LECTURE 01

Sept 03

- We live in a world of scarce resources
- Individual → limited budget & time
- Society → limited resources to produce goods.
- Economics is the study of how rational people make choices.

Rational Decision-Making

- Two building blocks
  - ① Opportunity cost
  - ② Marginal analysis

Opportunity Cost:

- Opportunity cost of taking an action is what one gives up by not taking the next best alternative.
  - If an opportunity cost of taking an action is high, one is less likely to take the action
  - "For anything we do, we do not do something else"
- Opp costs do 2 things:
  - Formalizes concept of what one gives up
  - Highlights need to identify next best alternative.

- Opportunity cost for attending uni for a year?
  - Tuition/books = $15000, Lost salary = $30000 } Total = $45000
  - Tuition/books = $15000, Lost salary = $0 } Total = $15000
- Undertake action if marginal (additional) benefits exceeds marginal (additional) cost
  - Insights: ① Include all opportunity costs
    ② Ignore sunk costs

What are Sunk Costs?

- Costs that are incurred regardless of the action being taken
  - The only relevant costs are those that can be avoided if no decision is made.

Incentives

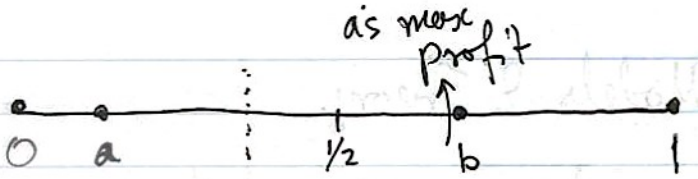
- Incentives can alter marginal benefit/cost of an action
  - Can have an important affect whether an action is taken.
- Keynes → "Economics ... is a method rather than a doctrine ...."

Roles of Models & Theory

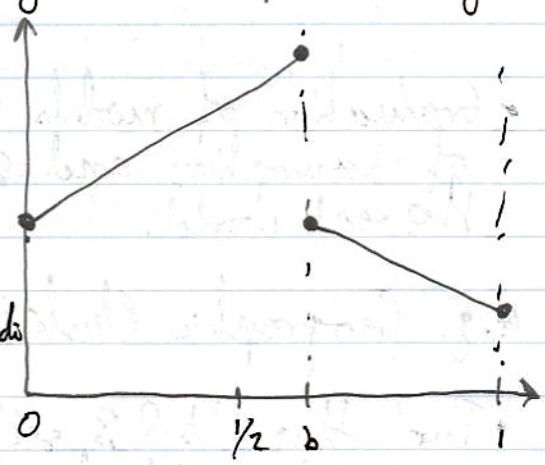
- Explain everyday economic activity
- Model – set of assumptions that lead to a set of conclusions
- Role of assumptions → reduce complexity of real world
- Evaluation of models depends on reasonability of assumptions and success in explaining the real world.

E.g. Geographic Clustering

- Two firms A & B sell burgers at price P & price cost C, identical.
- Assumptions:
  - ↳ 2 firms listed as above
  - ↳ Geographic space is a straight line from 0 → 1
  - ↳ Consumers, N in total, distribution equally.
  - ↳ Each consumer buys 1 unit at P
  - ↳ Travel is costly and increases w/ distance
  - ↳ Firms and consumers motivated by self-interest



- a's portion of market → $(a+b)/2$
- What is a's profits → $(p-c)\cdot[(a+b)/2]\cdot N$
- Which location maximizes profit? → see diagram
- General rule:
  - ↳ a will always locate either to immediate left or right of b. If $b > 1/2$, then a will locate to left, and otherwise to the right of b.



- Say neither location was fixed, we see equilibrium point where both locate immediately left and right of 1/2 point.
- Idea is that clustering can be generalized.

Positive vs. Normative Economics

- Positive → "what is?"
  - ↳ Description, quantification, explanation of phenomena
  - ↳ Fact-based
  - ↳ Theory must be consistent w/ observations
- Normative → "what ought to be?"

Comparing Two Alternatives

- Need to compare individual welfare
  - ↳ Who benefits? Who is worse off? Who is indifferent?
- Need a criterion? → Pareto criterion
  - ↳ "everyone is at least as well off as they were before, and at least one is better off".

LECTURE 02

Sept 10

COMPARATIVE ADVANTAGE & GAINS FROM TRADE

- Countries trade primarily on the basis of comparative advantage

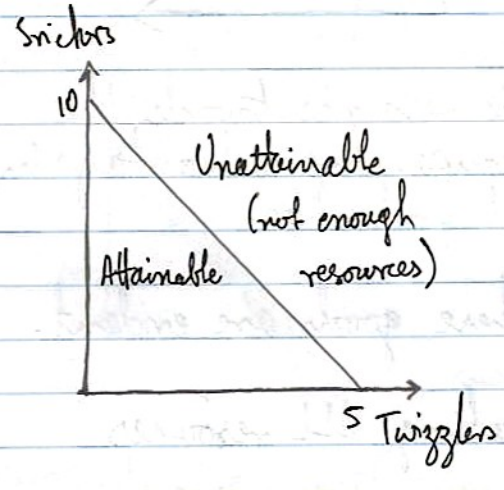
Production Possibilities Frontier (PPF)

① Scarcity (attainable vs unattainable)

② Tradeoffs (choices – decisions)

③ Opportunity cost

- Used to illustrate the benefits of trade b/w countries and b/w individuals



E.g. Opportunity Costs.

Snickers	Twizzlers
10	0
8	1
6	2
4	3
2	4
0	5

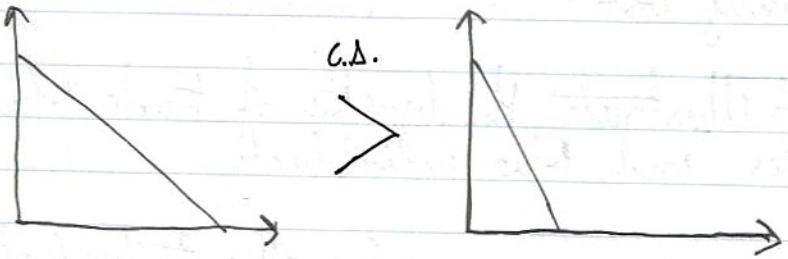
Observations

- For a linear PPF, opportunity costs do not change as we move along PPF.
- In real-life, PPF is often concave, reflecting increasing opportunity costs.

Comparative Advantage

- An individual has a competitive advantage in an activity if they can perform an activity at a lower opportunity cost than anyone else
- Comparative advantage is the key to gains from trade.

→ For any two countries or individuals, the body w/ the comparative advantage is the one w/ the lower slope on the PPF curve.



- If each allocate all their resources towards the activity they hold the comparative advantage in, we will see more total production.

↳ Gains from trading these goods are evident.

↳ Specializing ≠ allocating ALL resources

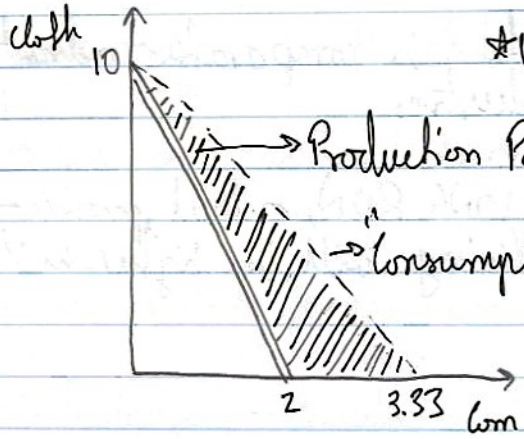
- In ECO101 students not expected to find breakdown of production when incomplete specialization

↳ Should understand significance, however.

