ECON 899 Problem Set 5

Jackson Crawford, Dalya Elmalt, Jon Kroah*

Due 12 Oct 2022

1 Setup

The dynamic programming problem for the true HH problem is:

$$V(k,\varepsilon,\Gamma,z)=\max_{k'}\left\{u\Big((1+r(K,L)-\delta)k+w(K,L)\bar{e}\varepsilon-k'\Big)+\beta\mathbb{E}\Big[V(k',\varepsilon',\Gamma',z')\Big|\varepsilon,z\Big]\right\}$$

where Γ evolves according to

$\Gamma'=H(\Gamma,z,z')$

where

- ε is a HH's idiosyncratic employment state; $\varepsilon\in\{1,0\}$
- z is the aggregate state of the economy; $z\in\{z^g,z^b\}$
- $\Gamma(\varepsilon,z)$ is the distribution of HHs across employment states ε and aggregate states z
- K,L are aggregate capital and labor stocks

We approximate this problem as follows:

$$V(k,\varepsilon,\bar{K},z)=\max_{k'}\left\{u\Big((1+r(\bar{K},L)-\delta)k+w(\bar{K},L)\bar{e}\varepsilon-k'\Big)+\beta\mathbb{E}\Big[V(k',\varepsilon',\bar{K}',z')\Big|\varepsilon,z\Big]\right\}$$

where $\bar{K}$ evolves according to

$$\log(\bar{K}')=\begin{cases}a_0+a_1\log(\bar{K}) & \text{if } z=z^g\\ b_0+b_1\log(\bar{K}) & \text{if } z=z^b\end{cases}$$

where $\bar{K}$ is average capital holdings across HHs.

2 Results

Following the algorithm in the Krusell-Smith handout, we obtain:

Aggregate State	**Coefficients**		**Goodness-of-Fit**
$z=z^g$	$\hat{a}_0=0.0881$	$\hat{a}_1=0.9649$	$R^2=0.9933$
$z=z^b$	$\hat{b}_0=0.0860$	$\hat{b}_1=0.9642$	$R^2=0.9933$

*Referenced code from Phil Coyle and Katherine Kwok.