

OUTLINE — September 20, 2017

- Elasticity, Burden of a Tax, continued
- 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

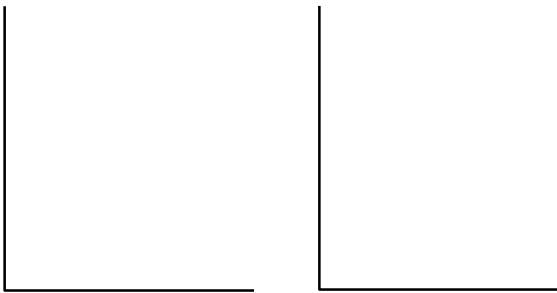
*Midterm #1: Wed 9/27, 7 pm. Read the old midterms yet?
Prepare ahead: watch the videos I made for you*

Revisit: Burden of a Tax

- Tax on an item increases its price
 - But (in the short run) not by the full amount of the tax
- Who "bears the (greater) burden" of the tax?
 - Definition: Burden = % of tax paid
- Burden depends upon slopes of S and D
 - That is, upon price-elasticity of supply and price-elasticity of demand

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Burden & quantity effect Depend on Price-Elasticity



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Firms' Supply Decisions

- Question
 - Why does supply slope up?
- Assume
 - Goal of firms is to maximize profit

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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

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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



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Opportunity Cost of Labor

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



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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 =

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Long Run	Short Run
<ul style="list-style-type: none"> Technique can be changed Entry & exit are possible Decision <ul style="list-style-type: none"> Exit Stay in Industry 	<ul style="list-style-type: none"> Technique is fixed Entry & exit are impossible <ul style="list-style-type: none"> If planning to stay, or if not shutting down: Decision: <i>how much to produce?</i> If planning to exit: <ul style="list-style-type: none"> Produce Shut Down

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Production
<ul style="list-style-type: none"> Yogurt Park's inputs? 

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Production
<ul style="list-style-type: none"> Question <ul style="list-style-type: none"> How does total output change when the variable input changes? Simplification <ul style="list-style-type: none"> Two inputs: "capital" and "labor" Assume <ul style="list-style-type: none"> "Capital" can't be changed in short run

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

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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)

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Diminishing Returns

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

For Yogurt Park?

Maybe with the 3rd or 4th worker



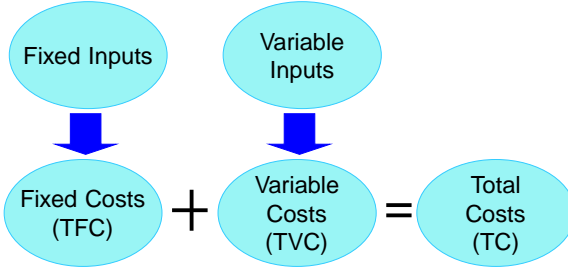
For Costco?

Probably with the 50th or so worker



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Fixed versus Variable Costs



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Short-Run: Produce how much?

- Depends upon

Costs of
Production

Price of
Output

- Assume: Goal = maximize profit

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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

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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**

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Marginal this and that

- **Marginal Benefit**
- An "umbrella" term that can encompass many different types of benefits

 - **Sleep?** MB is the health or other benefits from sleep
 - **Frozen yogurt production?** MB is the additional (marginal) revenue from producing and selling more frozen yogurt

- **Marginal Cost**
- Again, an "umbrella" term that can encompass many different types of costs

 - **Sleep?** MC is the health or other costs of not sleeping
 - **Frozen yogurt production?** MC is the additional (marginal) cost from producing and selling more frozen yogurt

- **Marginal Returns (same as "marginal product")**
Additional output produced with additional variable inputs

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Marginal Cost

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

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Marginal Cost Curve



Marginal costs
increase
because
marginal returns
(product)
diminish

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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

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Costs: Marginal & Average

- ATC =
- MC =
- Marginal > Average?
- Marginal < Average?

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Marginal & Average Cost Curves



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Type of industry?

- Until now, it doesn't matter
- Assume
 - **PERFECTLY COMPETITIVE** Industry
 - 1) Lots of firms
 - 2) Homogeneous product
 - 3) No barriers to entry or exit

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Perfectly Competitive Industry

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

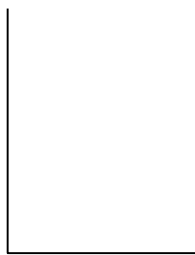
Market

Firm



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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, $MR = AR = p$

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Profit Max: choose q where $MR=MC$

- If $MR > MC$,
- If $MR < MC$,
- If $MR = MC$,



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

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