Old-age pensions

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Course schedule

▸ Syllabus

Week	Date	Topic	Chapters	Lecturer
1	Feb 18	Economic rationale for the government	1, 2, 3, 4, 5	Miroslav Palanský
2	Feb 25	Public budgets	10, 26, 27	Natalia Li
3	Mar 3	Inequality		Marek Šedivý
4	Mar 10	Old-age pensions		Ondřej Schneider
5	Mar 17	Health economics	12	Ondřej Schneider
6	Mar 24	Public choice theory	7, 8	Miroslav Palanský
7	Mar 31	Cost-benefit analysis	6, 10, 11	Petr Janský
8	Apr 7	Taxation, tax incidence	17, 18	Miroslav Palanský
9	Apr 14	Tax evasion	23, 24	Petr Janský
10	Apr 21	Corporate taxation	21, 25	Petr Janský
11	Apr 28	Optimal taxation, personal income taxation	19, 20, 22	Miroslav Palanský
12	May 5	Externalities	9	Miroslav Palanský
13	May 12	Public procurement		Miroslav Palanský

Today's lecture

Retirement Problem

Pensions Basics

Pension Systems

Data

Aron's rule

Retirement Problem

- Life is long and getting longer: how do you guarantee income over lifetime?
- Life-Cycle optimalization
  - People live longer than they earn income
  - Some transfer of income from working age to old-age is necessary
- How to do it?

Retirement problem

- Store current production
  - Fairly inflexible
  - Not used, will not analyse further
- Build a claim to future production
  - Raise kids and make them to care after parents
  - Acummulate financial wealth by savings
  - Acummulate promises from the state by participating in the state organised pension system

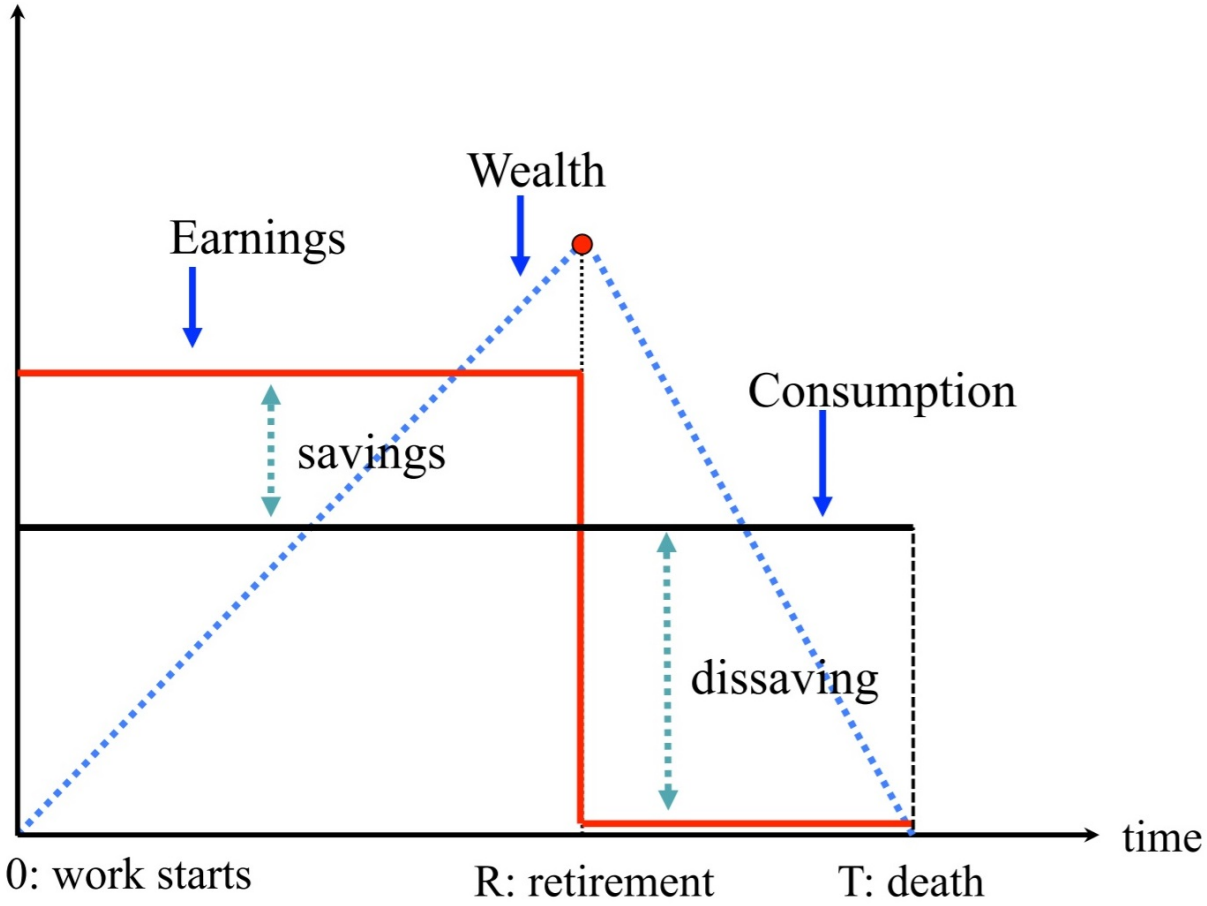
Key point: There are alternative methods for building claims to future production, but they all try to achieve the same thing: consumption smoothing.

