The Costs of Producing to Mass Markets

Variable Costs, Fixed Costs and Minimising Them

Mass Market Decisions

- Previous lectures: negotiations for sale

- Mass markets: decide on many units to sell at a given posted price. Can't individually negotiate each sale.

- Must decide how much to produce: nature of costs and technology becomes important.

Can Less Be More?

- Akio Morita, founder of Sony, attempted to export a small transistor radio to the US (1955).

- He found that demand was very high (upwards of 100,000 units) but Sony did not have the capacity to produce that much.

A 'U' in Your Cost Curve

Morita explained:

"Our capacity was less than a thousand radios a month. If we got an order for one hundred thousand, we would have to hire and train new employees and expand our facilities even more. This would mean a major investment, a major expansion, and a gamble.

I sat down and drew a curve that looked something like a lopsided letter 'U.' The price for five thousand would be our regular price. That would be the beginning of the curve. For ten thousand there would be a discount, and that was the bottom of the curve. For thirty thousand the price per unit would begin to climb. For fifty thousand the price per unit would be higher than for five thousand, and for one hundred thousand units the price would have to be *much more* per unit than for the first five thousand."

The Law of Diminishing Returns

▌ Morita had run into the law of diminishing returns:

When you have some fixed inputs into production (such as a plant), eventually expanding output raises the marginal (or per unit) cost of production.

▌ Increasing output beyond 10,000 a year meant hiring more workers, paying overtime, crowded floor space, higher prices to suppliers etc.

Some Cost Concepts

- Total costs: all of your costs of production

- Fixed costs: your costs even if you do not produce any output

- Variable costs: your costs that are dependent on your output level
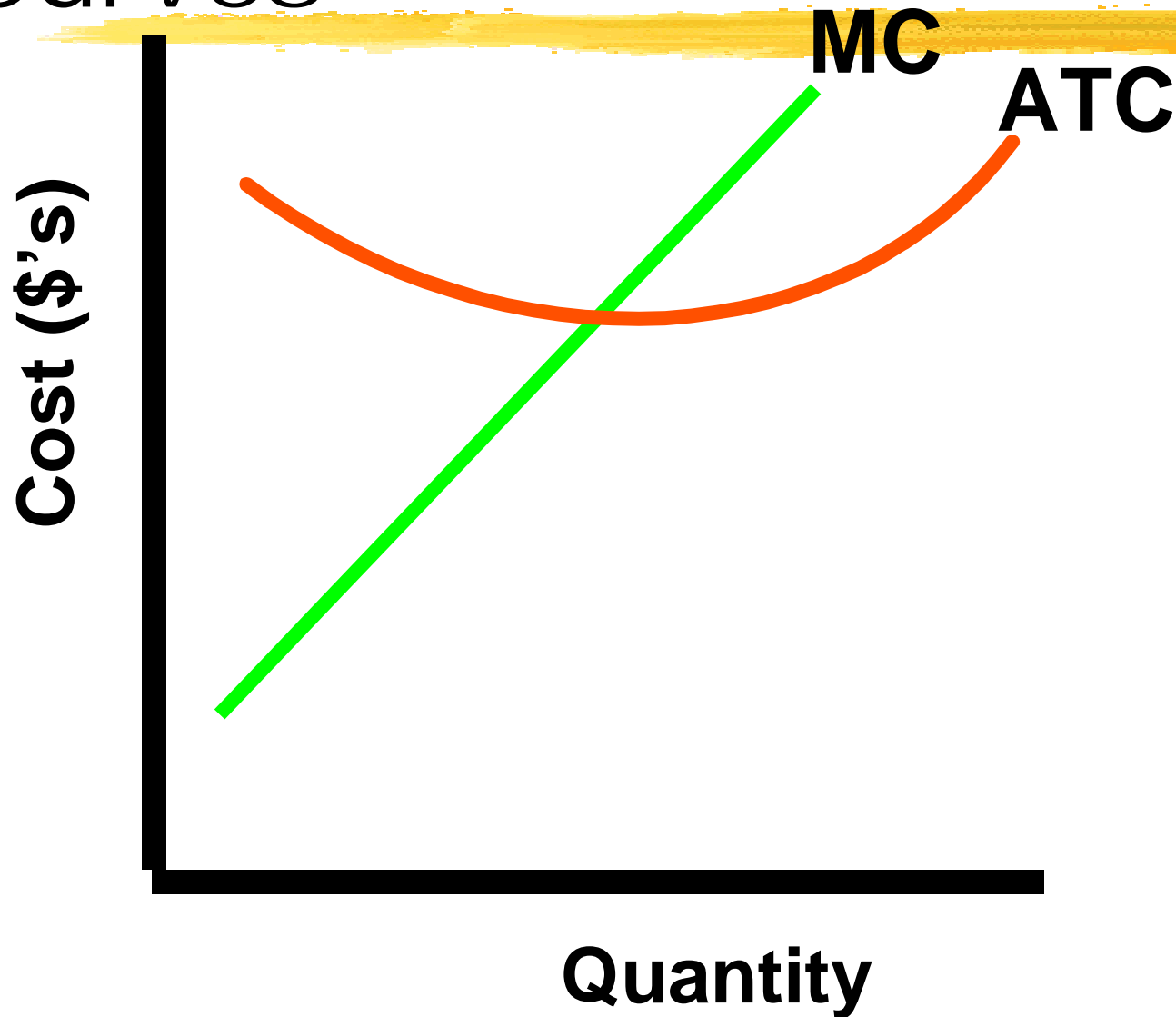
Average versus Marginal Cost

