



608: Economics of Regulation

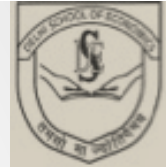
Lecture 2: Market, types, Perfect Competition vs. Monopoly, Regulatory Issues

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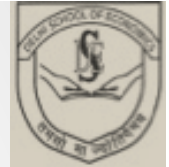
Winter Semester 2013

VVH: 4 & 11



Outline

- Market – Definition
- Market Concentration
- Perfect Competition and Economic Surplus
- What is a natural Monopoly?
 - Permanent vs temporary natural monopoly
- Natural Monopoly pricing problem
- Multi-product monopolists
- Monopoly and Deadweight Losses
- X-inefficiency
- Estimates of welfare losses of monopoly
- Technological change and Competition
- Patents and Copyright



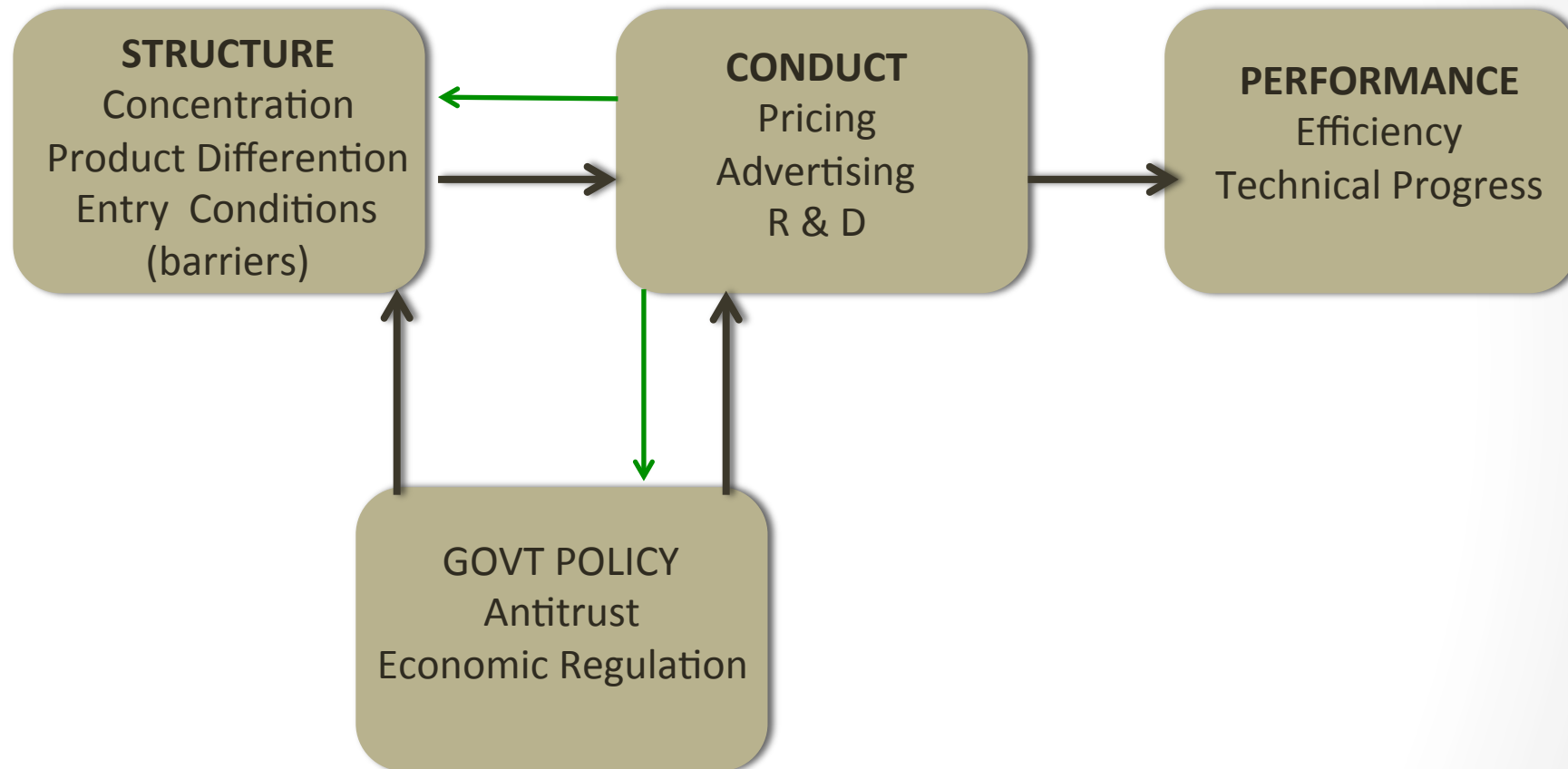
Definition of a Market

- This is something not easy.
- Identification of real markets can be done by:
 - physical characteristics of firms' products
 - the technology/raw materials employed
 - the cross price elasticity of demand between products
 - statistical definition (SIC figures)
- SIC system [ITC (HS) codes] {see: <http://exim.indiamart.com/sic-codes/> }

Code	Title
51	Information
513	Broadcasting and Telecommunications
5133	Telecommunications
51332	Wireless Telecommunications carriers (except satellite)
513321	Paging

How market works?

Structure-Conduct-Performance



Ref: VVH: 3 pp. 62-69 (skim)

Measurement of Concentration

- Concentration Ratio: CR_x , mkt share of largest x firms.

- Easy to measure

- Herfindahl index: $H = \sum s_i^2$

where s_i = mkt share of i^{th} firm

- Ideal properties

- Numbers equivalent property

- Herfindahl Hirschman Index: $HHI = \sum (100s_i)^2$

- $HHI = \sum (100s_i)^2 = 10000 \sum s_i^2$

- Used by the Department of Justice Anti-Trust Division

- Note connection with N-firm Cournot Model

- ◆ $\frac{P - MC_i}{P} = \frac{s_i}{\eta}$ where $s_i = \frac{1}{n}$; $\sum_i s_i \left[\frac{P - MC_i}{P} \right] = \frac{HHI}{10000 \cdot \eta}$

- ◆ Mkt power depends on entry condition, product differentiation, and conduct through collusion/ competition



Concentration Indices & Anti-trust policies

- High concentration index for an industry is a signal for high P-C margin.
- HHI is very important in Anti-trust cases, Anti-trust dept regards HHI of 1000 is very critical. Any merger that leaves industry with HHI <1000 would be challenged.
- Two competing hypotheses –
 - **Collusion Hypothesis:** Higher CR causes higher P-C margin.
Reason: the more concentrated industry, the less competitive firms are and thus higher P-C margin.
 - **Differential Efficiency Hypothesis (Demsetz):** Firms with high mkt share will have high P-C margin and profit. This advantage could be due to lower cost or better products or both. Superior firms would dominate the mkt – so the CR would be high.

So by DEH, one should not break highly concentrated industries as firms should not be penalised for being superior.