E.g. Australia's 100 units → 50 bikes or 25 tricycles
New Zealand's 100 units → 10 bikes or 10 tricycles

	B	T
AU	2 tricycles	0.5 bikes
NZ	1 tricycle	1 bikes

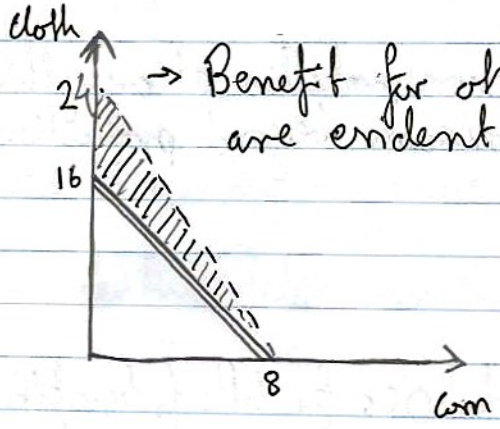
Gains From Trade – "Consumption" Possibility Frontier



*We can trade 3 cloth = 1 corn

→ Production Possibility Frontier

→ "Consumption" Possibility Frontier



→ Benefit for other body of trade are evident at the same ratio.

*Trade line (cloth/corn) must be between OC if both are to benefit from the trade.

$$2 < \text{trade line} < 5$$
(cloths per corn)

Gains From Trade

- 2 individuals → gains not controversial
- 2 countries → gains could be controversial
- Winners & losers in the SHORT RUN
- Jobs gained where there is comparative advantage, lost in other industries
- Economists say in the LONG RUN, output productivity, & standard of living will be higher in the presence of trade.

The Big Idea →

- Even when one party is more productive at everything, trade allows both to consume beyond production possibility frontiers.

Rules of Thumb

- Trade ratio must lie btw OCs for both to benefit
- If trade ratio < OC for both, no trade will occur.

LECTURE 03 Sept 17

SUPPLY & DEMAND AND MARKET PRICE

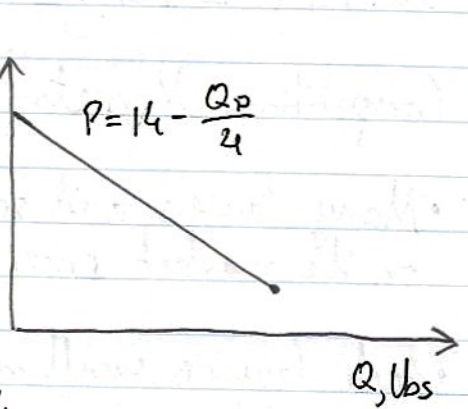
Competitive Markets

- Many buyers and sellers, each has no influence on the market price
- Each buyer is small relative to size of market
  - ↳ Can buy as much as they want w/o affecting the price.
  - ↳ MC of buying one more → $ Pmkt
- Each buyer is small relative to size of market
  - ↳ Can sell as much as they want w/o affecting price
  - ↳ MB of selling one more → $ Pmkt
- E.g. potential determinants of coffee beans?
  - ↳ Current price
  - ↳ Replacements
  - ↳ Future prices
  - ↳ Incomes (wealth)
  - ↳ # of consumers
  - ↳ Preferences & tastes

Law of Downward Sloping Demand

- Demand-schedule → how much of a good or service a consumer would buy at each price.

- All else equal → the higher the price, the lower the demand.



* Q_D → quantity being demanded

- Demand curve → $Q_D = f(P)$
  $Q_D = 56 - 4P$

- Inverse demand curve → $P = f^{-1}(Q_d)$
  $P = 14 - Q_D/4$

Individual → Market Demand Curves

- Sum of individual demand curves ie. at each possible price, sum of quantities demanded by all individuals

↳ $Q(p) = \Sigma q_i(p)$

Key Observations

- Movement along demand curve → change in demand quantity
  ↳ (price change)
- Change in demand → shift in demand curve
- Demand curve will shift b/c of changes in:

↳ Price of substitutes / complements

↳ Incomes

↳ Preferences / Expectations

Observations

- Substitute price ↑, product demand ↑
- Price of a complement ↑, product demand ↓

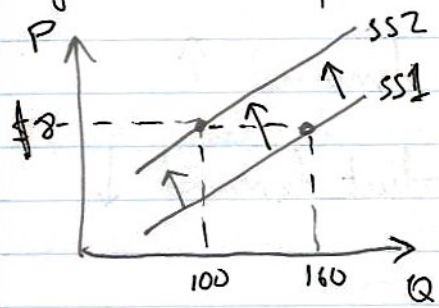
Effect of Changes in Income

- Normal good → income ↑, demand ↑
- Inferior good → income ↑, demand ↓

Supply Curve

- Law of upward sloping supply cost of production rises (think as ↑)
  - ↳ All else equal, higher price, higher quantity supplied.
  - ↳ Rationale: firms seeking to maximize profits.
- Market supply curve
  - ↳ Sum of individual firm supply curves
  - ↳ Assumes a large # of firms, none influencing price.
- Change in supply as price changes is movement along supply curves
- Change in supply as price is held is a shifts in curve.
- Market supply curve is the sum of supply curve of individual firms.

E.g. increase in price of labour



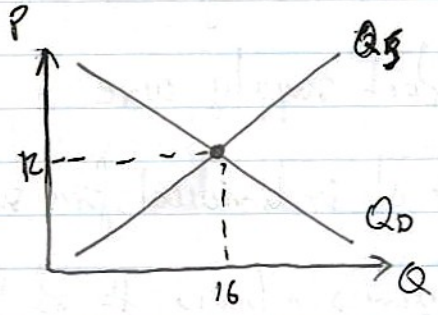
Market Equilibrium

- What determines coffee price? Quantity?

↳ Key is that markets move toward equilibrium

- Formal definition → In context of perfectly competitive markets, equilibrium is defined in terms of price at which: $Q_D = Q_S$

Price/lb	Q_D	Q_S
12	8	20
11	12	18
10	16	16
9	20	14
8	24	12



$P=11 \rightarrow Q_D=12 < Q_S=18 \rightarrow$ SURPLUS → price falls

$P=9 \rightarrow Q_D=20 > Q_S=14 \rightarrow$ SHORTAGE → price rises

Equilibrium price → $P=10$, $Q_D=Q_S=16$

- Algebra → { Demand: $P=14-Q_D/4$; Supply: $P=2+Q_S/2$ } → solve the SoE

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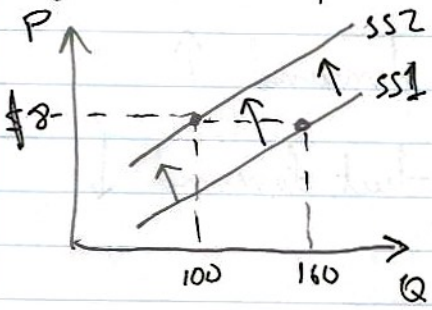

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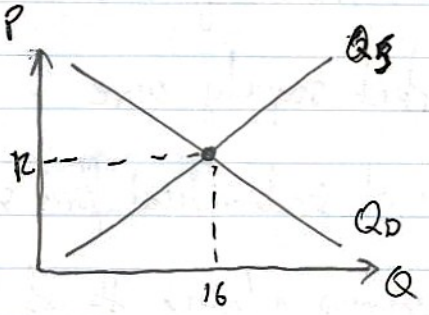

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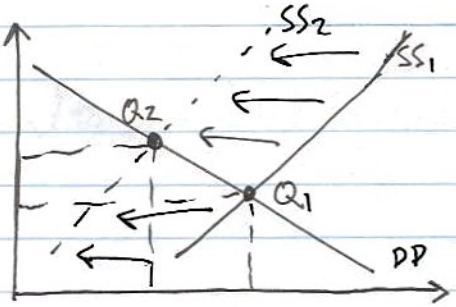
- Key to understanding DD/SS market equilibrium?