- **Average Total Cost (ATC)**
  = Total Cost/Quantity = TC/Q

- **Marginal Cost (MC)**
  = (Change in total cost)/(Change in quantity)
  = $\Delta TC/\Delta Q$

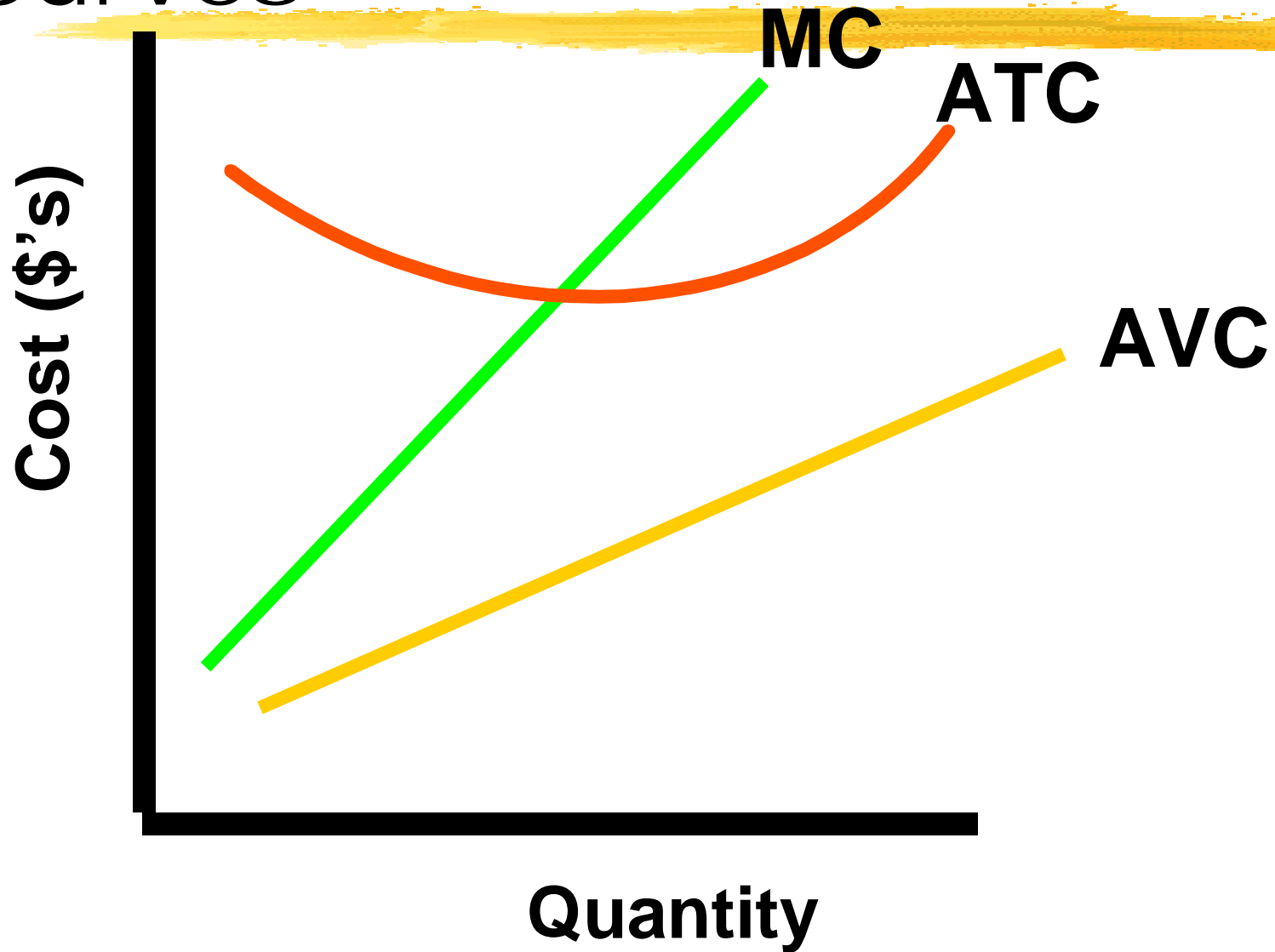- Suppose TC(Q) = F + cQ. What are ATC, AVC and MC?