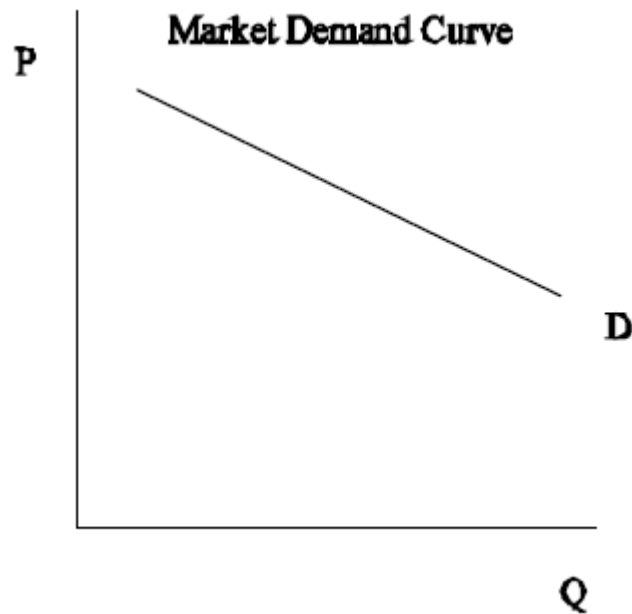
Empirical evidences strongly supports DEH as it shows firms's profit is strongly +vely associated with its mkt share, whereas there's weak +ve relation between industry profit and CR.



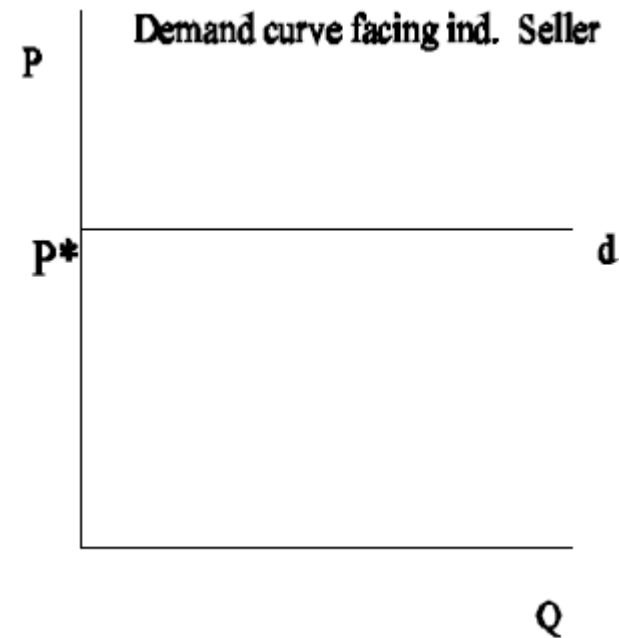
Perfect Competition-Assumptions

- Large number of independently acting buyers & sellers.
- No buyer or seller is so large that it can affect price.
- Externalities do not exist.
- No barriers to entry or exit.
- Perfect information about the products.
- Homogeneous product.
- Consumers maximise preferences given budget constraints.
- Producers have similar non-IRS technologies and maximise profits given the production functions.
- A competitive equilibrium is then determined at market clearing price.
- No artificial restraint on prices.
- Perfect mobility of factors of production.

