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Problem set 2 (seminar 2) – Septemeber 26

Question 1

How will the income distribution, in the neoclassical model – that between capital income and labour income – develop during the transition towards steady state when the economy is starting in a state with $k(0) < k^*$ (the steady state capital per head)?

Question 2

Disembodied technical progress is being modeled in different ways. One is by introducing an increasing function $A(t)$ in the macro production function $X(t) = \tilde{F}(K(t), L(t), A(t))$. Such disembodied technological progress can be of different types. One is a neutral one, called "Hicks-neutral technological progress" as given by $\tilde{F}(K(t), L(t), A(t)) = A(t)F(K(t), L(t))$, where the F-function has constant returns to scale. Another one is "capital-augmenting technological progress" or "Solow-neutral technical progress", so that $\tilde{F}(K(t), L(t), A(t)) = F(A(t)K(t), L(t))$, whereas a last one is a labour-augmenting one, or "Harrod-neutral technological progress" given by $\tilde{F}(K(t), L(t), A(t)) = F(K(t), A(t)L(t))$.

i) Try to show how the isoquant map is affected by each type of technological progress.

ii) Show also the balanced or steady-state properties of the neoclassical model if we have Harrod-neutral technological progress with a constant rate $m > 0$ so that $A(t) = e^{mt}$. (Hint: Define $N(t) = e^{mt}L(t)$, and proceed by defining output per unit of effective labour, $N(t)$.)

Question 3

Introduce government consumption in the neoclassical growth model, and let $X(t) = C(t) + \dot{K}(t) + G(t)$, where $G(t)$ is government spending (consumption) per unit time at t. (The remaining symbols have been defined earlier.) Assume that government spending is proportional to domestic output, $G(t) = \gamma X(t)$, and financed through taxes paid by the private sector who owns all means of production. Private consumption is proportional to disposable income; hence we have $C(t) = \beta\left(X(t) - T(t)\right)$, where $0 < \beta < 1$. Let $T(t) = \lambda G(t)$.

i) What is the effect of a higher value of γ on the equilibrium outcome of the model?

ii) How can this model be modified or reformulated to capture the financial problems some governments are facing today?