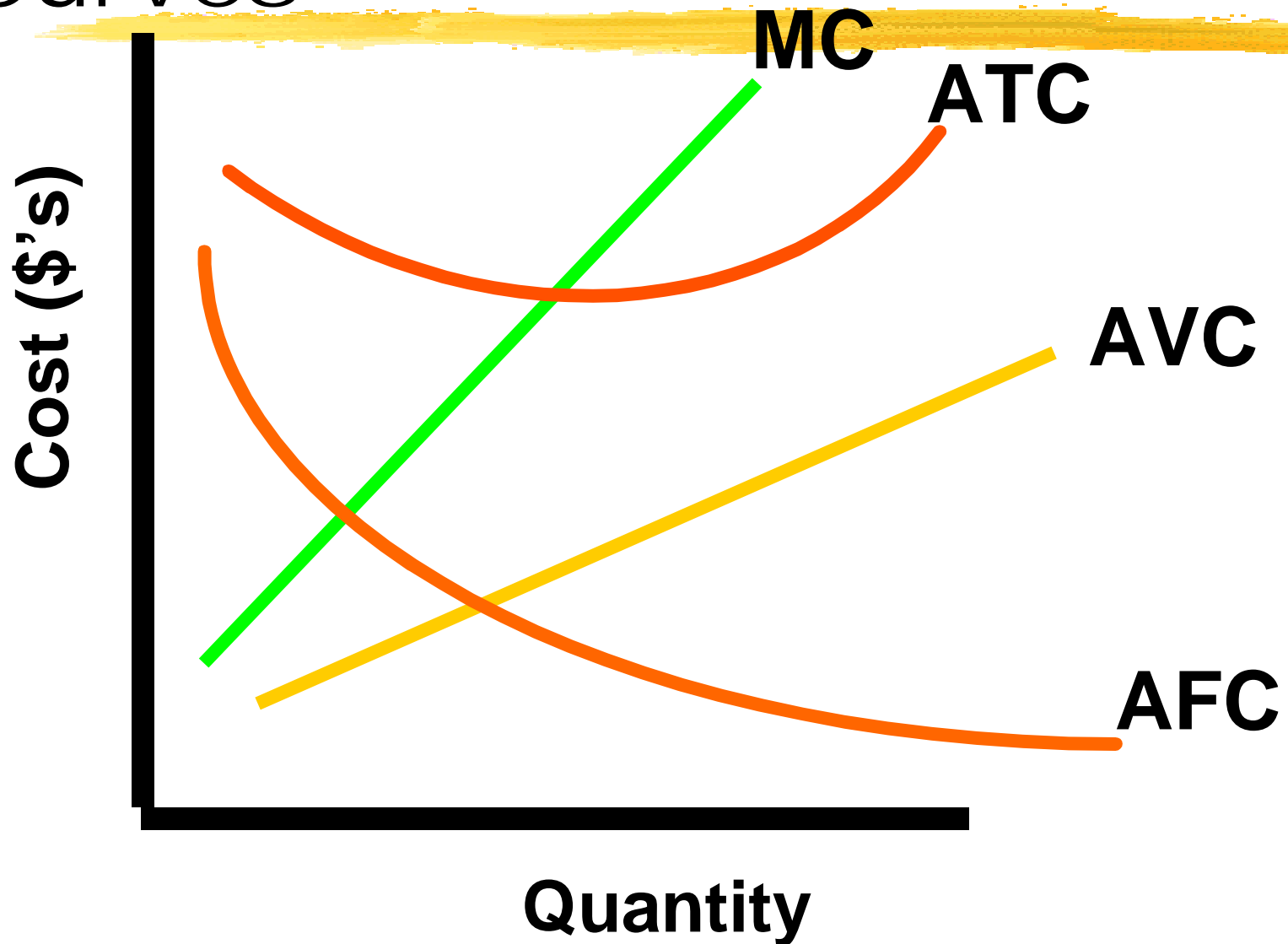
The Shape of Typical Cost Curves
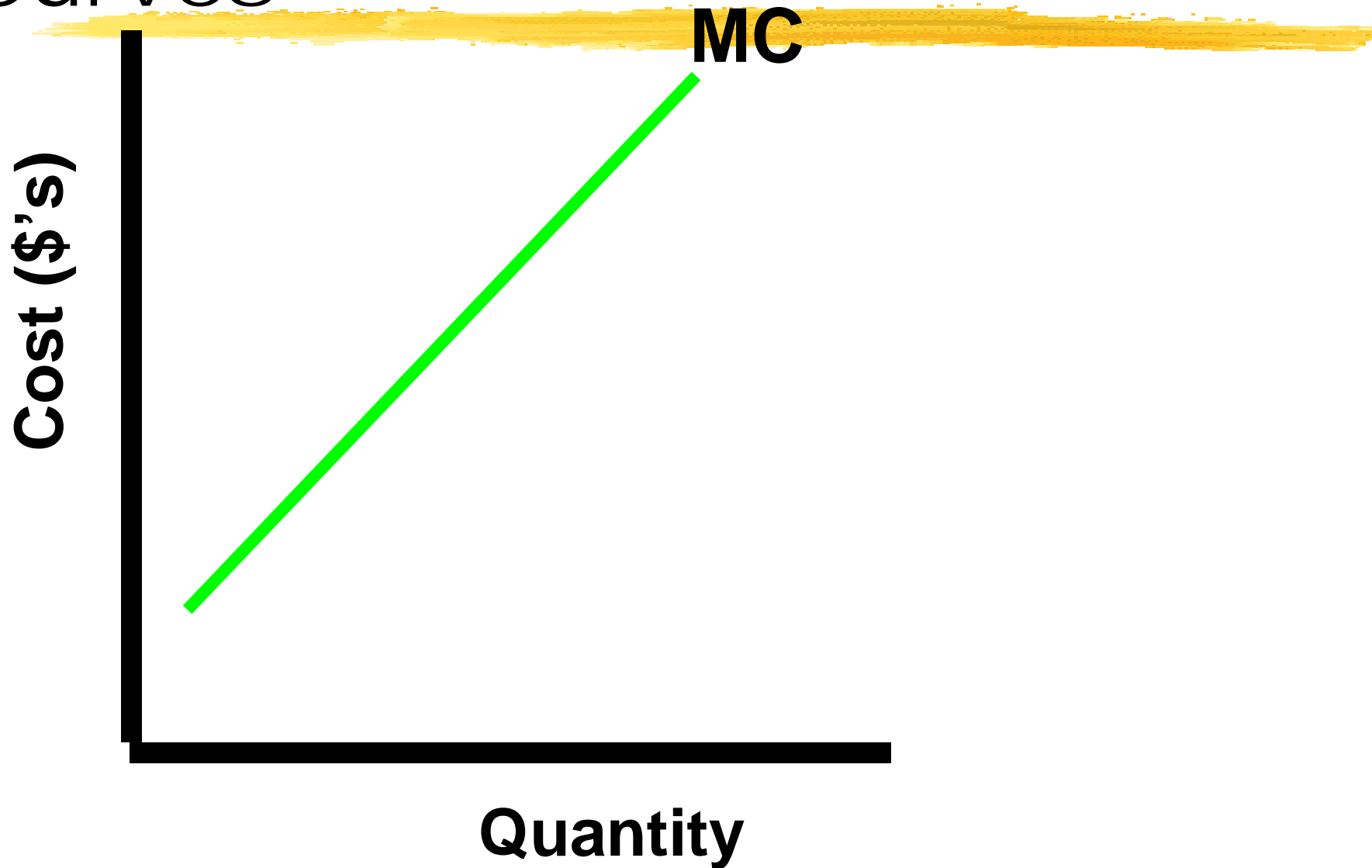
MC