Perfect Competition- Short Run Behaviour



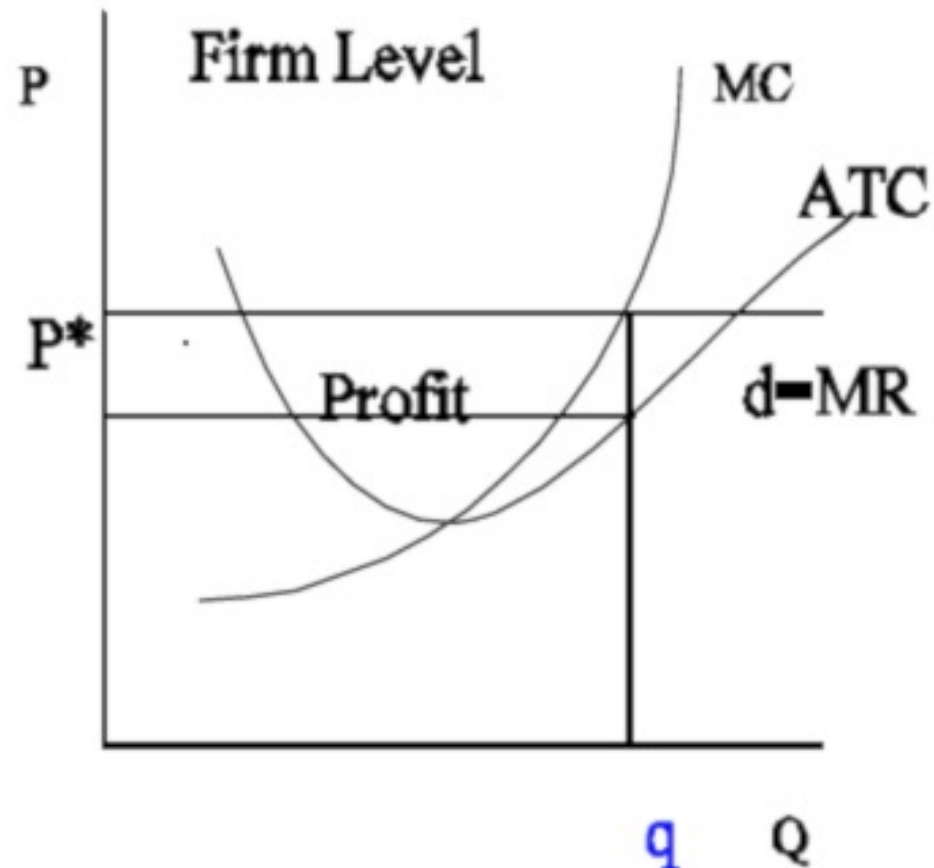
Market Demand is downward sloping



Each seller is a price taker -sells none if prices above market-clearing price

Perfect Competition- Short Run Behaviour

- Maximize Profit
- Marginal profit
= $MR - MC \geq 0$
- $\Rightarrow MR = MC$

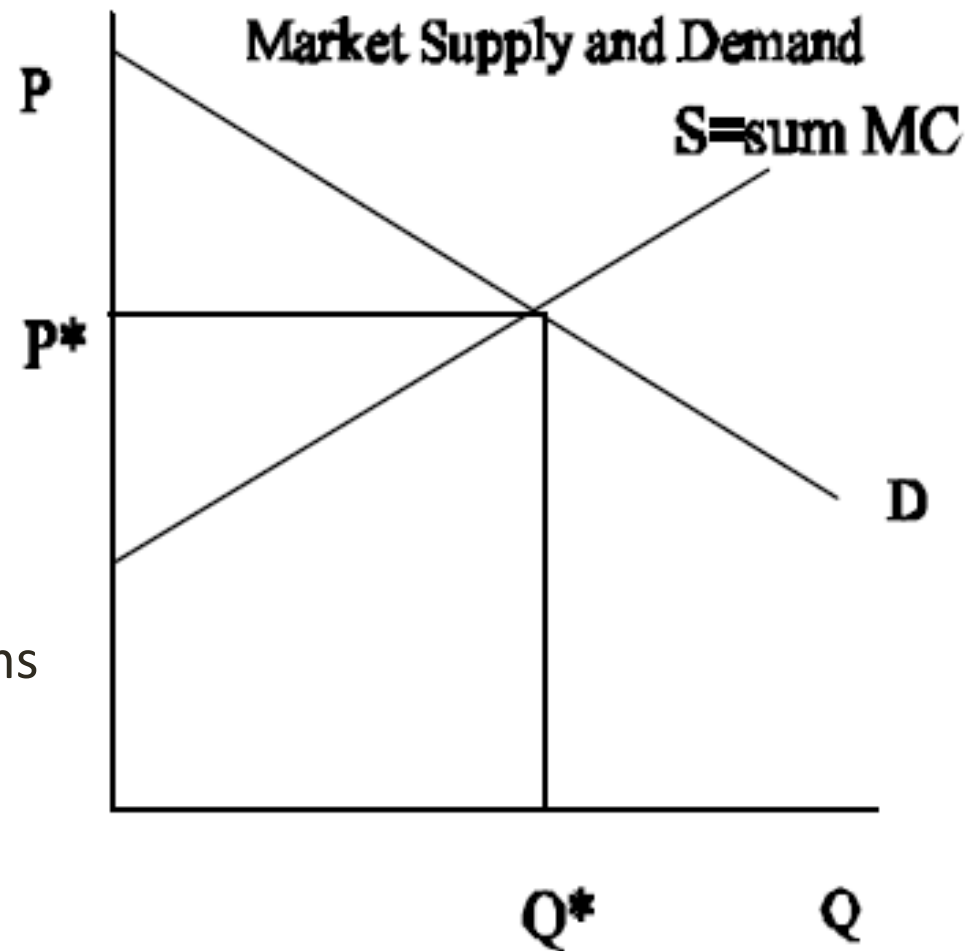


Perfect Competition- Short Run Behaviour

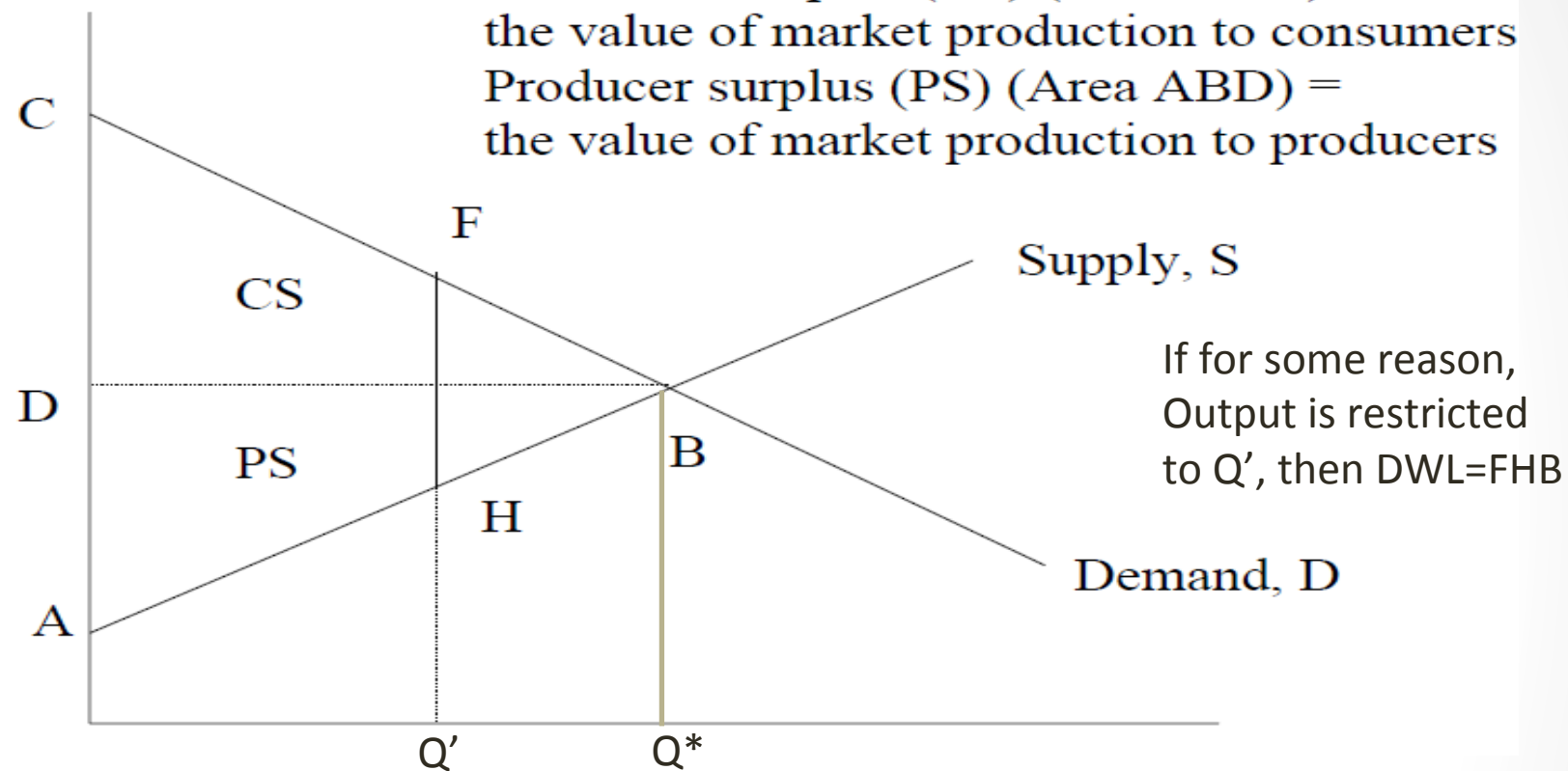
- Firm supply at MC above AVC;
- sum of these individual MC curves is market supply curve

LR Behaviour

- Incase there's above normal profit, more firms enter;
- Supply curve shifts to right until all economic profits disappear



Perfect Competition - Social Welfare



- ▶ Efficiency in Production - incentive to produce at lowest possible cost
- ▶ Efficiency in Allocation - right amount of good is produced since MC to produce equals marginal willingness to pay equals price
- ▶ Social surplus = Consumer and Producer surplus



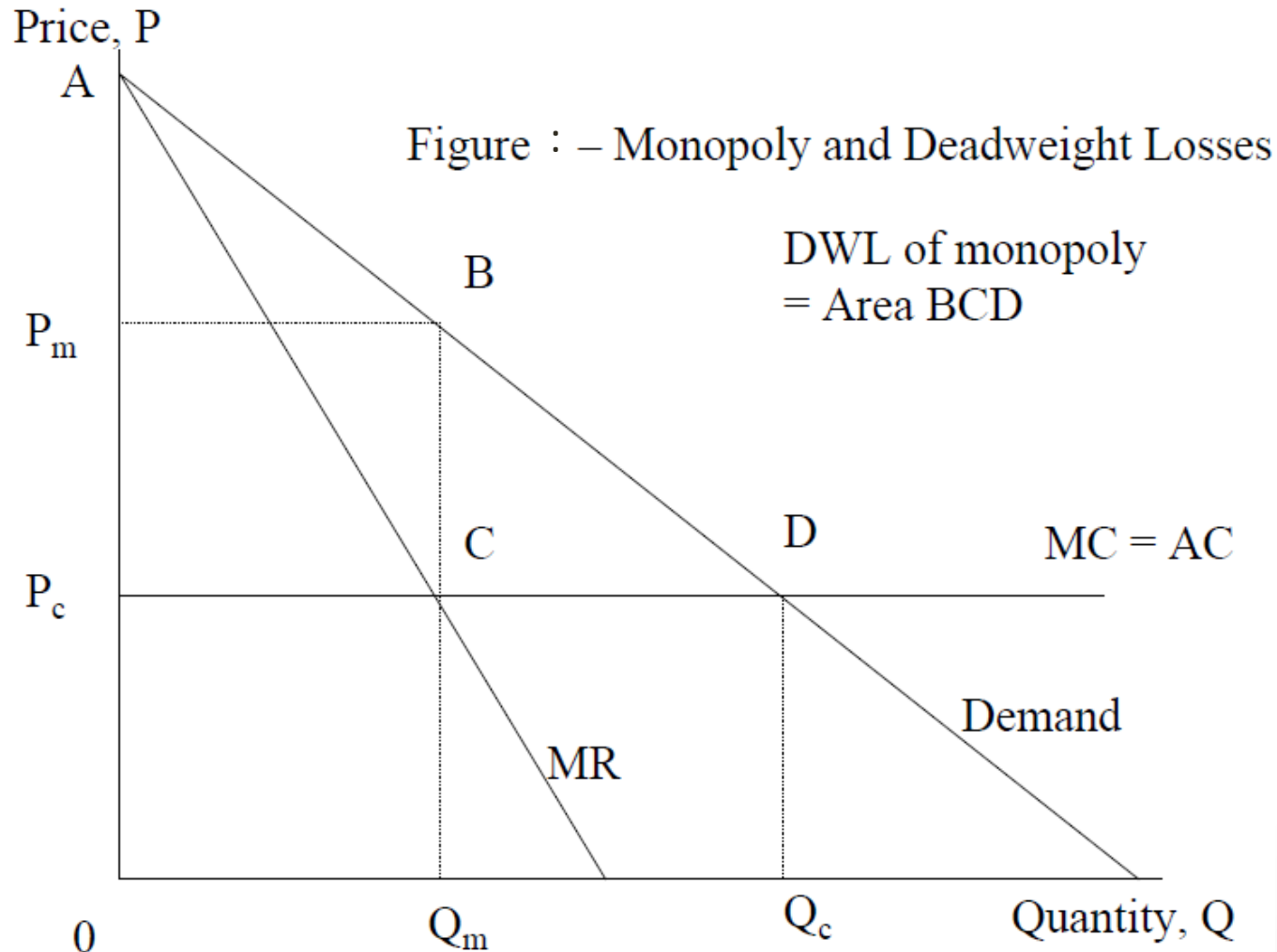
Properties of an equilibrium under perfect competition

