RBC Problem Set

September 29, 2022

Consider the standard RBC model we covered in class, but assume that there is a constant proportional tax levied on income from capital. Denote the tax rate by τ.

The objective function is given by:

$$\mathcal{U} = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \left[\ln C_t + b \ln (1 - L_t)\right]$$

Where C_t is consumption, L_t is labour supply, $\beta \in (0, 1)$ is the subjective discount factor and $b > 0$ a parameter. Consumers own their labour resources as well as the capital stock in the economy. Each unit of labour supplied earns wages W_t and each unit of capital earns before tax return of r_t. Capital K_t depreciates at rate $\delta > 0$ per period. Denote investment by I_t. The government consumes its tax income G_t at no benefit to the consumer.

1. Give the government budget constraint
2. Why is government income time varying while the tax rate is constant?
3. Derive the inter-temporal budget constraint of the consumer in terms of consumption, capital stock and labour.
4. Set up the Lagrangian and derive the Euler equation
5. In steady state, consumption and capital returns are constant and there is no uncertainty. Find the steady state level of the return on capital in terms of parameters of the model and determine how it is affected by an increase in the tax rate.