnings-related scheme are now linear
  • (8 of 35 OECD countries do not have such arrangements)
• Each extra year of contributions should deliver extra benefit
  • reduce impact of maximum replacement rate
Minimum pension
Interaction with accrual rates
Qualifying conditions
Accrual rates with minimum pensions

- Minimum-wage worker (SMIG)
- Worker earning 2.5 times minimum wage (SMIG) or more
Accrual rates by earnings

Accrual rate per cent of earnings

10 years’ contributions

5 years’ contributions

Individual earnings, multiple of minimum wage.
## Contribution years for minimum pension

<table>
<thead>
<tr>
<th>Years</th>
<th>5</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>No minimum</th>
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<tbody>
<tr>
<td>MENA</td>
<td></td>
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<tr>
<td>Tunisia</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>4</td>
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<td>AFR</td>
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<td>DR Congo</td>
<td>3</td>
<td>16</td>
<td>2</td>
<td>0</td>
<td>25</td>
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</table>
Alternative approaches

- 23 OECD countries do not have contributory minimum pensions
- Use basic or targeted universal schemes, social assistance to achieve adequacy objectives
- These are fairer than minimum pensions and improve incentives
  - better at achieving adequacy objectives because universal
  - basic scheme means all contributions accrue benefits at all earnings levels
  - targeted schemes often have withdrawal rates of less than 100%, giving low earners some incentive to contribute
Earnings measure
Earnings measure

• Four possible policies:
  • **final** salary: a limited number of the last years’ salaries in the career, such as last year, final five years *etc.*;
  • **best** salaries: a limited number of years with highest pay;
  • a **mix** of best and final: e.g., best three in final five salaries;
  • **lifetime-average** salary, using earnings from all years.

• Basing pensions on best or final salary is unfair:
  • workers with flat age-earnings profiles lose out

• It is distortionary:
  • incentivises people to under-declare earnings in earlier years and over-declare at the career end
  • encourages early retirement when wages have peaked
Earnings measures: OECD

Number of years of earnings in pension calculation

- Iceland
- Germany
- Hungary
- Japan, Korea, Luxembourg, Switzerland
- United States
- Canada
- Norway, United Kingdom
- Austria, Finland, Poland, Portugal
- Czech Republic
- France
- Greece, Netherlands, Slovak Republic, Italy, Turkey
- Spain, Sweden
Valorisation
Valorisation policies

- Revaluing earlier years’ earnings to wage inflation is fair:
  - neutral between earlier and later years
  - replacement rates constant with varying price and wage inflation

- Prices or no valorisation are unfair policies:
  - workers with flat age-earnings profiles lose out
  - replacement rates vary arbitrarily with price and wage inflation

- They are distortionary:
  - incentivise people to under-declare earnings in earlier years and over-declare at the end of the career
Revaluing earlier years’ earnings: OECD

Prices
- 100% (BEL, ESP)
- 75% (PRT)
- 50% (EST, FIN, ITA, TUR, POL, ISL)
- 20% (SWE)
- 100% (USA)

Earnings
- 25% (BEL)
- 50% (FRA, GRC, SVN)
- 80% (SVK, CHE)
- 100% (USA, ITA)

GDP growth
- 30% (POL)

Wage bill growth
- 100% (IRL, DEU, AUT)

Fixed rate
- 100% (SWE, ISL, CHE)
- 30% (ISL)

OECD countries:
- AUT
- CAN
- CZE
- DEU
- HUN
- JPN
- KOR
- LUX
- NLD
- NOR
- BEL
- SVN
- FRA
- GRC
- ESP
- GRC
- ISL
- CHE
- CHE
- POL
- CHE
Pension eligibility age
Pensionable age

• No guide from first principles what the *level* of the pension age should be
• But the concept of fairness – equal contributions deliver equal benefits – does show how pension age should *change* over time
• Inter-generational equity
## Demographic context: Tunisia

