Pension Debt and Implicit Tax

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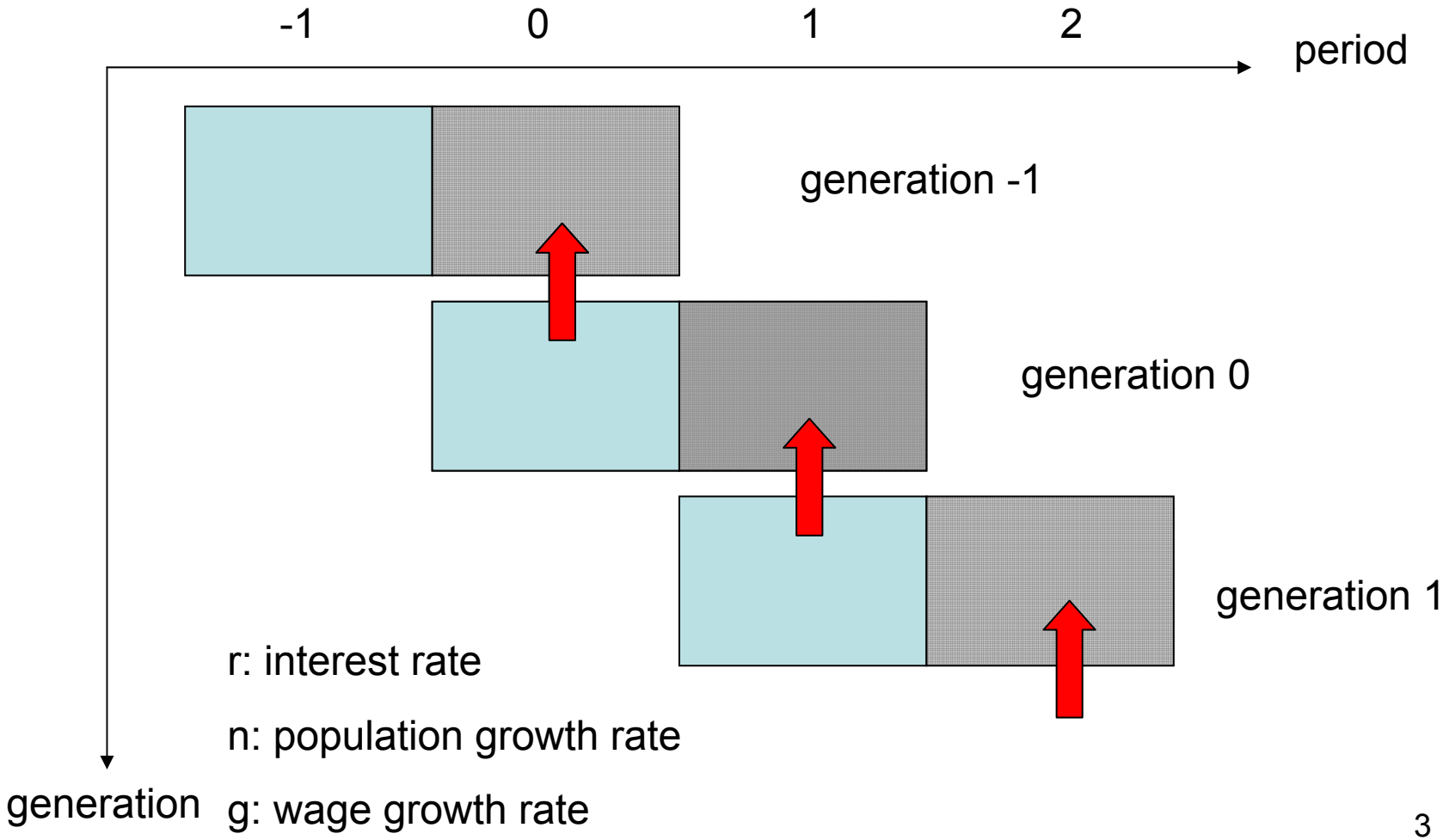
Intergenerational Transfer under PAYG Pension System

- Zero-sum nature of Income Transfer
- Equivalent Transfer policy
- Implicit Tax and Pension Debt
- Transition to Fully Funded System
- Size of Pension Debt
- Susutainability of Pension System