↳ Explain how (if market NOT at equilibrium), market forces will drive current price to equilibrium.

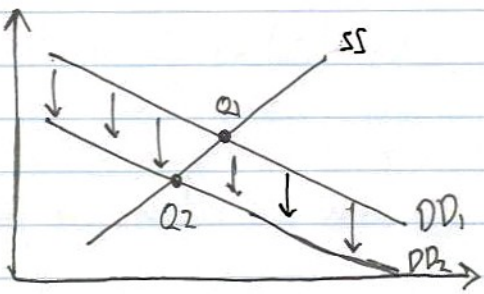
E.g. price of used SUVs as global oil markets are disrupted

↳ gasoline and cars are complements.

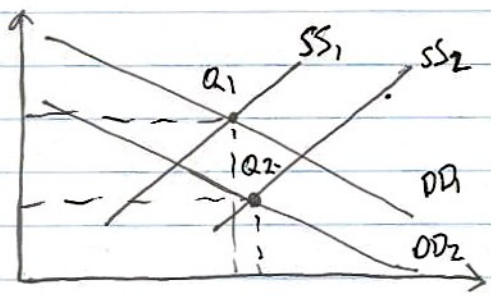
* Shift in SS = movement on DD & vice versa



- Demand shift only



- Demand & supply shifts



- Let's say increased tariffs on imported SUVs?

↳ Demand for used SUVs rises.

↳ Supply for used SUVs falls.

LECTURE 04 Sept 24.

ELASTICITIES

- Factors that contribute to change in demand/supply (that thus affects price) are called SHOCKS.
- Measures of sensitivity to how demand changes after a change in price is called ELASTICITY

(Price) Elasticity of Demand

- Percentage change in quantity demanded divided by percentage change in price

↳ $\%\Delta Q_D / \%\Delta P = \varepsilon$

- Given that curve is downward sloping, we look at absolute values
- Elasticity will differ depending on whether we move from A→B or B→A.

↳ To eliminate, we use mid-point convention

↳ $\%\Delta Q_{\$} = \Delta Q / \bar{Q}$ ↳ $\%\Delta P = \Delta P / \bar{P}$

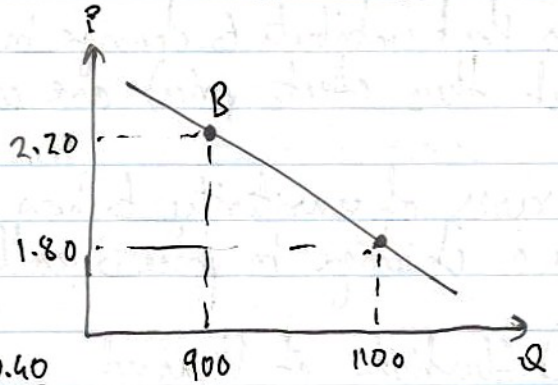
↳ $\therefore \varepsilon = \dfrac{\Delta Q_D / \bar{Q}}{\Delta P / \bar{P}}$

E.g.

Situation	P	Q_D
A	1.80	1100
B	2.20	900

$$\%\Delta Q_D = \frac{(1100-900)}{(1100+900)/2}$$

$$= \frac{200}{1000} = 0.2$$



$$\%\Delta P = \frac{(1.80-2.20)}{(1.80+2.20)/2} = \frac{-0.40}{2.00}$$

$$= 0.2 \qquad \therefore \varepsilon = 0.2/0.2 = \boxed{1}$$

Now suppose →

① $\%\Delta P = 10$, $\%\Delta Q_D = 20$, $\varepsilon = 2$ → ELASTIC

↳ Interpretation → For 1% Δ in P, Q will Δ by 2%

② $\%\Delta P = 10$, $\%\Delta Q_D = 2$, $\varepsilon = 0.2$ → INELASTIC

↳ Interpretation → For 10% Δ in P, Q will Δ by 2%

Why Do Elasticities Differ?

- More / better substitutes → higher price elasticity
- Luxury goods → high elasticities
- Necessary goods → low elasticities
- Proportion of income allotted → high portion, high elasticity & vice versa.

- Time elapsed since shock → elasticity grows higher as time goes on.

- E.g. which has higher elasticity?

  ↳ Ice cream, or individual brands

  ↳ Individual brands have higher elasticities!

Terminology

- Perfectly inelastic → $\varepsilon = 0$
  inelastic → $0 < \varepsilon < 1$
  unit elastic → $\varepsilon = 1$
  elastic → $\varepsilon > 1$
  perfectly elastic → $\varepsilon > \infty$

Two Technical Issues

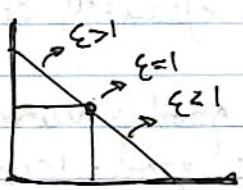
① Elasticity varies along a downward sloping linear demand curve.

② Measuring elasticity at each point on a downward sloping demand curve.

- Insight – Linear Demand Curve has slope constant everywhere but elasticity is NOT

- Intuitions → ① When price high, elasticity high
  ② When price low, elasticity low.

- $\varepsilon = \frac{P}{Q} \cdot \frac{1}{\text{slope}}$

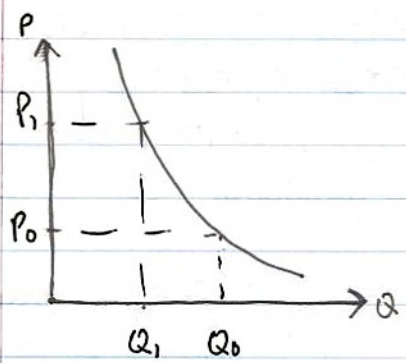


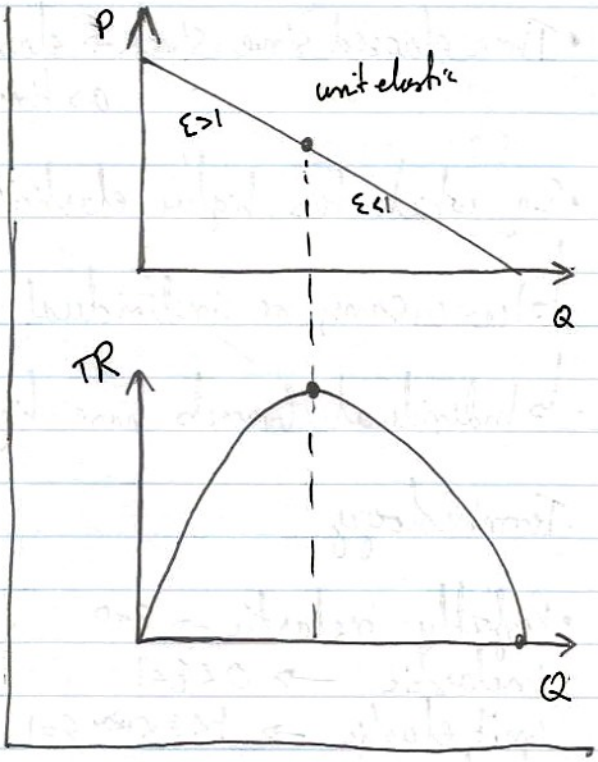
Inelastic Demand Curve

↳ TR ↑ if P ↑

$TR_0 = P_0 Q_0$ → old price
$TR_1 = P_1 Q_1$ → new price

Rev inc → $(P_1 - P_0) * Q_1$
Rev dec → $P_0(Q_0 - Q_1)$





- If the revenue increase exceeds the revenue decrease, total revenue as price

Cross-Price Elasticity

- % Δ in quantity demanded of good 1 divided by % Δ in price of good 2

- Substitutes : cross-price elasticity > 0
  Complements : cross price elasticity < 0

