

1 Production

- firm's goal is always to maximize profit (π)

$$\pi = \text{revenue} - \text{costs}$$

$$= \underbrace{P \cdot Q(p)}_{\text{price} \cdot \text{quantity}} - \underbrace{TC(Q(p))}_{\text{total costs}}$$

- Decision time frames

Short Run

- 1 or more factors of production are fixed
- capital is fixed, labor is flexible

Long Run

- All factors are variable (capital and labor)

- to vary outputs, must vary inputs that you can

- Marginal Product of Labor = change in total product that results from one unit increase in labor

- Average Product of Labor = total product / labor

- Product Curves = graphs between employment, TP, MP, and AP

Marginal Returns

↑ increasing

Increasing

- when MP of additional worker is greater than that of the previous worker (specialization, learning)

Decreasing

- when MP of additional worker is less than that of previous worker

- Law of diminishing returns states MP of variable input will eventually decrease

Total Cost (TC)

- cost of all factors of production

Fixed Costs (FC)

- capital, machinery, rent costs etc...

Variable Costs (VC)

- labor

$$TC = FC + VC$$

$$ATC \rightarrow \frac{TC}{Q}$$

$$AFC \rightarrow \frac{FC}{Q}$$

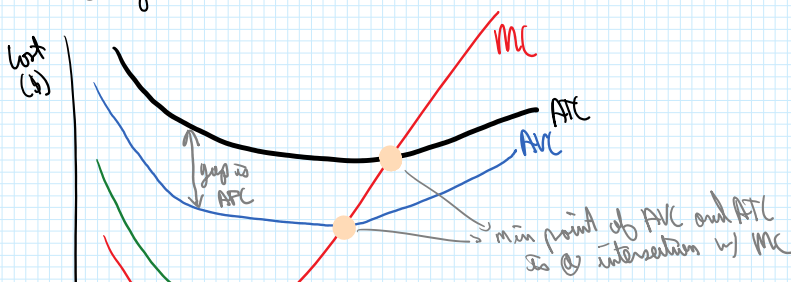
$$AVC \rightarrow \frac{VC}{Q}$$

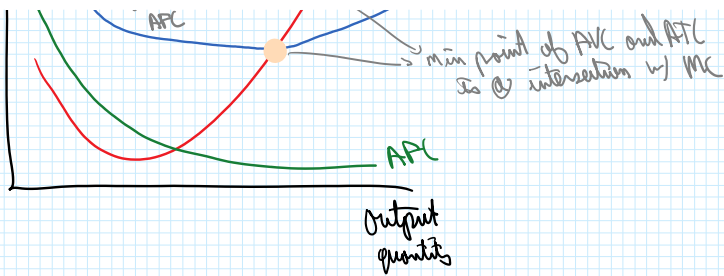
Marginal Cost

- slope of VC curve

Short Run

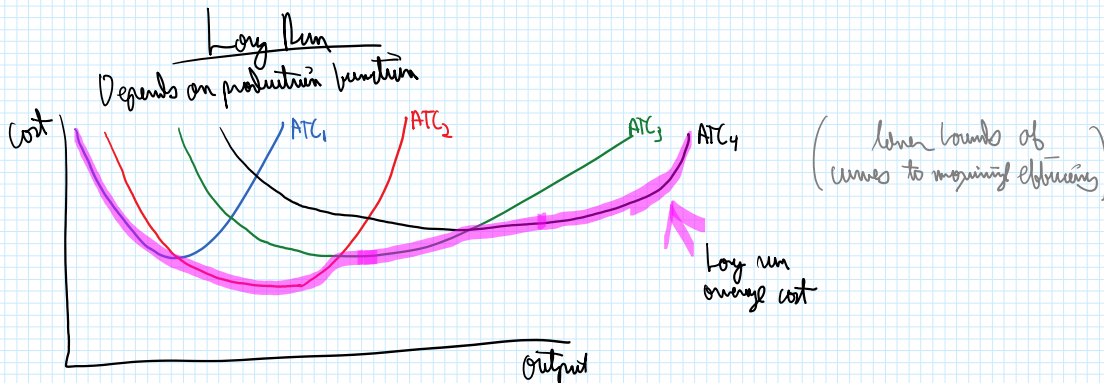
Graph w/ short run of costs





Changes / Shifts in cost curves?