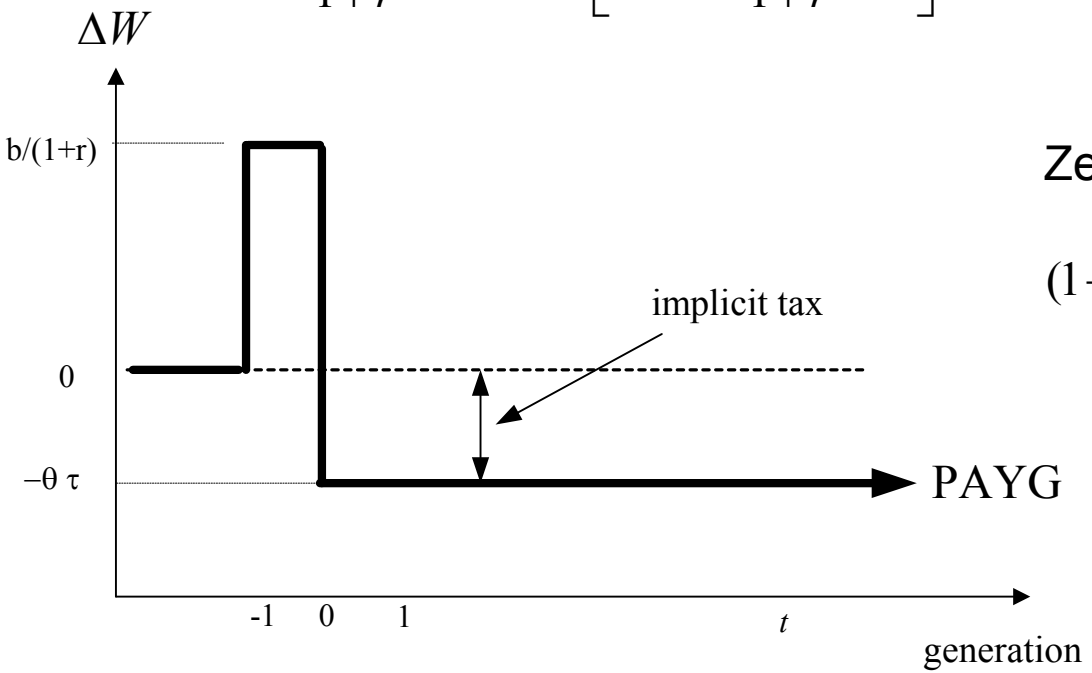
Income Transfer under PAYG pension system



Zero-sum Nature of Income Transfer

$$\Delta W_{-1} = \frac{b_0}{1+r}$$

$$\Delta W_t = \frac{b_{t+1}}{1+r} - \tau w_t = -\left[1 - \frac{(1+n)(1+g)}{1+r}\right]\tau w_t \equiv -\theta \tau w_t$$



Zero sum nature

$$(1+r)\Delta W_{-1} L_{-1} + \sum_{t=0}^{\infty} \frac{\Delta W_t L_t}{(1+r)^t} = 0$$

Equivalent Policy

- Transfer Policy
  - Transfer payment to the older people (generation -1) at time 0 by issuing government debt
  - Increase the tax burden of the younger people from time 0, 1, 2,..., to prevent government debt from growing infinitely
- Combination of Fully Funded Pension system and the above transfer policy