Income Elasticity

- % Δ in quantity demanded divided by % Δ in income

- Normal good : income elasticity > 0
  inferior good : income elasticity < 0

LECTURE 05 Oct 01

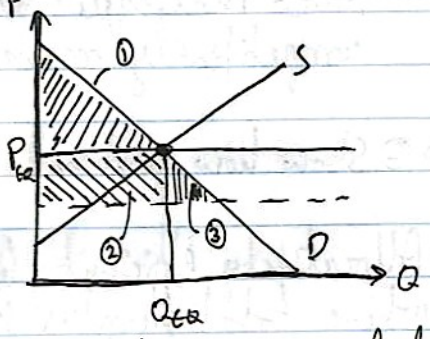
WELFARE ANALYSIS

Willingness to Pay

- Maximum amount a consumer would be willing to pay
- Analogous to reservation price

Consumer Surplus

- Definition → Difference b/w max price a buyer would pay & what a buyer actual pays
- Insight → we receive consumer surplus for most goods we buy.



Some Observations

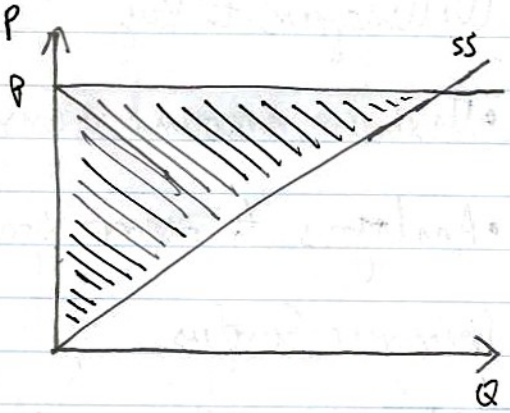
- Lower price of a good means a higher consumer surplus
- If the price is low, price may be a good measure of the value
- Important because it measures the benefit to consumers to participating in the market.

- At P=4, with $8 cover charge
  - ↳ 12 > 8 → ✓ you go in
  - ↳ ~~12~~ > ~~16~~ → ✗ you don't go
- At P=0, with $32 cover
  - ↳ 30 > 24 → you go ✓
  - ↳ 30 > 32 → don't go ✗

Price	#	CS(P=4)	CS(P=0)
		total = 12 ↑	total = 30 ↑
10	1	6	10
8	2	4	8
6	3	2	6
4	4	0	4
2	5		2
0	6		0

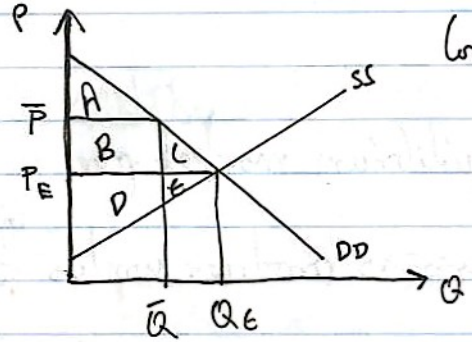
Producer's Surplus

- Definition → Amount seller is paid minus seller's cost.



Welfare Analysis

- Use concepts to:
  - ① Show that equilibrium output in a perfectly competitively market is allocatively efficient
  - ② Show how govt intervention can welfare reduce.
- Allocatively efficient level of output → level of output where total surplus is maximized.
- Key result confirm equilibrium output in a competitive market is allocatively efficient.
- Left of Q_E → value to buyer > value to seller
  - Efficient to increase output
- Right of Q_E → value to buyer < cost to seller
  - Efficient to reduce output.



Competitive → CS = A+B+C

PS = D+E

TS = A+B+C+D+E

Non-competitive → CS = A+B

PS = D

TS = A+B+D

Welfare loss → C+E

- Market pays CS + PS to prevent market shutdown.

Key Results

- If the output of a good is less than output in a competitive market, output is too low & is "allocatively inefficient" because

↳ ① Value of good exceeds cost to sellers

↳ ② "Gains from trade" → not fully utilized

Potential Sources of Inefficient

- Market Power
- Externalities
- Public goods, common resource, & private resources
- Government policy.

Price Ceilings

- Price ceiling is below equilibrium market price
- Consumer surplus increases as producer surplus falls
- Q_c is allocatively inefficient: at Q_c, value to buyer exceeds cost to producer of producing additional output
- Price ceiling is govt enforced pricing restrictions.

Equity (Fairness) & Efficiency

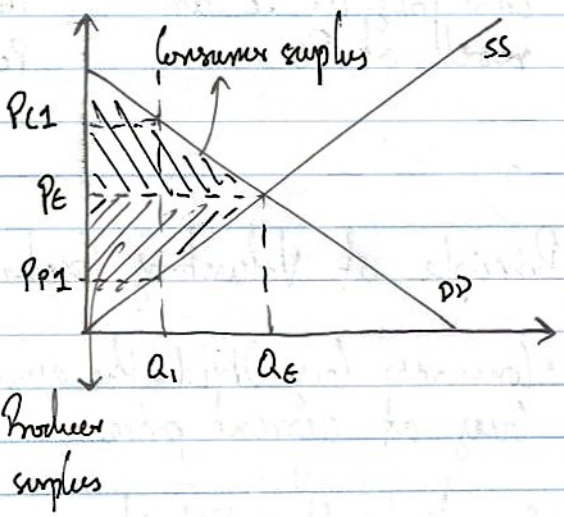
- Just b/c a market is efficient does not mean it is equitable.
- Consider the market for a new drug
  - ↳ Huge differences in willingness to pay
  - ↳ If market undisturbed, only the "richest" would be able to buy.
- Potential trade-off → policies that may promote equity may come at expense of decreased efficiency & vice-versa.

LECTURE 6 — Oct 08

PRICE CONTROLS & TAXES

Recap

- At Q_1, consumers willing to pay more for 1 more unit than cost to produce to produce 1 more unit.

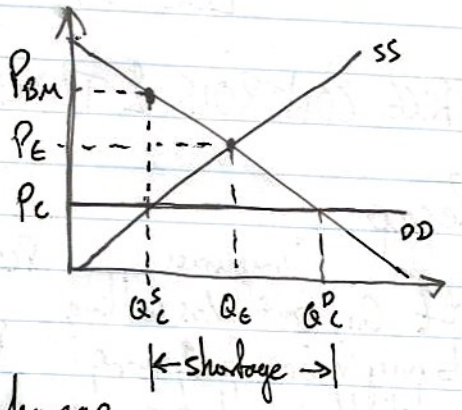


- Today → implications of various interventions by the government on markets.
- Who bears the burden of a fee/tax may not actually be the same as who pays it.
- Govts sometimes impose price ceilings & price floors
  - ↳ could sometimes be unintended consequences

Price Ceilings

- Ceilings, if below mkt-clearing price, creates shortages
  - ↓ At price ceiling, quantity demanded exceeds quantity supplied
- Principle of voluntary exchange
  - ↳ $Q(P) = \min[Q^D(P), Q^S(P)]$
- Non-price rationing.