- Definition: Pareto efficiency – exists when it is not possible to improve on the current equilibrium without making at least one consumer worse off.
- Competitive model satisfies Pareto Optimality
 - Price = Marginal Cost
 - All firms price takers.
 - There are no super-normal profits.

➤ However in practice the assumptions of perfect competition do not hold good as industries are often concentrated or monopolised (may be rightfully) thus the need for economic regulation arises.

➤ **The aim of economic regulation is often to simulate some of the properties of perfect competition.**

Moving to Monopoly – Social welfare, stylised fact



Monopoly vis-à-vis PC

Calculating Social Surplus under Monopoly and Competition

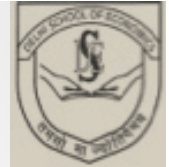
- Demand, $Q=100 - P$
- Marginal and average cost, $MC = AC = 20$
- $P_m = \$60$, $Q_m = 40$; at monopoly equilibrium
- $P_c = \$20$, $Q_c = 80$; at competitive equilibrium

- Monopoly:
 - Total surplus: $AP_cCB = \$2400$
 - CS: $AP_mB = \$800$; PS: $P_mP_cCB = \$1600$

- Competition:
 - Total surplus: $AP_cD = \$3200$ & CS: $AP_cD = \$3200$; PS: $P_mP_cCB = \$0$



- higher price lower output than perfect competition
- misallocation of society resources
- X-inefficiency: firm doesn't work hard to cut costs



Social weights and why they matter

- Society does not usually make decisions based on the maximisation of the sum of producer and consumer surplus.
- It usually attaches different weights to different groups of consumers and producers (and the government).
- Example of regulating casinos. De-regulation of casinos may affect those who cannot afford to gamble and the very rich impacting on consumer surplus. However it may also raise the producer surplus by increasing the profitability of casinos.



Natural Monopoly : Basic case

- LAC keeps falling for all quantities, and LMC necessarily lies everywhere below it and minLAC is larger relative to mkt dd

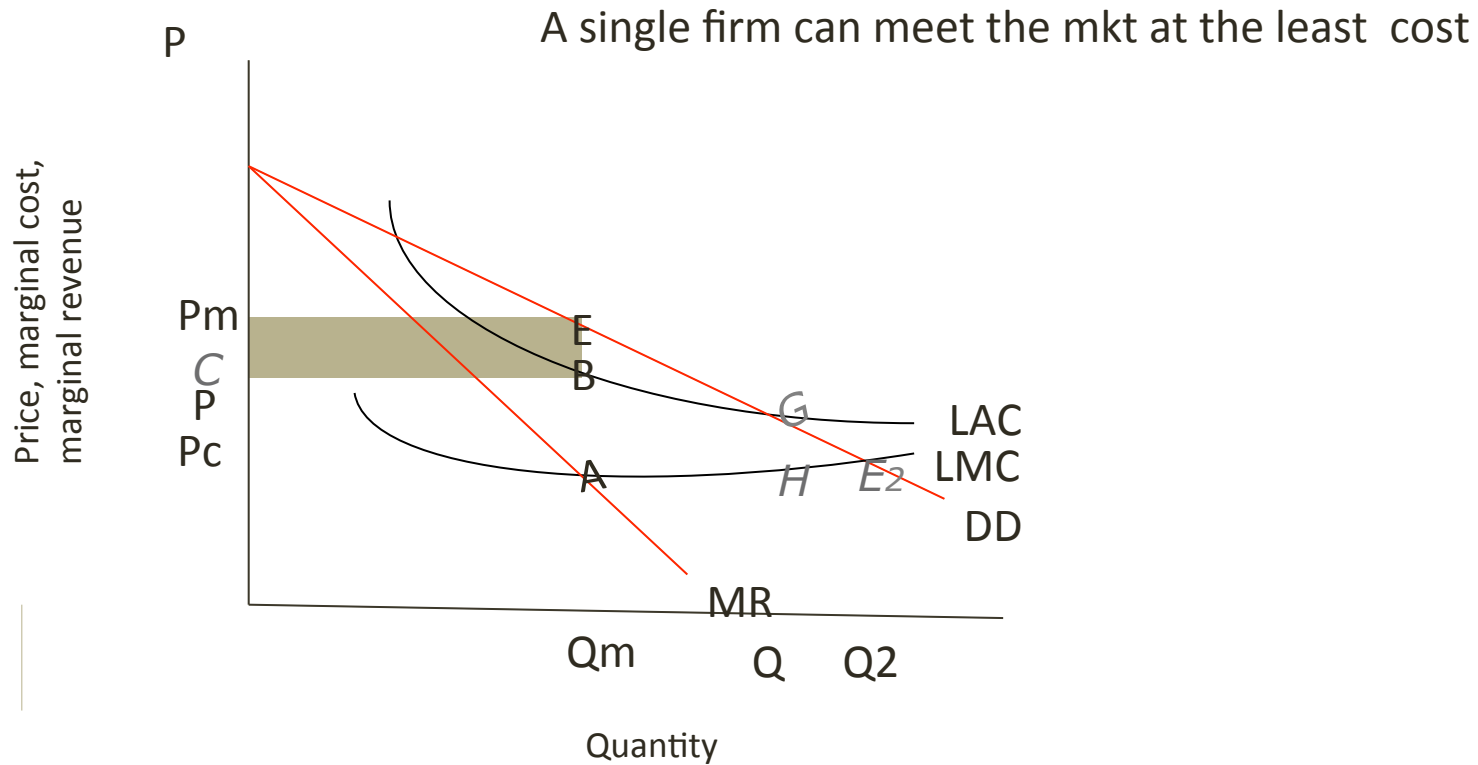
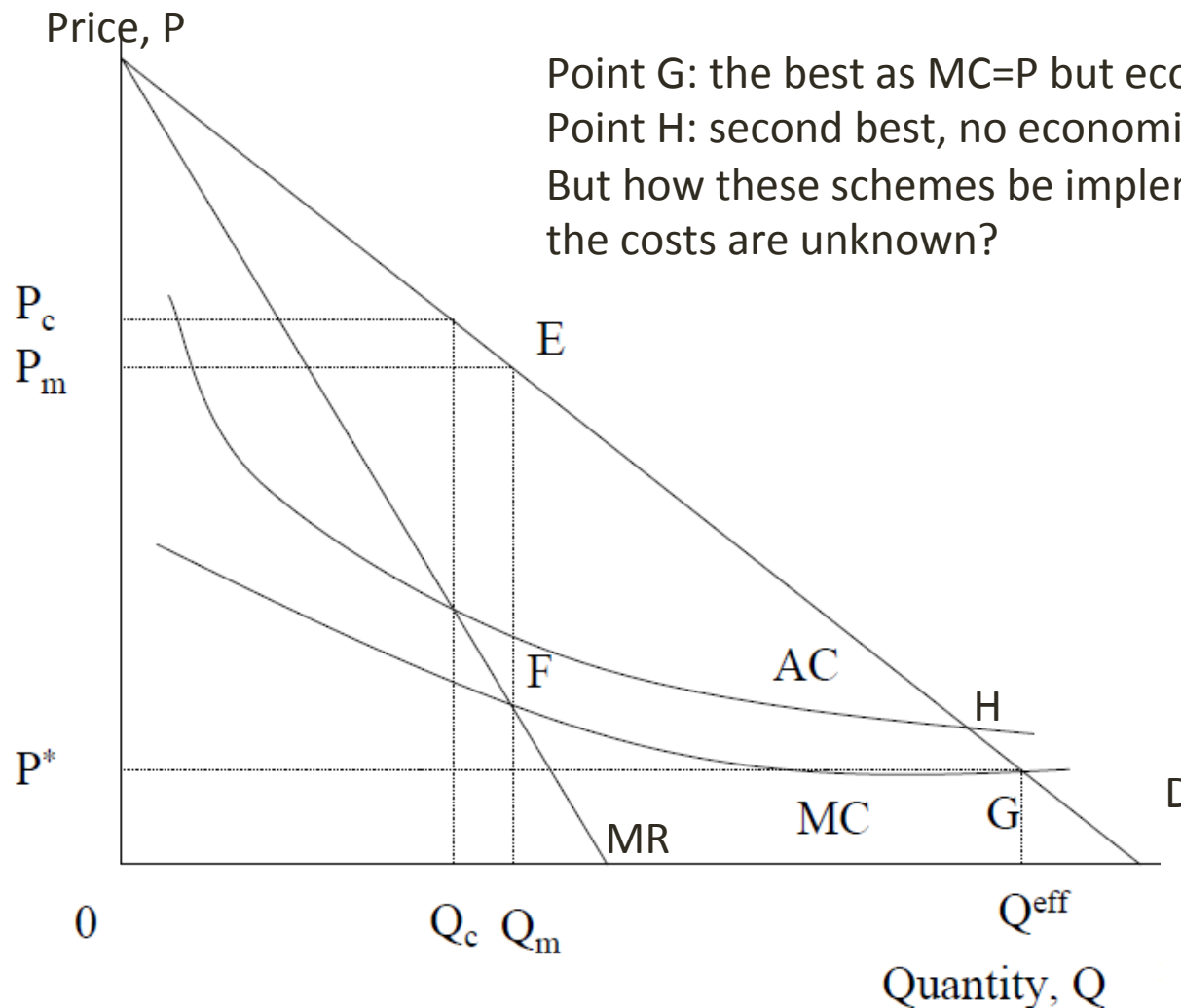