Pension Debt and the Tax burden of Future Generation

Pension Debt (Net) at time t

$$D_t = b_t L_{t-1} (= \tau w_t L_t)$$

Tax Burden of Future Generation

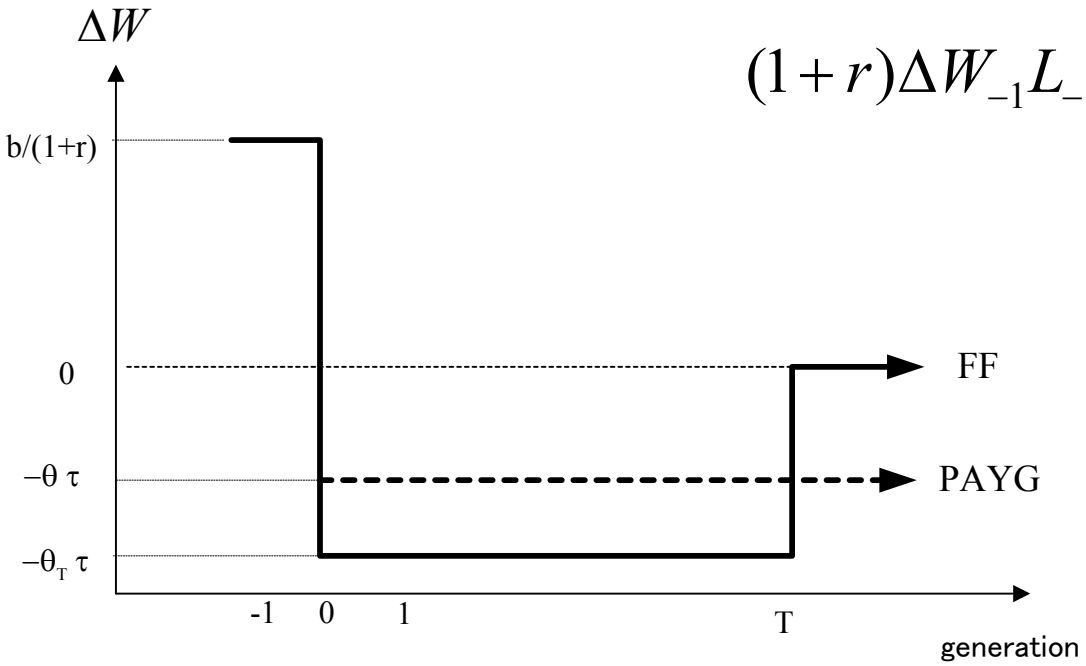
$$\sum_{i=0}^{\infty} \frac{\Delta W_{t+i} L_{t+i}}{(1+r)^i} = \sum_{i=0}^{\infty} \frac{-\theta \tau w_{t+i} L_{t+i}}{(1+r)^i} = -\tau w_t L_t$$

