

AAE635: Applied Microeconomic Theory

Discussion Section 4

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Today's goal

- Understand the difference between short-run and long-run input adjustment.
- Illustrate Le Chateliers principle using a simple production function example.

Practice Question

In Economics, capital is usually assumed to be fixed in the short-run. Then, for example, the effects of a change in wage on output and labor input are larger in the long-run than in the short-run.

To capture the intuition, consider a firm that analyzes big data with economists and Supercomputers. If the wage goes down, then the firm may hire more economists in the short-run, but not so much since the number of Supercomputers is fixed. In the long-run, since the firm can buy more Supercomputers, it hires more economists.

Consider a profit-maximizing firm with the production function

$$f(k, \ell) = -k^2 - \ell^2 + 4k + 8\ell + k\ell + 50. \quad (1)$$

The output price is 1. Let r and w be the capital price and the labor wage, respectively. Suppose that adjustment of k takes long time while adjustment of ℓ is immediate. Consider only interior solutions of (r, w) below.

1. Find the long-run input demand function $k^*(r, w)$ and $\ell^*(r, w)$.

2. Derive the long-run optimal inputs when $r = 1$ and $w = 5$.
3. The inputs costs, r and w , have remained at 1 and 5 for a long time. However, all of sudden, w increases to 6 while r is still 1.
 - (a) What is the optimal labor input in the short-run? What is the short-run response of labor input to the change in wage?
 - (b) What are the optimal labor and capital inputs in the long-run, $k^*(1, 6)$ and $l^*(1, 6)$? What is the long-run response of labor input to the change in wage?
 - (c) Verify that the LeChatelier's principle holds.