1 Optimal growth

Assume one-sector technology.

\[ W = \int_0^T u(c(t), k(t)) e^{-\delta t} \, dt \]

for \( T \leq \infty \). Make assumptions about \( u(\cdot) \). Analyze Pontryagin’s necessary conditions. Are they sufficient? Analyze steady states, turnpikes, global stability, and uniqueness. Interpret the economics.

2 Burden of the debt

Use the Phelps-Shell (1969) one-sector model. Do every possible steady-state graph including consumption-per-head versus debt-per-head, and capital-per-head versus debt-per-head. Numerically plot these for different parameters. Fully analyze the bifurcation(s) in this model. Discuss the economics.

3 Cass-Ramsey-Koopmans model

Show by construction that for some cases the optimal trajectory will switch from nonspecialization to specialization and back.
4 Phelps-Koopmans Theorem


5 Cass Criterion

Apply this first to one-sector growth. Precisely state the result. Reference: Cass, JET, 1972. Relate this result to Phelps-Koopmans. Next apply this to the OG model. Precisely state the result. Apply this result to the Samuelson OG paper (1958) and the Shell (1972) OG paper.

6 The Golden Rule

Define the golden rule. What use is the GR concept? In what ways are the GR concepts misleading? Include in your answer optimal growth theory, the Phelps-Koopmans theorem, and the OG model.