Retirement problem

- Individual: Rational individual(s) would save while working enough
  - It is VERY difficult: uncertainities in life-span, in future health status, in financial returns...
  - People tend to be myopic

Retirement problem

- Life-cycle Model: Stable consumption via acummulation of wealth



Retirement problem

- Family: the only form available until 20st century
  - Extremely sensitive to family circumstances (no kids?, sudden death/illness?)
  - Limits mobility
- Government
  - All OECD countries now, spend 5-15% of GDP
  - Subject to political process and neverending reforms

Pensions Basics

POLICY CHOICES:

1. Voluntary or Mandatory?
   - Optimality vs. coverage. Crowding out of private savings (if people prefer less).
2. Universal or Means tested?
   - Should all get pension or only poorer?
3. Who should bear the risk: DB or DC?

Pensions Basics

4. Funded or PAYG?
   - Macroeconomics and microeconomics
   - Intergenerational transfers
   - Political control and implicit debt

5. Funds manged publicly or privately?
   - Costs vs. yields

6. Lump-sum or annuities?
   - Costs, myopia

Tentative Answers

1. Voluntary or Mandatory?
   - If people are myopic and don't want poverty - mandatory.
   - Also, markets may fail (adverse selection) - mandatory.
   - Too generous system, forces people to contribute more than they would - voluntary.
   - Unsustainable and/or micro inefficient - voluntary.

Tentative Answers

2. Universal or Means tested?
   - Universal alleviates poverty, typically more expensive, easier to administer.
   - Means tested is cheaper, but punishes people who contributed and don't get benefits.
   - Note: Redistribution takes place WITHIN generations: progressive formula benefits poorer participants.

Tentative Answers

3. Who should bear the risk: DB or DC?
   - Defined Benefit: the system sets benefits (usually formula with of years, salary history). The system provider (govt/firm) is responsible for meeting the financial costs and bears the risk.
   - Defined Contribution: the system sets contribution rates (usually % of salary), the benefits depend on the system performance. Either public (Sweden - demography) or private (private pensions).

Tentative Answers

4. Funded or unfunded (PAYG)?

   - Funded depends on return to investment, may be subject to market failures as myopia, lack of information, moral hazard, absence of insurance markets (adverse selection). In balance by definition.
   - Unfunded is exposed to shifts in demography, political risks. May have negative impact on labor market (higher unemployment) and on savings (decline which lowers investment). Copes well with inflation, is more flexible and lets pensioners benefit from post-retirement growth.
   - Note: Redistribution takes place ACROSS generations - debt now will have to be paid by future generations.

Tentative Answers

5. Funds managed publicly or privately?
6. Lump-sum or annuities?

Details, leave it for another course.

Pension Systems

1. **Unfunded DB:** most public retirement programs (such as Social Security in the US, CZ...)
2. **Funded DB:** used to be provided by private firms in the US and UK as employer pension. Less frequent now, plagued by insufficient pre-financing
3. **Funded DC:** all private funds, also newer private employer pensions plans as 401(k)
4. **Unfunded DC:** Notional accounts in some government retirement programs (Sweden, Poland, Latvia): payroll taxes yield fictitious returns and benefits are based on contributions plus this fictitious (notional) return.

What Pension System?

There are 2 optimality/sustainability conditions:

- Microeconomic - is the system benefitial for individuals?
- Intergenerational (macroeconomic) - is the system sustainable over time?

