

Theory of Pension Systems

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Why do we have pension system at all?

- Behavioral economics¹ view - Irrationality of homo-economicus:
 - Expected Utility (Long term planning problem)
 - Risk-aversity problem
- Keynesian economics² view – theory of consumption:
 - Higher income of 10% \neq higher saving of 10%
 - Intergenerational solidarity³

1 Richard H. Thaler Nudge: Improving Decisions About Health, Wealth, and Happiness (2009) and Nassim Nicholas Taleb, The Black Swan (2010)

2 KEYNES, John Maynard. The General Theory of Employment Interest and Money. London: Macmillan and Co., 1936. ISBN 978-116983199-5.

3 BEETSMA, Roel M. W. J. a Lans BOVENBERG. Pensions and Intergenerational Risksharing in General Equilibrium. *Economica*. 2009, 76(302), 364-386. DOI: 10.1111/j.1468-0335.2008.00685.x. ISSN 00130427.

Why do we have pension system at all?

- Sociological view¹
 - Changes of the modern family
 - Lower birth rate
- Historical view²:
 - Industrial Revolution
 - Role of the Unions
 - ”Bribing the workers rather than be hanged”

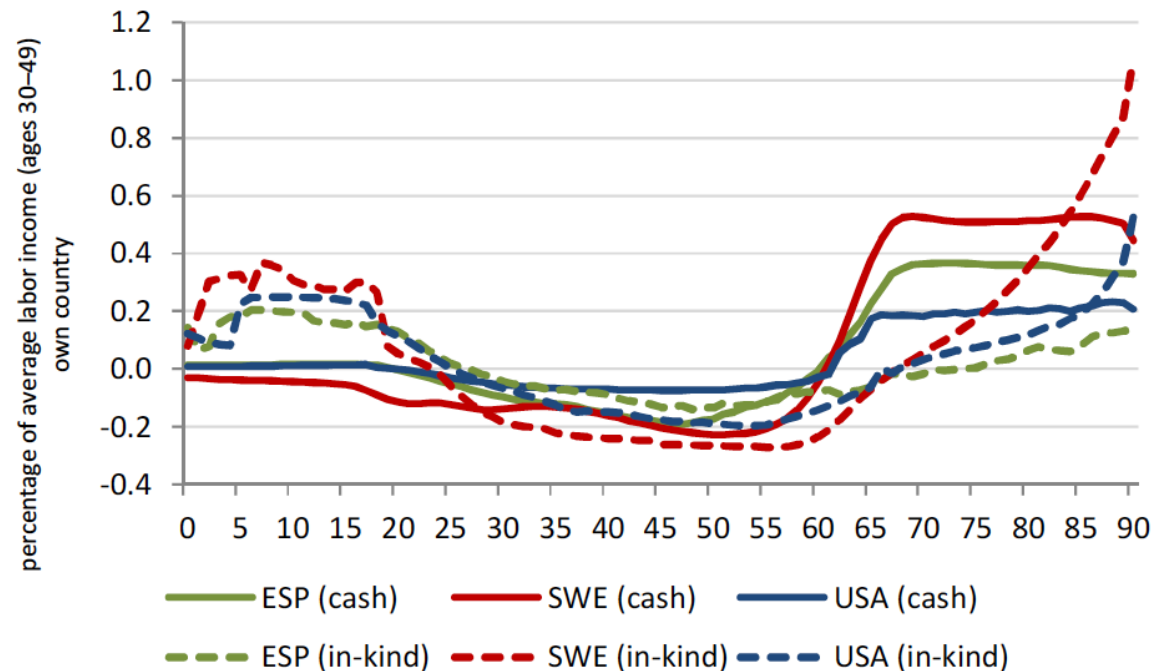
1 KELLER, Jan. Soumrak sociálního státu. Praha: Sociologické nakladatelství, 2005. Studie (Sociologické nakladatelství). ISBN 80-864-2941-5.

