

Lecture X: Aggregate Supply in the Long and Short-run

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Readings

Different Supply Curves for Different Firms

Long-Run Cost Function

Readings

- ▶ Becker Lecture 18
- ▶ Landsburg Chapters 22 – 23

Different Supply Curves for Different Firms

- ▶ Minimum Average Cost and the Choke Point
- ▶ Returning to the marginal and average cost functions in the preceeding lecture, Figure 1.

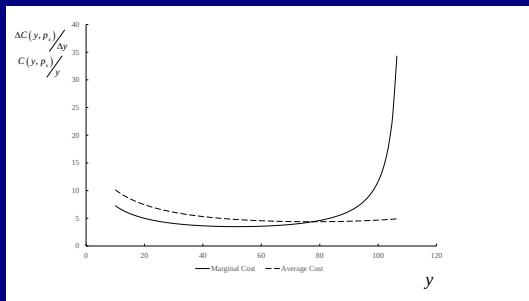


Figure : Firm Marginal and Average Cost Curves

- ▶ Developing a formal relationship between marginal and average cost, consider a change in average cost

$$\frac{\Delta AC}{\Delta Y} = \frac{\Delta \frac{TC}{Y}}{\Delta Y}. \quad (1)$$

- ▶ Taking the change in the numerator of Equation 1 will be no trouble, but I need to do something about taking the change in the denominator

$$\begin{aligned} \Delta \frac{1}{Y} &= \frac{1}{Y + \Delta Y} - \frac{1}{Y} \\ &= \frac{Y}{(Y + \Delta Y)Y} - \frac{Y + \Delta Y}{(Y + \Delta Y)Y} \\ &= \frac{Y - Y - \Delta Y}{Y^2 + Y\Delta Y}. \end{aligned} \quad (2)$$

- ▶ Dividing the result in Equation 2 by ΔY and then letting $\Delta Y \rightarrow 0$ yields

$$\frac{\Delta \frac{1}{Y}}{\Delta Y} = -\frac{1}{Y^2} \quad (3)$$

- ▶ Therefore returning to Equation 1

$$\begin{aligned} \frac{\Delta \frac{TC}{Y}}{\Delta Y} &= \frac{\Delta TC}{\Delta Y} \frac{1}{Y} - \frac{TC}{Y^2} \frac{\Delta Y}{\Delta Y} \\ \Rightarrow \frac{\Delta AC}{\Delta Y} &= \left[\frac{\Delta TC}{\Delta Y} - \frac{TC}{Y} \right] \frac{1}{Y} = 0 \end{aligned} \quad (4)$$

$$\frac{\Delta AC}{\Delta Y} = 0 \Rightarrow MC - AC = 0$$

- ▶ The average cost is minimum when it is equal to the marginal cost – this is the boundary to the standard economic region of production.
- ▶ Above this price point (i.e., where $MC = p_Y$), production covers all the variable cost of production.

$$p_Y Y \geq TC \Rightarrow \left\{ TC \Leftarrow MC = \frac{\Delta TC}{\Delta Y} = p_Y \right\} . \quad (5)$$

- ▶ Thus, the firm's supply function begins at this point (for competitive producers).

- ▶ This point forms a firm's "choke point" below which the firm will not supply output in a competitive market.
- ▶ Redrawing the implications from Figure 1 in Figure 2, p_y^0 is the choke price.

