

Lecture 3: Price setting firms

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EC566 | Macroeconomics for Business

Relevance of the previous lecture

- Previous lecture was a firm level analysis.
- We assumed unemployment rate is given in our analysis.
- In the coming weeks, we will analyze the determination of unemployment rate in the economy relying on what we have learned.

Price Setting Firms

Pricing and production decisions

- Relevant for firms selling differentiated products or firms with market power

Market power: "An attribute of a firm that can sell its product at a range of feasible prices, so that it can benefit by acting as a price-setter (rather than a price-taker)." – Core the Economy

- Depends on
 - firm cost structure
 - market demand
- Analyze pricing and production decisions in 4 steps
 1. Represent cost structure as cost function
 2. Using the cost function, draw isoprofit curves
 3. Repersent market demand as a demand function
 4. Using the isoprofit curves and the market demand, find the profit maximizing price and output combination

Cost Structure

Understanding economies of scale

- Increasing returns to scale (Economies of scale):
 - $xF(K, AL) < F(xK, xAL)$
 - If inputs increase by a given proportion, output increases more than proportionally
- Constant returns to scale:
 - $xF(K, AL) = F(xK, xAL)$
 - If inputs increase by a given proportion, output increases proportionally
- Decreasing returns to scale (Diseconomies of scale):
 - $xF(K, AL) > F(xK, xAL)$
 - If inputs increase by a given proportion, output increases less than proportionally

Economies of scale

Potential causes:

- Fixed cost of production
- Learning by doing
- Greater bargaining power
- Network effects

Diseconomies of scale

Potential causes:

- Additional layers of bureaucracy
- Increasing cost of monitor employees
- Necessity of establishing other departments

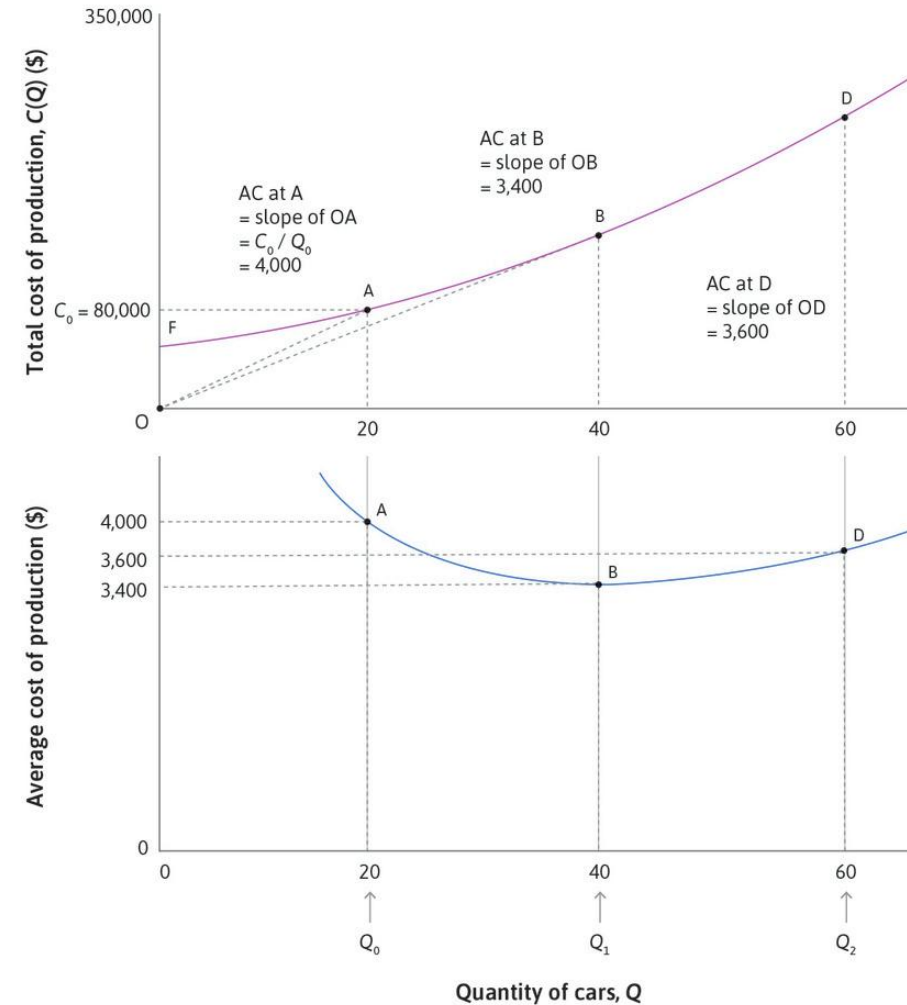


*"Do you think now that we're doing fewer illegal things
we can scale back the legal department?"*

