Industrial Organizational Analysis Exam Notes

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Consumer's Demand

Demand Curves

demand curve = quantity demanded of a given good as a function of its price and of other factors (consumer preferences, price of other factors and income) $q = f(p, X)$

change in price -> movement along the demand curve

change in other factors -> shift along the demand curve

residual demand curve = takes pricing decision by all other firms as given $q_1 = f(p_1, p_2)$

-> we graph the inverse demand function as a function of p

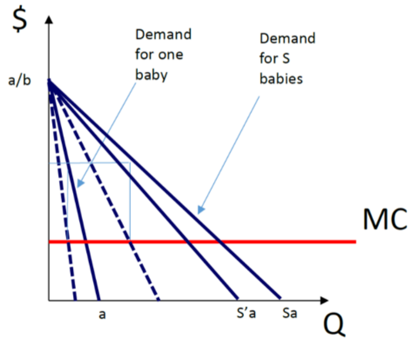
steepness reflects willingness to pay of consumers or unique benefit of a product

product positions are reflections of density of consumers -> a lot demand, many / multiple similar products

demand curves **shift for a change in the willingness to pay** (e.g. by adding new substitutes), especially when the highest willingness to pay is decreasing / increasing → might also pivot when "top guy" is still willing to pay the same for the specific product

demand curves **rotate / pivot for a change in the size of the market** (no effect on the price but quantity sold as percentage for each category falls / increases) or when certain customers value a substitute more compared to the high price of the product but when price would be zero, same demand for the product despite the substitute

best response is not affected by pure pivoting demand curves



no aggregate demand function when differentiated products

identification problem: market data result from a combination of demand-curve and supply-curve shifts -> therefore need for instrumental variables that are correlated with the supply curve but uncorrelated with the demand curve (like production disruptions or labor strikes)

alternative ways through surveys and experiments (not really reliable)

Elasticities

(price) elasticity of demand = ratio between the percentage change in quantity and the percentage change in price = **sensitivity of demand to changes in price**

based on one particular demand function (no shifts) & varies along demand curve

$\epsilon = -\infty$: perfectly elastic

$\epsilon < -1$: elastic (= sensitive to price changes)

-> decrease in price leads to increase in revenue

$\epsilon = -1$: unitary elasticity = midpoint

$-1 < \epsilon < 0$: inelastic (= insensitive to price changes)

-> increase in price leads to increase in revenue

$\epsilon = 0$: perfectly inelastic

constant elasticity demand curve = the elasticity is the same at every point along the curve e.g. horizontal demand curve (only buy strictly one price; perfectly elastic) and vertical demand curve (no change of quantity demanded; perfectly inelastic everywhere) -> use logarithms for calculations with constant elasticities

in general: $\epsilon = \frac{\%\, change\ in\ quantity}{\%\, change\ in\ price} = \frac{\frac{dq}{q}}{\frac{dp}{p}} = \frac{dq}{dp}\frac{p}{q} = \frac{\frac{q_2-q_1}{q_2+q_2}}{\frac{p_2-p_1}{p_2+p_1}} \approx \frac{d\log q}{d\log p}$
for $Q = a - bP$ or $P = \frac{a}{b} - \frac{Q}{b}$: $\epsilon = b\frac{P}{Q}$
percentage change in revenue: $\frac{d(pq)}{pq} = (1+\epsilon)\frac{dp}{p}$

cross price-elasticity = sensitivity of demand to the price of another good
is **negative if complements** and **positive if substitutes**

% change of quantity of good 1 as a response to % change of price of good 2: $\epsilon_{1\,2} = \frac{\frac{dq_1}{q_1}}{\frac{dp_2}{p_2}}$

income elasticity = sensitivity of demand to the change of income
normal goods: higher income raises quantity demand $\eta > 0$
luxury goods $\eta > 1$, **necessity goods** $0 < \eta < 1$ as people spend more income on the good, but a smaller proportion of it
inferior goods: higher income lowers quantity demanded $\eta < 0$

$$\eta = \frac{\frac{dq}{q}}{\frac{dY}{Y}} = \frac{dq}{qY}\frac{Y}{q}$$

general assumptions: elasticities are **higher for luxury goods** than necessities, for **specific products** than for a category and higher in the **long run** than in the short run

Indifference Curves & Budget Line
indifference curves = describe and rank consumer's preferences over all possible bundles of two goods -> downward sloping (law of demand), curved away from the origin and farther away from the origin means higher level of satisfaction

budget line = maximum affordable combinations of two goods (budget set) for fixed budget

consumer wants to maximize utility so reach the highest indifference curve with the given budget line -> should be tangent to each other

consumer surplus = the difference between willingness to pay and price
area under demand curve and above the price paid

Firm's Supply

Supply Curves and Production Function

firm's supply function is given by the marginal cost function for values of price greater than the minimum of average cost

a **supply function assumes price-taking behavior**

summing supply at each price gives the industry supply curve -> mostly upward sloping

production function = for a given set of inputs, how much output a firm is able to produce

Cobb-Douglas production function: $q = K^{\alpha}L^{\beta}$ where $\alpha = \frac{r}{p}\frac{K}{q}$ and $\beta = \frac{w}{q}\frac{L}{q}$

total factor productivity (TFP) = in a Cobb-Douglas production function $q = \omega K^{\alpha}L^{\beta}$, ω is the measure of firm performance

Isoquant Curves

= combinations of inputs that lead to a given level of output

behave like indifference curves

isoquants are convex curves (reflecting decreasing marginal returns) -> the closer complements the two inputs are, the more convex the corresponding isoquants are

extreme convex curves: perfect substitutes (goods that a consumer is completely indifferent as which to consume) which form a straight-line (MRS = constant) and perfect complements (goods that a consumer is interested in consuming only in fixed proportions) for a right-angle curve (MRS = 0)

Costs

economic costs include opportunity costs (= forgone costs by not putting a resource to its best alternative use) but **not sunk costs** (= cannot be recovered & are unavoidable)

forward looking view of costs ≠ accounting costs takes a retrospective view of costs

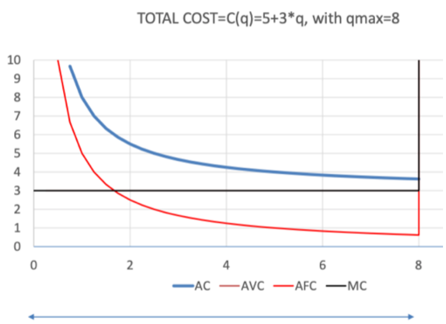
cost function $C(q)$ = smallest total cost of inputs the firm needs to pay in order to produce output q; the cost of producing q efficiently

minimizing cost at a point of tangency of isoquant and line with the slope equal to the minus ratio of two inputs prices (= isocost)

fixed cost (FC) does not depend on the output level

variable cost (VC) would be zero if output level were zero

total cost (TC) = sum of fixed and variable costs **(excludes sunk costs)**



average cost (AC) = $\frac{TC}{q} = \frac{C(q)}{q}$

economies of scale where $\frac{dAC}{dq} < 0$ for $q < q_{max}$ and

profitable when $p \geq AC$

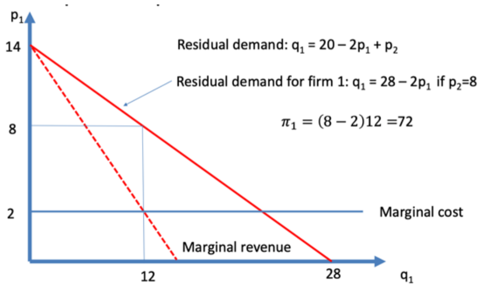
(when AC formula is always declining, minimum price at maximum capacity output)

marginal cost (MC) = the cost of one additional unit; incremental cost = $\frac{dTC}{dq} = \frac{dC(q)}{dq}$

with greater demand, the benefit from lower MC is greater

marginal cost is the appropriate cost concept to **decide how much to produce**, whereas **average cost** is the appropriate cost concept to **decide whether to produce at all**

interest rate has to be abstracted from regular profit: $\pi = \frac{(p-MC)q}{i\% \text{ or } (1+i)} - F$