- ① change in production tech
- ② change in input prices



② Market Structures

① Perfect Competition

Characteristics

- Many firms selling identical product to many buyers
- No restrictions to enter market
- No advantage to established firms
- Sellers/Buyers are informed about prices

Features

- Market price is @ intersection of market supply and demand
- No single firm can affect this (base elastic price = P^*)

Profit Maximization

- produce at q^* (optimal output) where $MR = MC = P^*$
- in a perfectly competitive market, long run profits = 0
 - firms enter/exit market to ensure this

Firm Decisions

- shut down when $\pi < AVC$ in short run

- shut down when $\pi < AVC$ in short run

- $\pi \geq 0$ in long run

- Derived supply curve is upper bound of market price and MC

B Monopoly

- Characteristics

- only one seller, many buyers
- product is differentiated } No close substitutes
- barriers to entry

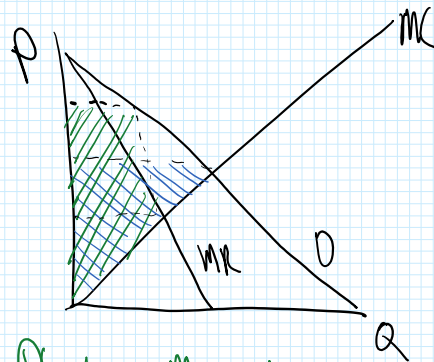
- Features

- single firm can set price
- can have price discrimination

- Maximizing Profit (Single Price)

$$MR = \frac{\partial TR}{\partial Q} \quad (\text{for linear functions } 2x \text{ slope of Demand})$$

- produce/sell where $MR = MC$
- restrict quantity, increase price



PS from Monopoly

PS from Perfect Competition

- Effects

$$CS_M < CS_{PC}$$

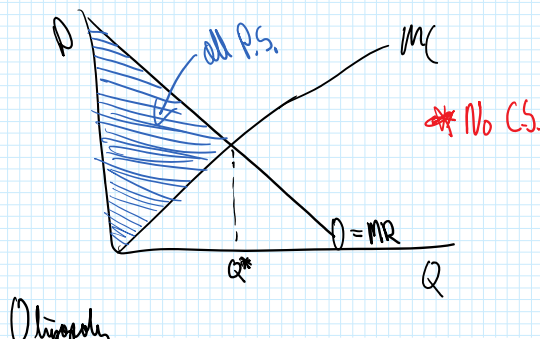
$$PS_M > PS_{PC}$$

$$E_{Monopoly} < E_{Perfect\ Competition}$$

- Price Discrimination?

- identify and separate different buyer types
- sell a product that can't be resold
- The better a firm can price discriminate:
 - the more efficient the outcome
 - the more CS the firm can "capture"

Perfect Price Discrimination



Oligopoly
- similar to monopoly but a small number of sellers
not just one

Gov intervention in these markets?

- difficult for you to calculate a firm average or marginal cost

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Monopolistic

- Characteristics

- a large # of firms w/ small market share
- differential product (close subs but not perfect)
- compete on product quality, price, and marketing
- firms are free to enter/exit, no long run barriers to entry

- Features

- in short run each firm has a market power
 - can make economic profit
- in long run more firms with entry, stability MR
 - profit = 0

} behaves like a monopoly
in short run

} behaves like perfect competition
in long run

- Differences from PC

- higher prices / lower quantity
- more variety
- inefficient, excess capacity (Not productively efficient)
 - also not allocatively efficient
- firms incur heavy advertising expenditures

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Oligopoly

- Characteristics

- between MC and PC
- Natural / legal barriers which prevent entry of new firms
- small number of firms compete

- Features

- firms can compete on price, quality, marketing etc
- interdependent, all with large market share
- temptation to cooperate, firm cartel

- Cartels are usually illegal

- must very stable (incentive to screw over partners)
- acts like a monopoly

3 Game Theory

Definition:

tools for studying agents recognize interdependence of their actions

Requirements:

- players
- strategies/actions
- payoffs

Payoff Matrix shows payoffs resulting from different strategies

Strategy profile \rightarrow set of strategies for each player

Nash Equilibrium \rightarrow strategy profile where each player has no incentive to deviate from given strategy

Dominant Strategy \rightarrow best strategy for a player no matter what opponents strategy is

Prisoners Dilemma Requirements

- 1 Nash \rightarrow is dominant strategy \approx
- 2 Players would be better off if both cooperated

Game Trees

- Branches specify actions of each player
- payoffs @ end of each branch

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Factors of Production

Production inputs:

- 1 labor - physical mental work and effort supplied

① Labor
- physical/mental work and effort supplied
- price is wage rate

② Capital
- tools/instruments, machinery, etc
- price is rental rate

③ Land
- natural resources
- price is rental rate

④ Entrepreneurship
- revenue/loss profits/losses that result
from business decisions

Demand for factors of production is **derived demand**
- derived from demand of outputs

Value of Marginal Product (VMP)
- extra output for one more unit of input
 $VMP = MP \times P$

\Rightarrow Extra units \cdot price \Rightarrow value added by one extra worker
- what is an additional worker worth for a firm?

