

NORTHWESTERN UNIVERSITY
Department of Economics

Economics 310-1

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So What's the Deal Concerning Avoidable and Unavoidable Costs?

The issue arises because economists have historically used confusing language:

A *fixed factor* is strictly defined as a factor of production whose quantity cannot be varied in the short run (in fact this *is* the definition of the short run).

However, *fixed costs* are not only the costs associated with fixed factors of production, but also include other costs that do not vary with output (or more strictly, do not vary with *positive* levels of output). Hence fixed costs can also exist in the long run, when all factors of production are, by definition, variable.

Consider the burger joint discussed in the lectures. In the short-run the firm has a fixed factor of production (4 grills, which at \$4/hour each, cost \$16). The variable factor is labor. Let say that in addition to the staff who cook and serve the burgers, there also has to be a manager, who is employed at \$10/hour. The manager does not affect total output of burgers (q), and the firm only needs one manager regardless of the number of staff. However, if the firm shuts down in the short run, both the staff and the manager are laid off.

Hence (using the cost function used in the lectures) the costs of the firm per hour are:

Total Short Run Cost of Capital = \$16

Total Short Run Cost of Labor = 0 if $q = 0$
= $10 + 1.1q - 0.03q^2 + 0.00033q^3$ if $q > 0$

Firm Short Run Total Cost (SRTC) = 16 if $q = 0$
= $26 + 1.1q - 0.03q^2 + 0.00033q^3$ if $q > 0$

The grills (\$16) are a *Sunk Fixed Cost* (SFC) (a.k.a unavoidable cost), the firm has to pay these costs even if they shut down.

The manager (\$10) is a *Nonsunk Fixed Cost* (NSFC) (a.k.a. avoidable costs), the cost does not vary with output, but is not incurred if the firm shuts down.

The cooks and servers ($1.1q - 0.03q^2 + 0.00033q^3$) are true *Total Variable Costs* (TVC), and are strictly a function of output.

The profit maximizing output decision of the firm is not changed by the Sunk / Nonsunk distinction. Denoting total revenue as Pq (price times output):

$$\text{Profit } (\pi) = Pq - \text{SRTC}$$

maximizing (note that the firm is a price taker, and hence P is not a function of q):

$$M\pi/Mq = P - \text{SRMC} = 0 \quad \text{or} \quad P = \text{SRMC} \quad (1)$$

(Plus the second order condition that $MM\pi/Mq > 0$, meaning the SRMC curve slopes up.)

The *short-run shutdown point* is where the profit from producing is just equal to the profit from shutting down (where the firm makes a loss equal to its SFC).

$$Pq - \text{SFC} - \text{NSFC} - \text{TVC} = - \text{SFC}$$

Adding SFC to both sides:

$$Pq - \text{NSFC} - \text{TVC} = 0$$

and then dividing by q produces the condition:

$$P - (\text{NSFC}/q) - \text{AVC} = 0 \quad \text{or} \quad P = (\text{NSFC}/q) + \text{AVC} \quad (2)$$

Combining (1) and (2), the shut down point is where:

$$\text{SRMC} = P = (\text{NSFC}/q) + \text{AVC} \quad (3)$$

The firm's *Short Run Supply Curve* will be the MC curve above the point where $MC = (\text{NSFC}/q) + \text{AVC}$ (which the textbook refers to as Average Nonsunk Cost or ANSC).

When none of the labor costs are invariant with (positive levels of) output, as was the case with the example in the lectures, then $\text{NSFC} = 0$ and equation (3) simplifies to the familiar shut down condition:

$$\text{SRMC} = P = \text{AVC} \quad (4)$$

which by definition is at the minimum point of the AVC curve.