PS05 -1- Irena

Q1 AR1:
$z' = \rho z + \eta \qquad \eta \sim N(0, \sigma_\eta)$

a) $z_0 = 0$, 10000 draws
n

$\rho = 0.9$
$\sigma = 0.1$.
I used "Distributions" package for this. Code is attached.

Tauchen, N=5, N=15

b) I used codes from Sergio & internet. Corresponding function in code is tauchen86_5 & tauchen86_15; simulation_5, simulation_15. Code attached.

c) In c), I used "Statistics" and "StatsBase", "DataFrames" packages. Code attached.

Table, N=5, Tauchen

Mean	0.0238478
St dev	0.286506
Skewness	2.004977
Kurtosis	-0.2016
Auto 1	0.864
Auto 2	0.804
Auto 3	0.7468
Auto 4	0.691779

these tables screenshots are also attached in this file. ← "Table 1", "Table 2"

Table, N=15, Tauchen

mean	-0.0129
St dev	0.2364
Skewness	-0.0589
Kurtosis	-0.1379
Auto 1	0.80552
Auto 2	0.72365
Auto 3	0.64794
Auto 4	0.58217

d) Code attached (my Julia has error using Plots, not sure why.)

(Q1) b, c, d. using Rouwenhorst method. the code was adopted from Sergio's website. the moments for $N=5$

mean	−0.0121132
st.dev	0.22876
skewness	−0.01046
kurtosis	−0.4783
autocorr1	0.810807
autocorr2	0.729591
autocorr3	0.656692
autocorr4	0.590772

$N=15$

mean	−0.001147
st.dev.	0.223827
skewness	0.048115
kurtosis	−0.442308
auto1	0.794741
auto2	0.706623
auto3	0.625851
auto4	0.554949

Screenshots from Julia are attached.

(Q2) $u(c,l)=\frac{c^{1-\delta}}{1-\delta}-\chi\frac{l^{1+\eta}}{1+\eta}$

$l\in[0,1]$
$\delta=0.05$
$\beta=0.98$
$\alpha=1/3$
$z=1$
$\delta=2$
$\eta=1$
χ is s.t. $l_{ss}=0.4$.

code attached.

$\log z'=\rho\log z+\eta$
$\eta\sim N(0,\sigma_\eta)$
$\rho=0.9$
$\sigma_\eta=0.1$..

Rouwenhorst's method to discretise z.

z' is log-normal,

$\log z'\sim N$

$\sigma_\eta(z')=\sqrt{\log 1+\sigma_\eta^2}$

$\psi=\sigma_\eta\cdot\sqrt{\frac{N-1}{1-\rho^2}}$

$\log z'=\rho\log z+\eta$
$\log z'=\log(\log z+\eta)$
$z'=\exp(\log z)\cdot\exp(\eta)=z^\rho\cdot\exp\eta$

8×2 DataFrame

Row	Statistics	Values
	String	Float64
1	Mean	-0.0121132
2	St.dev.	0.228762
3	Skewness	-0.0104603
4	Kurtosis	-0.478322
5	Autocorr1	0.810302
6	Autocorr2	0.729591
7	Autocorr3	0.656692
8	Autocorr4	0.590722

Rouwenhorst95_15 (generic function with 2

8×2 DataFrame

Row	Statistics	Values
	String	Float64
1	Mean	-0.00114708
2	St.dev.	0.223827
3	Skewness	0.048115
4	Kurtosis	-0.442308
5	Autocorr1	0.794741
6	Autocorr2	0.706623
7	Autocorr3	0.625851
8	Autocorr4	0.554949