Figure: Natural Monopoly

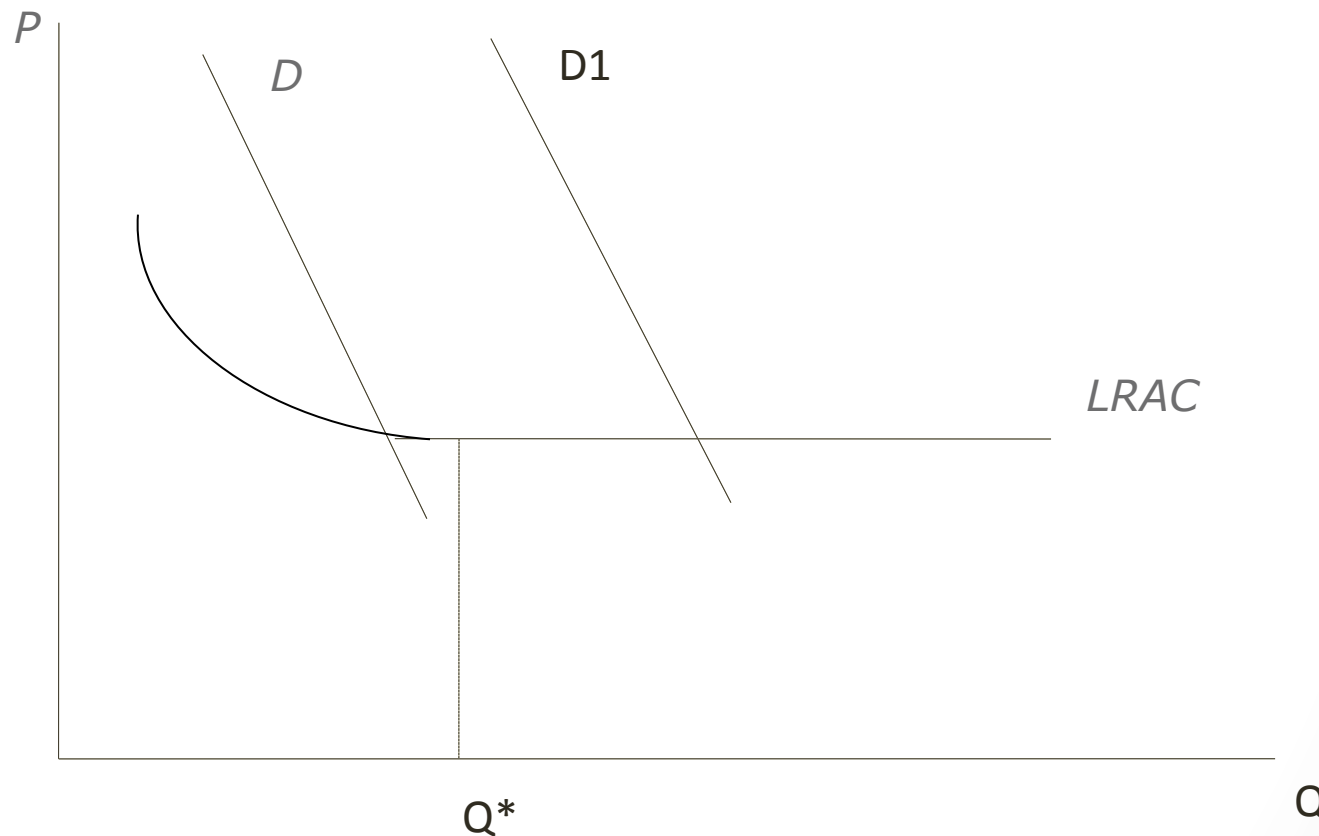
Economics of Scale, Fair rate of return and related complications



Point G: the best as $MC=P$ but economic loss
 Point H: second best, no economic loss
 But how these schemes be implemented if the costs are unknown?