Cost ($'s)

Quantity

The Shape of Typical Cost Curves

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The Shape of Typical Cost Curves

The Relationship Between Marginal Cost and Average Total Cost

- When marginal cost is less than average total cost, average total cost is falling.

$$MC < ATC \Rightarrow ATC \downarrow$$

- When marginal cost is greater than average total cost, average total cost is rising.

$$MC > ATC \Rightarrow ATC \uparrow$$

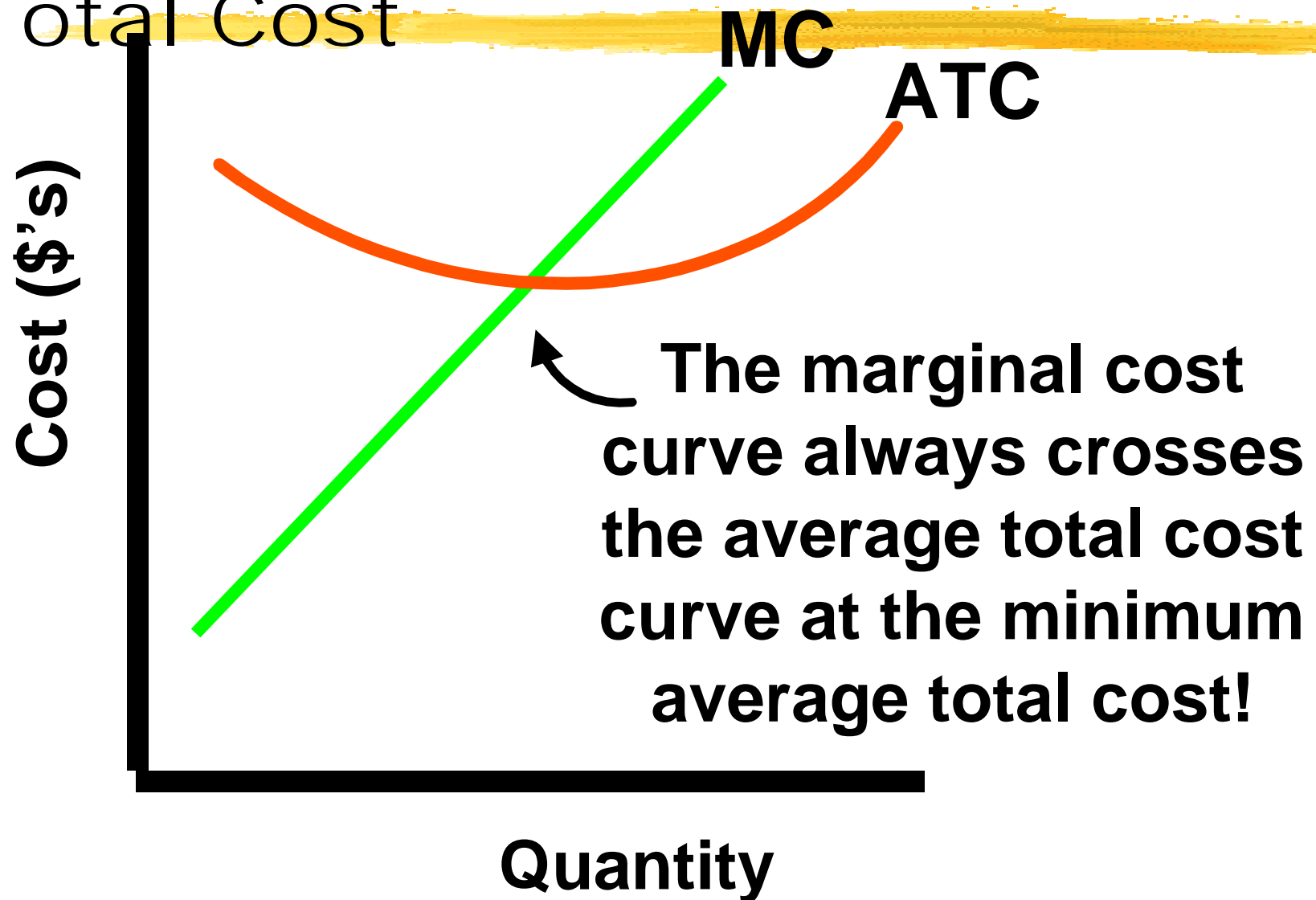# The Relationship Between Marginal Cost and Average Total Cost

The marginal-cost curve crosses the average-total-cost its minimum point.