<table>
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<tbody>
<tr>
<td>Life expectancy at birth, years</td>
<td>48.3</td>
<td>54.1</td>
<td>59.4</td>
<td>64.3</td>
<td>67.1</td>
<td>70.3</td>
<td>72.4</td>
<td>73.7</td>
<td>74.6</td>
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<tr>
<td>Probability of surviving to age 60</td>
<td>47.9</td>
<td>57.0</td>
<td>64.9</td>
<td>72.0</td>
<td>76.5</td>
<td>81.4</td>
<td>84.9</td>
<td>86.6</td>
<td>87.7</td>
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<tr>
<td>Life expectancy at age 60, years</td>
<td>13.9</td>
<td>14.8</td>
<td>15.4</td>
<td>16.5</td>
<td>17.0</td>
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<td>18.7</td>
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<td>19.4</td>
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<td>Probability of a 15-year-old surviving to age 60</td>
<td>62.2</td>
<td>69.4</td>
<td>74.3</td>
<td>78.8</td>
<td>81.7</td>
<td>85.3</td>
<td>88.2</td>
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<tr>
<td>Life in retirement, per cent of working life</td>
<td>46.3</td>
<td>49.5</td>
<td>51.2</td>
<td>54.8</td>
<td>56.7</td>
<td>59.8</td>
<td>62.4</td>
<td>63.9</td>
<td>64.7</td>
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Pension ages: retirees in 2000

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<th>Pension age</th>
<th>Countries</th>
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<tr>
<td>60</td>
<td>17</td>
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<tr>
<td>61</td>
<td>16</td>
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<tr>
<td>62</td>
<td>15</td>
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<td>63</td>
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<td>66</td>
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<td>67</td>
<td>10</td>
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<td>68</td>
<td>9</td>
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<tr>
<td>69</td>
<td>8</td>
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# Pension ages: new entrant in 2015

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<thead>
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<th>Countries</th>
<th>Pension age</th>
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<tbody>
<tr>
<td>AUT</td>
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<tr>
<td>BEL</td>
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<tr>
<td>CHL</td>
<td>62</td>
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<tr>
<td>CAN</td>
<td>63</td>
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<tr>
<td>EST</td>
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<tr>
<td>FRA</td>
<td>65</td>
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<tr>
<td>DEU</td>
<td>66</td>
</tr>
<tr>
<td>HUN</td>
<td>67</td>
</tr>
<tr>
<td>GRC</td>
<td>68</td>
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<tr>
<td>JPN</td>
<td>69</td>
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<td>KOR</td>
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<td>LUX</td>
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<td>ESP</td>
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<td>IRL</td>
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<td>DNK</td>
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<tr>
<td>TUR</td>
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<tr>
<td>USA</td>
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<tr>
<td>GBR</td>
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<td>ITA</td>
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</tr>
</tbody>
</table>

Countries: AUT, BEL, CHL, CAN, EST, FRA, DEU, HUN, GRC, JPN, KOR, LUX, MEX, NOR, POL, PRT, SVN, SWE, SVK, CZE, CHE, ESP, IRL, DNK, TUR, USA, GBR, ITA.
Treatment of early retirees
First principles

• **Actuarial neutrality** should be the goal
• Pension system is **fair** between early and later retirees
• There are no **incentives** to retire early
• Derive actuarially neutral decrements for early retirement
• Tunisia:

