

EXHIBIT 8

MICROECONOMICS

FOURTH EDITION

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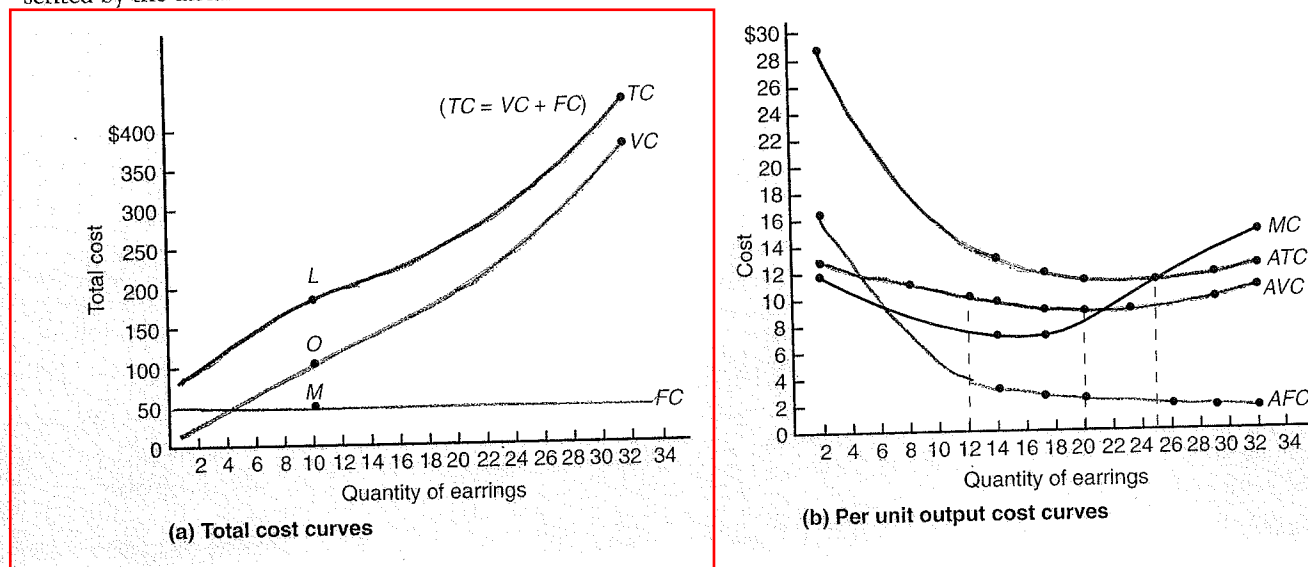
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Figure 9-2 (a and b) Total and Per Unit Output Cost Curves

Total fixed costs, shown in (a), are always constant; they don't change with output. All other total costs increase with output. As output gets high, the rate of increase has a tendency to increase. The average fixed cost curve shown in (b), is downward sloping; the average variable cost curve and average total cost curve are U-shaped. The U-shaped MC curve goes through the minimum points of the AVC and ATC curves. (The AFC curve is often not drawn since AFC is also represented by the distance between the AVC and ATC.)



straightforward: As output increases, the same fixed cost can be spread over a wider range of output, so average fixed cost falls. Average fixed cost initially falls quickly but then falls more and more slowly. As the denominator gets bigger while the numerator stays the same, the increase has a smaller and smaller effect.

The U Shape of the Average and Marginal Cost Curves

Let's now move on to the average and marginal cost curves. Why do they have the shapes they do? Or expressed another way, how does our analysis of production relate to our analysis of costs? You may have already gotten an idea of how production and costs relate if you remembered Figure 9-1 and recognized the output numbers that we presented there were similar output numbers to those that we used in the cost analysis. Cost analysis is simply another way of considering production analysis. The laws governing costs are the same laws governing productivity that we just saw in our consideration of production.

In the short run, output can only be raised by increasing the variable input. But as more and more of a variable input is added to a fixed input, the law of diminishing marginal productivity enters in. Marginal and average productivities fall. The key insight here is that when marginal productivity falls, marginal cost must rise, and when average productivity of the variable input falls, average variable cost must rise. So to say that productivity falls is equivalent to saying that cost rises.

It follows that if eventually the law of diminishing marginal productivity holds true, then eventually both the marginal cost curve and the average cost curve must be upward sloping. And, indeed, in our examples they are. It's also generally held that at low levels of production, marginal and average productivities are increasing. This means that marginal cost and average variable cost are initially falling. If they're falling initially and

As more and more of a variable input is added to a fixed input, the law of diminishing marginal productivity causes marginal and average productivities to fall. As these fall, marginal and average costs rise.