- Seems like a "Black Market" → those who can buy at P_C can resell at P_B

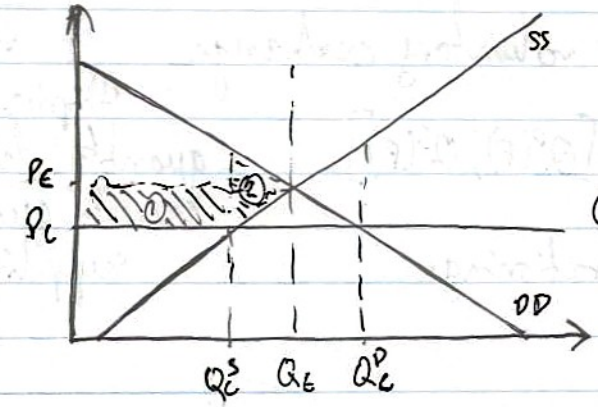


Principle of Voluntary Exchange

- Consumers buy ONLY the quantity they're willing to buy at current price
- Supplies sell ONLY the quantity they're willing to sell at current price
- Volume of market activity is always lesser of quantity demanded and supplied.

Non-Price Rationing

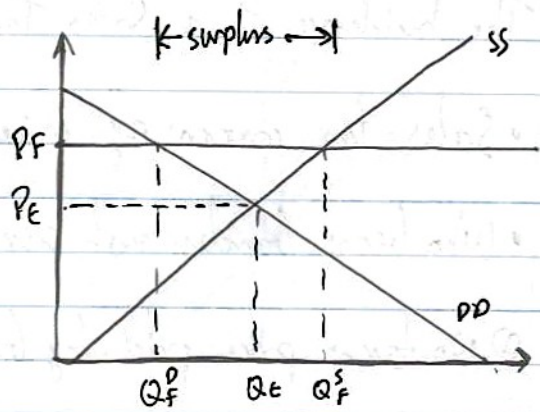
- In a free market, price adjusts to equilibrium
- If price can't play a role, a mechanism must determine who obtains quantity supplied.
  - e.g. First-come-first-served.



① Gain to consumers

② Loss to everyone (= "deadweight" loss)

Price Floor

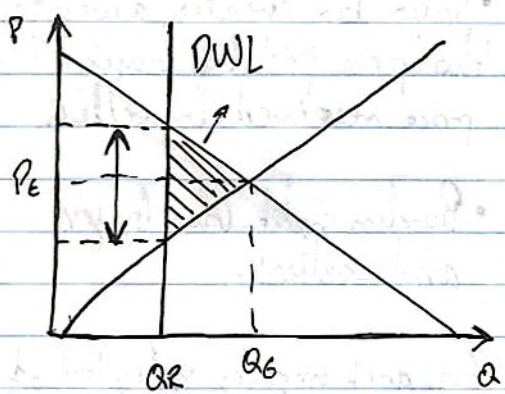


Minimum Wage → An Assessment

- Advantage → Raises income of working poor
- Disadvantages → ① Reduces # of jobs
  ② Reduces opportunity for OTJT
  ③ Affects teenagers/youth most.

Quantity Control/Restrictions

- Licenses required to participate in a market
  ↳ taxis, for e.g.
- Used as part of "supply management"
  ↳ e.g. dairy & poultry.



The Incidence of a Sales Tax

- Sales tax common e.g. excise tax
- Who bears burden not same (necessarily) as who pays

① No tax → price paid by buyer = price received by buyer

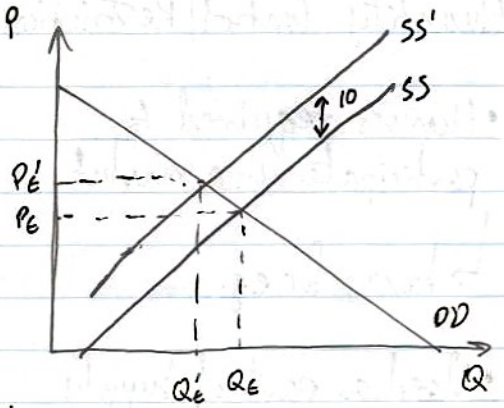
② ~~Tax~~ Tax levied on seller → price paid by buyer = market price
received by seller = mkt − tax

③ Tax levied on buyer → paid by buyer = mkt + tax
received by seller = mkt

E.g. gov't imposes a sales tax of $10 on SELLERS

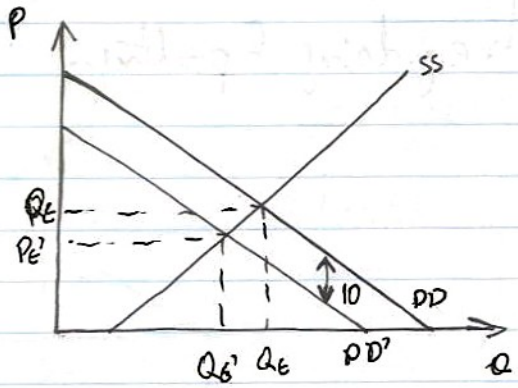
↳ Adjust calculations based on S2D curve.

- Sales tax creates a wedge btw price paid by buyer & price received by seller.
- Burden split btw buyers and sellers.



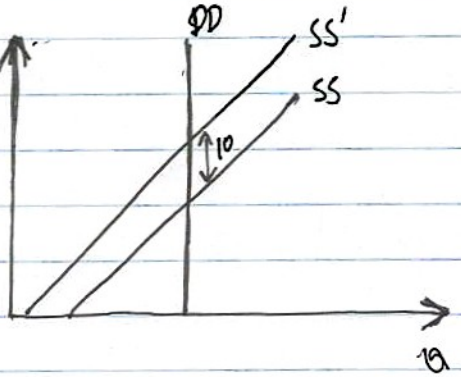
E.g. gov't imposes sales tax of $10 on BUYERS

- We same split btw how burden is taken on by buyers and consumers.



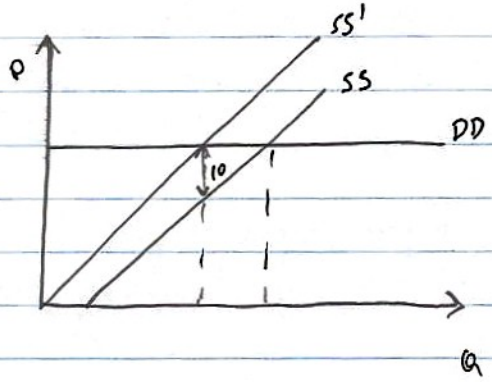
Perfectly Inelastic Demand

- For perfectly inelastic DD,
  - ↳ Buyers unresponsive to Δ in P
  - ↳ Full burden of tax on buyer



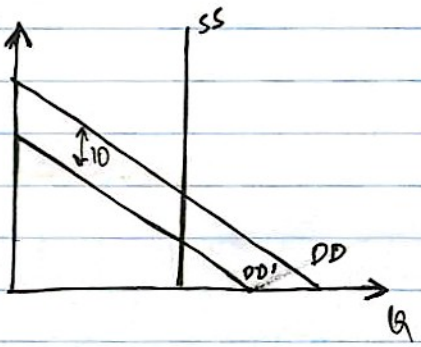
Perfectly Elastic Demand

- Buyers very responsive to $\Delta P \rightarrow$ any ΔP and $Q_D \rightarrow 0$
- Full burden borne on sellers



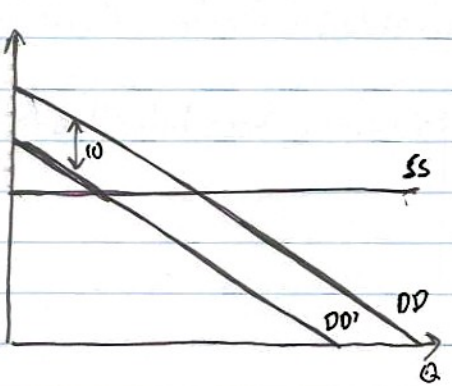
Perfectly Inelastic Supply

- Sellers completely unresponsive to ΔP
- Full burden on the seller



Perfectly Elastic Supply

- Buyer pays full burden of tax
- Sellers very responsive to ΔP so any ΔP leads to $Q_S \rightarrow 0$