Pricing Decision

marginal revenue (MR) is linear and twice as steep as linear demand curve

when $MR(q) = 0$: $\epsilon = -1$

$R(q) = pq = P(q)q$ so $MR = \frac{dR(q)}{dq} = p + P'(q)q$

firms want to **maximize economic profits**

-> level of **output** should be at the point **where MR equals MC;** in elastic part of demand

$\pi(q) = R(q) - C(q)$ and $\frac{d\pi(q)}{dq} = MR(q) - MC(q) = 0$ so $MC(q) = MR(q)$

for demand $q = a - bp$: $p = \frac{a+bMC}{2b}$ at maximizing profit point

1. fixed costs don't change the optimal price or quantity but only moves profit function up
2. profit function is flat at the top, so a small deviation does not affect profits a lot

if $MC(q) = 0$ then profit is maximized at $\epsilon = -1$ and if $MC(q) > 0$, $\epsilon < -1$

with the elasticity rule of optimal pricing we receive the **Lerner Index** (measure of **market power**) or **price-cost margin**: $\frac{1}{-\epsilon} = m = \frac{p-MC}{p}$ -> inverse elasticity rule!!

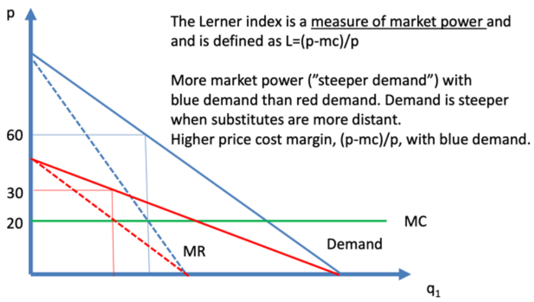
the **smaller ϵ** (closer to zero; steeper demand curve with high market power (fewer substitutes)), the **higher** the **price-cost margin** should be set

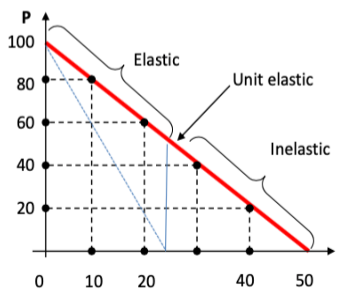
$m < \frac{1}{-\epsilon}$ -> an increase in price leads to an increase in profits

$m > \frac{1}{-\epsilon}$ -> a decrease in price leads to an increase in profits

if unsure about costs, calculate lower and higher bound (include least possible cost for lower and all possible costs for higher bound)

price markup: $k = \frac{p-MC}{MC} = \frac{1}{-\epsilon-1}$





owners who receive profits don't make the decisions determinant for firm's profit objectives differ as managers / decision makers have better information -> “agency theory”

board of directors to solve this problem but more effectively:
contracts with a fixed wage and a profit-contingent compensation (incentives and risk protection for manager)
labor market discipline: profits for a good reputation for future jobs
product market discipline: competition (pressure to maximize profits) aligns shareholder’s & manager’s interests
capital market discipline: threat of takeovers and thus management change motivate

Perfect Competition

Conditions for Perfect Competition

assumptions for each market and industry: **homogenous product**, **perfect information** about prices, **many small buyers and sellers** that do not have power about the price (= atomistic firms), **free entry** in the long run (and one fixed factor of production in the short run)

> **realistically sufficient**: **main standardized product with typical price**, **roughly observable price transparency**, **no buyer/seller with more than 10-15% market share**, **relatively small entry costs** which are similar to the costs an existing firm in the market faces, **relatively low profits and similar for all firms**

if a firm Cournot
a competitive advantage, it must lie in the violation of these aspect

sources of monopolies: patents / copyrights or cost function (including network effects, high fixed costs or efficient production technology)

Market Equilibrium

market equilibrium = point where demand and supply curve intersect -> none of the market participants have an incentive to change their behavior = **market clearing price**
law of supply and demand = price tends to move in the direction of equilibrium price

comparative statics = looking at what happens to the equilibrium if an exogenous factor changes (and predict how a shift of one variable will influence others)

> “run a counterfactual”= make a prediction as a function of other variables

rightward shift of the demand curve -> **increase in quantity and an increase in price**
rightward shift of the supply curve -> **increase in quantity and a decrease in price**
demand/supply is **steep** -> **effect** of a shift in supply/demand **mainly in price**
demand/supply is **flat** -> **effect** of a shift in supply/demand **mainly in quantity**

Profit Maximization

firms face a flat (infinitely elastic) (residual) demand curve so $MR(q) = p = MC(q)$ for profit-maximization in the long-run equilibrium under perfect competition firms produce at the minimum average cost $\boldsymbol{p = MC = AC}$ and make **zero profits** as firms enter until economic profit equals zero and there is no incentive to enter or exit anymore

if one has (technology) **advantages** (better cost function), firms can **earn "rent"**

Real-Life Competition & Efficiency

exit and entry takes place simultaneously, profits are greater than zero (even in the long run as firms can earn "rents"), firms have different sizes and the exit/entry as well as growth rates are dependent of the size (smaller firms enter and exit more often), some firms have superior skills to achieve higher outputs

assumptions: firms are still **price takers**, **product is homogenous** & **perfect information** but firms must pay a **sunk cost to enter** and have **unequal access to technology**

different firms have **different productivity levels** and is uncertain about it

competitive selection = efficient firms with low marginal cost function remain active and increase output while these with high production costs become pessimistic and exit market

distribution efficiency levels affect distribution of firm sizes

θ is the firm's estimate of the value efficiency parameter

$VC = \frac{q^2}{\theta}$ so $\pi = pq - \frac{q^2}{\theta}$ -> we take the derivative and set $\pi = 0$ to maximize profits

we get $q = \frac{1}{2}\theta p$ -> in previous profit function $\pi = \frac{1}{4}\theta p^2$ which implies that profits are increasing with higher efficiency -> proves that **lower efficiency firms exit the market**

Oligopoly

= **few competitors** in a market with strategic **interdependence**

duopoly: two competitors in a market

Cournot Model

assumptions: two firms, homogenous product, same constant marginal cost and firms simultaneously set quantity (+ market demand is linear)

best response to residual demand (demand curve is shifted to the left by q_2, then firm 1 acts like a monopolist) -> **firm 1's optimum for possible values of $\boldsymbol{q_2}$**

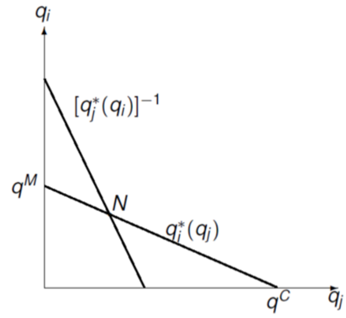
$q_1 = \frac{a-c}{2b} - \frac{q_2}{2}$ for $P(Q) = a - bQ$

given our assumptions, we use symmetric best response function for firm 2, thus $q = \frac{a-c}{3b}$

intersection of both best response functions is **Nash equilibrium**

we always converge to Nash equilibrium as it is the optimal production level for both

for differing MCs: $q_1 = \frac{a-2c_1+c_2}{3b}$ & $q_2 = \frac{a-2c_2+c_1}{3b}$



total industry quantity is $Q = \frac{2a-c_1-c_2}{3b}$ and price $p = a - bQ = \frac{(a+c_1c_2)}{3}$
thus, $\pi_1 = \frac{1}{b}\left(\frac{a+c_2-2c_1}{3}\right)^2$ and $\pi_2 = \frac{1}{b}\left(\frac{a+c_1-2c_2}{3}\right)^2$

increase in MC -> **downward shift** of best response function
decrease in MC -> **upward shift** of best response curve

