Exercise 12: Recursive Competitive Equilibrium - Baby Booms
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Let m_t be the measure of people born at the beginning of date t. The process governing this measure is

$$m_{t+1} = \alpha_m + \rho_m \, m_t$$

The probability that an individual of age a will survive to age a+1 is σ_a. The σ_a are positive for a<70 and zero for a≥70. People, when they die, die at the end of a period.

The aggregate production function is

$$c_t + x_t \le z_t \, (k_t)^{\theta} \, (n_t)^{1-\theta}$$

The process governing the technology shock is

$$z_{t+1} = \alpha_z + \rho_z \, z_t$$

The nature of depreciation is

$$k_{t+1} = (1-\delta) \, k_t + x_t$$

Conditional on survival, individuals have one unit of labor at ages a=1,…,45 and zero for a=46,…,70. They rent labor services to the firm. Individuals own capital and rent their capital to the firm. Individuals begin life owning 0 units of capital. There are no Arrow securities to share risk.

a.   Represent this competitive equilibrium problem in the language of recursive competitive equilibrium.