Microeconomic View

1. Some individuals are rational and maximize life time utility $U = U(c_1, c_2)$

$$max\ [u(c_1) + \delta u(c_2)]$$

δ - time discount rate $0 \leq \delta \leq 1$
They work in period 1 at wage w and retire in period 2 with saving s

$$c_1 = w - s\ ;\ c_2 = s(1 + r)\ ;\ c_1 + c_2(1 + r) = w$$

If $\delta = 1$ - consumption in both periods has the same utility and solution is easy:

$$c_1 = c_2 \text{ and optimal saving } s^* = \frac{w}{2}$$

Microeconomic View

2. Some individuals are myopic and their $\delta = 0$

$$max\ [u(c_1) + \delta u(c_2)] = max\ [u(c_1)]$$

Then it is super easy:

$c_1 = w$

$c_2 = 0$ and optimal saving $s^* = 0$

Unfortunately, generation dies in period 2.

If $0 \leq \delta \leq 1$ - things get complicated and you need a master degree course :-)

Microeconomic View

The government may step in and force people to save. But:

1. How much to save? Government does not know δ.
2. One saving rate for everybody? Everybody has a different δ.
3. How will the government transfer savings from period 1 to period 2? In a fund? (Good luck.) Through taxes?

Intragenerational (also macroeconomic) view

OLG model with 2 periods (work and retirement).

Generation t lives in periods t and $t+1$, there is N_t of them (cohort size N_t) and their wage is w_t

PAYG system
1st generation of retirees gets a pension for free.
(BTW the same holds everytime pensions are made more generous: retired generation gets something for nothing. That explains a lot...)

Intragenerational (also macroeconomic) view

All other generations t pay tax T_t and get pension P_t.

$$T_t = \tau w_t$$

$$P_t = \tau w_{t+1} \frac{N_{t+1}}{N_t} = \tau w_t \frac{w_{t+1}}{w_t} \frac{N_{t+1}}{N_t} = \tau w_t (1+g)(1+n)$$

Rate of return for generation t :

$$\frac{P_t}{T_t} = (1+g)(1+n)$$

where n is population growth and g real wage growth per capita

Have we found the best system?

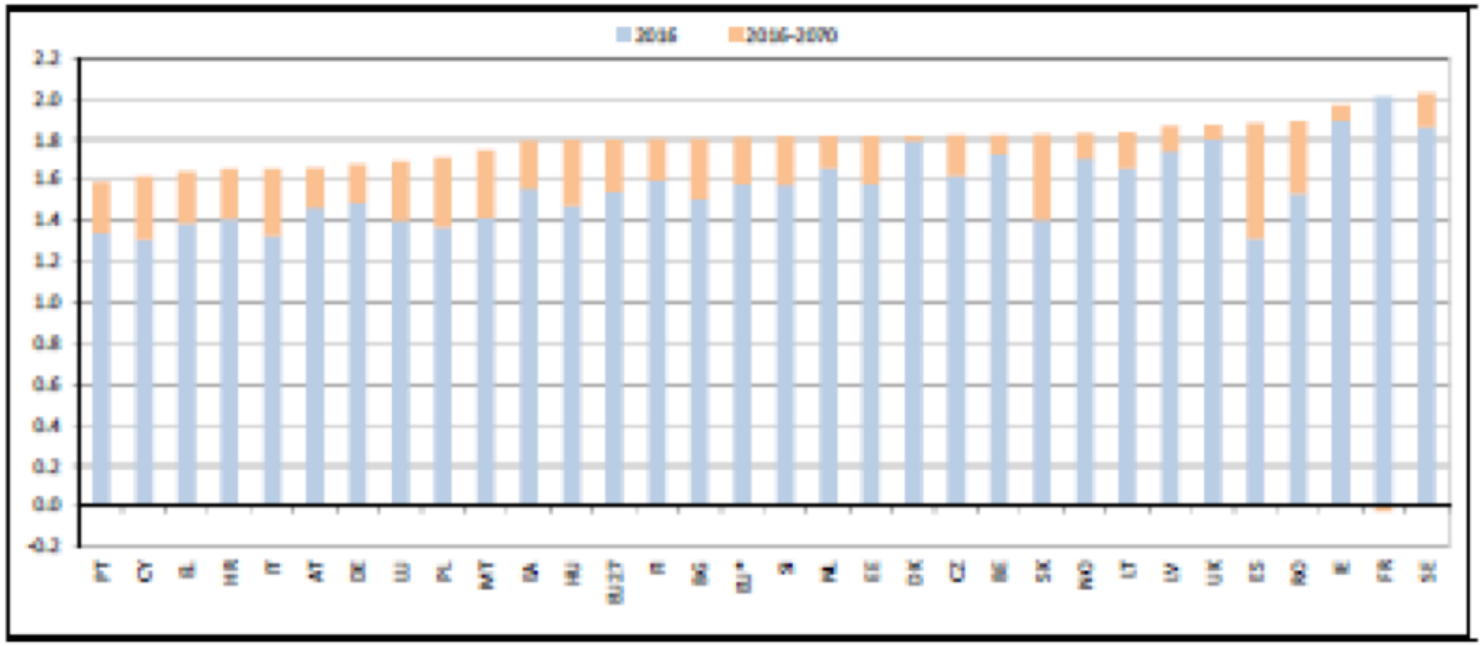
Problem is that participants do not control either n nor g. And they can change.

