Problem Set #8

Economic Growth
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Professor Todd Keister
keister@itam.mx

No Due Date

Consider the Romer model, where output is produced using different types of capital according to the production function

$$Y(t) = AL(t)^{1-\alpha} \int_0^{M(t)} K_j(t)^{\alpha} \, dj.$$

Households have the usual preferences and there is no population growth (normalize $N = 1$). Suppose the government subsidizes the **sale** of capital: for each unit of K_j that firm j sells, the government pays it an amount σ (hence, the total revenue that firm j gets from selling one unit of output is $R_j + \sigma$). The government finances these subsidies by taxing labor income.

a) What are the differential equations for the variables c and a that come from solving the household's problem under this policy?

b) Write the profit-maximization problem of a final output producer, and use this problem to derive the demand function for capital of type j.

c) Write the profit-maximization problem of firm j, and use this problem to derive the production intensity K^* (the amount of each type of capital that will be used in production).

d) What are the equilibrium conditions? Use these conditions to determine the equilibrium interest rate for this economy.

e) What is the equilibrium growth rate of consumption for this economy? (This may depend on the levels of subsidy σ.)

f) Can the government choose the levels of subsidy σ so that the equilibrium is optimal? If so, what is the correct level? If not, why not?