Why?

The Relationship Between Marginal Cost and Average Total Cost

Cost ($'s)

MC

ATC

The marginal cost curve always crosses the average total cost curve at the minimum average total cost!

Quantity
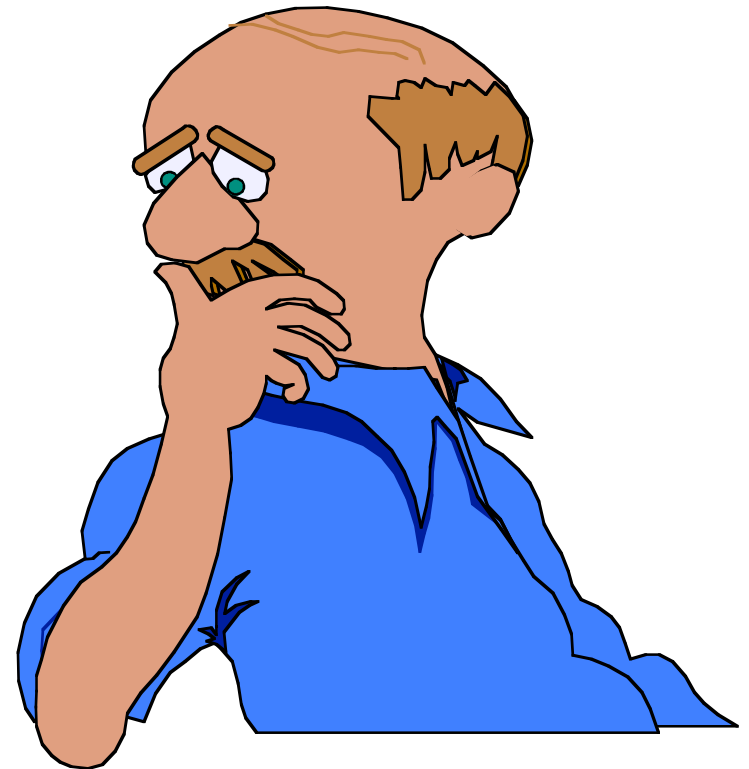
Why the Average Total Cost Curve is U-Shaped

- There are two opposing forces that guarantee the short-run average total cost curve will be U-shaped:
    - Decreasing average fixed cost
    - Eventually increasing average variable cost caused by diminishing returns
- The shape of the ATC curve combines these two effects.

Why didn't Sony expand?

- Doubling capacity was a risky endeavour. Morita was uncertain that the demand for repeat business would be high enough.

- Expanding too quickly, Sony would have sacrificed quality and efficiency and perhaps harmed its long-run reputation.

Adjustment in the Long-Run

- Fixed inputs into production can be adjusted in the long-run.
- Choose optimal size or number of plants.

Returns to Scale

- A change in scale occurs when there is an equal percentage change in the use of all the firm's inputs.

- Suppose we double the quantities of labour and capital used in production, doubling the scale of the firm. How much will output increase?
  - Constant returns to scale
  - Increasing returns to scale

Constant Returns to Scale

- *Constant returns to scale* occur when the percentage increase in output equals the percentage increase in inputs.

- Doubling all inputs causes output to exactly double.

Increasing Returns to Scale

- *Increasing returns to scale* occur when the percentage increase in output exceeds the percentage increase in inputs.

- Doubling all inputs causes output to more than double.

Decreasing Returns to Scale

- *Decreasing returns to scale* occur when the percentage increase in output is less than the percentage increase in inputs.

- Doubling all inputs causes output to less than double.

Economies and Diseconomies of Scale

- *Economies of scale* are present when, as output increases, long-run average cost decreases.
- Diseconomies of scale are present when, as output increases, long-run average cost increases.
- Long-run average cost curves usually exhibit all three types of returns to scale.

The Shape of Long-Run Cost Curves

U-Shaped Long-Run Average Cost:

▌ *Economies of Scale:* occurs when a firm has large fixed costs.

  ▌ ATC declines as output increases

▌ *Diseconomies of Scale:* occurs when some important input is limited.

