Pay-As-You-Go Pension System

Ph. BERTRAND

IAE Aix-en-Provence

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Simple Model of Pay-As-You-Go Pension Systems

- In a pay-as-you-go (PAYG) pension system, current workers' contributions fund current retirees' benefits. The sustainability of such a system depends on demographic and economic factors.
- The fundamental equation of a PAYG system can be expressed as:

$$\underbrace{c \cdot W \cdot L}_{\text{contributions}} = \underbrace{P \cdot B}_{\text{benefits paid}} \tag{1}$$

Where:

- c = contribution rate (tax rate on wages)
- W = average wage
- L = number of workers
- P = number of pensioners
- B = average pension benefit

- This means the total contributions collected (left side) must equal the total benefits paid (right side).

Pay-As-You-Go Pension Systems: Balance

- For the system to be in balance, we can rearrange to find the necessary contribution rate:

$$c = \frac{P}{L} \times \frac{B}{W} \tag{2}$$

- Here, P/L is the demographic dependency ratio (retirees per worker), and B/W is the replacement rate (pension benefit as a percentage of average wages).
- As equation (2) shows, the means to maintain the equilibrium of such a system are limited:
  - contribute more: increase c;
  - lower the generosity of the system, by lowering benefits $\frac{B}{W}$;
  - work longer, by increasing the retirement age, which translates into a decrease in the dependency ratio $\frac{P}{L}$ by increasing the number of contributors and decreasing the number of beneficiaries.

PAYG Implicit Return vs Funded System Explicit Return

- The implicit return of a PAYG system depends on wage and population growth:

$$r_{\text{PAYG}} \approx g + n \tag{3}$$

  where:
  - g: Productivity/Wage growth rate.
  - n: Workforce growth rate.
- Funded pensions earn market returns:

$$r_{\text{Funded}} = r \quad \text{(e.g., 4-6\% real)}$$

- Comparison
  - If $g + n > r$, PAYG is better.
  - If $g + n < r$, funded systems dominate.

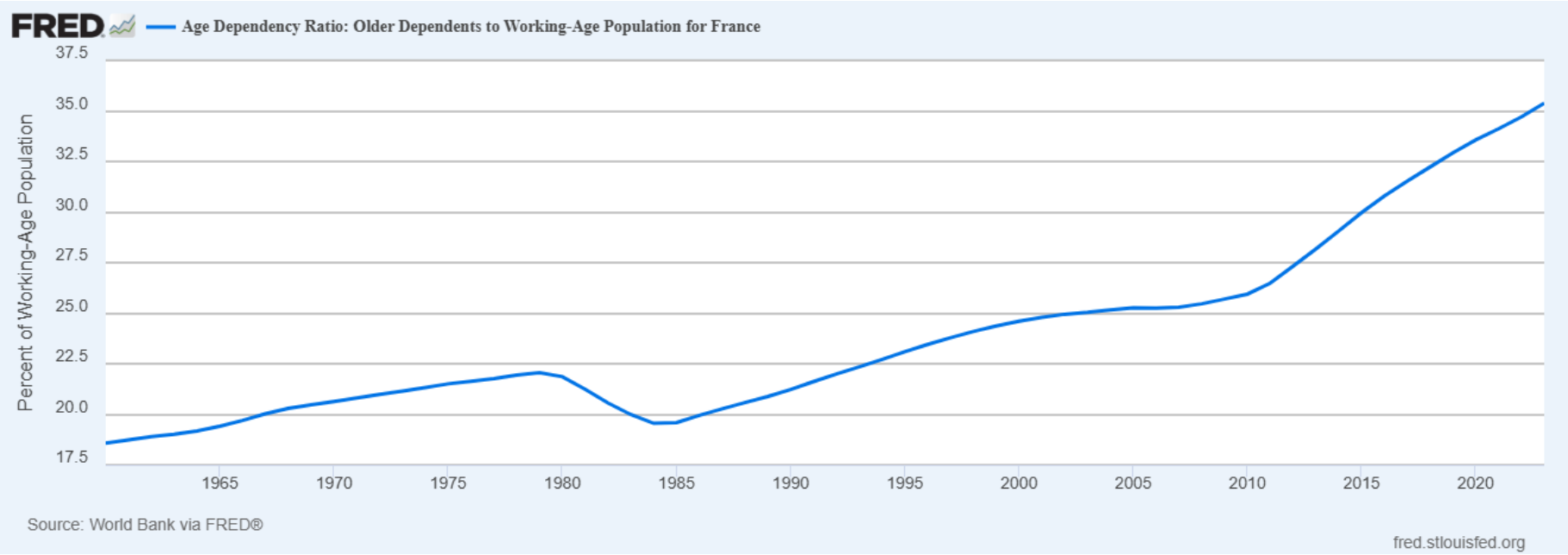
PAYG Implicit Return vs Funded System Explicit Return

Component	USA	Germany	France
Expected Real Growth (g)	1.5% - 2.5%	1.0% - 2.0%	1.0% - 2.0%
Expected Workforce Growth (n)	0.0% - 0.5%	-0.5% - 0.0%	-0.3% - 0.2%
Implicit Return (r)	**1.5% - 3.0%**	**0.5% - 2.0%**	**0.7% - 2.2%**

Table: Illustrative Ranges for Components of Implicit Return ($r = g + n$)

PAYG vs Funded System: Policy Implications

- Aging societies ($n \downarrow$) weaken PAYG returns.
- Funded systems face market risks but avoid demographic dependency.



Note: Age dependency ratio, old, is the ratio of older dependents (people older than 64) to the working-age population (those ages 15-64). Data are shown as the proportion of dependents per 100 working-age population.

Figure: Age dependency ratio

French Case

- France faces a major demographic challenge concerning its pension system. The primary problem is the aging population, which creates an imbalance in the ratio between the working population and retirees.
- France Population pyramid for 2025 ▸ INSEE Population pyramid
- This imbalance is characterized by several factors:
  - The increase in life expectancy: French people are living longer, which means they receive pensions for a longer period.
  - The decline in the fertility rate: Fewer children per woman means fewer future contributors.
  - The retirement of the large baby-boom generations.
  - A relatively low employment rate for seniors compared to other European countries.
- This situation raises questions about the long-term financing and viability of the system, which has motivated several pension reforms in recent decades, including the particularly controversial one of 2023 that raised the legal retirement age from 62 to 64.