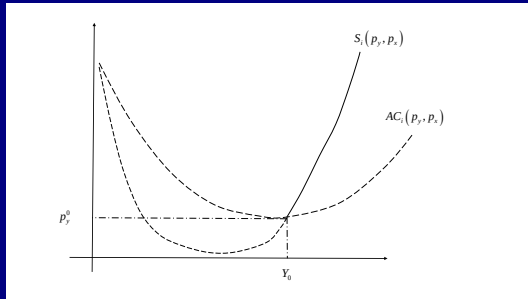


Figure : Choke Point for Production

- ▶ Defining the sector's supply function as the horizontal sum of the firm supply functions

$$S_T(p_y, p_x) = \sum_{i=1}^N S_i(p_y, p_x) \quad (6)$$

differences in the choke point make the overall supply curve more elastic – we define the elasticity of supply as

$$\epsilon_S = \frac{\Delta S_T(p_y, p_x)}{\Delta p_y} \times \frac{p_y}{S_T(p_y, p_x)}. \quad (7)$$

this result is depicted in Figure 3

Sum of Firm Supply Curves

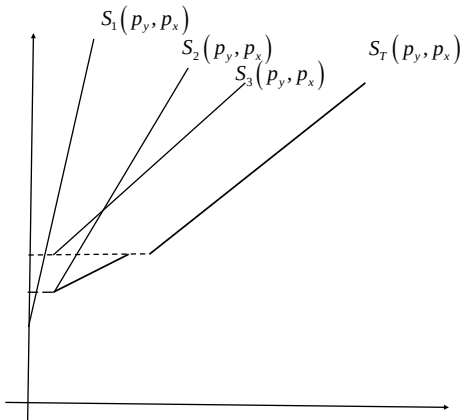


Figure : Sum of Firm Supply Curves

Long-Run Cost Function

- ▶ Next we assume that production is a function of two inputs – the variable input we have been working (x) and quasi-fixed input that cannot be varied instantaneously (z).
 - ▶ The cost function can be written as a function of the price of the variable input, the level of output, and the level of the quasi-fixed input $C(y, p_x, z)$.
 - ▶ Figure 4 depicts the interaction between the cost curves.

Long and Short-Run Cost Functions

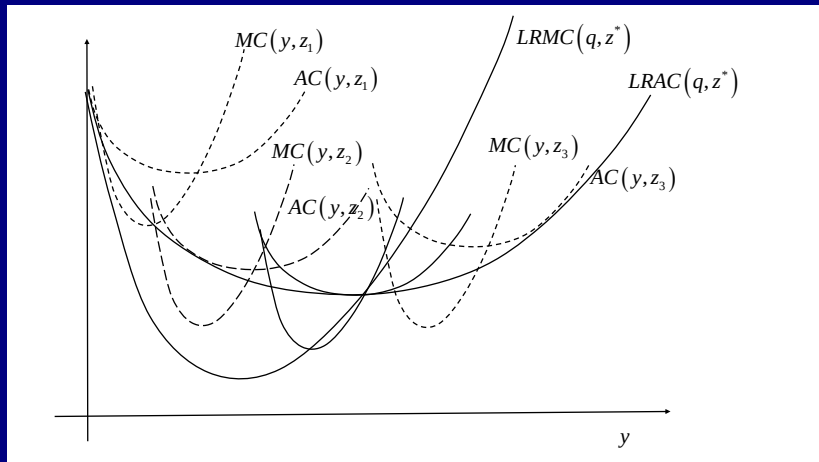


Figure : Long and Short-Run Cost Functions

- Figure 5 depicts the effect of short and long-run supply on shifts in the market equilibrium.

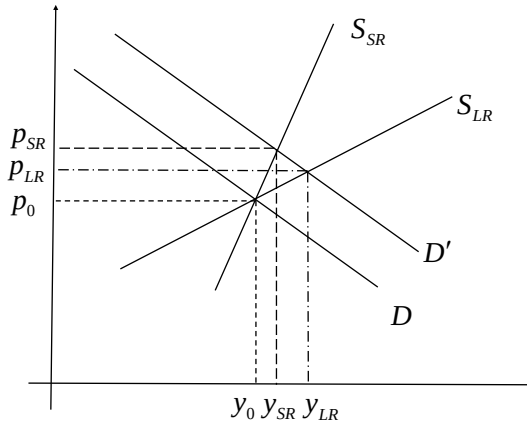


Figure 5: Long and Short Run Supply Functions