LECTURE 07 Oct 15

PRODUCTION & COSTS

Production Function

- Expresses relationship b/w output and quantity of inputs → capital & labour.
- Technical relationship → $Y = F(K, L)$
  - ↳ Short-run → one input is fixed, other can vary
  - ↳ Long-run → all inputs can vary.
- Law of Diminishing Returns → In the presence of a fixed input, the marginal product of a variable input eventually diminishes

Firm's Costs of Production

- Total costs (TC) → total of all costs
- Total fixed cost (TF) → total of all fixed input cost
- Total variable cost (TVC) → total of all variable input cost
- Marginal cost (MC) → increase of all total cost / increase in output
  - ↳ $MC = \Delta TC / \Delta Q$

Two Preliminary Observations

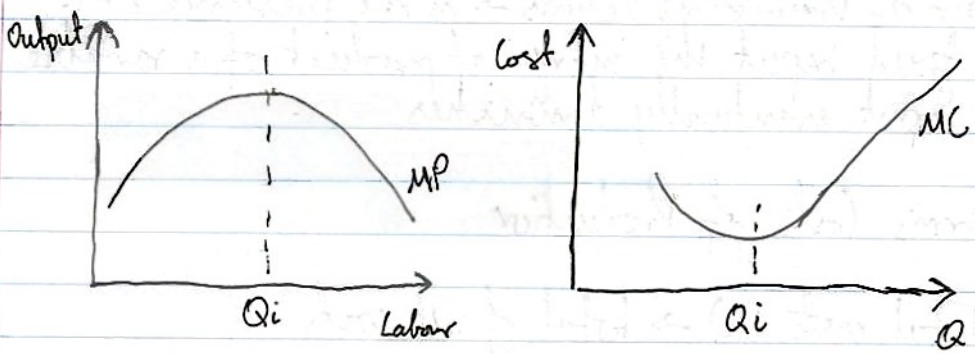
① If MP rises then MC falls (and conversely)

↳ This is the key link b/w the production function & costs

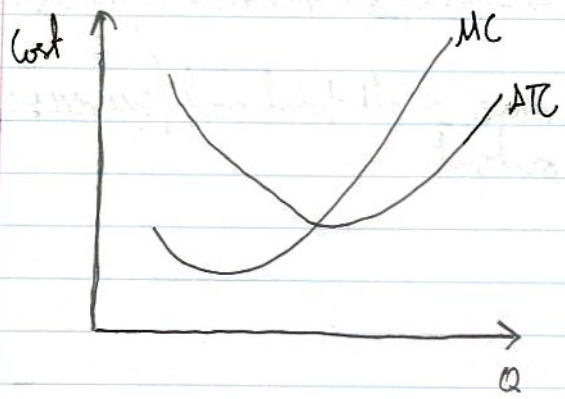
② MC & ATC are the key cost schedules

↳ MC intersects the ATC schedule at its minimum point

③ Due to Law of Diminishing Returns → MC eventually rises, which is the standard case when analyzing profit-maximizing behavior of firms.



- when MP of labour is at its maximum, MC is at its minimum.



- MC intersects ATC at a minimum of ATC

Production & Short-Run Costs

① In short-run, there is a fixed and variable factor of production

② Law of Diminishing Returns → the marginal product of the variable factor eventually falls

③ Implications? The marginal cost (MC) of producing additional unit eventually rises

④ ATC schedule is U-shaped

Firm's Long-Run ATC Schedule

① In short run, Tesla must hire more workers to increase output → LODR

② In long run, Tesla can build more plants & hire more workers → LODR doesn't apply.

③ Suppose firm doubles all inputs. If:

↳ Output doubles (constant returns), ATC stays same.

↳ Output < doubles (diseconomies of scale), ATC increases

↳ Output > doubles (economies of scale), ATC decreases

Economic Vs Accounting Profits

- Economic profit → total revenue − opportunity costs.
- Opportunity costs →
  - ↳ Explicit → wages paid to employes, cost of raw material
  - ↳ Implicit → opportunity cost of owner's invested capital, OC of invested time.
- Requires implicit costs be identified & measurable
- Purpose is to determine whether a firm should exit an industry

LECTURE 08

Oct 22

PERFECT COMPETITION

Perfectly Competitive Markets

- Many buyers and sellers of an identical product
  - ↳ Actions of individuals do not affect market price
- Firms can enter & exit market as they please
- Each firm is a price taker & faces a perfectly elastic demand curve at the market price.
- # of firms is fixed in short-run.
- In absence of barriers to entry → economic profits cannot persist in the long run.

Profit Maximization Insights

- All firms are price takes → cannot influence the price
- Must choose level of output that maximizes profits GIVEN market price.

Summary

- For the supply curve of a perfectly competitive firm:
  - ↳ ① For any P=MR, firm maximizes profits by producing level of output where P=MC.

↳② For any P, we can thus determine the firm's level of output from the firm's MC schedule.

↳③ Hence, the firm's supply schedule is firm's MC schedule

- If the firm's total revenue (TR) is less than TVC, the firm can minimize its losses by shutting down

Summary: Decisions of Perfectly Competitive Firms

① Choose output q that maximizes profits

↳ i.e. where P=MC

② Determine if it should shut down in short run

↳ If P< AVC then shut down else continue

③ Determine if it should exit the industry in the long run

↳ If P<ATC then exit else continue

P=ATC ⇒ Zero Economic Profits

① Economic Profits → total revenue - total Opp Costs

② Most important OC → OC of invested capital

③ Zero Economic Profit → earning a normal rate of return

↳ Long-run supply curve = MC (unless P < ATC)

② Industry

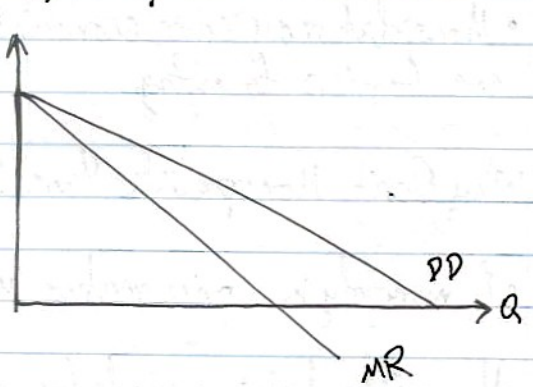
↳ Short-run supply curve = Σ firm's supply schedules

↳ Long-run supply curve = min of ATC of new firms

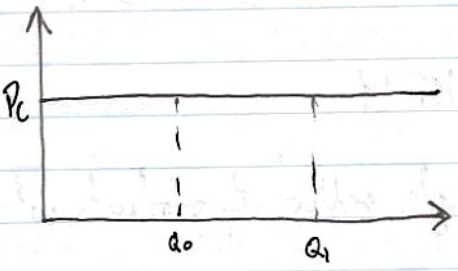
LECTURE 09 Nov 06

MONOPOLY

- Single seller of products w/ no close substitutes
- Barriers to entry
  - ↳ Legal barriers → legalized monopoly
    - ↳ Post office (first class mail)
    - ↳ Patents
  - ↳ Natural baniers → natural monopolized
    - ↳ High fixed costs and economies of scale
    - ↳ Network effects (social media)
    - ↳ Resource control
- For a monopolist →
  - ↳ Market DD = Firm DD (both slope downward)
  - ↳ To sell an additional unit, monopolist must reduce price of all units
  - ↳ Implication: MR < P
    - ↓
    - marginal revenue
    - $\frac{\Delta TR}{\Delta Q}$



