Dynamic Programming Exercise Class 3

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Ex. 6: Deaton model in finite horizon

$$V_t(W_t) = \max_{c_t} \frac{c_t^{1-\rho}}{1-\rho} + \beta E_t[V_{t+1}(W_t+1)]$$

$$\text{s.t}$$

$$W_{t+1} = R(W_t - c_t) + Y_{t+1}$$

$$c_t \in \mathbb{R}_+$$

$$W_t - c_t \geq 0$$

$$Y_{t+1} = \exp(\xi_{t+1})$$

$$\xi_{t+1} \sim \mathcal{N}(0, \sigma_\xi^2)$$

- Nothing new!
- We use gauss-hermite guadrature to handle the expectation

Ex. 6: Euler-errors

We can check the accuracy of our solution by using the Euler equation:

$$u'(c_t) = \beta R E_t[u'(c_t + 1)]$$

- Idea: Take simulated consumption and cash-in-hand and check whether euler equation is satisfied for these levels of cash-on-hand.
- Euler-error:

$$\frac{1}{\sum_{i=1}^{N}\sum_{t=1}^{T} 1(c_{i,t} \leq W_{i,t})} \sum_{t=1}^{T}\sum_{i=1}^{N}(u'(c_{i,t}) - \beta R E_t[u'(c_{i,t+1})])1(c_{i,t} \leq W_{i,t})$$

- $1(c_{i,t} \leq W_{i,t})$ is an indicator for whether the individual is borrowing constrained.

Ex. 7: Deaton model in infinite horizon

Today:

$$V(W_t) = \max_{c_t} \frac{c_t^{1-\rho}}{1-\rho} + \beta E_t[V(W_t + 1)]$$

s.t

$$W_{t+1} = R(W_t - c_t) + Y_{t+1}$$

$$c_t \in \mathbb{R}_+$$

$$W_t - c_t \geq 0$$

$$Y_{t+1} = \exp(\xi_{t+1})$$

$$\xi_{t+1} \sim \mathcal{N}(0, \sigma_\xi^2)$$

- Same as exercise 6 but in infinite horizon