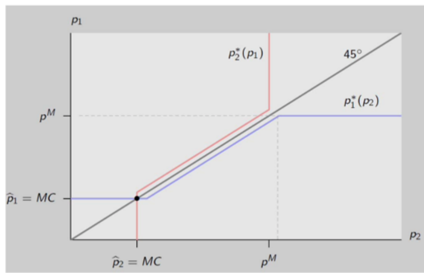
higher number of competitors, price is **closer to the perfect competition** price -> $p = \frac{a+nc}{n+1}$
monopoly $q <$ duopoly / Cournot $q <$ perfect competition q
monopoly $p >$ duopoly / Cournot $p >$ perfect competition p

Calculation: Cournot
best responses: 1. find inverse demand function, plug into $\pi = (p-c)q$, then derive profit function and set equal to zero, solve for q
2. find inverse demand function, multiply with q to get the TR, then derive MR and set equal to MC, solve for q

Nash equilibrium: plug best response for firm 2 in firm 1's best response and solve for q_1
plug q_1 in best response for firm 2 to get q_2 and both in demand function to get p

Bertrand Model
assumptions: two firms, homogenous product, same constant marginal cost and firms simultaneously set prices (+ market demand is linear)

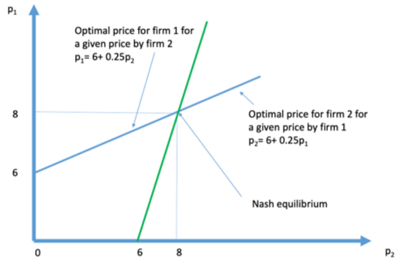
as products are perfect substitutes and firms have unlimited capacity, the **firm with** the **lowest price gets all of the demand** -> both have an incentive to undercut the rival
under price competition with **homogenous product and constant, symmetric marginal cost**, firms price at the level of marginal cost / **perfect competition level** -> **"Bertrand trap"**



avoid perfect competition price level **through product differentiation**, **dynamic competition** (multiple periods), **asymmetric costs** (cost leader with lower MC gets whole market demand by slightly undercutting rival) or **capacity constraint** (if total industry capacity is low in relation to market demand, then equilibrium prices are greater than marginal cost / such that demand equals total capacity)

Calculation: Bertrand (with Product Differentiation)
$\pi_1 = q_1(p_1 - MC_1)$ then set $\frac{d\pi_1}{dp_1} = 0$ and isolate p_1 to get the **best response** for firm 1

when $\boldsymbol{MC_1}$ **decreases**, the best response function **shifts down**
results in Nash equilibrium in lower prices for both firm 1's and 2's product which means higher profits for firm 1 and lower profits for firm 2



Nash equilibrium: find best response for firm 1 and 2, plug best response of firm 1 into best response of firm 2 and solve for p_2 plug p_2 in best response for firm 1 to get p_1 and put both in demand functions for q_1 and q_2

<u>Comparing Models</u>
firms must make both decisions, pricing and output -> use of right model as a **question of the timing**

capacity / output adjusted easily -> **Bertrand** model better (price as the long run decision)
output / capacity difficult to adjust -> **Cournot** model better (price as the short run decision)

estimation of the oligopoly model by **looking at the pass-through rate** (= cost changes by one, price changes by x)
in Cournot: differentiate $p = \frac{a+2c}{3}$ with respect to c so $\frac{dp}{dc} = \frac{2}{3}$
pass-through rate for Bertrand: 1 (as price is close to MC), Cournot: 2/3 & monopoly: 1/2
caution: for non-linear demand monopoly and Cournot pass-through rates might differ

Game Theory

game = stylized model that depicts situations of strategic behavior where the payoff of one agent depends on its own actions as well as on the actions of other agents

consists of a set of players, rules, actions and payoff functions (= utility each player gets as a result of each possible combination of strategies)

<u>Nash Equilibrium and Strategies</u>
pair of strategies that result in no player being able to obtain a higher payoff by choosing a different strategy -> combination of **best response strategies** (= **maximizes a player's payoff** given its believes about its rivals' strategies)
for multiple Nash equilibria (happens often under compatibility), we cannot predict what happens

dominant strategy = decision yields in **highest payoff** regardless of the other players' choices -> always played
dominated strategy = decision yields in a payoff which is lower than that of any different decision, regardless of what the other players do -> **never played**

prisoner's dilemma = conflict between individual incentives and joint incentives -> all players have **dominant strategies that result in payoffs** that are **inferior** to what they could achieve of they used cooperative strategies

focal points = strategies on which players coordinate even if they don't communicate

Static Games

assumptions: simultaneous decisions, rational players that aim to maximize payoff, imperfect information about the other player's choice (but players believe that the others are also rational) and **single move / "one-shot"**

payoff matrix shown in a table -> normal form

Sequential Games

= time between strategy choices is sufficiently long to observe other's decisions
incumbent's decision as a function of entrant's decision like in **Stackelberg Oligopoly**

a credible commitment may have significant strategic value
"value of commitment" or first-mover advantage

game tree to model sequential games with decision nodes (= squares) -> extensive form
solve with backward induction: first find best response of incumbent for all options and then choose the highest payoff of all these combinations for the entrant
-> subgame-perfect equilibria as part of a larger game

for single firm analysis: long-run variable is chosen first, then short-run variable given the value of long-run variables

Repeated Games

= **stage game** as a player changes its action in response to a rival's action (= retaliation)
action = decision of a single move
strategy = combinations of "if-then" statements dependent on previous decisions

many Nash equilibriums as players can react to other players' past actions (strategic interaction) and thus, future is **hard to predict**
ability to create a **system of rewards and punishment**

relational contracts = agreements based on unwritten contracts

δ = **discount factor** / a dollar next period is worth δ dollars in the current period
-> probability that game continues on into the next period for indefinitely repeated games
in this case: discount factor as the individual firm's appreciation of future shares of monopoly profits as a result of a collusive agreement
net present value is $\sum_{t=0}^{\infty} \pi\delta^t = \frac{\pi}{1-\delta}$

example at calculation: deviation from agreement on the next page

Additionally (not in syllabus?)
for games with uncertainty and asymmetric information, nature is a new player without strategic motives (shows uncertainty)
asymmetric information is shown when the second player is placed after nature (so he has more information)
adverse selection: uninformed party making the first move
signaling games: informed party makes the first move

principal-agent problem: a principal who cannot directly observe the agent's action but would like to induce a specific behavior
moral hazard (hidden action): principal might be able to observe outcomes

Interaction Between Firms

Collusive Agreements
collusion = agreements to **increase market power** (firms are better off at the expense of consumers) e.g. cartels that restrict supply, advertising expenditures, firm's territory, increase price or set level of service quality
public & institutional, tacit (focal points, historical reasons) or secret agreements

collusion is easier to maintain when firms interact frequently and the probability of industry continuation and growth is high
more **likely in concentrated industries** with similar firms, multimarket contact (= firms compete against each other in several markets; even for differing costs as balancing out) and with facilitating practices (= institutional factors (rules / regulations) which ease collusion like most-favored-customer (= discount must be offered to all customers) lowers incentive to price aggressively for firms and market transparency for coordination

in **reality: few collusions** due to antitrust policy (it's illegal), industries with high turnover rates, threat of price war is not really credible (both firms dislike it) & no perfect price transparency
we estimate degree of collusion through historical data and discovered cartels

Stability
tit-for-tat strategy = doing everything that the rival did in the previous period

grim strategy = both set the price to monopoly level as long as no one changes his behavior, then all set the price to MC in the next period and profits are zero
-> no-deviation constraint must be satisfied

both stick to equilibrium strategy: $\frac{1}{2}\pi_M + \frac{1}{2}\pi_M\delta + \frac{1}{2}\pi_M\delta^2 + \cdots$ so $V = \frac{1}{2}\pi_M\frac{1}{1-\delta}$ is the discounted **equilibrium payoff**
payoff from deviation (set p slightly under p_M): $V' = \pi_M$ -> it follows $\delta \geq \frac{1}{2}$

if discount factor is sufficiently high, the Nash equilibrium is when both firms set price equal to monopoly price

normally $0 < \delta < 1$ as there is the opportunity cost of time r, firms change their prices f, the probability that the industry will not exist in the next period h or grows with growth rate g thus $\delta = \frac{(1+g)(1-h)}{1+\frac{r}{f}}$ → $\frac{\pi^M}{n(1-\delta)}$ and $\delta \geq \frac{n-1}{n}$ indicate that for more firms, higher δ needed
if $\delta h \geq \frac{1}{2}$, $\delta h(1+g) \geq \frac{1}{2}$ colluding is optimal

collusive equilibrium = firms have **no incentive to undercut** their rival's price
difference between future collusive and price war profits must be large