$$\therefore D_t = \sum_{i=0}^{\infty} \frac{\Delta W_{t+i} L_{t+i}}{(1+r)^i}$$

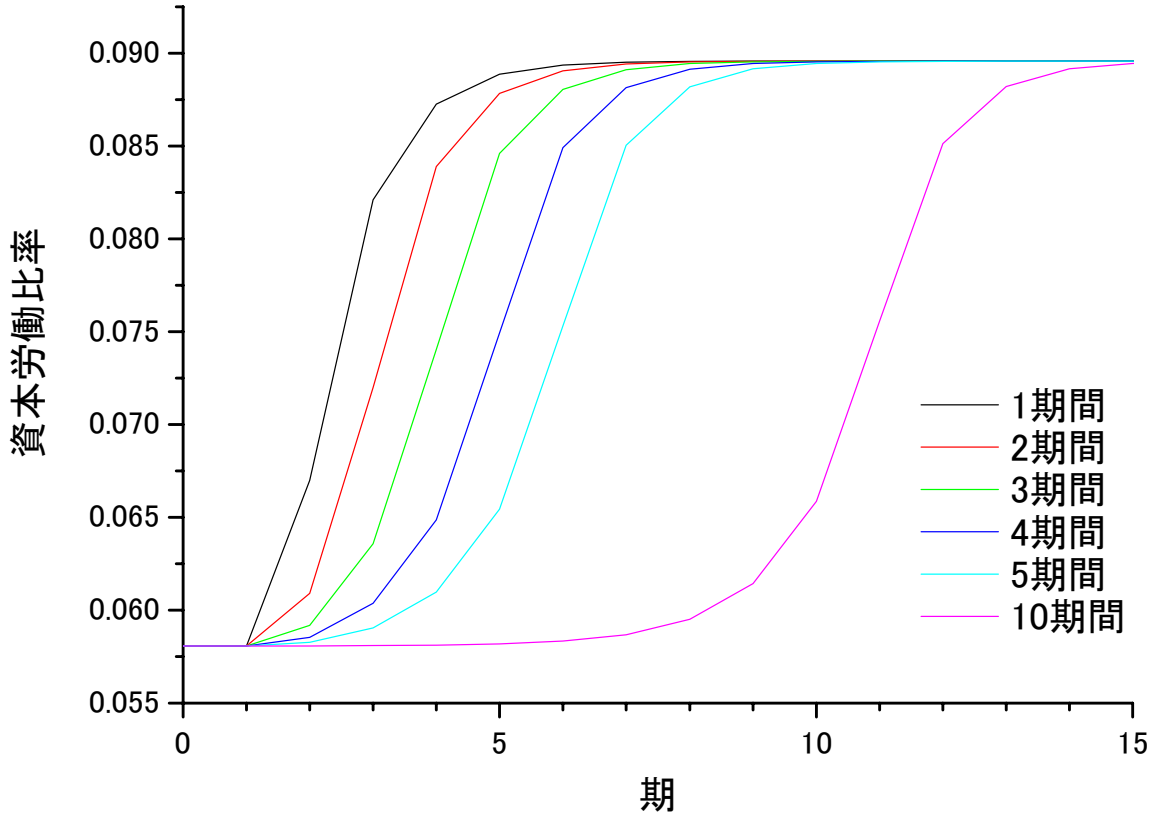
Transition to Fully Funded system

Zero-sum nature also holds under constant r,n,g

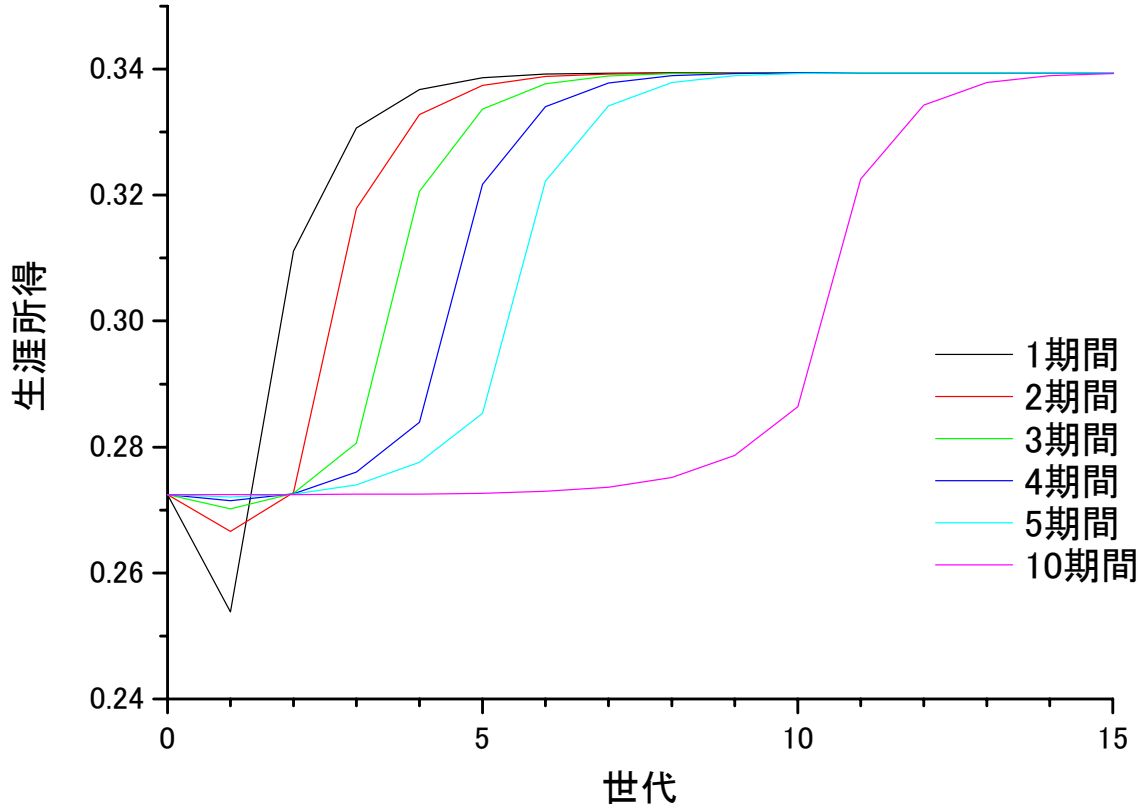
$$(1+r)\Delta W_{-1}L_{-1} + \sum_{t=0}^{\infty} \frac{\Delta W_t L_t}{(1+r)^t} = 0$$