Permanent vs. temporary natural monopoly

LRAC declines upto Q^* and then becomes constant thereafter. If D grows sufficiently overtime, it becomes workably competitive mkt.





What is a natural monopoly?

Additional definitions

- A. When a single firm can produce a product or a group of products more cheaply than two or more firms.
- B. Technically, a **natural monopoly exists in an industry where the costs are subadditive**. That is, where two firms produce q_1 and q_2 respectively and the costs are as follows

$$C(Q) = c(q_1+q_2) < c(q_1) + c(q_2)$$

- C. **Subadditivity is not the same as economies of scale**. Costs can be subadditive even if diseconomies exist (near the total output q_1+q_2). **In the single product case, scale economies is a sufficient condition for subadditivity.**
- D. In the **multiproduct case, product-specific scale economies is not a sufficient condition**. Economies of scope (i.e. it is cheaper to produce various goods in a single plant) is a necessary but not sufficient condition for subadditivity. If Economies of scale and scope exists then cost fn likely to be subadditivity (but no guarantee.)



What is a natural monopoly?

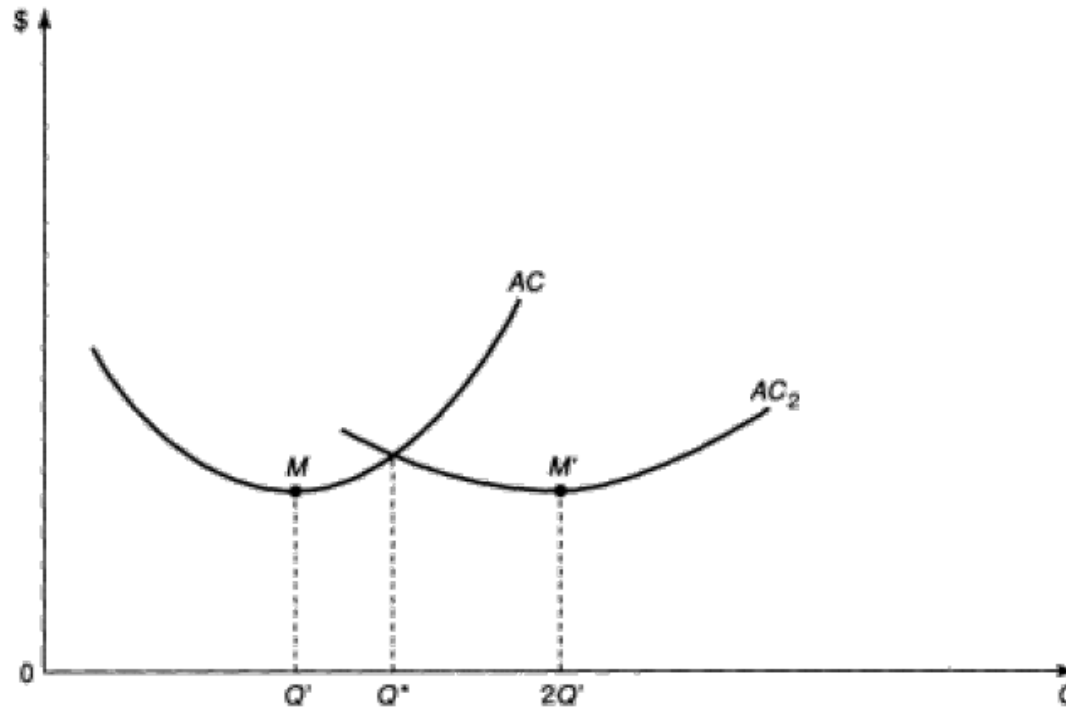
- E. **Contestable Market** is one where there is free entry and even a single firm will face pressure to keep costs low and to price efficiently. Developed by Baumol, Panzer, Willig.
- F. **Sustainable natural monopoly** is one where entry can be prevented. (Price where LRTC meets demand curve – no incentive to enter).



Natural monopoly revisited

- **Economies of scale**, $C(\lambda Q) < \lambda C(Q)$, in production and **Economies of scope** in product interact.
- It is possible that economies of scale combine with diseconomies of scope to make multi-product monopoly inefficient.
- Similarly economies of scope, $C(Q_1, Q_2) < C(Q_1) + C(Q_2)$, with diseconomies of scale may make multi-product monopoly inefficient.
- Thus integration of electricity transmission and generation (in tradition electric utility monopolies) may not be justified by proof of economies of scope.
- See the example in VVH pp. 406

Subadditivity

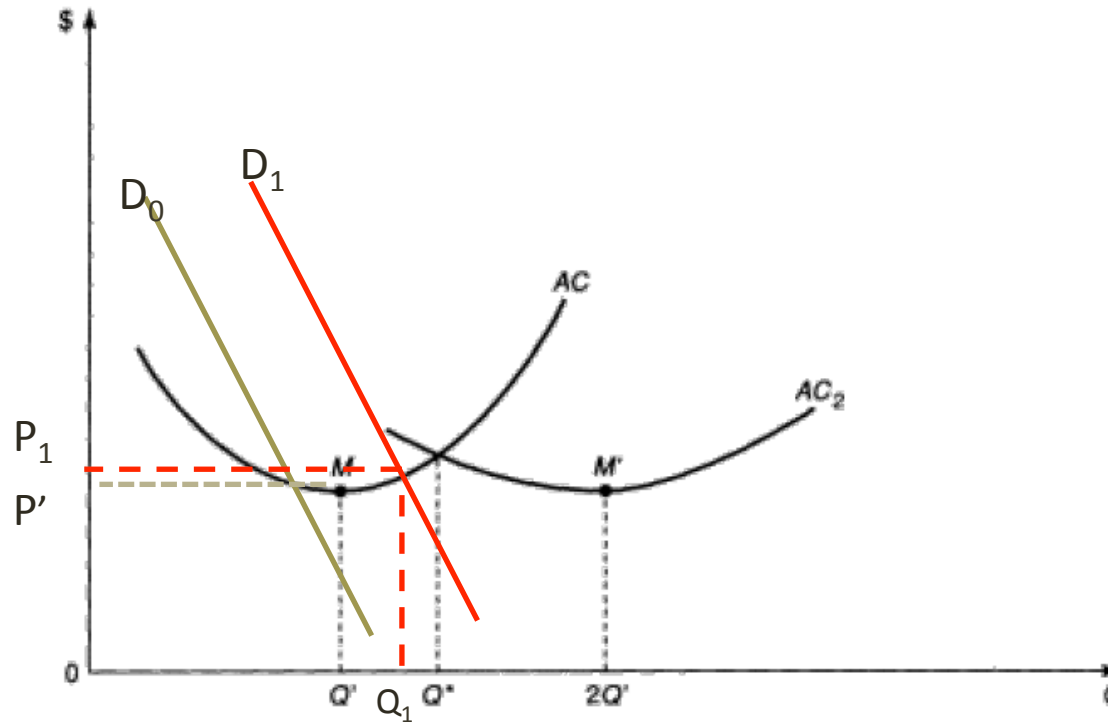


Economies of scale are said to exist at all outputs less than Q' and diseconomies at all outputs greater than Q' .

Subadditivity refers to whether it is cheaper to have one firm produce total industry output, or whether additional firms would yield lower total cost. For outputs less than Q' , one firm is the least-cost solution, and therefore cost is subadditive for that range of outputs.

The intersection of AC and AC_2 at output Q^* defines the range of subadditivity, for Multiproduct case.

Subadditivity & Sustainable monopoly



When mkt dd D_1 intersects AC somewhere in between Q' and Q^* where AC is rising, Natural monopoly may be Unsustainable.