- On the other hand, perfectly competitive firms can sell additional output at the same price

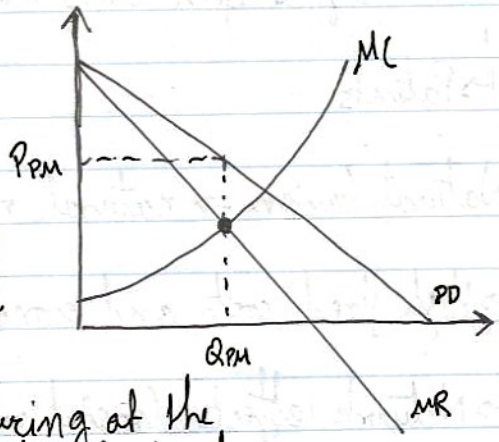


↳ $MR = P_C$

Profit Maximizing Output

- Monopolist should choose profit-maximizing output where $MR = MC$

↳ Q_1 where $MR > MC$ → expand
Q_2 where $MR < MC$ → contract



- If the monopolist is producing at the profit-maximizing level of output, they will earn profit if $P > ATC$

↳ Economic profits!

- Monopolist can set either P <u>or</u> Q, not both. Once one set, the demand curve sets the other.

- Monopolist may earn economic profits in long run as there are barriers to entry.

Why Don't Monopolists Have Supply Curves?

- A monopoly is a price maker, not price taker.

- Monopolists decisions made by demand curve they face.

- Shape of demand curve affects ~~was~~ marginal revenue curve → in turn affects monopolists' profit ~~was~~ level out.

Insights

- For a competitive firm, as P varies, there is a new profit-maximizing where $P=MC$

↳ Key idea: perfectly competitive firms are price takers.

- A monopolist has only one profit-maxing q where $MR=MC$ → no SS curve

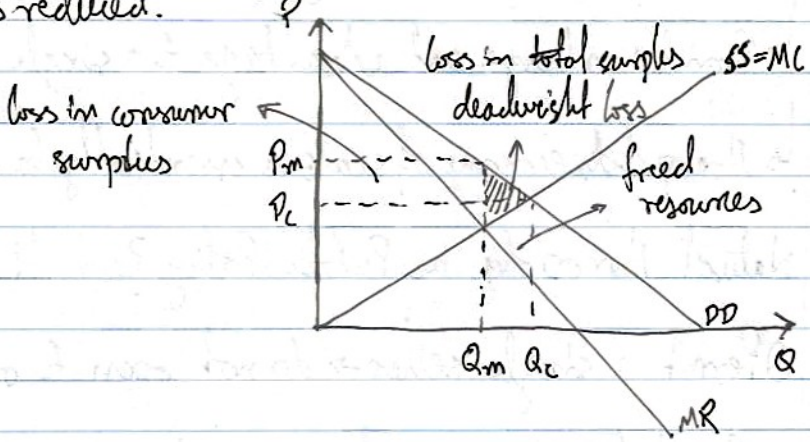
↳ Key idea: monopolist is a price setter

- When a competitive market gets monopolized:

↳ Becomes allocatively inefficient

↳ Not monopoly profits

- Welfare cost of monopoly is loss in total surplus as output is reduced.



Intuition

- If $P > MC$ then resources are NOT being allocated efficiently
  - Where P = value to buyer of additional unit
  - MC = [illegible] cost to society of producing additional unit.
- From perspective of society, output of good is too low
- Yet monopolist produces where $P > MC$ ($\& MC = MR$) and thus produces low level of output.

Natural Monopolies

- Arise because a single firm can supply at a lower cost than two or more firms combined.
- Source of these advantages:
  - High fixed costs, low marginal costs
  - Provides a large cost advantage to a single firm.
  - Monopolists economy of scale is essentially barrier to entry.

Natural Monopoly as Public Policy?

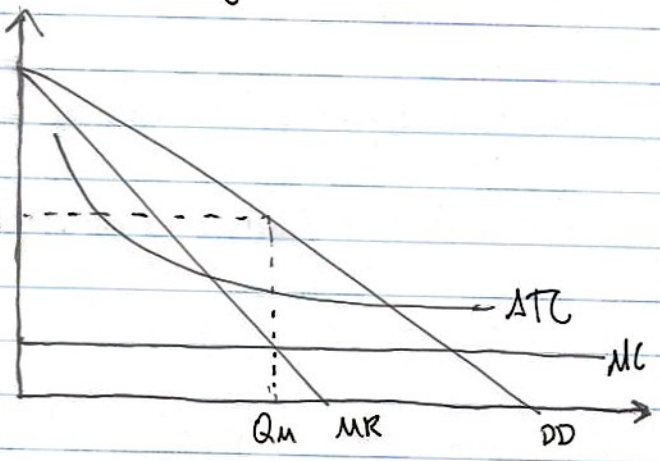
① Permit a single seller → do not open to others

② Regulate price monopoly can set.

③ Other option is public ownership

Unregulated Natural Monopoly

- Q_M set to where $MC = MR$
- Monopolist earns economic profits as $P_M > ATC$

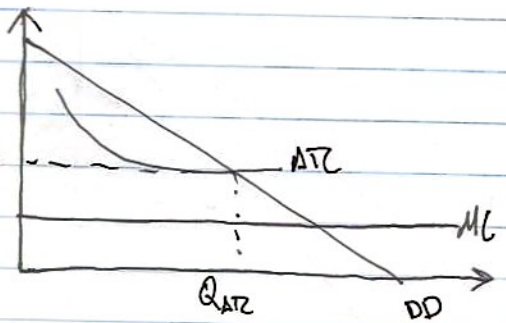


Regulation of Natural Monopoly

- Set $P_{reg} < P_m \rightarrow$ then $Q_{reg} > Q_m$
- Often regulated P equals average total cost ATC

Regulating a Natural Monopolist

- Not allocatively efficient
  - ↳ Value to buyers (P) > MC to produce
- Monopolist earns zero economic profit.



- Problem is that monopolist has no incentive to control cost.

LECTURE 10

Nov 12

OLIGOPOLY

- Few firms → each faces a downward sloping demand curve
- Aware of mutual independence → strategic interaction

Oligopolists

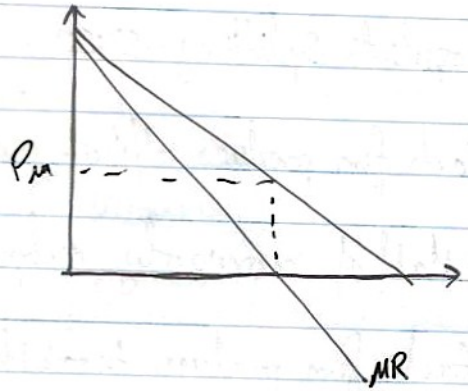
- If they compete, industry profits lower than monopolists
  - ↳ Could fall to perfectly competitive level profits
- Alternatively if they form a cartel then they can equal monopoly profits
- Problems of maintaining collusion/cooperation

Duopolist: Possible Outcomes

① Collude (Form Cartel)

↳ Replicate monopoly

↳ $Q=30, P=60, \pi = 1800$



② Must allocate market share

③ Incentive to cheat: cartel may break down

- Cartel members have incentive to cheat

Observation

① Firms want to collude to achieve monopoly but each firm has an incentive to cheat if MR>MC

② Difficulty in cooperating leads to higher output, lower price than monopoly

Game Theory

- Payoff Matrix
- Strategies of players
- Outcome

Duopolists Splitting 50:50

- Each firm produces 1/2 of output

↳ Half of monopoly output

- Each firm produces two-thirds of monopoly output
- One produces 1/2, other makes 2/3.