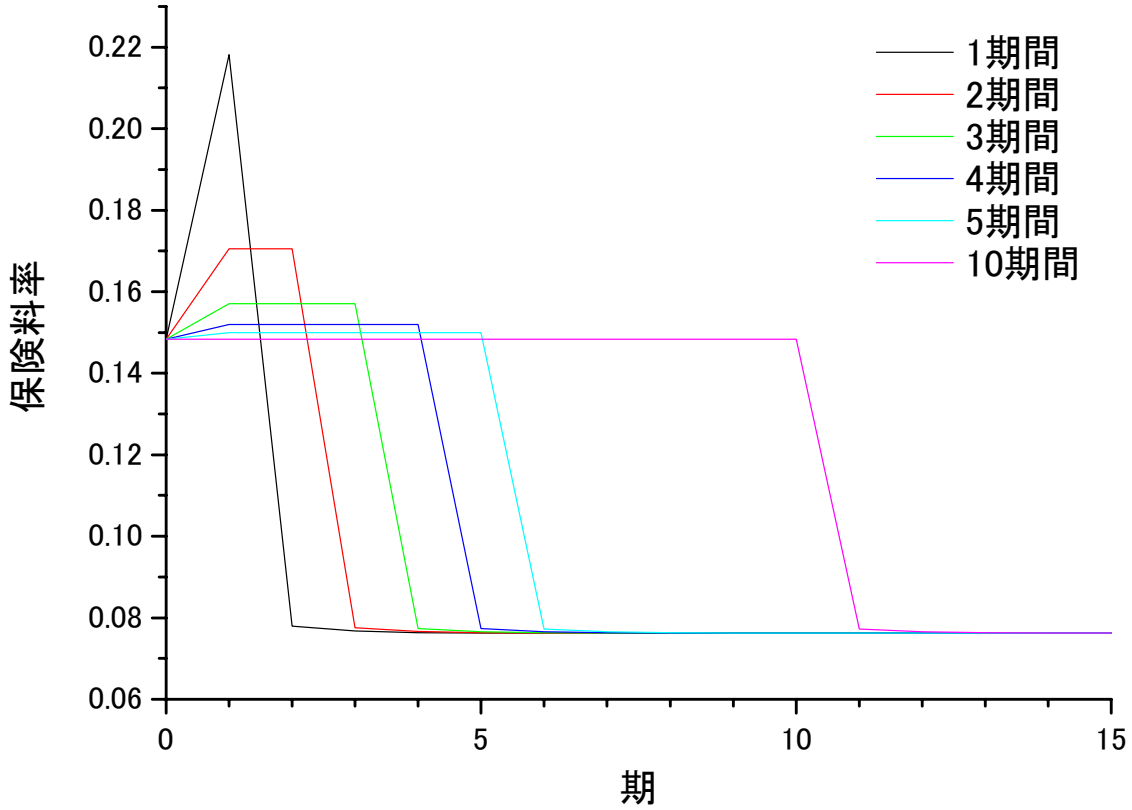
Transition to FF pension system
The Effect on Capital Accumulaton: capital labor ratio(2period OLG)



Transition to FF pension system Lifetime Income (2period OLG)