Samuelson (1958): In an economy with no capital and no way to save unfunded system generates Pareto improvement because it allows trade across generations.

Some data...

Fewer Europeans by 2070

Graph I.1.2: **Projection of total fertility rates, 2016-2070 (number of births per woman)**

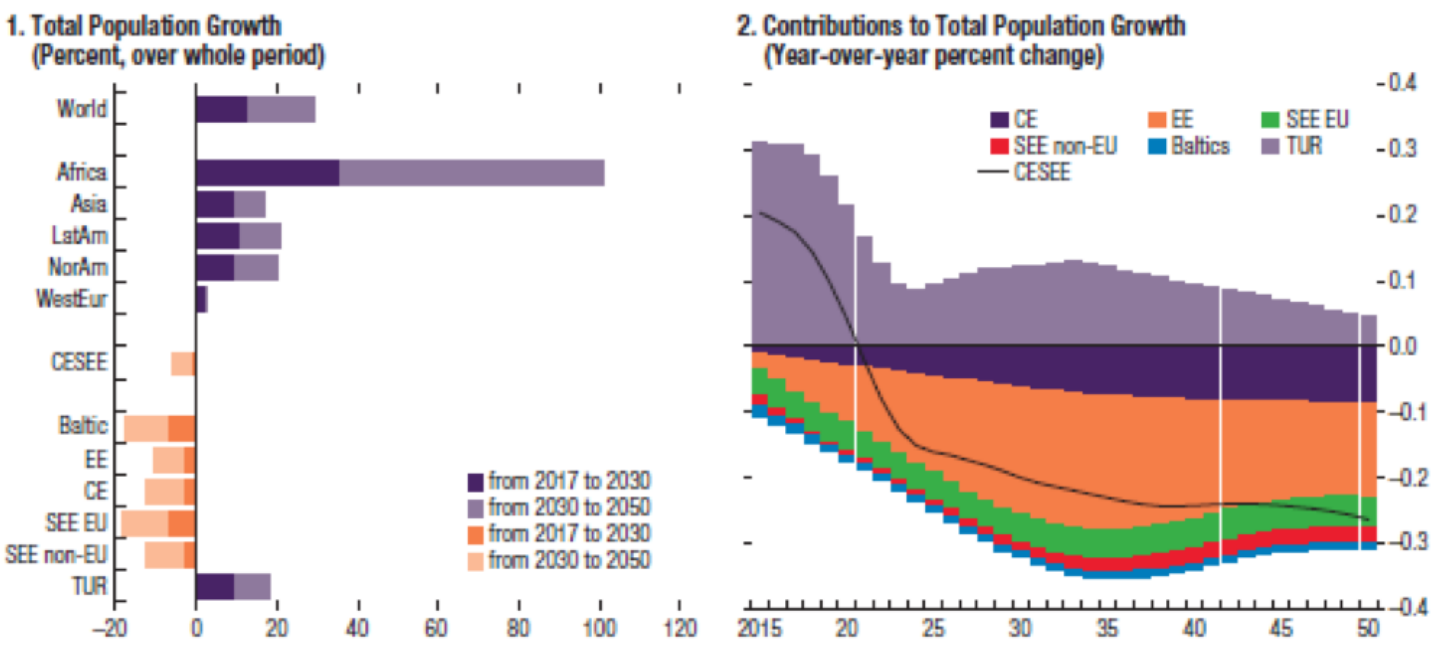


Source: Eurostat, 2015-based population projections.

Some data...