2 MIERZEJEWSKI, Alfred C. A history of the German public pension system: continuity amid change. 1. Lanham: Lexington Books, 2016. ISBN 978-149852116-1.

Role of the Pension System in Social Security

- Based on costs:
 - Net public transfers¹
 - Part of public budget CZE:
 - Almost 1/3 of total exp.
 - 7% of GDP
 - For 1,8mil. citizen

Figure 3: Per capita age profile of net public transfers in Spain, Sweden, and the United States



Source: Authors' elaboration using NTA data (<http://www.ntaccounts.org>).

2. ČSSZ. Důchodová statistika: 2019. [online]. Praha: ČSSZ [cit. 2019-12-30]. <https://www.cssz.cz/web/cz/duchodova-statistika>

1 ABÍO, Gemma, Concepció PATXOT, Miguel SANCHEZ-ROMERO a Guadalupe SOUTO. The welfare state and demographic dividends. Demographic Research. 2017, 36, 1453-1490. DOI: 10.4054/DemRes.2017.36.48. ISSN 1435-9871

Role of the Pension System in Social Security

- Concept of Utility¹:
 - Long-term total utility can be much higher than without any Pension system
 - Negative during childhood and most of the working life
 - Positive not only during retirement, but even during the pre-retirement period
- Regional diversity¹:
 - Labour market adjusts the regional diversity itself
 - Pension system adjusted accordingly to previous wage, which is problematic in PAYG DB

¹ BRABEC, Petr. Ekonomicko-politicky proveditelná reforma penzijního systému v ČR (2020 - 2085), Praha. Available in VSE Library

Pension Systems classification

	Funded on an ongoing basis	Funded on investment basis
Defined benefit	PAYG DB	FF DB
Defined contribution	NDC	FF DC

- The main classification is on the basis on how we finance the pension system and how its benefits are calculated.
- We can also classify many other aspects (social security funded vs taxes funded and so on). That is subject of higher courses.

PAYG DB

PUBLIC SYSTEM

- Active/working population pays social insurance or taxes that are used for current pensioners.
- Nothing is invested, all funds collected are used immediately to pay pension benefits (intergenerational solidarity)
- The pension benefit usually includes intragenerational solidarity (DB) – higher-income individuals receive lower benefits relative to their previous income than lower-income individuals.
- The pension benefit depends on the length of working life, indexed lifelong income, valorisation formula and level of solidarity.
- Countries: almost all Europe incl. Czech Republic.

PAYG DC (NDC) PUBLIC SYSTEM

- Active/working population pays social insurance or taxes that are used for current pensioners.
- Nothing is invested, all funds collected are used immediately to pay pension benefits (intergenerational solidarity)
- The pension benefit does not include intragenerational solidarity (DC) – higher-income individuals receive the same benefits relative to their previous income as lower-income individuals.
- The pension benefit depends on the rise of nominal GDP, length of working life = funds paid and life expectancy.
- Countries: Sweden, Poland, Denmark, Finland, Canada, ...

FF DC PRIVATE SYSTEM

- Active/working population pays from their wages some percentage into the private pension/investment companies that invest their money during their working life according to selected pension plan.
- The pension benefit does not include intragenerational solidarity (DC) – higher-income individuals with the same pension plan and working life receive the same benefits relative to their previous income as lower-income individuals.
- The pension benefit depends on the return on investment in the selected pension plan, length of working life = funds paid and life expectancy.
- Countries: all 3rd pillars in Europe, second pillars in CEE, Chile.

FF DB CORPORATE SYSTEM

- Active/working population pays from their wages some percentage into the private fund/pension company established by their employers or by sector union. The pension company invest their money, not only during their working life, but also during their retirement age. It is the real collective investment.
- The pension benefit can include intragenerational solidarity (DB) – higher-income individuals receive lower benefits relative to their previous income than lower-income individuals.
- The pension benefit depends on the return of the investment of the fund selected by your employer or sector union, length of working life = funds paid and life expectancy.
- Countries: the Netherlands, Switzerland, USA (Ford Motors), etc.

