

## TOTAL COST

Apart from the Total Cost we might be interested in other quantities. For example, cost of production *per unit of output*. This is natural, since it tells us if current output price covers the cost of each unit or not. We calculate it in the following way:

$$AC(Q_{\text{out}}) = TC(Q_{\text{out}}) / Q_{\text{out}}$$

We call it Average Cost.

Now we want to put more structure on the costs we are studying. The costs that firms are facing differ. Some costs are related to the quantity of output – like the price for raw materials, and some are not – like the price of land on which the plant is built. This kind of thinking leads us to the following definitions.

**DEF Fixed Costs.** Fixed costs are the ones you have to pay *in order to start* producing anything at all. For example, rent for land, buildings, etc. Fixed costs *do not depend on the amount of output you produce*. Fixed costs are paid once before the firm starts producing.

**DEF Variable Costs.** Variable costs are the costs that do depend on the amount of output produced. For example, price of raw materials, wages for workers, etc.

What does this tell us? Obviously, fixed costs should be the same for any level of output and variable costs of producing zero units of output should be zero. We introduce the following notation:  $TFC(Q_{\text{out}})$  – Total Fixed Cost;  $TVC(Q_{\text{out}})$  – Total Variable Cost.

$$\begin{aligned}TVC(0) &= 0 \\TFC(Q_{\text{out}}) &= TFC = \text{constant}\end{aligned}$$

Total Cost is the sum of these two

$$TC(Q_{\text{out}}) = TFC(Q_{\text{out}}) + TVC(Q_{\text{out}}) = TFC + TVC(Q_{\text{out}})$$

By writing TFC without  $Q_{\text{out}}$  next to it, I try to emphasize the fact that fixed costs do not depend on the amount of output produced.

Now we are ready to introduce all notation and formulas necessary to do the homework assignment.

$$AC(Q_{\text{out}}) = TC(Q_{\text{out}}) / Q_{\text{out}} = (TFC + TVC(Q_{\text{out}})) / Q_{\text{out}} = AFC(Q_{\text{out}}) + AVC(Q_{\text{out}})$$

Here  $AFC(Q_{\text{out}})$  is Average Fixed Cost and  $AVC(Q_{\text{out}})$  is Average Variable Cost.

$$\begin{aligned}AVC(Q_{\text{out}}) &= TVC(Q_{\text{out}}) / Q_{\text{out}} \\AFC(Q_{\text{out}}) &= TFC(Q_{\text{out}}) / Q_{\text{out}} = TFC / Q_{\text{out}}\end{aligned}$$