Central and Eastern Europe affected most (IMF)

Figure 1. Population Projections

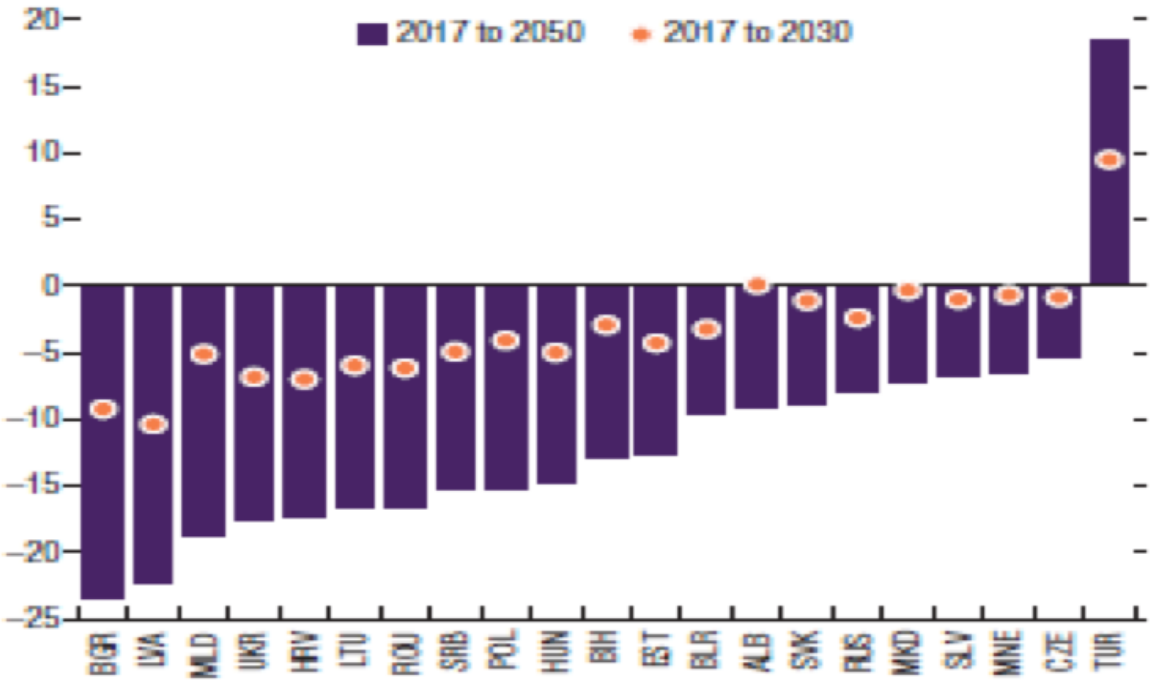


Sources: United Nations; and IMF staff calculations.
Note: CE = Central Europe; CESEE = Central, Eastern, and Southeastern Europe; EE = Eastern Europe; SEE EU = Southeastern European EU members; SEE non-EU = Southeastern European non-EU members; TUR = Turkey.

Some data...

Central and Eastern Europe affected most (IMF)

Figure 6. Population Changes
(Percent)