To maximize profit set $VMP = MC =$ wage rate

- Demand for labor shifts:
- price of output changes
- technology changes
- prices of other factors of production change

Complementary inputs V_0

$\uparrow \downarrow$ $\downarrow \uparrow$

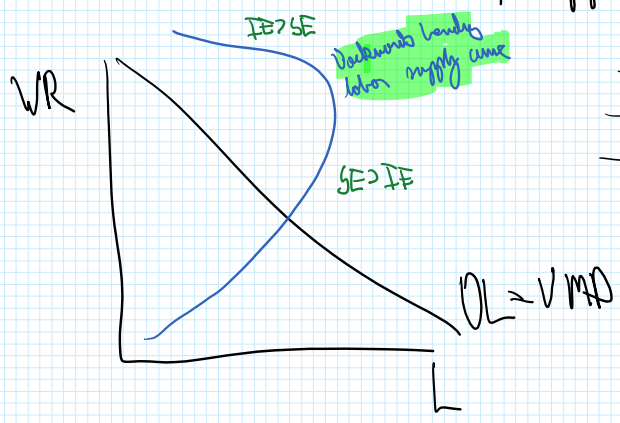
Substitute inputs

$\uparrow \uparrow$ $\downarrow \downarrow$

$P \downarrow$ of other $Q \uparrow$ $P \uparrow$ of other $Q \downarrow$

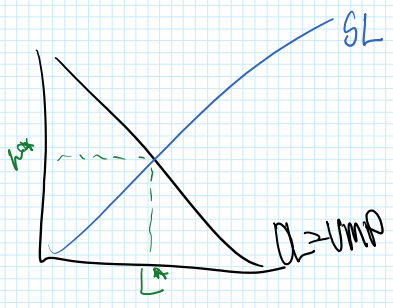
Competitive Labor Market

- many buyers demand, many houses supply
- market demand/supply are sum of all individuals

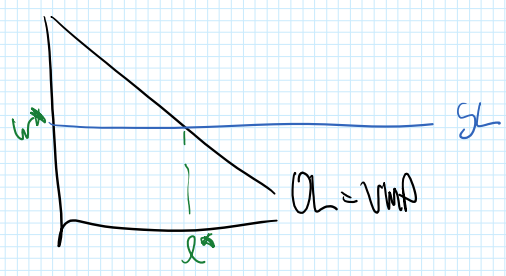


Wages \uparrow	SE	FE	TE
labor	\uparrow	\downarrow	\uparrow
business	\downarrow	\uparrow	\downarrow

In most cases SE is stronger than FE



Labor Market

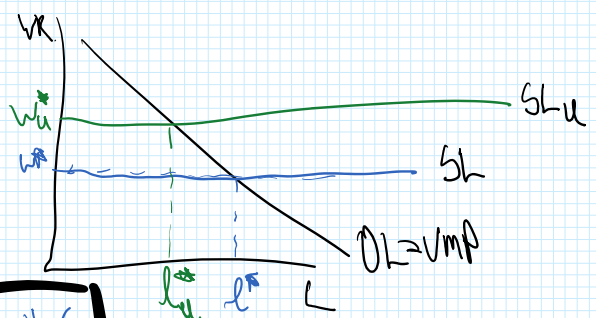


Firm

- wage rates are not even
- depends on supply/demand for different types of labor
- highest wages where VMP is highest and best workers able to do job

Labor Unions

- market power, can raise wages
- shift supply curve up
- lobbying
- provide shared tasks



$$w_u > w^*$$

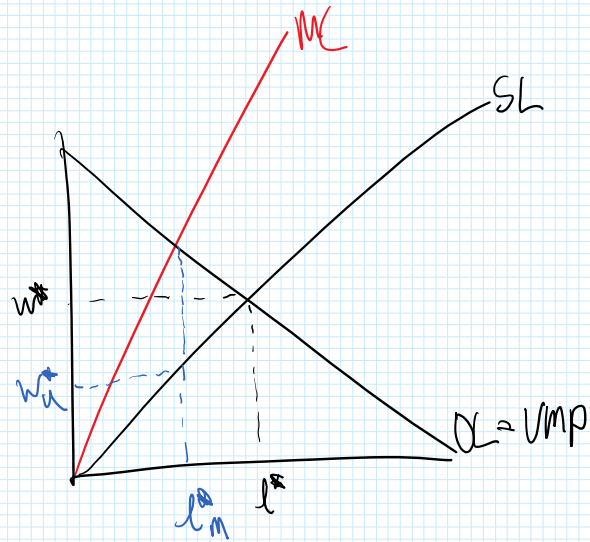
$$L > L_u$$

W

$$l^d > l_u^*$$

Monopsony

- one buyer
- in case of labor, one employer
- hire where VMP intersects with MC



How does minimum wage affect a Monopsony?

- if $min\ w \leq w^*$ increase quantity
- if $min\ w > w^*$ decrease quantity

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Market For deposits

Discounting

- convert a future amount of money into present amount of value
- take into account interest

$$\text{Future Amount} = \text{Present Amount} (1+r)^n$$

← number of years

↑ interest rate

Demand for capital is demands saving
- supply is deposits

Net Present Value

$$NPV = \text{Present Value} - \text{cost}$$