Perturbation Homework

Model Setup

We consider a standard infinite-horizon RBC model with the following features:

- Infinite horizon representative agent.

- Log utility: $u(c_t) = \frac{c_t^{1-\gamma}}{1-\gamma}$.

- Cobb-Douglas production: $Y_t = \exp^{z_t} K_t^{\alpha}$, where $0 < \alpha < 1$.

- No full depreciation of capital: $\delta < 1$.

- Stochastic total factor productivity (TFP): $z_{t+1} = \rho z_t + \sigma \varepsilon_{t+1}$ where $\varepsilon_{t+1} \sim \mathcal{N}(0,1)$.

Questions

1. Write the FOC of the model, remenber there have to be three of as we are looking for policy function for consumption, capital, and TFP shocks.

2. Find the Steady-State analytically

3. Write
$$H(c_t, c_{t+1}, k_t, k_{t+1}, z_t, z_{t+1})$$

4. Write the policy functions we are looking for as a function of (k_t, z_t, σ)

5. Write the
$$F(k_t, z_t, \sigma)$$

6. Write H_i for $i = 1, \ldots, 6$

7. Write H_i for $i = 1, \ldots, 6$ evaluated a Steady-State

8. Write F_k, F_z, and F_σ

9. Write $\mathbf{A}$ and $\mathbf{B}$

10. Find $\mathbf{h}_x$ and $\mathbf{c}_x$