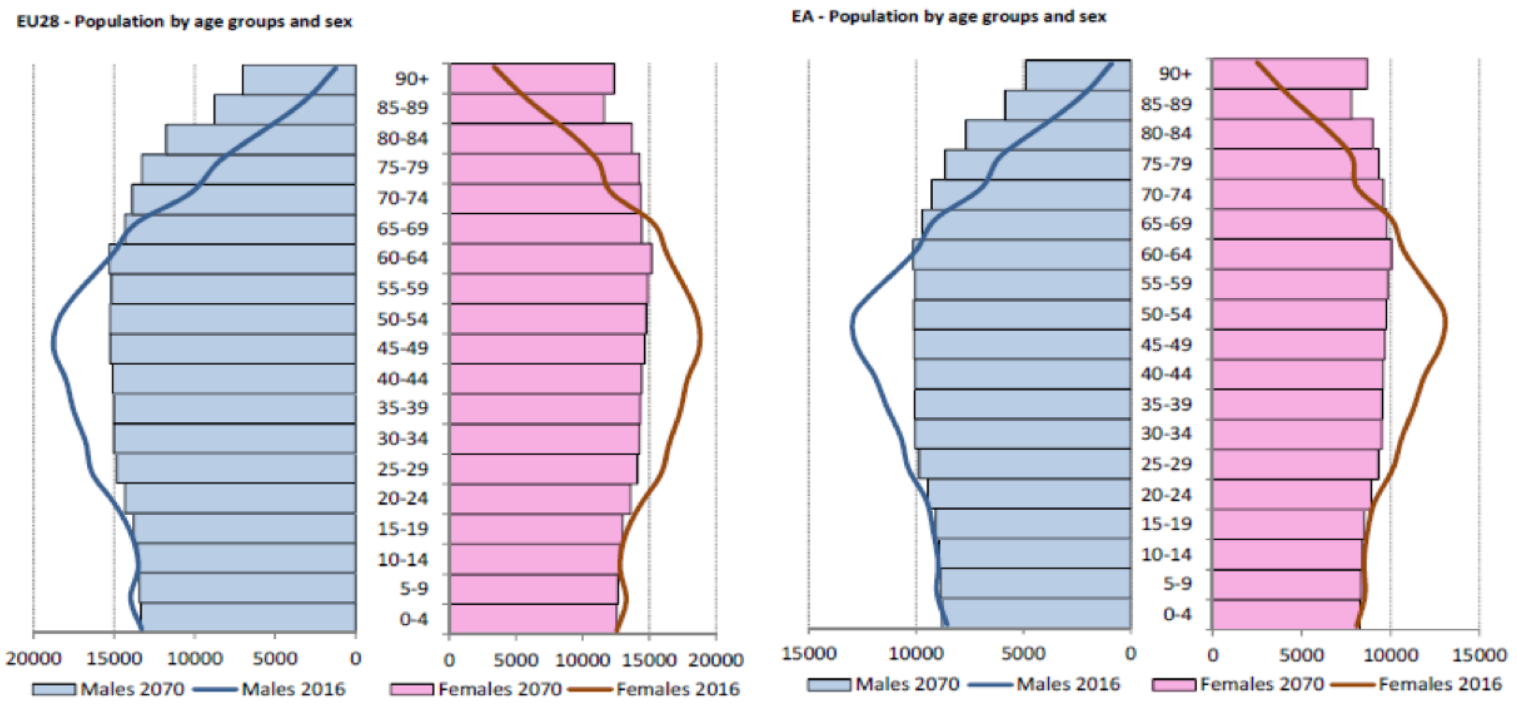


Sources: United Nations; and IMF staff calculations.
Note: Data labels use International Organization for Standardization (ISO) codes.

Some data...

And they will be older...

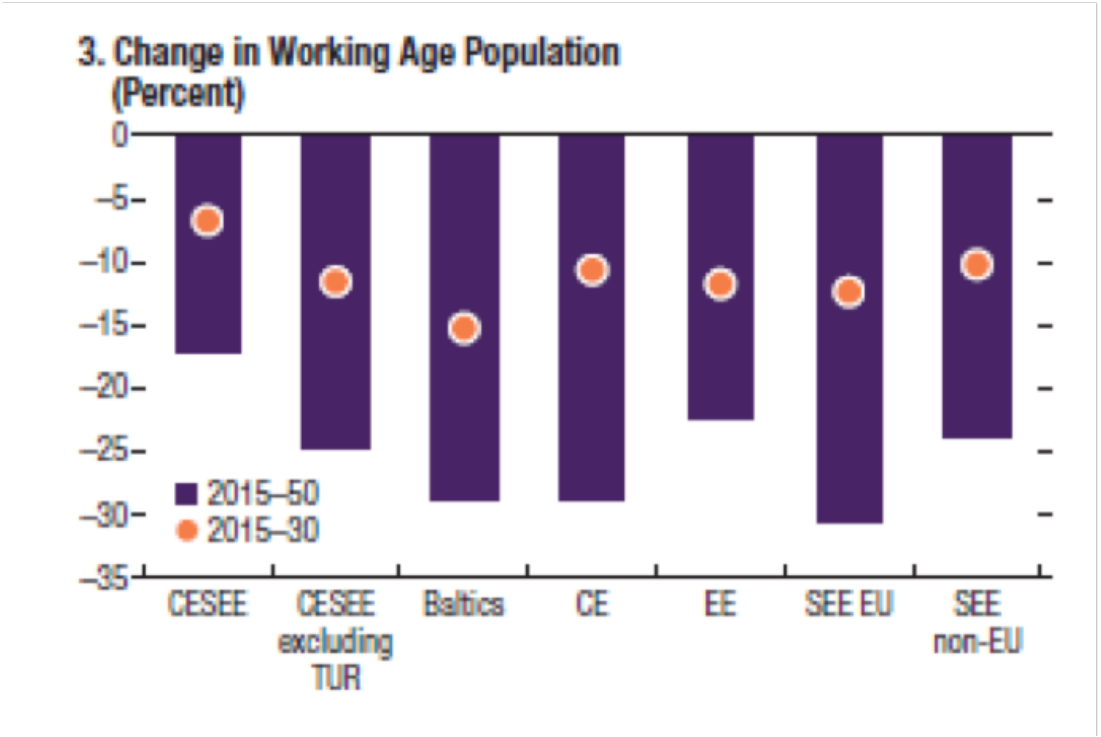
Graph 2: **Population by age group and gender, 2016-70 (thousands)**



Source: Commission services, Eurostat.