Czech Republic



(example of predominantly PAYG DB)

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Czech Republic

retirement age and replacement rate

Atribut	Women 	Men 
Current retirement age (entered market at 22 y.o.)	62.7 y.o.	63.2 y.o.
Future retirement age (just entered market 22 y.o.)	65 y.o.	65 y.o.
Net pension replacement rate of 0.50 of AW	91.6%	91.6%
Net pension replacement rate of 1 of AW	60.3%	60.3%
Net pension replacement rate of 1.50 of AW	47.9%	47.9%
Expected years in retirement	22,8 years	17,7 years

Source: own calculations and OECD (2021): Pension at Glance statistics, available from stats.oecd.org

Pension System Setting in the Czech Republic

- 1st Pillar – PAYG DB with the highest solidarity element in Europe
- 2nd Pillar – funded 2013 and cancelled 2015
- 3rd Pillar – two different FF DC system.

1st Pillar – PAYG DB / Czech Republic

- $$OVZ = \frac{\sum_{t=\max(R_{1986}, R_{18+1})}^{T-1} \min(P_t, MVZ_t) \cdot \frac{VVZ_{T-2} \cdot PK_{T-2}}{VVZ_t}}{\sum_{t=\max(R_{1986}, R_{18+1})}^{T-1} D_t - \sum_{t=\max(R_{1986}, R_{18+1})}^{T-1} VD_t} \cdot 30,4167^1$$
- $$VZ = OVZ \cdot rr1 - \max(0; (OV - rh1)) \cdot (rr2 - rr1) - \max(0; (OVZ - rh2)) \cdot rr1^1$$
- **Complicated? Welcome to PAYG DB! ☺**

1 MPSV. Zpráva o stavu důchodového systému České republiky a o jeho předpokládaném vývoji se zřetelem na demografickou situaci České republiky a na očekávaný populační a ekonomický vývoj. MPSV [online]. 2019, [cit. 2019-12-22]. Available from: <https://www.mpsv.cz/documents/20142/225513/Zpráva+2019.pdf>

1st Pillar – PAYG DB / Czech Republic

- During the work employee pays mandatory public social insurance: **6,5 % of his gross wage, but also their employer pays 21,5 % of the gross wage**
- Self-employed pays officially 28% of their profit, but due to law and possible cost effectiveness procedure it is only 6 - 14% of their real profit.
- Born after mid-70s retire at 65 y.o. regardless of their gender and number of children.
- Every year that you work is entitled to 1.5 p.p. (1.2 p.p. in case of searching for job, on maternity leave or illness) of the indexed all work-life reduced (solidarity element) salary + fix element of 10% of average current wage in the economy.
- **Solidarity:**
 - Only 10 % of pensioners receive less than 74 % of average pension¹ of 15.351CZK (1Q 2021)
 - Only 10 % of pensioners receive more than 124 of average pension¹ of 15.351CZK (1Q 2021)

¹ ČSSZ. Důchodová statistika: 2019. [online]. Praha: ČSSZ [cit. 2019-12-30]. Available from: <https://www.cssz.cz/web/cz/duchodova-statistika> and ČSSZ. Otevřená data: 2021. [online]. Praha: ČSSZ [cit. 2021-08-10]. Available from: <https://data.cssz.cz>.

3rd Pillar – FF DC (pension savings) Czech Republic

- During lifetime, everyone can pay at least 300CZK to private pension funds per month to receive a **state subsidy of**:
 - 90 CZK for first 300 CZK, 20 CZK for every 100 CZK thereafter up to total of 1000 CZK paid to pension fund as direct subsidy,
 - Every crown invested between 1000 CZK and 3000 CZK per month can be deducted from taxes.
 - Total subsidy is then up to 530 CZK per month per person.
- **Two different systems exist:**
 - Old one with guaranteed of 0% nominal return per year, so that almost no return exists.
 - New one without the guarantee and possible choice of pension plan (by risk/gain).