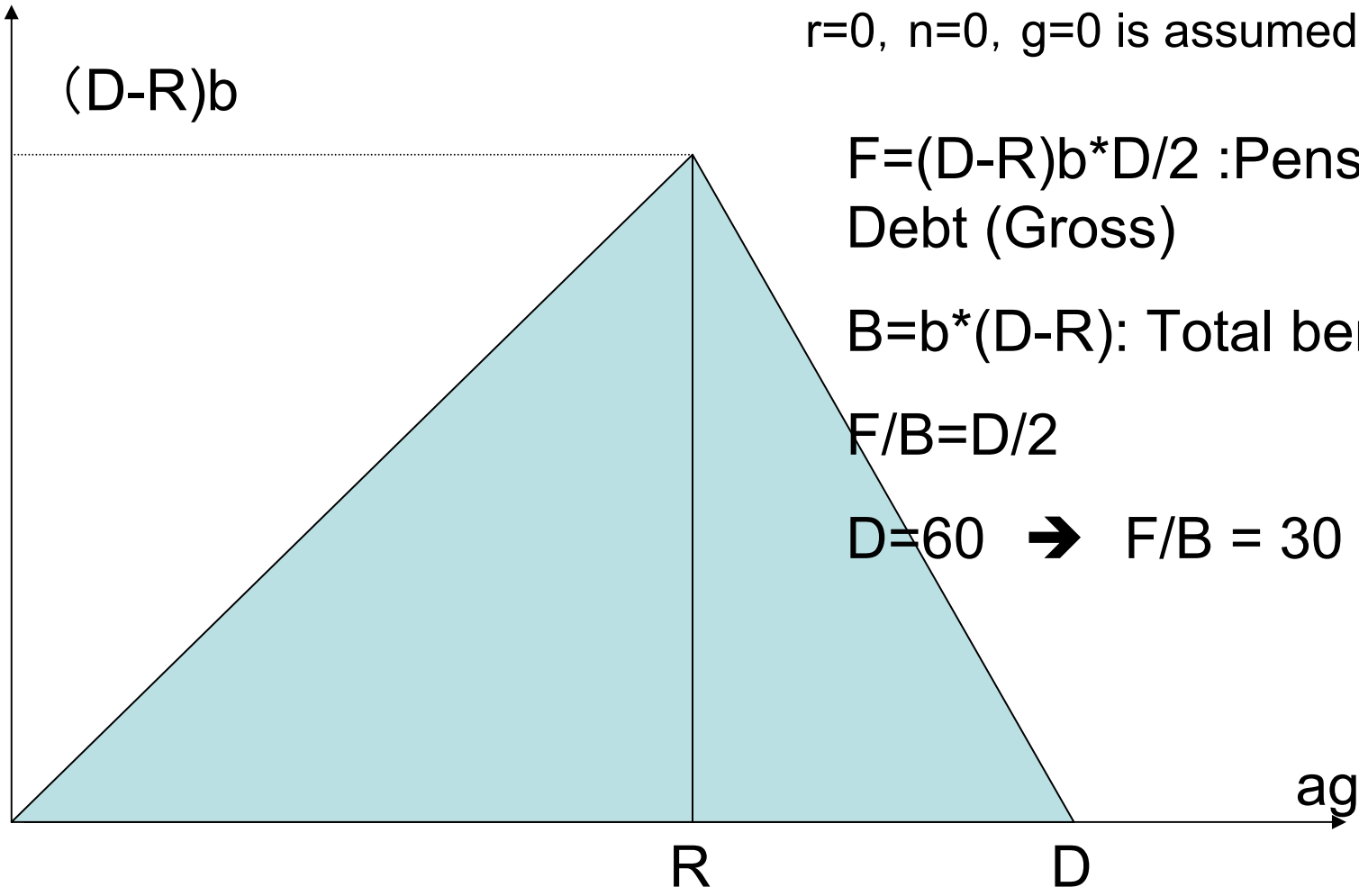


Transition to FF pension system Contribution rate (2 period OLG)



