Auerbach and Kotlikoff (1987)

Household

$$\sum_{s=1}^{T+T^R} \beta^{s-1} u(c_{t+s-1}^s, l_{t+s-1}^s)$$

$$u(c,l) = \frac{[(c+\psi)l^\gamma]^{1-\eta} - 1}{1-\eta}$$

$$k_{t+1}^{s+1} = (1+r_t)k_t^s + (1-\tau_t)w_t n_t^s - c_t^s$$
$$k_{t+1}^{s+1} = (1+r_t)k_t^s + b - c_t^s$$

Production

$$Y_t = N_t^{1-\alpha} K_t^\alpha$$

$$\max_{w_t, r_t} Y_t - (r_t+\delta)K_t - w_t N_t$$

Government

The measure of all generation is equal $\frac{1}{T+T^R}$

$$\tau_t w_t \sum_{s=1}^{T} n_t^s \times \frac{1}{T+T^R} = T^R \times \frac{1}{T+T^R} b$$

$$\tau_t w_t N_t = \frac{T^R}{T+T^R} b$$

Define Equilibrium

$$N_t = \sum_{s=1}^{T} \frac{n_t^s}{T+T^R}$$

$$K_t = \sum_{s=1}^{T+T^R} \frac{k_t^s}{T+T^R}$$

$$C_t = \sum_{s=1}^{T+T^R} \frac{c_t^s}{T+T^R}$$

Goods market

$$Y_t = C_t + K_{t+1} - (1-\delta)K_t$$

Calibration

Replacement ratio

$$\xi = \frac{b}{(1-\tau)w\bar{n}} = 0.3$$

Steps of Solving Equations

Step 1: Make initial guesses of the steady state values of the aggregate capital stock K and employment N.

Step 2: Compute the values w, r, and τ, which solve the firm's Euler equations and the government budget.

Step 3: Compute the optimal path for consumption, savings, and employment for the new-born generation by backward induction given the initial capital stock $k_1 = 0$.

Step 4: Compute the aggregate capital stock K and employment N.

Step 5: Update K and N and return to step 2 until convergence.