

Advanced Macroeconomics

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Problem Set 6:

Investment

Problem 1: Investment and Tobin's q

Consider an economy in which the investment dynamics are subject to installation costs (captured by the parameter $\phi > 0$). In line with the discussion of Tobin's q -theory as developed in the Lecture Notes, assume that the partial equilibrium dynamics in k and q can be summarized by the following two dynamic equations, assuming $\beta \in (0, 1)$ and $f'(k) > 0$, $f''(k) < 0$:

$$\Delta k_{t+1} = \frac{1}{\phi}(q_t - 1)k_t \quad (1)$$

$$\Delta q_{t+1} = \frac{1 - \beta}{\beta}q_t - f'(k_{t+1}). \quad (2)$$

- a) Draw a phase diagram in $k - q$ -space using equations (1) and (2).
- b) Assume the economy is initially in a steady state. Using an appropriate diagram, discuss the effects of a permanent increase in productivity. Think about what changes in the diagram derived in part a). Which lines will shift? Describe the dynamics to the new long-run equilibrium.
- c) Assume the economy is initially in a steady state. How does a permanent increase in ϕ affect the long-run values of k and q ?