Problem Set #4

Growth and Innovation

Michael A. Klein

Due 2:00PM 3/17/23

1. Learning by doing (LBD) model concepts - No need to derive anything, just provide an answer in a few sentences.

   (a) Describe the source of technology/knowledge growth in the LBD model. Do you think that it is a realistic way to model technology growth?

   (b) Describe the presence of diminishing returns to factors of production in the model and connect this to our balanced growth equilibrium

   (c) How do we determine if a market equilibrium is efficient (in general)? Is the market equilibrium in the LBD model efficient?

   (d) Describe the source of this market inefficiency.

2. (Production subsidy in the LBD model). Consider the Cobb-Douglass version of the learning by doing model that we analyzed in class. Each firm i's output is given by

$$Y_i = K_i^{\alpha}(KL_i)^{1-\alpha}$$

   and households have log utility $u(c) = ln(c)$.

   (a) Suppose that the government implements a production subsidy to correct market inefficiency. Specifically, the government will help defray the cost of production by paying firms $0 < s_y < 1$ for each unit of output that they produce. Use a typical firm's profit maximization problem to derive the demand for loanable funds and labor as a function of the subsidy. Hint: firm i's revenue is now $(1 + s_y)Y_i$.

   (b) Determine the value of s_y that corrects the market inefficiency.

(c) Suppose the government runs a balanced budget, and finances the subsidy through a tax on consumption (just like the investment subsidy we examined in class). Determine the level of t_c that is required to maintain a balanced budget

(d) Compare this production subsidy to the investment subsidy we analyzed in class - provide some intuition for how both policies can accomplish the goal of eliminating market inefficiency. (a few sentences is fine)