Size of Pension Debt

SSW



r=0, n=0, g=0 is assumed

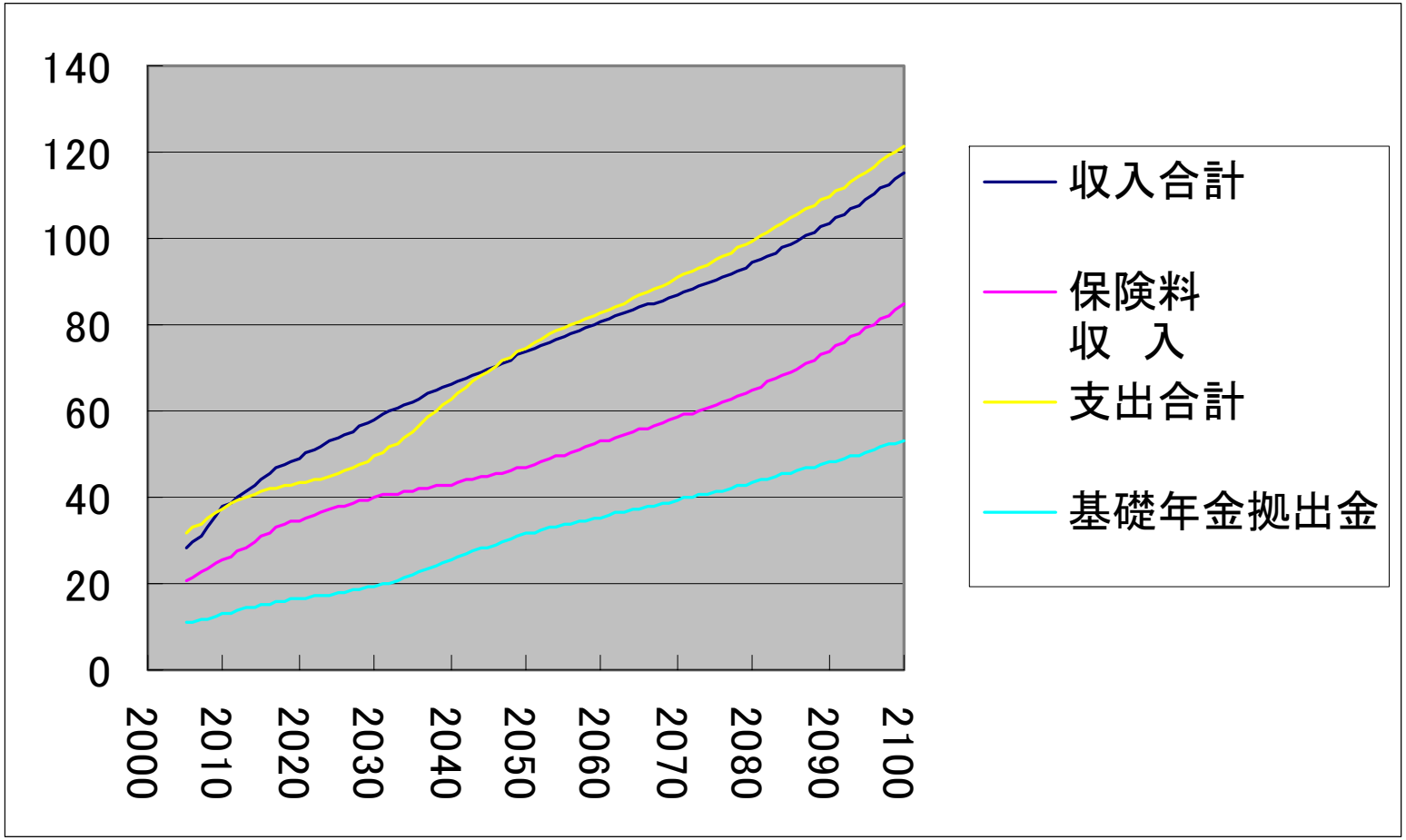
F=(D-R)b*D/2 :Pension Debt (Gross)

