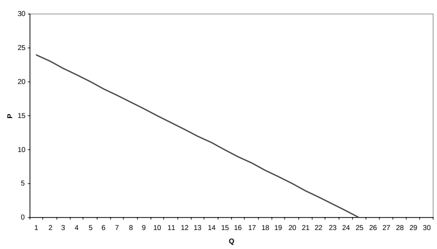
Demand curves.

- Demand curves describe the relationship between the price and the quantity customers would be willing to purchase at that price.
- A demand curve can be drawn for a single firm or for a whole industry.
- Firms sometimes take explicit steps to learn their demand curves (e.g. Amazon's randomized pricing experiment or airlines computer reservation systems).
- More often, managers have some sense for how demand for their product would change if they changed their price.

A demand curve graphically.

An example: Q = 25 – P ⇒ P = 25 – Q



Demand elasticity.

The demand elasticity measures the percent change in quantity for a given percent change in price:

$$\varepsilon = -\frac{\Delta Q_A / Q_A}{\Delta P_A / P_A}$$

Demand elasticity calculation.

Demand function Q = 25 – P

Demand at P = 10 is?

– Q = 15 at P = 10

Elasticity (small change, say ΔP = 1)

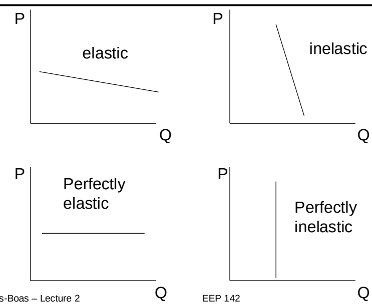
– For ? P = 1, ? Q = -1

– Elasticity (? Q/Q)/(? P/P) =

– (-1/15)(1/10) = .66666

What is Elasticity at P = 15?

Demand elasticity measures the sensitivity of quantity demanded to price.



Elasticity rules of thumb.

- Rule-of-thumb 1: Elasticities are higher (in absolute value) on luxuries than necessities.
  - Food vs. Armani suits.

  NOTE: DON'T CONFUSE ELASTICITIES WITH PRICE LEVELS.
- Rule-of-thumb 2: Elasticities are lower (in absolute value) in the short run than in the long run.
  - Gasoline.
- Rule-of-thumb 3: Elasticities are higher on specific products than for a category as a whole.
  - Mazda 323 vs. cars overall.

Other elasticities.

We will also talk about:

- Cross-price elasticities (how Compaq's demand changes when Dell changes their prices).
- Income elasticities (how much Phillip Morris' demand changes when incomes go down).

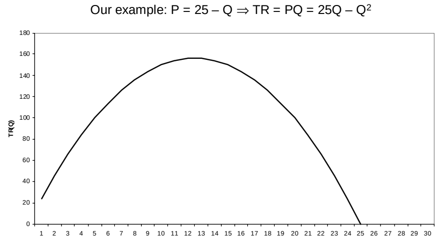
Total and marginal revenue.

- Total revenue: TR = P(Q) x Q
- Average revenue: AR = R / Q = P(Q)
- Marginal revenue: MR = change in revenue from selling an additional unit
- Marginal revenue is less than average revenue (price). Selling one extra unit implies
  - Extra revenue from the extra unit (=P)
  - But: must lower price on all other units sold, too

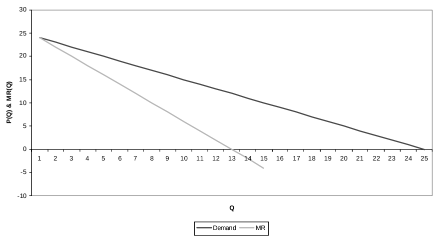
$$MR = \frac{\partial TR}{\partial Q} = P(Q) + Q\frac{\partial P}{\partial Q} \le P(Q)$$

Total revenue.

Our example: P = 25 – Q ⇒ TR = PQ = 25Q – Q^2



Marginal revenue.



The Golden Pricing Rule

Increase output as long as gains in revenues exceed increases in costs

Simplistic conclusion:

$$MC = MR$$

Marginal revenue and pricing.

For a firm facing downward sloping demand, P>MR, always.