Calculation: Deviation from Agreement (+ Example)
calculate profits from deviation: $\pi_D = \pi_{D_{t=1}} + \frac{\pi_P \delta_1}{1-\delta}$
calculate profits from not deviating: $\pi_C = \frac{0.5\pi_M}{1-\delta}$
compare both profits to see whether **cheating is profitable**

multiply payoff of equilibrium successively with δ e.g. for payoff 5: $V = 5 + 5\delta + 5\delta^2 + \cdots = \frac{5}{1-\delta}$ to get the expected payoff
for deviation payoff 6 and punishment payoff 4: $V_2 = 6 + 4\delta + 4\delta^2 + \cdots = 6 + \frac{4\delta}{1-\delta}$
as V was the Nash equilibrium: $V \geq V_2$ so $\delta \geq \frac{1}{2}$

Price Wars
although price wars occur in equilibrium (it's rational to punish the other firm if it's not behaving to the rules), **no firm cheats in equilibrium**

customer markets = industries where each customer is sufficiently large that prices are negotiated on a case-by-case basis / sale terms are individually tailored
collusive agreements are difficult to monitor -> **higher incentive to cheat**
firm only receives demand for price it sets -> low demand means either cheating other firm or overall low demand? (firms cannot observe demand fluctuations)
if price cuts are difficult to observe, then occasional **price wars** may be **necessary to discipline** collusive agreements -> **soft punishments**
prices in industry move cyclically with the demand fluctuations

firms can observe demand fluctuations -> price wars take place during booms
gains from cheating on the cartel are greater when demand is higher
gains from cheating are lower when price is lower
-> might be necessary to reduce price during periods of high demand

asymmetry between firms: price war can be initiated by a single firm

firms have a lower discount factor when in difficulty -> future is less important & long run gains from sticking to collusion are lower than short run gains from cheating
stronger firms want to push their quantity -> can afford the price war as quantity rises and they will set prices higher again at some point

Price Discrimination

= setting **different prices for the same good** -> ability to create or **capture consumer surplus** and exploit maximum willingness-to-pay
against law of one price: resale must be expensive or impossible (physically, restrictions, imperfect information or high transaction costs)

based on observable buyer characteristics or by inducing buyers to self-select among different product offerings (quantity, sale clauses, …)
not seen as fair to charge different prices -> **negative consumer perception**

the case if **price-cost margin across markets different**
perfect price discrimination = seller has perfect information about each buyer's valuation & is able to set a different price to be paid by each buyer = **first-degree** price discrimination
  optimal **price is equal to individual willingness to pay** over MC

for durable goods, timing is essential
due to strategic purchase delays, profits may be lower under price discrimination
coase conjecture = seller is forced to lower prices
  avoid by commit to not lower prices in the future, leasing it, product differentiation or acquire new reputation of "never lowering prices"

Second-Degree Price Discrimination

= price depends on **quantity / package purchased**, not on identity (= **self-selection**)

consumers want to maximize willingness to pay – value perceived = **information rent**
participation constraint: price cannot be greater than the low-end consumer is willing to pay
incentive constraint: difference between high & low-valuation products cannot be too large otherwise high-end consumers get more information rent from buying low-end product

damaged goods = **reduced quality** of existing product in order to price discriminate
tie-in sales = bundling as an alternative strategy for sorting consumers
  pure bundling: bundle or nothing; **mixed bundling**: bundle or separate

non-linear pricing = lowering the average price per unit for a higher quantity purchased
  charging **different unit prices**

two-part tariff: consists of a **fixed part** f (to capture the whole surplus under the demand curve) and a **variable part** p (as an incentive for consumers to purchase the two-part tariff)

total efficiency increases but consumer welfare decreases

multiple two-part tariffs offer consumer the choice
for high type consumers 2 and low type consumers 1: (no need to calculate in exam)
$f_1 = CS_1(p_1)$ but $p_1 > MC$ -> normal fixed fee but higher marginal fee
$f_2 > f_1$ so $f_2 > CS_1(p_1)$ but $p_2 = MC$ -> higher fee but normal marginal fee
thus $CS_2(p_2) - f_2 = CS_2(p_1) - f_1$ -> type 2 gets no higher value from choosing the low type option

seller loses consumers of $p_1 > c$ and loses surplus to consumers of $f_2 < CS_2(MC = p_2)$ which is the willingness to pay of high-end consumers

Calculation: Two-Part Tariff
fixed part: set $p = MC$ and find consumer surplus for that price
set $f = CS$ and variable part p equal to MC to maximize profits

Calculation: Optimal Pricing Strategy (Versioning)
$p_L = CS_L(p_L)$ -> the price of the low-quality product should equal the maximum willingness to pay of the low value consumer for the low-quality product

$CS_H(p_H) - p_H \geq CS_H(p_L) - p_L$ where $CS_H(p_H)$ is the maximum willingness to pay of the high value consumer for the high-quality product and $CS_H(p_L)$ is the maximum willingness to pay of the high value consumer for the low-quality product

compare profits of versioning to profits of standardizing prices

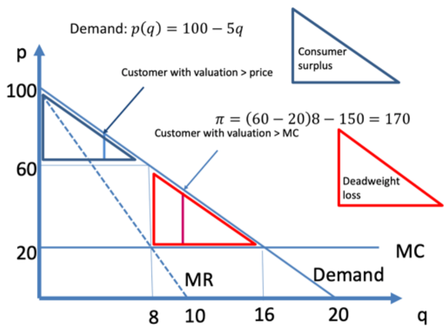
Third-Degree Price Discrimination
= different prices for **different market segments** (= **selection by indicators**)

charge a **lower price** in those market segments with **greater price elasticity**
home bias = demand elasticities tend to be lower in the domestic markets
limited by similar or extremely varying price elasticities in neighboring market segments

elasticity rule to find optimal prices: $p_1\left(1 + \frac{1}{\epsilon_1}\right) = p_2\left(1 + \frac{1}{\epsilon_2}\right) = MC$ (negative value of ϵ)
$\pi = p_1 q_1 + p_2 q_2 - c(q_1 + q_2)$ from which follows that $q_i = \frac{a_i - cb_i}{2}$

through internet more precise consumer information -> closer to perfect discrimination
also, more information for buyers -> further from perfect price discrimination

Welfare and Price Discrimination



total welfare is greater under price discrimination, but **consumer welfare is lower**

contrary: total efficiency might also decrease as price discrimination is costly, sometimes consumers and seller are better off and consumers dislike paying different prices

fairness issue / prospect theory: dislike of higher prices is stronger than like of lower ones compared to others

by allowing resale and parallel imports, price discrimination is difficult

Product Differentiation

Characteristics

allows sellers to **increase price / price discriminate without substantial losses**

the greater the degree of product differentiation, the **greater** the degree of **market power** -> ability to set prices above MC

sources can be location, product specification, actual or perceived quality differences, switching costs, cost leadership or focus-strategy (intense target on few people)

Demand for Differentiated Products

for **few products**: estimate the value of each characteristic by running a statistical regression of price as a function of characteristics / **estimate demand for each product**

for **more products**: characteristics approach is feasible and realistic

estimating demand for each characteristic -> implicit price of each is called "hedonic price"

provides a quantitative idea of the relevant submarkets within a given market

ϵ measure consumer utility that is not explained by measurable product characteristics and σ is its variance

but not all consumers value each characteristic equally

when individual data is available: estimate relation between buyer characteristics and valuation and demand of product characteristics

if only aggregate data is available: use average demographics to estimate a relation

high-valuation consumers are more sensitive to quality changes

for **more distant or lower quantity of substitutes** -> steeper residual demand / **more market power** thus higher prices