- A potential entrant have the incentive to enter mkt and produce a share in total output (even though that increases industry cost)
- Assumptions required for that –
 - Incumbent firm keeps the price unchanged for some time after entry
 - Incumbent will supply the residual output



How to improve social welfare in Natural Monopoly Industries

- Government ownership e.g. Public Services
- Regulation of prices e.g. Electric Utilities
- Franchising e.g. Cable TV
- Introduction of competition e.g. Telephony



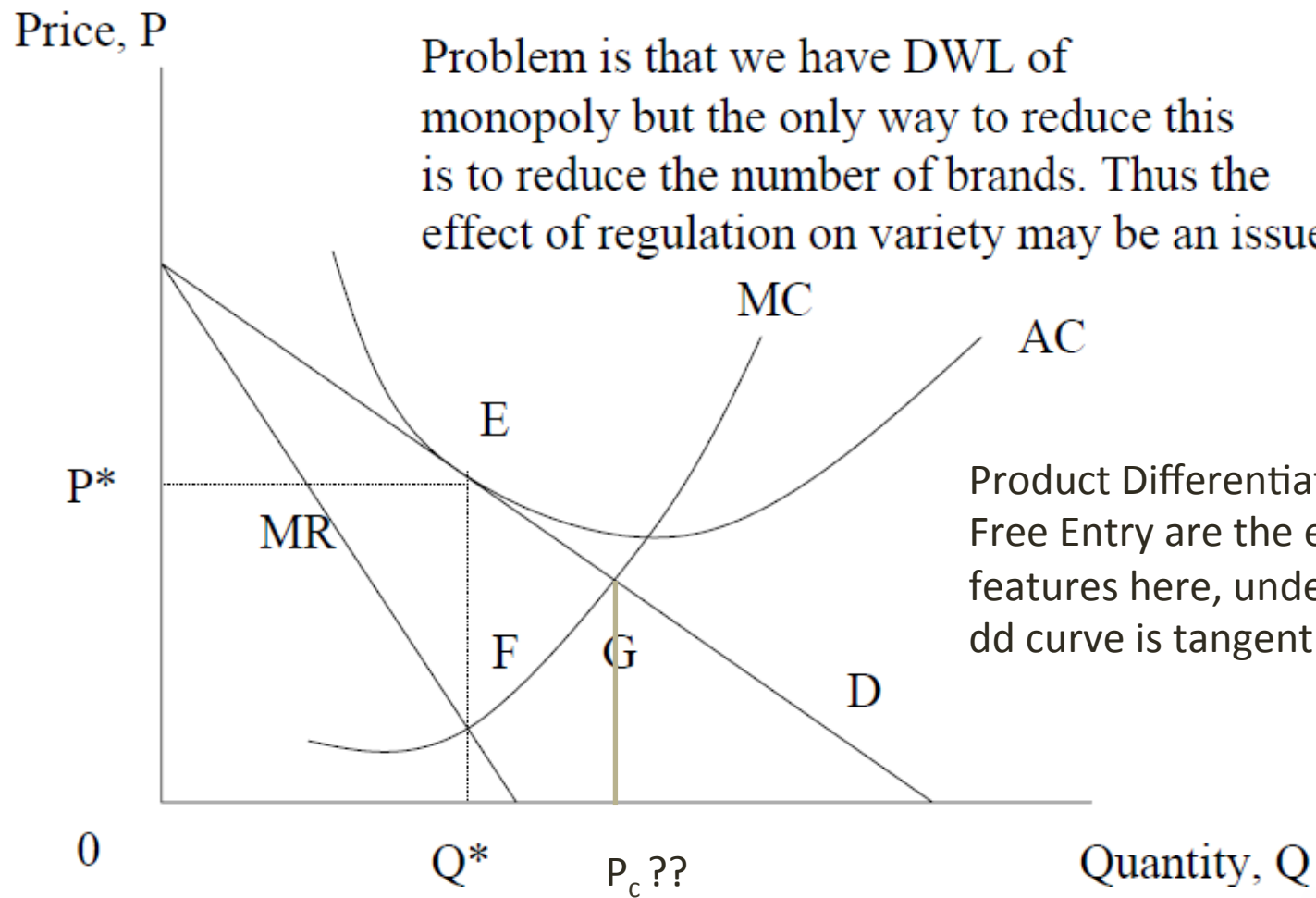
Other types of market structure with deadweight losses

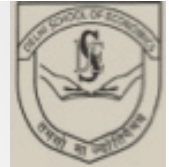
- **Monopsony** – where a single buyer drives down the price it pays and the quantity it buys.
- **Oligopoly** – the intermediate case between perfect competition and monopoly where a small number of firms operate in a market with some ability to raise prices and reduce industry output.
- **Oligopsony** – where small groups of buyers drive down price paid and quantity bought.



Oligopoly and oligopsony and their detection and control are more the concern of anti-trust authorities rather than economic regulatory agencies.

Monopolistic Competition - Figure





Monopoly Wastes –

X-Inefficiency and Competition for Rent Seeking

- X-inefficiency (Leibenstein, 1966) occurs when firms do not minimise the costs of producing their output.
 - X-inefficiency occurs due to lack of competition or incentive to minimise costs within firms.
 - Monopolies may be particularly prone to such inefficiency.
- Thus a reason why de-regulation might be favoured is because the static cost efficiency of monopoly is outweighed in the long run by rising X-inefficiency.
- Competition among firms to become a legitimate monopoly (through franchise or otherwise) lead to **Rent-seeking** behaviour which leads to greater DWL of $P_m - BDP_c$. (Refer to figure in pg 13). Monopoly profit is wasted.



Deadweight Losses of Monopoly

$$\frac{1}{2}(P^* - P_c)(Q^* - Q_c) = \frac{1}{2}\eta d^2 P^* Q^*$$

where P^* = actual price, Q^* = actual quantity

η = price elast. of dd, d = price cost margin

Refer to figure in slide no. 13. for this calculation.

- Harberger (1954) from industry revenue and profits.
- Estimated d as difference between industry and average sample rate of return.
- Assumed $\eta=1$.
- Got answer that DWL are only 0.1% of GNP.

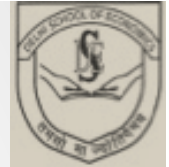
Deadweight Losses of Monopoly ... Contd.

$$\frac{P^*}{P^* - MC} = \eta (= \frac{1}{d})$$

Substituting this in Harberger we get –

$$DWL \cong \frac{1}{2} \left(\frac{P^* - MC}{P^*} \right) P^* Q^* = \frac{1}{2} (P^* - MC) Q^* = \frac{1}{2} \Pi^*$$

- Cowling and Mueller (1978). Assumed MC=AC
 - Data on 734 US firms in 1963-66.
 - They estimate DWL of 4% of GNP.
- If you include rent seeking behavior and advertising cost etc. then the figure is much higher.



Economic Regulation: Efficiency and Technical Progress

- Economic regulations should promote efficiency and technical progress.
- Efficiency is concerned with optimizing the use of existing resources and technology.
- Technical progress is conditional on the allocation of resources to develop new technologies.
- Efficiency is static, technical progress is dynamic. Different types of market structures may impact efficiency and technical progress differently.
- Question is what mkt structure is (more) conducive for TP?