Maximizing profits $\Rightarrow$ MR> MC for the last unit sold, MR<MC for the next unit.

For a price-taking firm, MR≡P, so produce until MC=P.

Pricing/Production Rules

Case 1 – Price-taking firm:

sell if P ≥ MC

Case 2 – Profit-maximizing firm:

increase production/reduce price if MR>MC

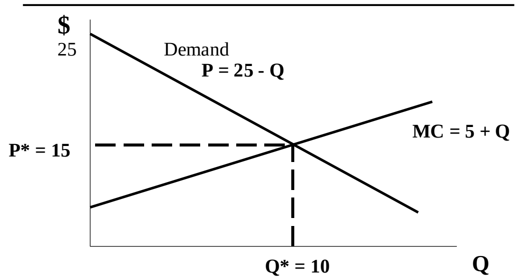
decrease production/increase price if MR<MC

Case 1: Perfectly competitive market*

- The market price will not fall no matter how much a given supplier produces.
- The market price will not rise no matter how much a given supplier reduces output (competitors will produce more).
- Since your output decision has no impact on the market price, might as well produce as long as P≥MC.

*This requires (i) many firms (or potential entrants) (ii) producing identical products.

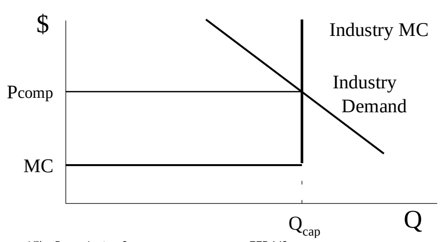
Competitive price.



How do firms make money in industries like this?

- If a firm is capacity constrained, MC includes the overhead costs of building more capacity.
- Suppliers with lower MC than the marginal supplier in the industry can make profits.

Prices in capacity constrained markets (perfect competition)



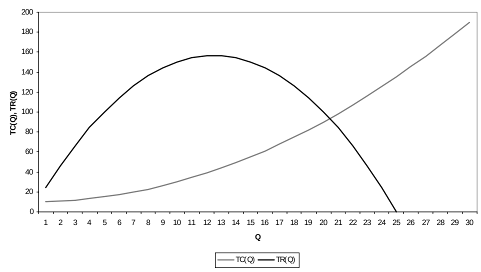
Case 2: Anything but a perfectly competitive market.*

Setting the profit maximizing price or output level involves equating MR and MC.

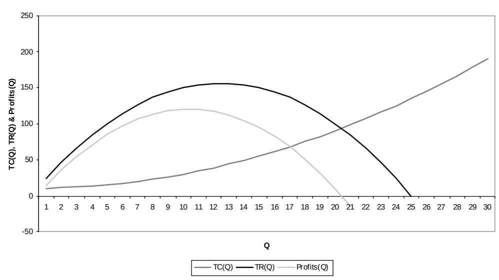
- Increase production if MR>MC.
- Decrease if MR<MC.
- Production is optimized when MR=MC.

* Firms face downward sloping demand curves, so their output decisions affect the market price.

Finding the profit maximizing quantity on a graph.



Graphing profits.



Finding the profit maximizing quantity algebraically.

In our example, $TR = 25Q - Q^2$ and $TC = 10+.2Q^2$.

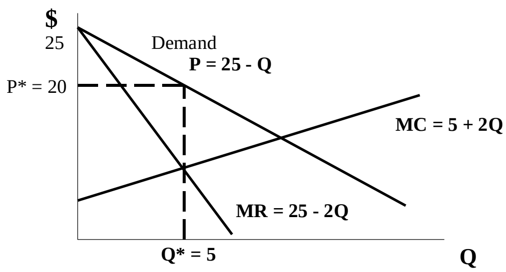
MR =

MC =

Solve for Q when MR=MC:

Pick corresponding P off the demand curve:

Pricing with market power.



Villas-Boas – Lecture 2 EEP 142 Page 22

Pricing and elasticity.

Prices with market power are inversely related to demand elasticity:

$$\frac{P - MC}{P} = \frac{1}{\varepsilon}$$

Villas-Boas – Lecture 2 EEP 142 Page 23

Pricing takeaways.