Competition / Market for Differentiated Products

vertical differentiation = consumers unanimously prefer more of a given characteristic (same signs but put different value on it)
if prices are the same **everyone would pick the higher quality product** (demand is zero for one product at same prices)
quality aspects that are easier to measure such as memory in mobiles
markets with vertical differentiation tend to **concentrate as market size is increasing**

horizontal differentiation = different buyers' preferences for a given characteristic have different signs (ether like or dislike something)
prices are the same, but **some people prefer product one and others product 2**
based on perceived quality and values
markets with horizontal differentiation tend to **fragment as market size is increasing**

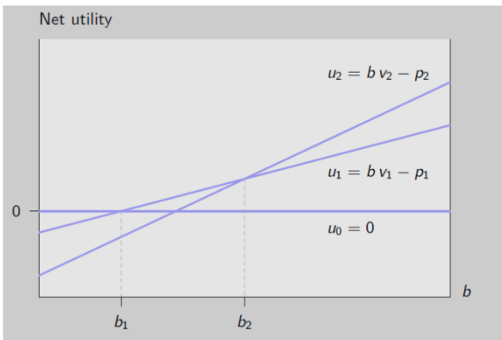
direct effect: **move close to competitor** to gain market share -> increase quality
if price competition is not very intense, firms tend to locate close to each other / low degree of differentiation

strategic effect: move away to **reduce price competition** -> otherwise equilibrium price-adjustments so decrease of prices and price-cost margin
if price competition is very intense, firms tend to locate far apart / high degree of differentiation

direct mostly positive and strategic negative -> outcome depends on exact situation

Calculation: Differentiated Products in a Price Setting Market

firm 2 has higher quality: $v_2 > v_1$
$\frac{d\pi_1}{dv_1} = \frac{d\pi_1}{dv_1} + \frac{d\pi_1}{d\hat{p}_2}\frac{d\hat{p}_2}{dv_1}$ where the first term is the direct and second one is the strategic effect



high value consumers b_{high} and low value consumers b_{low} -> individual utility $u_j(b) = bv_j - p_j$ and if not buying anything $u_0(b) = 0$
$b < b_1$ -> do not buy anything
$b_1 < b < b_2$ -> buy from firm 1
$b > b_2$ -> buy from firm 2

indifferent when $b_2 v_1 - p_1 = b_2 v_2 - p_2$
demand for firm 1: $q_1 = b_2 = \frac{p_2 - p_1}{v_2 - v_1}$
best response: $p_1 = 0.5 p_2$ so $p_1 = \frac{v_2 - v_1}{3}$ and $\pi_1 = \frac{v_2 - v_1}{9}$
demand for firm 2: $q_2 = 1 - b_2 = 1 - \frac{p_2 - p_1}{v_2 - v_1}$
best response: $p_2 = 0.5 p_1 + 0.5\,(v_2 - v_1)$ so $p_2 = \frac{2(v_2 - v_1)}{3}$ and $\pi_2 = \frac{4(v_2 - v_1)}{9}$
prices and profits increase with $v_2 - v_1$ and are **strictly above the level of marginal cost**

Example: Two Firms with Differentiated Quality Products

firm 1 has higher quality v_1 -> increases quality even more which leads to a shift to the right of the demand curve and higher prices
-> demand for v_2 shifts to the left / back which leads to a lower price due to a relatively lower quality (but at the same time shift to the right as the price for v_1 increases)
profit of firm 1 increases and profit of firm 2 decreases

firm 1 has higher quality v_1 -> firm 2 increases quality so v_2 is closer to v_1
price of product 2 and 1 decrease, quantity of product 2 increases, quantity of product 1 decreases
profit for firm 1 decrease, profit for firm 2 is ambiguous

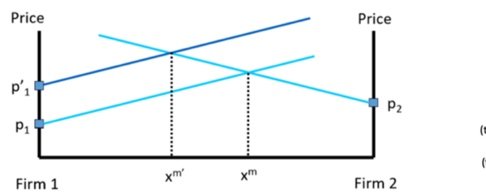
Calculation: "Hotelling Model"

= firms **simultaneously set prices**, but small change of price does not imply a big change of demand

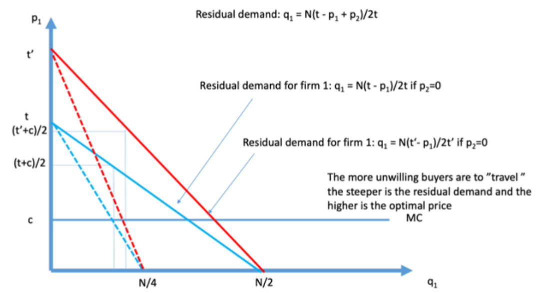
consumers' address x is their preferred product characteristic and t the transportation / **travel cost** or drop in utility resulting from one unit of distance ($t = 0$ for Bertrand model)
for **higher t, higher willingness to pay** instead of "walking away"
firm i's address / type is a_i and the price p_i
total cost for consumer is $p_i + t(x - a_i)$
consumers are indifferent if $tx + p_1 = t(1 - x) + p_2$ where $q_1 = x \times n$ (n is number of consumers)

$$x = \frac{1}{2} + \frac{p_2 - p_1}{2t} = \frac{p_2 - p_1 + t}{2t}$$

Firm 1's best response $p_1 = \frac{1}{2}(c_1 + t + p_2)$ and by symmetry $p_1 = p_2$ we have $p = c + t$



At prices p_1 and p_2 everyone to the left of x^m would find it more attractive to buy from firm 1 and those to the right would prefer firm 2. If firm 1 would raise its price to $p_1' > p_1$ then those between x^m and $x^{m'}$ would switch to firm 2.



Firm Strategy as a Result of Consumer Behavior

when consumers are less than fully rational or perfectly informed (search costs are high), firms may have an opportunity to increase market power -> raise prices without losing consumers

price dispersion: customers have **different search costs** -> can lead to an equilibrium price dispersion where firms set different prices for the same product

obfuscation practices = sellers purposefully make **selling terms unclear**
add-on pricing or shrouded attributes = features of a product or sales contract that are hidden from a consumer until after the purchase takes place

switching costs combines objective and subjective, monetary and non-monetary barriers to change from one brand to another
harvesting effect = firms raise prices without losing customers
investment effect = not raise prices in order to receive more new customers

Public Policy
strategic trade policy: oligopoly competitors belong to different countries and thus, import tariffs have different effects and can increase or decrease costs / profits

spurious product differentiation = identical products are perceived by consumers as different -> **consumer harm**
advertising should be truthful as part of consumer protection

Market Structure

Measures of Concentration
$\frac{1}{n}$ where **0 is minimum and 1 is maximum concentration** (monopoly)

$C_m = \sum_{i=1}^{m} s_i$ where the market share s_m is summed of the largest m firms

Herfindahl index (HHI): $H = \sum_{i=1}^{n} s_i^2$ which is more precise but requires more knowledge (market share of all firms -> if not know of some, then calculate the **lower bound** which means that the unknown firms have an equal market share and the **upper bound** which means that one firm of the unknown has all the residual market share (maximum as large as the smallest known firm))

Characteristics of Market Structure
free-entry equilibrium = no active firm wishes to leave and no inactive firm wishes to enter the market

equilibrium **number of active firms** varies less than proportionally with **respect to market size** and **decreases in the level of fixed costs** (higher F, lower n)
not linear: market size doubles -> number of firms less than doubles (40% increase) due to increased competition which drives down the price cost margin, so each firm has to sell to more consumers in the same market -> **firms become bigger**

in reality: not all firms have the same technology / cost function (move down the learning curve) -> enough if no dominant technology over other ones
imperfect information, coordination mistakes and historical details of industry origins influence market structure -> e.g. agglomeration economies or “snowball effect”

new industries: first high entry rate, then consolidation followed by a “shakeout” where number of competitors declines drastically