B=b*(D-R): Total benefit

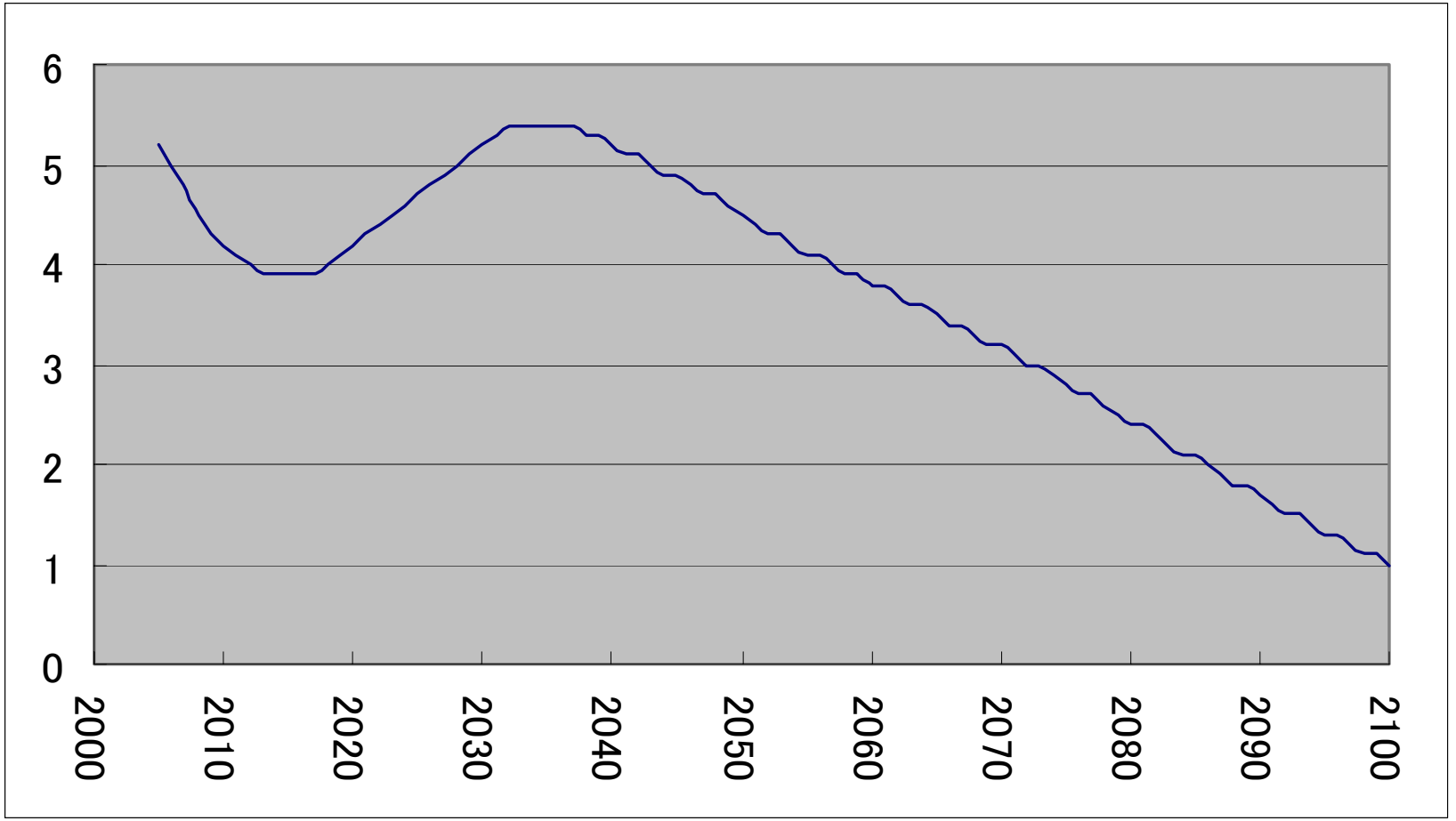
F/B=D/2

D=60 ➔ F/B = 30

Prospect of Revenue and Payment Kosei Nenkin(Empolyee's Pension)



Fund Benefit Ratio
Kosei Nenkin



Sustainability of Pension System

Budget Constraint

$$F_{t+1} = (1+r)F_t + T_t - B_t$$

$$\sum_{i=0}^{k-1} \frac{B_{t+i}}{(1+r)^{i+1}} + \frac{F_{t+k}}{(1+r)^k} = F_t + \sum_{i=0}^{k-1} \frac{T_{t+i}}{(1+r)^{i+1}}$$

Ft: Pension Fund; Tt: Revenue ;Bt: Benefit Payment

$$\lim_{k\to\infty} \frac{F_{t+k}}{(1+r)^k} = 0$$

non Ponzi game condition = sustainability

Note: this condition is satisfied even if $F_{t+k}<0$

$$\sum_{i=0}^{\infty} \frac{B_{t+i}}{(1+r)^{i+1}} = F_t + \sum_{i=0}^{\infty} \frac{T_{t+i}}{(1+r)^{i+1}}$$

This equation holds when non Ponzi game condition is satisfied

Balance Sheet

$$\lim_{k\to\infty}\frac{F_{t+k}}{(1+r)^k}=0$$

if above condition is satisfied, then

$$\sum_{i=0}^{\infty}\frac{B_{t+i}}{(1+r)^{i+1}}=F_t+\sum_{i=0}^{\infty}\frac{T_{t+i}}{(1+r)^{i+1}}$$

$$B^P+B^F=F+T$$

$$\left(F-B^P\right)+\left(T-B^F\right)=0$$

This equation holds even if $F_{t+k}<0$

B^P: Pension Debt(past contribution)
B^F: Pension Debt(future contribution)
F: Pension Fund
T: Future Revenue

Summary

- Exisiting Pension Debt = Tax Burden of Present and Future Generation
- Maintaining PAYG system does not mean vanishing the burden of future generation
- Transition to FF system is achieved by temporaliy heavy burden of transitional generation
- Transition to FF is preferable in the long run
- Pension Debt should be made explicit
  - Establish the Rule for sharing the burden of the existing debt
  - intergenerational equity
  - efficiency
    - capital accumulation
    - labor supply