*Dominant Strategies

- Defined of strategy of a player that is the best action regardless of action taken by other player

Nash Equilibrium

- Each firm is optimizing given the strategy of the other firm
- Neither has an incentive to change

Prisoner's Dilemma

- 2 criminals apprehended & approached individually
  - Need at least one to confess, payoffs symmetric
- In dilemma each has a dominant strategy → want to play regardless of how other plays.
- Prisoner's dilemma highlights important tension btw
- Equilibrium of prisoner's dilemma does NOT maximize group's total payoffs.

Dominant Strategy & Nash Equilibrium

- Strategy profile specifies each player's action anytime a particular strategy has a choice
- In an NE, each player respons in best possible way to actions chosen by all others

Bertrand Assumptions

- Firms simultaneously choose prices
- All consumers buy from the lowest price firm
  - If multiple firms offer same lowest price, customers select at random
- No capacity constraints

Bertrand Paradox

- In a market for a standardized good where firms compete on price w/o capacity constraints, only takes 2 firms to get marginal cost pricing
- Intuition → strong incentive to undercut rival's price which leads to rigorous price competition
- Resolving the paradox
  - Capacity constraints → i.e. Cournot-Nash equilibrium
  - Product differentiation
    - Some prefer A, others prefer B
      - Customers buy most preferred product so long as price difference isn't too big.

LECTURE 11 — Nov 19

PRICE DISCRIMINATION

- Charge consumers different prices for the same product. for increased profits
- Requires a firm be able to segment its consumers

Necessary Conditions

① Market power (as opposed to monopoly)

② Ability to sort based on willingness to pay (or elasticity)

③ No arbitrage

- General objective is high prices for one group and lower prices for another group.

Perfect Price Discrimination

- Monopolist charges each consumer the most price they're willing to pay

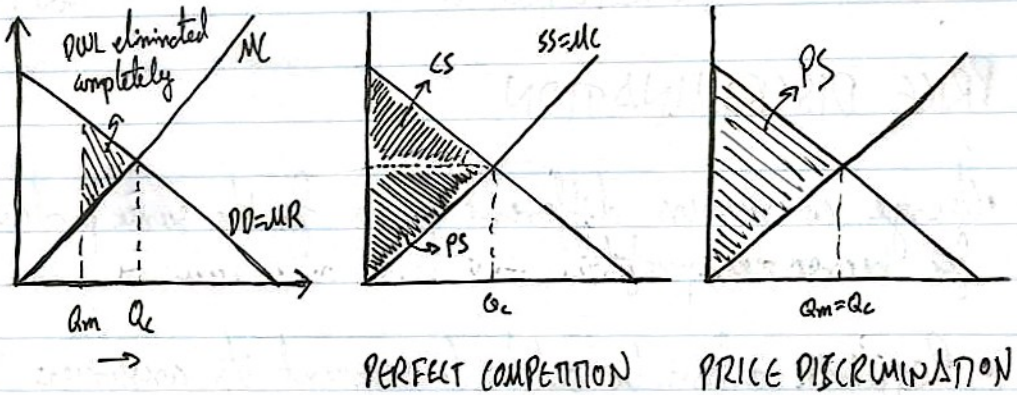
↳ Makes market allocatively efficient.

Consequences of Perfect Price Discrimination

① Monopolist doesn't have to lower price on all previous units just to sell one more.

② DD=MR curve ③ Profit maximizing → P=MR=MC

④ Output same as competitive market ⑤ Efficient & Surplus redistributed



PERFECT COMPETITION PRICE DISCRIMINATION

- Biggest problem → hard to determine WTP; high WTP consumers have no incentive to reveal WTP
- Two solutions: 2nd / 3rd degree price discrimination
- 3rd → Sort consumers into groups
  - ↳ Receive lower price if you prove membership in a group
- 3rd → Consumers sort themselves into groups
  - ↳ Receive lower price if you jump some sort of hurdle.
  - ↳ This type of price discrimination available to all willing to jump that hurdle.

LECTURE 12 — Nov 26

EXTERNALITIES

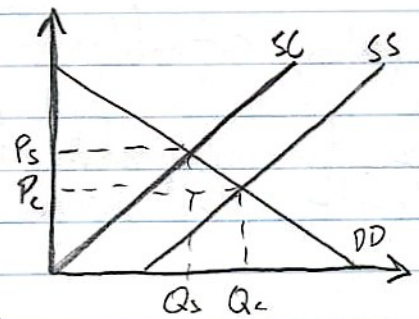
- Occurs when a transaction btw a buyer and seller affects a third party. → positive or negative
- In both cases
  - ↳ Market output is not allocatively efficient
  - ↳ Government intervention may help
- E.g. greenhouse gases produced by aluminum production
  - ↳ Social cost → private cost + externality cost
  - ↳ Social benefit → private benefit

Allocative Efficiency

- No externality → value to buyer of last unit sold is equal to cost to producer of last unit sold.
- Externality → social value of last unit sold equals social cost of last unit sold
  - ↳ Social value → private value + externality.

Production Externality

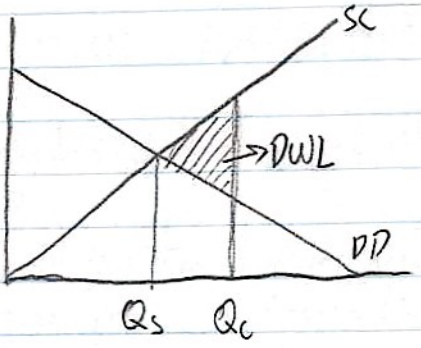
- At Q_c, P_c < social cost so inefficient
- At Q_s, P_s = social cost so efficient.



- $Q_c > Q_s$ → private market "overproduces" aluminum
- $P_c < P_s$ → private market "underprices" aluminum

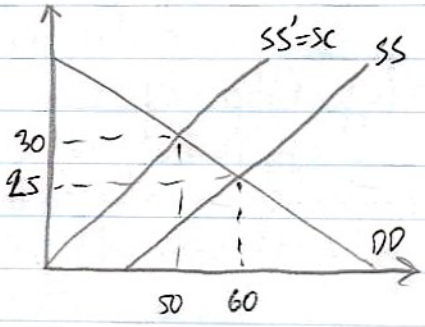
Welfare Analysis → Negative Production Externality

- To right of Q_s, the social cost exceeds value to buyer so we shouldn't produce.



Policy Intervention

- Say gov't imposes $10/ton tax paid by sellers
  - ① SS shifts upwards to SS'
  - ② Achieve allocative efficiency



- Buyers and sellers share incidence of the tax
- Output of aluminum produced declines as well since consumers pay a higher price.

Consumption Externalities

- Occur when consumption of a good either harms 3rd parties or benefits a third party.

- An eg: car owners can use 1 of 3 devices to protect their car from theft.
  - ① Lock on steering wheel
  - ② Tracking device w/ sticker on windshield
  - ③ Invisible tracking device
- Is there a positive consumption externalities associated w/ one of the devices?
- Some observations:
  - ① & ② discourage car theft but no disincentive to steal somebody else's car.
  - ③ generates positive $\mathcal{EE}$ as thieves don't know which cars are being tracked.

* Question: Can private markets solve the problem of externalities?

- Coase Theorem → if ① Property rights well defined
  ② Transaction costs are low
  then private markets can solve.

Coase Theorem Limitations

- Oftentimes transaction costs are high and parties not able to negotiate an efficient solution