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# Econ 100A: Intermediate Microeconomic Analysis Lecture 12

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## Plan of Today's Lecture

- Ch. 7: Costs of Production
- All about costs: types of costs & relations between them. Costs:
  - Accounting, economic, opportunity
  - Total
  - Fixed
  - Sunk
  - Marginal
  - Variable
- SR and LR Costs

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## Cost Minimization

- For a given output, profit is maximal when costs are minimal
- An example: Which costs matter?
  - If a firm has to rent equipment or buildings, the rent the firm pays is a cost
  - What if a firm owns its own equipment or building?
    - How could we calculate the costs here?
- Cost minimization: we have to clarify:
  - What do we mean by costs?
  - How to measure the costs?

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## Costs? Which Costs?

- **Accounting Cost**

- Actual expenses plus depreciation charges for capital equipment
- [retrospective view of firm's costs]

- **Economic Cost**

- Cost to a firm of utilizing economic resources in production, including opportunity cost
- [forward looking view of firm's costs]

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## Opportunity Cost

- **An Example**

- A firm owns its own building (→ this firm pays no rent for office space)
- Does this mean the cost of office space is zero?
- But: The building could have been rented instead
- Foregone rent is the opportunity cost of using the building for production
- This forgone rent should be included in the economic costs of doing business (i.e., forgone rent is opportunity cost)

- **Opportunity cost**

- Cost associated with opportunities that are foregone when a firm's resources are not put to their highest-value use

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## User Cost of Capital: to rent (lease) or to purchase?

- The user cost of capital must be considered

- The annual cost of owning and using the airplane instead of selling or never buying it
- Sum of the economic depreciation and the interest (the financial return) that could have been earned had the money been invested elsewhere

- Rental rate = per year cost of renting one unit of capital

- Purchased capital can be treated as if it was rented at a rate equal to the user cost of capital

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## Fixed Cost & Variable Cost

- Some costs vary with output, while some remain the same no matter the amount of output
- **Total Cost** can be divided into:
  1. **Fixed Cost** [FC]
    - Does not vary with the level of output
  2. **Variable Cost** [VC]
    - Cost that varies as output varies
- Total cost [TC] = a sum of fixed & variable costs:

$$TC = FC + VC$$

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## Sunk Cost

- **Sunk Cost**
  - Expenditure that has been made and cannot be recovered
  - Should not influence a firm's future economic decisions
- Opportunity costs (which are hidden)
  - but should be taken into account
- Sunk costs
  - Sunk costs should not be taken into account
  - When some cost is sunk, the firm's opportunity cost is zero!

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## Fixed Cost Versus Sunk Cost

- Fixed Cost
  - Cost paid by a firm that is in business regardless of the level of output
- Sunk Cost
  - Cost that has been incurred and cannot be recovered
- Fixed cost and sunk cost are often confused, but really
  - fixed costs could be recoverable
  - sunk cost could be variable (not fixed)

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## Fixed and Variable Costs: SR and LR

- Which costs are variable and which are fixed depends on the time horizon
- Short time horizon [SR] – most costs are fixed
- Long time horizon [LR] – many costs become variable

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## Marginal Cost

- Marginal Cost (MC):
  - The cost of expanding output by one unit
  - Fixed costs have no impact on marginal cost, so it can be written as:

$$MC = \frac{\Delta VC}{\Delta q} = \frac{\Delta TC}{\Delta q}$$

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## Average Cost

- Average Total Cost (ATC)
  - Cost per unit of output
  - Also equals average fixed cost (AFC) plus average variable cost (AVC)

$$ATC = \frac{TC}{q} = AFC + AVC$$

$$ATC = \frac{TC}{q} = \frac{TFC}{q} + \frac{TVC}{q}$$

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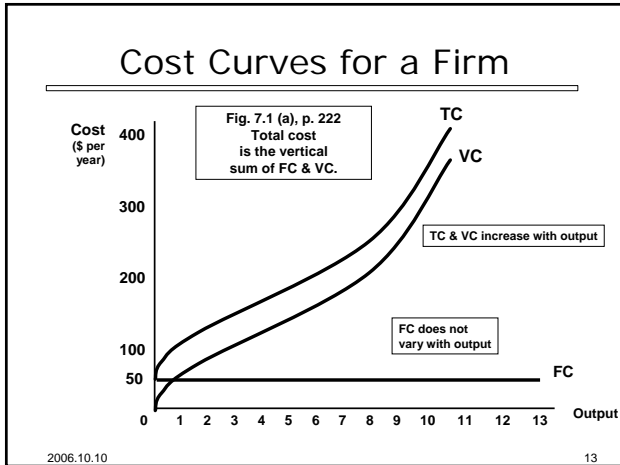
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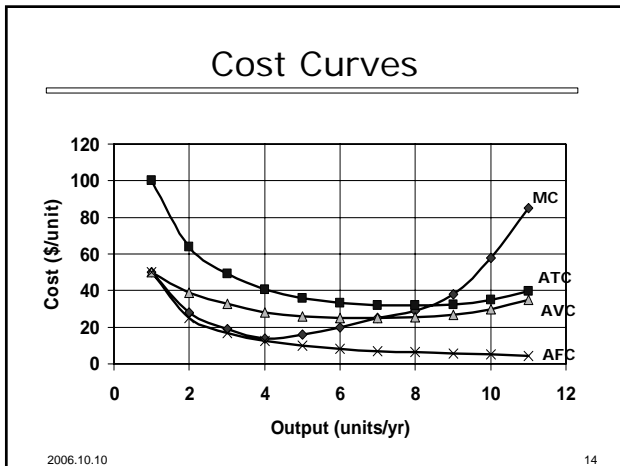
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### Cost Curves

- When MC is below AVC, AVC is falling
- When MC is above AVC, AVC is rising
- When MC is below ATC, ATC is falling
- When MC is above ATC, ATC is rising
- → MC crosses AVC and ATC at the minimum
  - The Average – Marginal relationship is similar to the relationship between marginal and average product (Ch. 6)

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## Determinants of SR Costs

- The rate at which these costs increase depends on the nature of the production process
  - The extent to which production involves diminishing returns to variable factors
- Diminishing returns to labor  $\leftrightarrow$  when marginal product of labor is decreasing
  - If marginal product of labor decreases significantly as more labor is hired
    - Costs of production increase rapidly
    - Significant expenditures must be made to produce more output
  - If marginal product of labor decreases only slightly as increase labor
    - Costs will not rise very fast when output is increased

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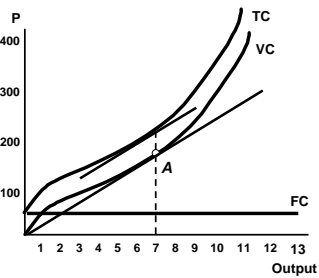
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## Cost Curves for a Firm

The line drawn from the origin to the variable cost curve:

- Its slope equals AVC
- The slope of a point on VC or TC = MC
- at 7 units of output (point A) MC = AVC



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## Summary of Today & Plan of Next Lecture

- Definitions of costs:
  - Accounting cost
  - Economic cost
  - Opportunity cost
  - Total Cost
    - Fixed cost, Variable cost
- Short time horizon & long time horizon
- Marginal cost, Average cost
- Cost curves
- Next Lecture – Ch. 7 continued

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