  ▌ ATC rises as output increases

The Shape of Long-Run Cost Curves

- *U-Shaped Long-Run Average Cost:*
  - The bottom of the U-Shape occurs at the quantity that minimizes average total cost
  - This is called the *Efficient Size* of the firm.
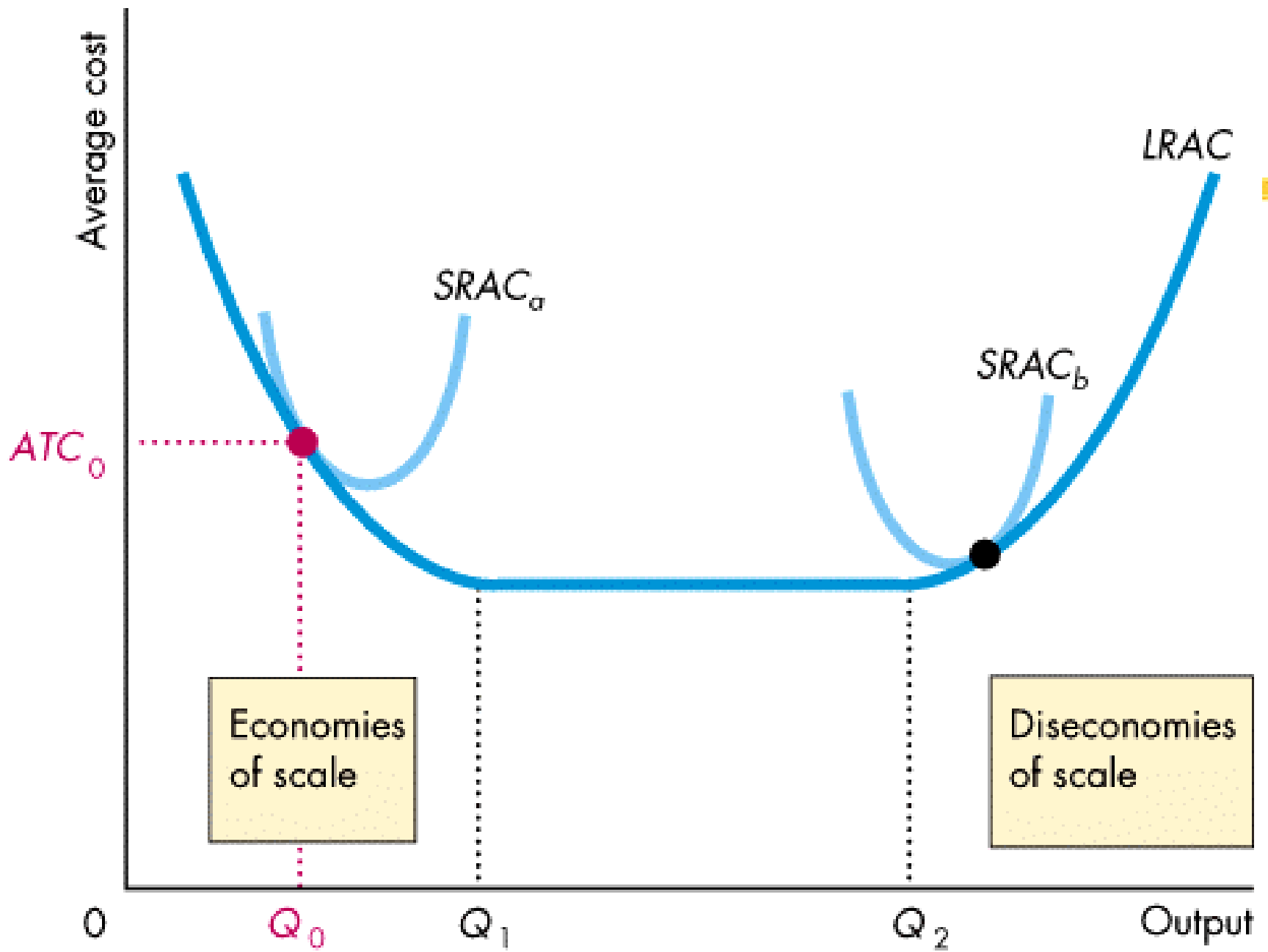
Costs at the Margin

- Critical to any cost decision are the notions of *incremental* or *marginal* cost

How much will it cost me to produce one additional unit of my product, or to supply one more unit of my service?