Calculation: Number of Firms and Entry Costs
assumption: equal company size (so concentration is only number of firms)
$C = F + cq$ and demand curve $Q = (a - p)S$ where S is the market size (= number of consumers with demand of each $(a - p)$)

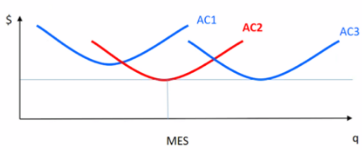
each firm’s profit: $\pi(n) = S\left(\frac{a-c}{n+1}\right)^2 - F = 0$ so $n = (a - c)\sqrt{\frac{S}{F}} - 1$
always round to the lower number / integer

Minimum Efficient Scale and Scale Economies
minimum efficient scale = quantity produced that yields the lowest possible unit cost, given available technologies and input prices -> **minimum of average cost curve**
if $\boldsymbol{MES}$ **increases by factor 2, number of firms decreases by factor** $\sqrt{2}$

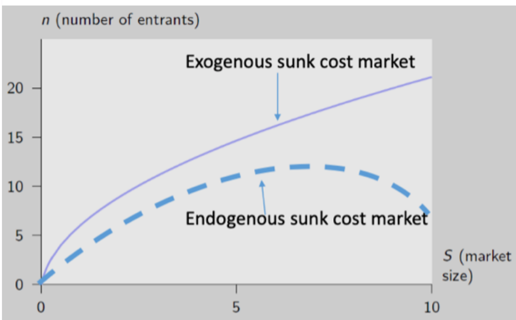
$\frac{MES}{S}$ to see how many equally efficient firms can operate in an industry
when $\frac{\boldsymbol{MES}}{\boldsymbol{S}}$ **is small** -> industries tend to have **many firms**
when $\frac{\boldsymbol{MES}}{\boldsymbol{S}}$ **is large** -> industries tend to have **few firms**
market size and MES increase by the same amount -> number of firms stays constant

economies of scale when $p = \frac{AC}{MC} = 1 + \frac{F}{cq} > 1$ = increasing returns to scale
diseconomies of scale $p = \frac{AC}{MC} = 1 + \frac{F}{cq} < 1$

minimum efficient scale and **economies of scale are barriers to entry** -> **more concentration the higher barriers** (greater MES or degree of scale economies)



AC1, AC2, and AC3 are average costs curves for three different technologies. Technology 2 and 3 have the same lowest possible average cost. MES is the smallest scale of operation that results in the lowest possible average cost i.e. using technology 2.



Endogenous and Exogenous Costs

endogenous entry costs (dependent to market size): choice of quality is important

advertising or R&D expenditure is high (>3% of revenue) and part of firm's strategy

incentive to invest in quality increases with market size (sunk cost spread over more units)

decreasing residual demands for other firms -> either competing with also investing in quality or dropping out -> **more concentrated market** again

the number of firms is less sensitive to changes in market size

-> relation between concentration and size is flatter

exogenous entry costs: given costs that do not substantially differ with regards to quality; when sunk costs are paid, all firms are the same

number of firms increases proportionally as **market grows in size**

-> **market tends to fragment**

Market Power and Market Structure

Lerner index as market power in the industry as a whole -> weighted average of each firm's margin by its market share $L = \sum_{i=1}^{n} s_i \frac{p - MC_i}{p} = \frac{H}{-\epsilon}$

the greater concentration, the greater the degree of market power

efficient firms (low MC) have higher market share & power

the more intense market competition, the lower the number of equilibrium firms

$n = \frac{1}{E+F}(p-c)D(p)$ where more competitive means lower p (thus lower profits per firm)

Structure-Conduct-Performance paradigm (SCP) = system for the analysis of a given industry by structure (concentration), conduct (behavior of firms) and performance (market power, allocative efficiency, …) which are related to / influenced by each other

structure influences conduct, conduct and structure influence performance

hypothesis: positive relation between concentration and market power

limited by empirical evidence and the possibility of reverse causal links in relations

reasons for positive effect of market structures on performance

collusion hypothesis: concentration implies market power through increased collusion

efficiency hypothesis: increase in market power is associated with an increase in productive efficiency (= transfer of market share from relatively inefficient firms to a more efficient one) -> society can be better off

Free Entry, Welfare and Policy

if some conditions of perfect competition fail, **free entry is not necessarily desirable**

product differentiation important or fierce competition -> **insufficient entry**

product differentiation unimportant or soft competition -> **excessive entry**

surplus gained by additional seller is smaller than profit of latest entrant

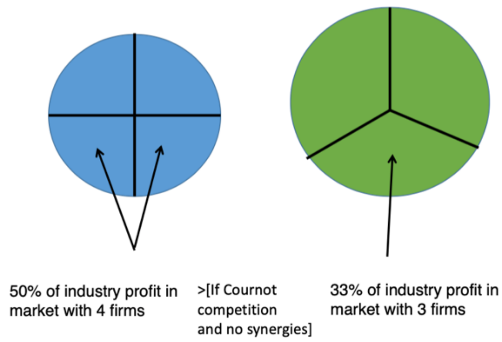
business stealing effect = part of the profits is stolen from incumbent firms when significant -> entry barriers may moderate excessive entry and protect consumers

firms with higher average productivity replace the ones with lower productivity
firm entry and exit, as well as reallocation of capital among incumbents, is an important component of industry productivity growth -> can be better for society welfare
protectionist entry regulations harm the consumers and benefit the existing producers

Mergers

horizontal mergers = acquisitions between two firms within the same industry
vertical mergers = mergers between firms at different stages of the value chain

coordinated effects: collusion might be possible after a merger as they reduce the number of firms (easier to coordinate and sustain collusion) ->
merger changes competition mode
$V_C > V_D$ so $\frac{\pi_M}{n(1-\delta)} > \pi_M$ so $\delta \geq 1 - \frac{1}{n} = \frac{n-1}{n}$



<u>Horizontal Mergers without Synergies</u>
= no reduction in marginal or fixed costs through merger, only **reduction of competitors by 1**
total output decreases and price increases -> **higher industry profits and for each firm**

for competitors: $p - MC > q_3 \Delta p$ thus they increase output and their value increases (**positive strategic externality**)
for merger: **typically, merger is not profitable** (reduced combined profit) except for the ones resulting in a monopoly -> loss $p - MC$ needs to be smaller than gain $(q_1 + q_2)\Delta p$

<u>Calculation: Merger to Monopoly (equal costs)</u>
add profit function of both firms: $\pi_M = \pi_1 + \pi_2$
take derivative with respect to p_1 and p_2 or q_1 and q_2 (for symmetry $p_1 = p_2 = p$ and $q_1 = q_2 = q$;) and set equal to zero, solve for decision variable to get best response (or result)
insert value for p or q in demand function to get non-decision variable and calculate profits

<u>Horizontal Mergers with Synergies</u>
cost efficiencies / savings in fixed costs (eliminating of duplicated functions) **and variable costs** (combining competitive advantages in different areas = merger synergies)

savings in FC does not affect best response function -> no effect on competitors
savings in VC affect MC and shift best response function -> changes equilibrium

for competitors: large reduction of MC & thus increase of output of merger leads to decrease in own output which implies **decrease of profit** and value
for mergers: only **profitable if synergies are large enough** and rather for price competition with differentiated products (firms price less aggressively -> higher prices for all firms)

Calculation: Merger (unequal costs -> Synergies)
set up profit function of merger **with the lower marginal cost**: $\pi_{1+2} = (p - c)Q$ and maximize with respect to q or p, set equal to zero and solve for decision variable
plot into demand function to get non-decision variable and calculate profits