Sweden



(example of predominantly NDC)

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Sweden

retirement age and replacement rate

Atribut	Women 	Men 
Current retirement age (entered market at 22 y.o.)	65 y.o.	65 y.o.
Future retirement age (just entered market 22 y.o.)	65 y.o.	65 y.o.
Net pension replacement rate of 0.50 of AW	60.7%	60.7%
Net pension replacement rate of 1 of AW	53.4%	53.4%
Net pension replacement rate of 1.50 of AW	68.9%	68.9%
Expected years in retirement	21,3 years	18 years

Source: own calculations and OECD (2021): Pension at Glance statistics, available from stats.oecd.org

Pension System Setting in Sweden

- **1st Pillar** – mainly **PAYG DC (NDC)** with elements of **FF DC**
- **2nd Pillar** – corporate/employer pension funds (FF DB -> FF DC)
- **3rd Pillar** – FF DC voluntary system.

We will focus just on the NDC element, that is paid from contribution from gross wage of 16% from total contr. 17,21% (7% employee, 10,21 % employer)

NDC model in Sweden

- The contribution goes to current pensioners through 4 separated reserve funds. In the end, all contributions are used for current pensioners, and nothing is invested.
- It's a DC model, so your pension depends only on your contributions that are annually indexed by nominal wage rise in economy. You get a letter including your current amount "saved". In real money, does not exist as an investment. It is only your entitlement to the country of Sweden.
- In case of death, your heirs are not entitled to your "saved" money (contradictory to FF DC). It is recalculated for other employees of your birth year and raises their pensions.
- Pension benefits depend only on how much you imaginarily "save" and unisex life expectancy, and are valorised yearly by inflation and real-wage growth. In case of economic downturn, your pension benefits can be lowered.

The Netherlands



(example of predominantly FF DB)

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The Netherlands

retirement age and replacement rate

Atribut	Women 	Men 
Current retirement age (entered market at 22 y.o.)	65,8 y.o.	65,8 y.o.
Future retirement age (just entered market 22 y.o.)	71,3 y.o.	71,3 y.o.
Net pension replacement rate of 0.50 of AW	78.0%	78.0%
Net pension replacement rate of 1 of AW	80.2%	80.2%
Net pension replacement rate of 1.50 of AW	78.5%	78.5%
Expected years in retirement	23,4 years	18,6 years

Source: own calculations and OECD (2021): Pension at Glance statistics, available from stats.oecd.org

Pension System Setting in the Netherland

- 1st (zero) Pillar – Flat pension for everyone 67+ y.o. paid from taxes – PAYG DB system based on residency (2% of flat pension per year of residence) – 1226€¹ for single pensioner, 838€¹ for married pensioner in case of 50years+ residency.
- **2nd Pillar – corporate/employer pension funds (88% FF DB)**
- 3rd Pillar – FF DC voluntary system.

We will focus just on the FF DB element that is paid from contributions from the gross wage paid mainly by EMPLOYER in average of 16%.

1 SVB 2021, available from: <https://www.svb.nl/nl/aow/nieuws/nieuwe-aow-bedragen-vanaf-juli-2021>

FF DB model in the Netherland

- The contribution goes to the private fund managed by non-profit organizations (insurance companies) usually founded by the company or made for the whole industry.
- It is mainly FF DB base, but 12 % is DC models. DB model has an advantage of collective share of risk. The target is to receive around 80 % of previous netto wage if you work at least 40 years.
- The investment strategy is the same for the participants of each fund. They share the risk together, so that there is no life-annuity problem known from FF DC.
- The pension benefits depend on how many years you worked, how much you earned and also on current situation of global financial markets (assets price). The fund must have a value of at least 105 % of future claims, so that you cannot maximize the pension benefit as in FF DC. On the other hand, you have almost complimentary life annuity.

Thank you for the attention!

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NB 337a – on request only

Sources

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