Some data...

so fewer people will be working...



Some data...

... and dependency ratios will worsen

Table 2. Old-Age Dependency Ratio
(65+/(20–64))

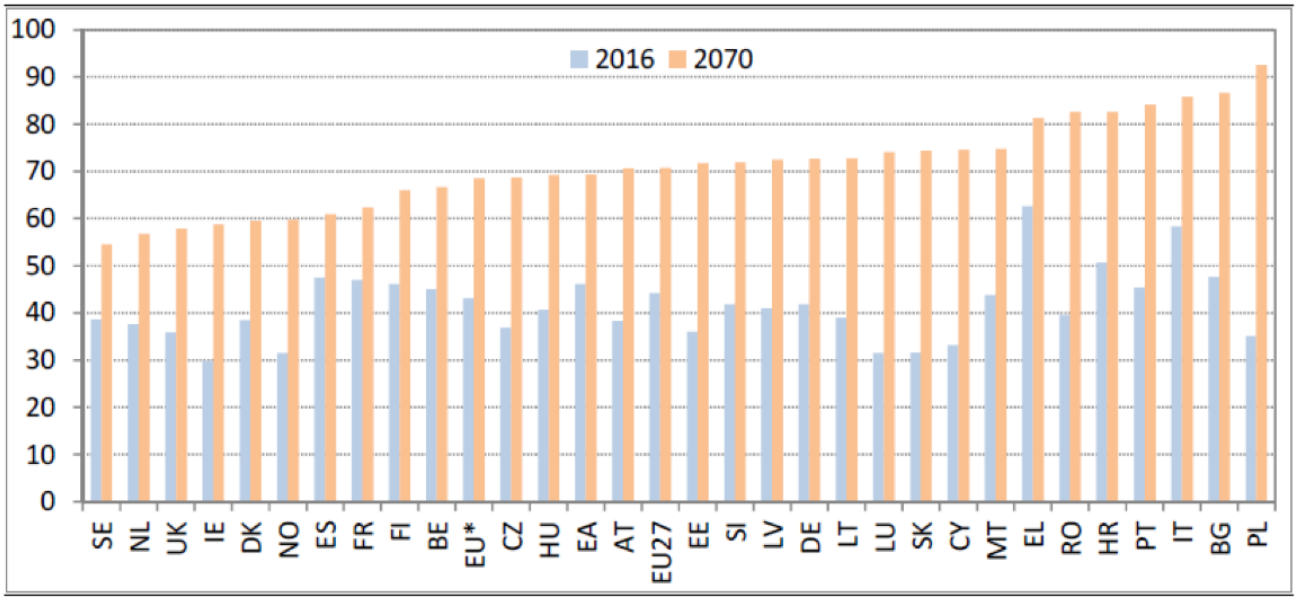
Country	2015	2020	2025	2030	2035	2040	2045	2050
SVN	28.8	35.0	41.1	46.7	51.8	55.9	61.8	66.8
POL	24.3	30.0	36.4	39.3	41.2	44.8	51.4	60.8
CZE	28.8	34.0	37.1	39.1	41.1	46.7	54.5	58.9
HRV	31.2	35.3	39.8	43.7	45.8	49.2	53.0	57.4
EST	31.0	35.0	39.2	42.3	44.5	48.1	51.5	56.3
BGR	32.6	36.2	39.2	41.0	42.8	46.5	51.4	54.9
SVK	21.5	26.5	31.4	35.2	37.5	41.4	47.7	53.9
BIH	24.9	28.5	33.3	39.1	42.6	46.3	49.6	53.2
ROU	27.4	31.7	35.3	35.2	40.3	45.1	50.7	52.7
HUN	27.9	33.3	36.6	37.0	39.0	43.7	50.0	52.4
LVA	31.5	34.7	39.0	42.4	44.3	47.0	48.9	52.3
ALB	20.6	23.4	29.0	35.6	40.1	43.6	46.6	51.0
LTU	30.7	32.4	36.7	42.2	45.3	47.6	47.7	47.9
UKR	24.7	27.9	31.6	34.6	35.5	37.6	41.1	46.8
MNE	22.8	27.0	31.0	34.9	36.8	39.3	42.3	46.6
MKD	19.5	22.9	26.5	30.2	33.8	36.8	40.6	45.8
SRB	26.8	31.8	34.3	35.9	37.3	39.6	42.6	45.3
BLR	22.2	25.1	30.2	34.5	36.1	37.6	39.6	43.8
RUS	20.7	25.1	30.1	34.1	33.4	34.2	36.0	40.0
MDA	14.5	18.9	23.0	27.2	27.9	29.4	32.9	39.9
TUR	13.4	14.9	17.3	20.2	23.3	27.2	31.6	36.2
Avg CESEE	25.0	29.0	33.2	36.7	39.1	42.3	46.3	50.6
Avg WE	30.6	33.6	37.5	42.1	46.7	50.3	53.0	55.2

