Replication of Aiyagari(1994)

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Individual's Problem

$$\max E_0 \left(\sum_{t=0}^{\infty} \beta^t U(c_t) \right) \tag{1}$$

$$\text{s.t.} \tag{2}$$

$$c_t + a_{t+1} = wl_t + (1+r)a_t \tag{3}$$

$$c_t \geq 0 \tag{4}$$

$$a_t \geq -\phi \tag{5}$$

where ϕ (if positive) is the limit on borrowing; l_t is assumed to be i.i.d with bounded support given by $[l_{min}, l_{max}]$, with $l_{min} > 0$; w and r represent wage and interest rate respectively.

Bellman Equation and Euler Equation

The Bellman equation is as follows:

$$V(z_t, \phi, w, r) \equiv \max_{\hat{a}_{t+1}} \left(U(z_t - \hat{a}_{t+1}) + \beta \int V(z_{t+1}, \phi, w, r)\ dF(l_{t+1}) \right) \tag{6}$$

Consequently, Euler equation is:

$$U'(z_t - \hat{a}_{t+1}) = \beta(1 + r) \int U'(z_{t+1} - \hat{a}_{t+2})\ dF(l_{t+1}) \tag{7}$$

Solve the Model

The decision rule can be written as:

$$\hat{a}_{t+1} = A(z_t, \phi, w, r) \tag{8}$$

And the law of transition would be:

$$z_{t+1} = wl_{t+1} + (1 + r)A(z_t, \phi, w, r) - r\phi \tag{9}$$

Firm's Problem

$$\max F(K, L) - wL - rK \tag{10}$$

where K is the aggregate capital, L is the aggregate labor, $F(K, L)$ is the production function.

Computation and Tools

- We used `Dolo` and `Dolark` to solve the model.
- Codes are written in Python.
- You can easily find details of our replication on *EconArk GitHub page*.