(30)



Technical Progress

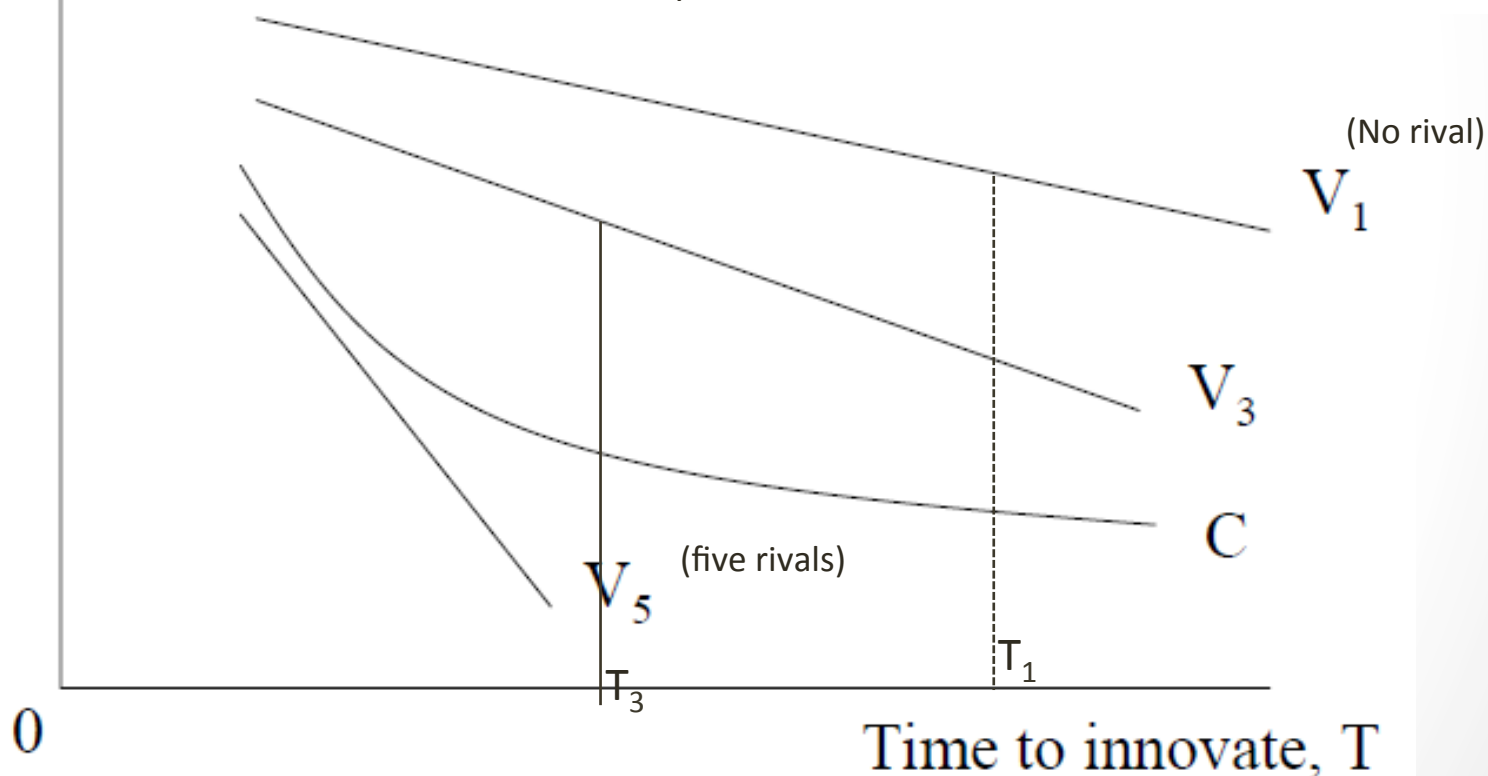
- Schumpeter famously argued that monopoly was good for innovation because the competition for monopoly encouraged investment in innovation.
- Others have argued that competitive pressure produces higher rate of progressiveness.
- Research and Development expenditure – an important vehicle for TP - can take a number of different forms and involves different stages:
 - Basic and applied research
 - Invention
 - Development
 - Diffusion

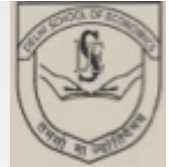
Technical Change and Competition

A Model of R&D Rivalry (Scherer and Ross) –
 conflicting incentive provided by mkt structure for innovation

Present Discounted
 Values, \$

C curve: Cost-time trade off implying that it costs more to shorten the time to innovate.
 V represent PDV of net revenue that vires with time.





Explaining the model

- Market structure provides Conflicting incentives for innovation.
 - 1) More rivals tend to stimulate more rapid innovation so that first innovator can reap disproportionate rewards
 - 2) More rivals leads to split of potential benefit into more parts, making each firm's share less.
- Early innovation (shorter time) is good but it costs more, so not necessarily socially preferred. However speed of innovation is important.
- Benefits of innovation to individual firm are negatively effected by number of competitors (V_1 to V_5). This is because more competitors increases the speed and severity of copying by rivals.
- This implies that there can be excessive competition which stifles innovation completely by eliminating incentives to invest ($V_5 < C$).
- Thus one aim of regulation may be to preserve incentives to innovate and to reward innovators.



Regulatory approaches to innovation

- Patents
 - These give companies a monopoly right to exploit an invention for a limited period. This increases producer surplus in the short run.
- Copyright
 - This gives copyright holders the right to benefit from reproduction of intellectual property for a period. This similarly increases producer surplus in the short run.
- The impact of these arrangements on consumer surplus in the short run is uncertain. There may be more innovations which quickly benefit consumers even though they are expensive.



Why is there regulation?

Theories of Regulation

1) Public Interest Theory (Normative analysis as a positive theory)

- Regulation is supplied in response to the demand of the public for the correction of inefficient or inequitable market practices.

(Market failure – natural monopoly, externality)

- Regulation would be highest in highly concentrated industries
- it is not. Thus there comes another theory.

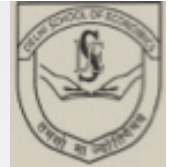
2) Capture Theory - Regulation is supplied in response to the demands of interest groups struggling among themselves to maximize the incomes of their members. Regulators are “captured” by the industries that they serve

- No linkage or mechanism by which a perception of the public interest is translated into legislative action.
- Regulators don't always behave as captives



Theories of Regulation

- 3) Stigler's regulation** as an economic good (welfare of different interest group can be improved upon through regulation, agents are rational in choosing actions that maximise utility)
- Refined by Peltzman
 - Regulation is a commodity or good
 - Like any good, it has an equilibrium price and output depending on supply and demand
 - Demanders - consumers wanting protection from monopoly or producers wanting protection from each other
 - Suppliers – political representatives
-
- Regulation redistribute wealth
 - Regulator supplies regulation to be in the power
 - Interest groups compete among themselves by offering political support. (better organised group often makes the cut.)
-
- **Conclusion** – special interests succeed in political marketplace



Theories of Regulation

4) Public Choice -Voting /Rent seeking

- Public Choice –political actors maximise THEIR well-being subject to the rules and constraints they face in the political arena.
- Voting –must worry about getting a majority and about the intensity of voters’ preferences
- Rent-Seeking –spending to acquire or maintain a market position in which rents may be earned
 - Wasteful
 - Non-productive
 - Can dissipate all monopoly profits.

[For more details -review Posner and Peltzman articles]



Conclusions

- Short run static efficiency likely to be negatively effected by monopoly via deadweight losses.
- Technical progress may benefit from monopoly as monopoly may be associated with better incentives to invest in innovation.
- Regulation needs to involve society deciding on the optimal trade-offs between consumer and producer surplus based on implicit or explicit social weights.