Sources: ILOSTAT; United Nations; and IMF staff calculations.
Note: CESEE – Central, Eastern, and Southeastern Europe; WE – Western Europe. Data labels use International Organization for Standardization (ISO) codes.

Some data...

... and dependency ratios will worsen

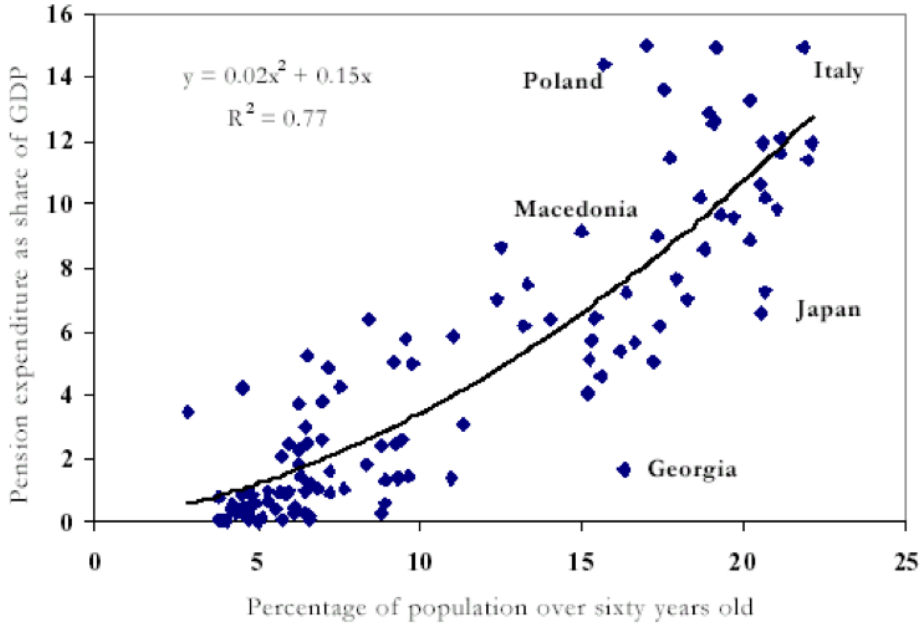
Graph I.2.9: **Effective economic old age dependency ratio - inactive population aged 65+/employed persons aged 20-64, 2016-2070 (%) (1)**



(1) Countries ranked in ascending order of the old age dependency ratio in 2070
Source: Commission services, EPC.

Some data...

Public pension spending – includes all government expenditures on cash-transfers targeted to the old, disabled and survivors as well as the administrative cost of these programs



Public pension spending versus the percentage of the population over age 60, selected countries

Have we found the best system?

Diamond (1965) analyzed more realistic economy, where savings is possible.
Return on savings is the interest rate r.
To find which system (funded or unfunded) is better, we need to compare their rates of return:

$$(1+g)(1+n) \textit{ and } (1+r)$$

Systems are equal if $(1+g)(1+n) = (1+r)$
Which we can simplify $g + n = r$ ($n * r$ is *really small*)

This is the famous **Aron's rule**.

Aron's rule

- If $g + n > r$ unfunded system is better for all generations.
- If $g + n < r$ unfunded system redistributes from all generations to the first one. All generations except the first one are worse off in an unfunded system.

Aron's rule

Empirical question: $g + n > r$ or $g + n < r$?

- In practice $r > g + n$ almost everywhere: funded system delivers higher returns
- US economy: annual $n = 1\%$ and $g = 1\%$ [$n + g$ was higher in 1940-1970]. $r = 3$-4% if r is average return on all capital assets held by households over the long-run.
- Europe: annual n typically negative, $g = 1 - 2\%$. r now 1%, will be permanently low?
- Note that r is much more risky than $n + g$: risk adjusted market rate of return should be lower than average market rate r but still higher than $n + g$.

See you next week!

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