OUTLINE — September 19, 2018

- Firms' Supply Decisions
  - Accounting vs Economic Profit
  - Long Run and Short Run Decisions
  - Diminishing Marginal Returns
  - Costs of Production
  - Perfect Competition
  - Produce q where MR=MC to maximize profit
  - Calculating Profit

Midterm #1: Thurs 9/27, 8 pm. Read the old midterms yet?
Prepare ahead: watch the video before Monday

Firms' Supply Decisions

- Question
  - Why does supply slope up?

- Assume
  - Goal of firms is to <u>maximize profit</u>

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Economic Profit

- Profit = Total Revenue — Total Costs

Total Revenue (TR)
= Price * Quantity

Total Costs (TC) include both
1) Out-of-pocket (explicit, accounting) costs
2) **Opportunity (implicit) costs**

Keep in mind: there's a time frame, even if not stated explicitly. Per year, quarter, etc.

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Opportunity Cost of Capital

- Capital (machinery) costs you $100,000

- What if your $100,000 could earn 5 percent elsewhere
  - "Normal rate of return" = rate financial assets are earning
  - In this case, "normal rate of return" = 5 percent per year

- Here, Implicit cost of capital = 5% of $100,000

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

1

Opportunity Cost of Labor

- You could earn $60,000 per year working elsewhere
  - Opportunity cost of your labor = $60,000 per year

Accounting vs. Economic Profit

- Total annual revenue = $100,000
- Annual accounting costs = $45,000
- Your savings tied up in company = $100,000
- Normal annual rate of return = 5 %
- Working elsewhere, you could earn $60,000 per year

Accounting Profit =

Economic Profit =

Long Run | Short Run

Long Run
- Technique can be changed
- Entry & exit are possible

- Decision
  - *Exit*
  - *Stay in Industry*

Short Run
- Technique is fixed
- Entry & exit are impossible
  - If planning to stay, or if not shutting down: Decision: *how much to produce?*
  - If planning to exit:

  Decision
  - *Produce*
  - *Shut Down*

Production

- Yogurt Park's inputs?

Production

- Question
  - How does total output change when the variable input changes?

- Simplification
  - Two inputs: "capital" and "labor"

- Assume
  - "Capital" can't be changed in short run

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Total and Marginal Product

# of workers	Total Product per day	Marginal Product
0	0	
1	100	
2	220	
3	315	

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Law of Diminishing Returns

- As quantity of labor increases, *all else constant (that is, all **other inputs** held constant)*, marginal product decreases

- Better name might be
  "Law of decreasing (but still positive) marginal product"

- Implication
  To increase output by constant amount requires ever more labor (variable input)

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Diminishing Returns

- The point where diminishing returns "kicks in" depends upon the particular business

For Yogurt Park?
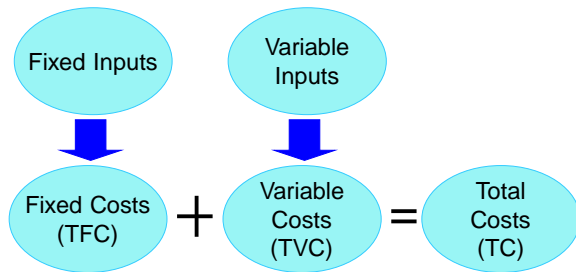Maybe with the 3rd or 4th worker

For Costco?
Probably with the 50th or so worker

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule
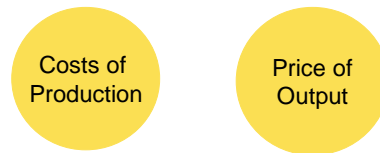
3

Fixed versus Variable Costs

Fixed Inputs → Fixed Costs (TFC)

Variable Inputs → Variable Costs (TVC)

Fixed Costs (TFC) + Variable Costs (TVC) = Total Costs (TC)

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Short-Run: Produce how much?

- Depends upon

Costs of Production   Price of Output

- Assume: Goal = maximize profit

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

How much to produce?

- Already producing 1,000 units
- Should firm produce 1 more unit (to 1,001)?
  - For 1,001st unit   Δ costs = $1.00
                            Δ revenue = $1.10

- Already producing 2,000 units
- Should firm produce 1 more unit (to 2,001)?
  - For 2,001st unit   Δ costs = $1.15
                            Δ revenue = $1.10

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Marginal benefit vs marginal cost

- Compare marginal benefit & marginal cost
  - Ignore "sunk costs"
- MB > MC: do it
- MB < MC: don't do it
- MB = MC: that's the best you can do

• Sleep one more hour?   • Provide free vaccines?
• Change your major?   • Produce more frozen yogurt?

- **Profit Max: choose q where MR=MC**

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Marginal Cost

q	TC	MC
0	70	
1	100	
2	120	
3	150	
4	190	

Marginal Cost Curve
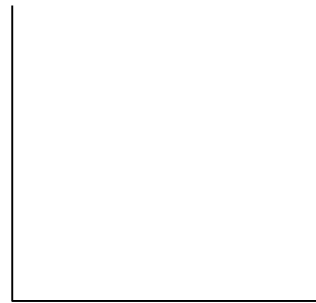
Marginal costs increase
because
marginal returns (product) diminish

Diminishing Returns & Marginal Cost

- Marginal Returns diminish
  - Because K is fixed, L must share a fixed amount of K
  - $\frac{\Delta\ Output}{\Delta\ Variable\ input}$ decreases as input increases
  - $\frac{\Delta Variable\ Input}{\Delta Output}$ therefore increases as output increases

- The marginal (additional) cost of producing 1 more unit of output is $\frac{\Delta Variable\ Input\ *Cost\ of\ Variable\ Input}{\Delta Output}$
  - Marginal cost increases as output increases because marginal returns diminish

Costs: Marginal & Average

- ATC =

- MC =

- Marginal > Average?

- Marginal < Average?

Marginal & Average Cost Curves

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Type of industry?

- Until now, it doesn't matter

- <u>Assume</u>
  - **PERFECTLY COMPETITIVE** Industry
    1) Lots of firms
    2) Homogeneous product
    3) No barriers to entry or exit

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Perfectly Competitive Industry

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule

Perfectly Competitive Industry

- *Key idea*: Each firm faces a horizontal demand curve at the market equilibrium price

Market   Firm

Profit   SR & LR   Diminishing Marginal Returns   Costs   Industry Type   Profit max rule
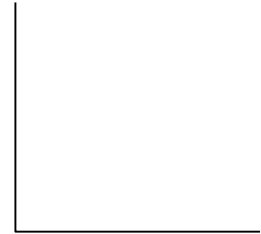
Market determines the price

- Perfectly competitive firm can sell as much as it wants at market price

- Sell more? Additional revenue per unit = price

- Sell less? Lost revenue per unit = price

When price is constant, MR = AR = p

Profit Max: choose q where MR=MC

- If MR > MC,

- If MR < MC,

- If MR = MC,

- *RULE*:
  To maximize profit, produce q so that MR = MC

How much Profit?

π = TR – TC

$π = p \times q - ATC \times q$