<table>
<thead>
<tr>
<th>Pension withdrawal</th>
<th>50</th>
<th>51</th>
<th>52</th>
<th>53</th>
<th>54</th>
<th>55</th>
<th>56</th>
<th>57</th>
<th>58</th>
<th>59</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annuity factor (multiple)</td>
<td>22.0</td>
<td>21.5</td>
<td>20.9</td>
<td>20.4</td>
<td>19.9</td>
<td>19.4</td>
<td>18.9</td>
<td>18.3</td>
<td>17.8</td>
<td>17.2</td>
<td>16.7</td>
</tr>
<tr>
<td>Actuarially neutral decrement (%)</td>
<td>4.8</td>
<td>4.9</td>
<td>5.0</td>
<td>5.1</td>
<td>5.3</td>
<td>5.4</td>
<td>5.6</td>
<td>5.8</td>
<td>6.0</td>
<td>6.2</td>
<td>6.4</td>
</tr>
<tr>
<td>Cumulative reduction (%)</td>
<td>54.0</td>
<td>49.3</td>
<td>44.4</td>
<td>39.4</td>
<td>34.2</td>
<td>28.9</td>
<td>23.5</td>
<td>17.9</td>
<td>12.1</td>
<td>6.2</td>
<td>0.0</td>
</tr>
</tbody>
</table>
No early retirement possible
- Netherlands
- Poland
- Turkey
- United Kingdom

Benefit reduction per year of early retirement, per cent
Uprating pensions in payment
Uprating policies

• **No adjustment**
  • real pension value falls in retirement, which might be acceptable if the expected length of retirement is short

• **Ad-hoc uprating**
  • pensions are increased, but only sporadically, and not linked to changes in prices or wages. Typically, nominal pension value follows the electoral cycle

• **Discretionary increases**
  • pensions increased regularly on a fixed time-table: *e.g.* annually. Again, rate of increase not linked to changes in prices or wages

• **Indexation**
  • Pensions are increased regularly and automatically, linked to changes in economic variables. Typically, these are indices of prices or average earnings
Indexation

• No benefit uprating, *ad-hoc* changes and discretionary (albeit regular) increases are **unfair**
  • lifetime benefits are arbitrarily lower or higher depending on price inflation and the adjustments that take place
  • also fails to ensure pension adequacy through retirement

• Uprating pensions in payment in line with price inflation is **fair**
  • lifetime benefits the same, relative to individual earnings, at time of retirement, regardless of future price inflation
  • maintains pensions’ purchasing power through retirement

• Indexation to economy-wide earnings growth
  • individual pensions remain the same during retirement relative to economy-wide average earnings
  • protects relative living standards
International experience

<table>
<thead>
<tr>
<th>Prices</th>
<th>USA</th>
<th>FIN</th>
<th>CZE</th>
<th>CHE</th>
<th>SVN</th>
<th>SWE</th>
<th>NOR</th>
<th>LUX</th>
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<tbody>
<tr>
<td>100%</td>
<td>80%</td>
<td>67%</td>
<td>50%</td>
<td>40%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Earnings</td>
<td>20%</td>
<td>33%</td>
<td>50%</td>
<td>60%</td>
<td>-1.6%</td>
<td>-0.75%</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>
Conclusions: Designing earnings-related pensions
Fairness and incentives

- **Accrual rates**: same at all ages and contribution years
- **Maximum replacement rate**: ensure all years count
- **Contributory minimum**: think about social pension instead
- **Earnings measure**: lifetime average salary
- **Revaluation of earlier years’ earnings** to calculate benefits: use average-earnings growth
- **Pension eligibility age**: regular reviews so it keeps pace with changes in life expectancy at pension age
- **Benefit adjustment for early retirement**: actuarially neutral reductions
- **Adjustment of pensions in payment**: index pensions to ensure automatic, regular increases preferably in line with price inflation
Fairness and incentives

• Fairness between members of different schemes:
  • need to consider differences in accrual rates, contribution rates *etc.* together

• Fairness between covered and uncovered
  • again, think about social pension instead of contributory minimum benefits
  • earnings-related benefits should be self-financing: no permanent subsidy from the general government budget
Final thoughts

• Fairness/incentives analysis leaves three key questions unanswered
  • guidance on **structure** of accrual rates, but not the **level**
  • appropriate **change** in pensionable age, but not its **level**
  • right **structure** of contribution rates, but not their **level**

• These three need to be determined by looking at two other objectives of pension system:
  • financial sustainability/affordability
  • social sustainability: benefit adequacy and coverage

• Explore further: Apex, Spot