- The optimal price depends on
  - (a) marginal cost and
  - (b) what the market will bear (demand elasticity).
- Prices are optimized when MR = MC
- In a competitive market, the demand for your product is typically sensitive to price and the optimal markup is low.
- If demand for your product is insensitive to price (your product has unique characteristics and/or you're the only producer), the optimal markup can be high.
- What's missing: dynamic elements of competition.

Villas-Boas – Lecture 2 EEP 142 Page 24

Measuring market outcomes

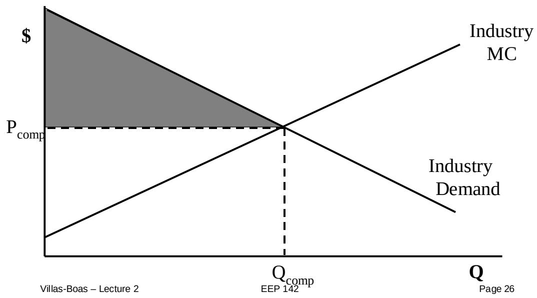
How do we judge a ‘healthy’ industry?

Does it depend on your perspective?

i.e. customer vs.competitor vs. investor?

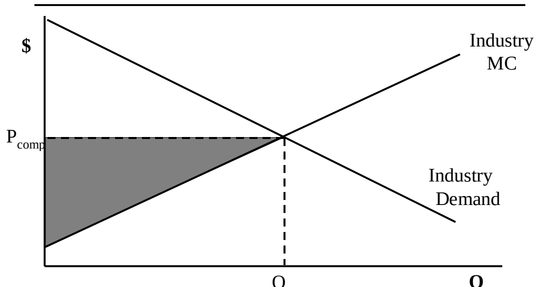
Consumer surplus.

(aggregate net benefits of all units of consumption)

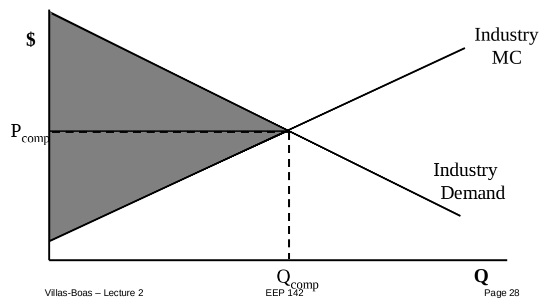


Producer surplus.

(aggregate operating profit from all sales)

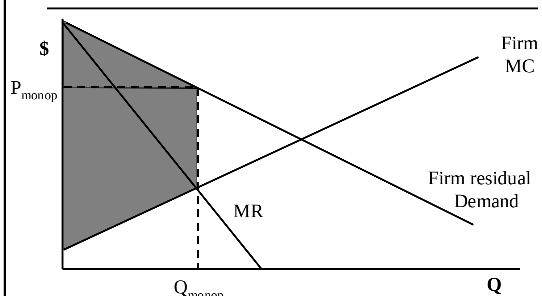


Total surplus (net social surplus).
(aggregate economic gains from trade)



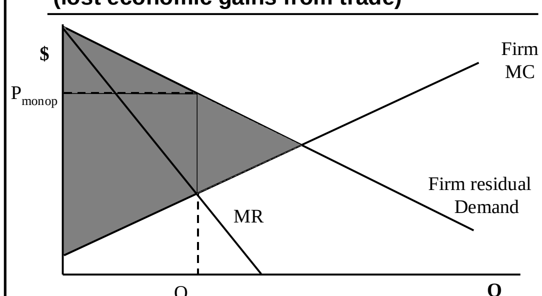
Villas-Boas – Lecture 2 EEP 142 Page 28

Is market power bad?



Villas-Boas – Lecture 2 EEP 142 Page 29

Deadweight loss from market power
(lost economic gains from trade)



Villas-Boas – Lecture 2 EEP 142 Page 30

Entry intuition.

When setting prices (production quantities) focus only on *marginal costs and marginal revenues*

- Profit maximizing Q where MC(Q) = MR(Q)

Even at profit maximizing Q, profits may not be enough to cover fixed costs

No costs are fixed in considering entry

- So enter if profits > 0
- *i.e.* If P(Q) > AC(Q) at profit maximizing Q