Merger Dynamics
merger paradox = mergers are not profitable, thus shouldn't happen but **in reality, many mergers take place** (our assumptions don't include synergies & change of competition mode)

merger with multiple products profits from **spillover effect** -> set higher price for one to increase demand for another product
competitors will also raise prices and all firms benefit from higher individual profits

merger softens price competition

merger waves caused by exogenous (new regulations) or endogenous factors (the need to cut costs to stay competitive or another merger raises incentive to merge as well -> mergers can influence each other)

goal of acquisition can be to preempt a rival from doing so -> might even decrease value

mergers like an exit from one firm / competitor-> **self-correcting dynamics**: new firms enter after mergers happened in an industry if barriers to entry are not too high

Calculation: Merger and Market Share
${s_M}' = \frac{q'}{Q} = \frac{a+c-2c'}{2a-c-c'}$ and $s_{NM} = \frac{q}{Q} = \frac{a+c'-2c}{2a-c-c'}$
where ${s_M}'$ is the market share of the merged firm who has an output quantity of q' and marginal cost of c'; the non-merged firm has a market share of s_{NM} (and q and c)

fixed costs do not affect the market share or output quantity

Merger Policy
merger implies a **decrease in consumer welfare** as prices rise

exception: when cost efficiencies are very strong

the greater the price increase, the less desirable the merger as policy makers give more weight to the loss of consumer welfare than the gain shown in firm's profits
failing firm merger defense: alternative to merger is for the firms to go bankrupt which is an even bigger loss for consumers

unilateral (increase in concentration) **and collusion effect** (collusion easier) especially big for two **large firms**
the smaller the size of the merging firms, the more likely the total effect of a merger is positive -> smaller price increase possible and higher efficiency gains

merger needs to be announced, analyzed and approved by government department or agency (EU can block mergers, US can only in front of court; often behavioral or structural remedies)
difficulties in defining market -> harder to predict impact of mergers
direct approach through looking at real-life examples like cities with little competition

small cost efficiencies -> overestimation of effect of merger
large cost efficiencies -> underestimation of the effect of merger
reduction of number of competitors reduces output while cost efficiencies increase output (= market share for mergers) -> equilibrium adjustments

Market Foreclosure

sequential move game: incumbent / leader decides first, then entrant = **Stackelberg Model**
incumbent captures first mover advantages

decision must be **irreversible and observable** to be a credible threat
game tree with payoff matrix only shows nodes for irreversible decisions
-> **otherwise Cournot Model** with simultaneously decisions

entry barrier = anything that allows incumbents to **earn supranormal profits** without threat of entry -> creates **asymmetry between incumbents and entrants** (not only high fixed costs as everyone bears that; only when information asymmetry is high for e.g. lending money)

structural entry barriers = outside firms' control ("exogenous")
regulations (if without lobbyism), specific equipment or large MES/market size, scarce resources (cannot replicate), strong network -> absolute cost advantages

strategic entry barriers = within firms' control or created through competition ("endogenous") by decreasing entrant's demand, increasing entrant's cost or committing to fierce response
R&D, patens, advertising, trademarks, distribution networks, product proliferation, contracts, high price / quantity setting -> decision variables

in reality, firms are often unable to avoid entry but can influence the timing of it

Entry Accommodation

= no matter what incumbent does, the entrant is **better off by entering** insert entrant's best response $q_2 = \frac{a - MC_2}{2b} - \frac{1}{2} q_1$ in incumbent's profit function and derive

$q_1 = \frac{a + MC_2 - 2MC_1}{2b}$ and thus $q_2 = \frac{a - 3MC_2 + 2MC_1}{4b}$

if $MC_1 = MC_2$: $q_1 = 2q_2$ and $\pi_1 = 2\pi_2$ (double quantity and profits for incumbent)

for **large markets with low entry costs**

Calculation: Subgame Nash Equilibrium and First Mover Advantage

find best response for firm 2 and insert in firm 1's profit function
differentiate π_1 with respect to p_1 or q_1 (decision variable) and set equal to zero, isolate p_1 or q_1
plug p_1 or q_1 in best response for firm 2 to get p_2 or q_2
insert both in demand functions to receive prices or quantities (non-decision variable)

first mover advantage when profits of firm 1 increased but profits of firm 2 not, if both increased need to try firm 2 as the first mover and look at whether profits for each firm increase relatively more for second or first mover situation

for **setting prices, mostly second mover advantage** and for **setting quantities mostly first mover advantage**

Entry Deterrence

= incumbent chooses **certain level** so that **entrant's profit is lower than entry costs** (= non-positive profits) and he does not enter -> **market foreclosure**

set $q_1 = \frac{1}{b}\left(a - MC_2 - 2\sqrt{bE}\right)$ in order to avoid entry

need to check whether monopoly level with accommodated entry or entry deterring level leads to higher profits for incumbent

for **intermediate size markets with intermediate or low entry costs** (depending on own capacity and entrant's best response function)

Calculation: Profitable Deterrence

calculate p_2 (p_1 is given) and calculate profits considering entry costs F_2
if profit negative, do not enter and firm 1 gets the profit for p_1 but serving the whole market

if p_1 or q_1 is not given: insert best response for firm 2 into π_2 and set $\pi_2 = 0$ to get q_1 or p_1 necessary for entry deterrence

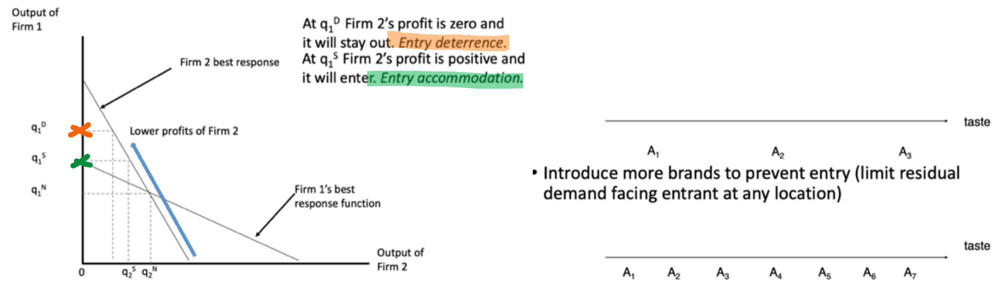
Blockaded Entry

no matter what level the incumbent chooses (including optimum monopoly level), the **entrant cannot compensate entry costs and does not enter**

for **small markets with high entry costs**

Strategies for Foreclosure

raise rival's costs to keep them out of the market or **reduce their market share** -> increase incumbent's profitability through different strategies



product proliferation strategy: increase the density of product offerings to "kill" entrant's residual demand thus deter entry even when profit margins are high

more brands -> trade-off between higher prices and higher fixed costs (seen as irreversible sunk costs that carry commitment value)

bundling / tying the sales of two products (part of price discrimination) by a dominant firm to increase dominance / power in both markets

naked exclusion = incumbent signs contracts with a sufficient number of buyers so that entry is unprofitable for entrants

divide and conquer = fraction of buyers (large enough to make entry in the next period unprofitable) is offered a contract with a favorable price (lower than monopoly)

all-units discount (for only buying from one firm) can raise rival's price relatively

incumbent receives entrant's surplus when someone breaks the contract -> **raises entry costs** for entrant as they have to offer significantly lower prices to the buyer

most favored nation (MFN) clauses: when a lower price is offered to a rival, the seller must pay the difference to the incumbent

adjustment of capacity levels (see above) or prices -> **predatory pricing = pricing below cost**

Predatory Pricing

Chicago school of thought: as first period is temporary, a rational **entrant should stay** in the market even if the incumbent prices aggressively

if all were rational, no predatory behavior to avoid unnecessary loss L in the first period

in reality not always rational nor perfect information

long-purse / deep-pocket theory based on financial constraint of entrant

$1-p$ = probability that the bank will give entrant a loan as he might not have enough resources to sustain loss in the first period -> predation is successful in p % of the times

incumbent behaves aggressively when $p\pi_M > L + (1-p)\pi_D$

low-cost signaling by setting low prices -> competing is not promising for entrant
building a reputation for "toughness" -> incumbent as strong competitor

when capturing a minimum market share in the beginning is crucial, incumbents may prevent entrants from doing so through predatory pricing

