

## Profit Maximization and “As If”

- Do firms maximize profits?
  - Do they make our calculations?
- Positive vs. Normative
  - Can use our theory as prescriptive tool (“managerial economics”!)
  - Does our theory hold as a positive description?
    - If managers don’t take derivatives, can this be useful theory?

## As If

- Friedman’s billiard player
  - Physicist needs hairy math to describe good shot
  - Does billiard player need to know calculus? No!
- She plays *as if* she knew physics
- Similarly, manager may behave as if she knew calculus
- What if I don’t believe this?
  - This is not what they teach on the 2<sup>nd</sup> floor of Sh-Dh

## Do firms maximize really profits?

- Criticism of profit-max assumption
- Bounded rationality
  - But:
    - Firms imitate successful competitors
    - Competition weeds out “losers”
- Not unitary actor - who is “the firm”?
  - But:
    - Competition – e.g. market for corporate control
- Hence, *tendency toward* profit maximization

## Profit Max. and Supply

- How does the firm decide how much to produce?
  - Assume that firm chooses input mix and output level to maximize profits
- Note that revenue and costs are each functions of the quantity produced <sup>d</sup>
- Profit(q) = total revenue(q) – total cost(q)
  - $\pi(q) = TR(q) - TC(q) = P(q)q - TC(q)$
- To maximize profit:
  - $d\pi(q)/dq = dTR(q)/dq - dTC(q)/dq = 0$
  - $\Rightarrow$  max profit by choosing q so that MR = MC

## Competitive Supply

- Competitive firms are “atomistic”
  - ...*small relative to the market*
    - Its production decisions have no effect on prices
  - Analogy: earth looks flat from surface
    - We’ve seen this before in linear budget constraints and isocosts
  - Competitive firm is a “price-taker”
    - Demand is elastic
  - Revenue =  $P \cdot q$ ,  $P$  fixed

## Choosing Output in SR

- Put revenue and usual-shaped cost in diag.

- Profit is maximized when
  - Max distance betw. TR & TC
  - Slope of TR = Slope of TC
  - $MR=MC$
  - $P=MC$  for competitive firm

## Profits in SR

- To produce, or not to produce... that is the question
  - Show profit in a MC diagram



## Profit in MC diagram

- P determines  $q$   $\{q=q|MC(q)=P\}$
- $\pi(q)=\text{Rev}-\text{Cost}=P(q)*q-AC(q)*q$
- Profit per unit =  $\pi(q)/q=P-AC(q)$
- $\pi(q)=\text{profit per unit}*(\# \text{ of units})$

## Short Run Supply

- To see firm supply curve, consider a firm's optimal quantities of output when facing various prices

- $\Rightarrow$  Firm supply curve is MC above AVC

## Mathematical Example

- Revenue= $R(q)=Pq=36q$
- Cost= $C(q)=100+20q-5q^2+0.5q^3$ 
  - Why cubic? Derivative is quadratic
    - MC can be “U-shaped”

