Description of the problem

The household's utility function is

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\gamma}}{1-\gamma}$$

The labor income can be characterized by

$$Y_t = \begin{cases} \tilde{Y}_t, \text{ if employed} \\ b, \text{ if unemployed} \end{cases}$$

where

$$\log \tilde{Y}_t = (1-\rho) \log \mu + \rho \log \tilde{Y_{t-1}} + \epsilon_t$$

and

$$\epsilon_t \in \mathcal{N}(0, \sigma^2)$$

When a household is employed, its probability of becoming unemployed next period is p. When a household is unemployed, its probability of becoming employed again next period is q.

The budget constraint is given through

$$C_t + \frac{A_{t+1}}{1+r} = Y_t + A_t$$

and the borrowing constraint is

$$A_t \geq 0.$$

The parameter values are

$$\gamma = 2, \beta = 0.98, \mu = 1, b = 0.4, \rho = 0.9, \sigma^2 = 0.05, p = 0.05, 1 = 0.25, r = 0.01.$$

The notation of the parameters is consistent with that used in literature.