<u>Public Policy</u>
trade-off between bundling as pro-competitive (increased welfare as a price discrimination strategy) or anticompetitive

same with other foreclosure cases like quantity discounts, exclusive contracts, capacity expansion or low prices

lower prices after entry of new rival can be either predatory pricing or simply competitive response / new equilibrium -> **hard to determine for policymakers**
Areeda-Turner test: prices are seen as predatory if below marginal cost
but also the case when purpose is moving down the learning curve
alternative: look at prices after exit, do they jump back up to old level?

need to weight **short-run rise in welfare against possible long-run monopoly prices**

"grandfathering" clauses exempt incumbent firms (especially for environmental regulations)
normally illegal to spend money / raise entrant costs (= entry deterrence) -> use of dominant position can result in a fine and compensation for the entrant

Welfare and Regulation

<u>Externalities</u>
= actions of an economic agent have an **impact on other agents** that go **beyond** the effect on **market price** (e.g pollution and climate)

free-riding problem: an agent's decision does not take into account the costs imposed on other agents
tragedy of commons = common resource is overused (over socially optimal level)

congestion: not taking into account extra costs through delay -> **negative externalities**
public goods: benefit that is also enjoyed by others for no cost -> **positive externality**

Pigou tax: output tax for negative and output subsidiary for positive externality
alternative is direct regulation of externality-creating activity by government or social norms

Coase Theorem: if property rights are properly assigned and negotiations are costless, all externalities will be "internalized"

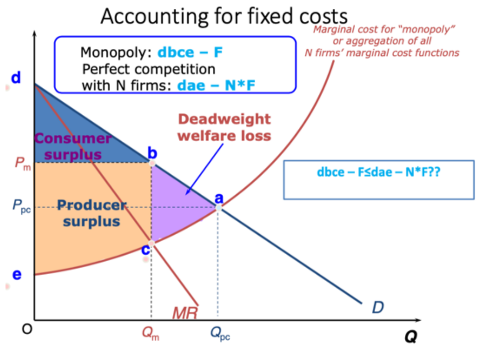
-> **resource allocation maximizes gains from trade** (efficiency not fairness)

Efficiency
consumer surplus = area between demand curve and price
producer surplus = area between price and supply curve

allocative efficiency = resources are allocated to their most efficient use
when marginal willingness to pay equals marginal cost of production
productive efficiency = output produced in the least expensive way achievable
low productivity means wrong input mix or suboptimal use of existing ones
dynamic efficiency = improvement over time of products and production techniques

competitive markets are efficient -> equilibrium levels of output and price results in maximum surplus = **Fundamental Theorem** or "invisible hand"
with free entry and exit, competitive selection equilibrium is also efficient (and profits are 0)

Market Failure
adverse selection: **asymmetric information** between buyer and seller which leads to inefficient / **non optimal market outcomes** (lower than social optimum)
advantageous selection: results in an **output that is higher than social optimum**
moral hazard: after the purchase, buyers change their behavior (e.g. for insurances)



Harberger triangle = **efficiency loss from monopoly** / market power-> allocative inefficiency by transfer of surplus from consumers to firm and loss of productive efficiency as firm does not need to compete
extent depends on demand elasticity (lower power for elastic demand)

monopoly can also be beneficial for innovation, strong network effects and more variety
+ need to account for fixed costs -> for monopoly only once, for perfect competition n times

Regulation
= **government intervention** in economic activity using commands, controls and incentives

market regulation: affects directly the workings of the price mechanism
entry regulation: rules determining firm entry into a market
firm regulation: firm is subject to direct oversight by the government
social regulation: rules that apply to firms, consumers and employers

normative theory: **consumers** faced with the negative effects of market failure **demand regulation** from their political leaders
capture theory: **regulation as a tool employed by firms** to better serve their own interests -> possible as costs are spread among many agents and benefits on few

regulatory capture = firms invest into influencing the regulator's decisions to achieve profit maximizing regulations

revolving doors: common personnel turnover between regulatory agencies and regulated firms as they are best informed

natural monopoly = cost structure so that costs are minimized with one supplier only -> need for direct firm regulation as competition is no alternative

trade-off between efficiency and market power

monopolist as an upstream bottleneck as output is an essential facility and concern that monopolist tries to extend his power downstream -> access price (= same) for all
Efficient Component Pricing Rule (ECPR): price for independent firm cannot be larger than difference between final price by integrated firm – marginal cost of integrated firm
only competitive firms can survive the market -> maximize production efficiency

average cost pricing as the firms makes losses of F with marginal cost pricing
= rate-of-return regulation which includes invested capital but **reduces incentive for cost reduction** (in reality regulatory lag still provides it) -> **low-power incentive mechanism**
high-power incentive mechanism = price is set before and does not change, even when cost changes -> price cap regulation which has **higher risk for the firm**, requires strong degree of commitment of regulator and **little incentives for quality provision**

Antitrust (US) and Competition Policy (EU)

= policies and laws ensuring that competition is not restricted & reduces economic welfare
Sherman Act (US) and Treaty of the EU: **protect competition not competitors**!

some agreements may benefit the consumer but ease price fixing in the future

Article 101 TFEU: **price fixing is illegal**; through explicit agreements with direct contact or "public communication of pricing system"
implicit / tacit collusion is typically not illegal; no communication and coordinate prices through a mutual understanding
effects doctrine: price fixing abroad that affects the domestic consumers also illegal
leniency programs give incentive to cheat on agreement for lighter penalty

Article 102 TFEU: **dominant firm** (over 30% market share) **abusing its position** must be proven with an intent to keep or drive entrants out

merger policy / regulation: prevent excessive concentration of market shares (especially ending in monopolies); change of Herfindahl Index to see effects on market structure

buyer collusion (= monopsony power) is also illegal

Market Definition

industries are typically not markets

products and firms in the same market should be in direct competition
reasonably close products and good substitutes (similar use, performance and availability) -> look at cross-price elasticities

when suppliers can switch to produce something else easily, it should probably be in the same market (women's to men's sunglasses)

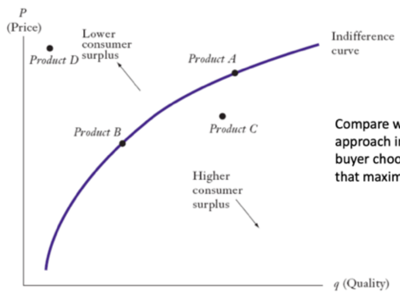
SSNIP
= small but significant and non-transitory increase in price or hypothetical monopoly test
look at the **substitutability from consumers and producers point-of-view**

force an **equal increase in prices (5%) for the smallest possible defined market**
quantity decreases (people switch) but also price-cost margins are higher
if it is not profitable to increase the price by 5%, we have to broaden our definition

Competitive Advantage
80% of firm performance is explained through sustained competitive advantage
value created = buyers' willingness to pay – cost of providing / production
depends on cost and benefit position to competitors

can be **hard to identify** & imitate as it lies in tacit knowledge (experience and not written down) -> casual ambiguity or is protected by patents
strategy, management quality and historical events impact CA

porter's five forces determine profitability of a firm -> only **static description** not analysis
porter's generic strategies: broad or narrow with either cost or benefit / quality leadership
always **trying to achieve a higher rate of economic profit / price-cost margins** than average firm in the market



Products A and B exhibit consumer surplus parity
Product C has a higher consumer surplus than A and B
Product D has a lower consumer surplus than A and B

Compare with characteristics approach in Lecture 6 where buyer chooses the product j that maximizes $U_j = bv_j - p_j$

value map shows indifference curve dependent on quality and price -> static description
steepness of the indifference curve reflect **tradeoff between price and quality that consumers are willing to make** -> flat for price sensitive and steep for quality focus
if a product is part of the market, then it should be on the same indifference curve as the other products for at least some customers