Source: New Yorker

Total cost of production and average cost of production

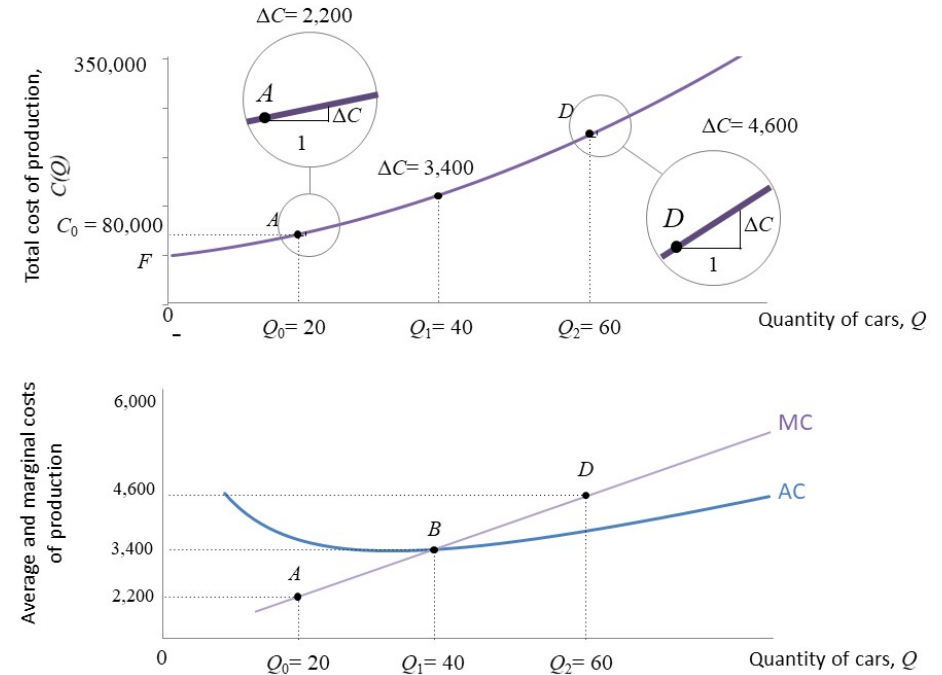
- Total cost of production, $C(Q)$:
 - total cost of producing Q amount of output
- Average cost of production = $C(Q)/Q$
- F : fixed cost of production
 - Leads to increasing returns to scale
 - Average cost of production is decreasing when Q is low (when $Q < 40$ in our example graph)
- After certain amount of production, diseconomies of scale forces dominate, and average cost increases.



Marginal cost of production

- Derivative of the total cost function,
 $MC \equiv \frac{dC(Q)}{dQ} = C'(Q)$
- Slope of the total cost curve at a given point
- The effect on total cost of producing one more unit of output
- In this example, MC is increasing in Q
- AC is decreasing if $AC < MC$
- AC is increasing if $AC > MC$
- AC is at its minimum if $AC = MC$

Figure 7.7. The marginal cost of a car.

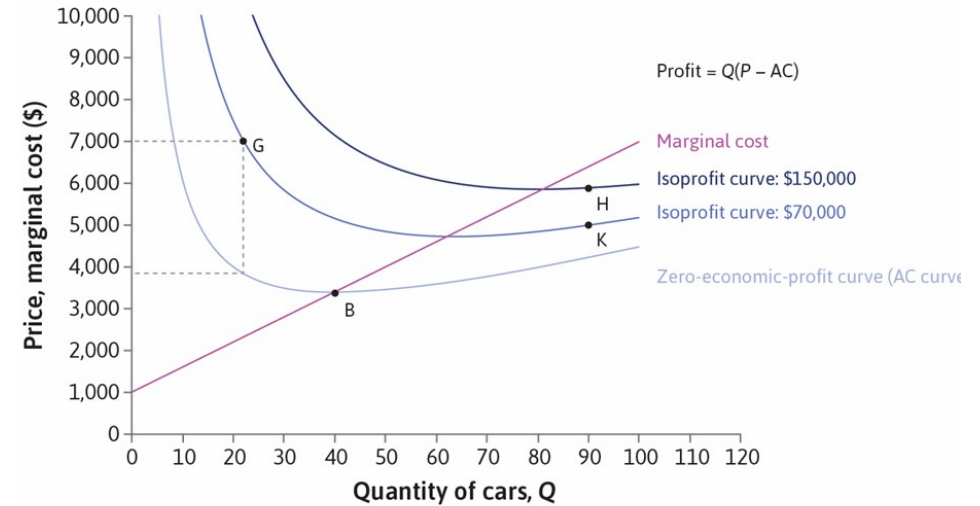


Isoprofit curves

- Profit = Revenue - Cost

$$\pi = PQ - C(Q) = Q(P - AC)$$

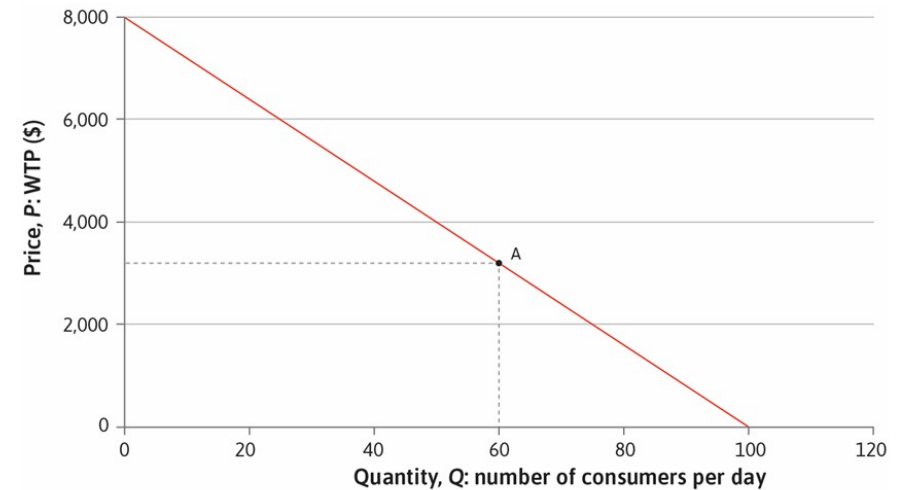
- An isoprofit curve represents all the price and quantity combinations which lead to same level of profit
- MC curve intersect with each isoprofit curve at its lowest point
- Average cost curve represents the 0 profit isoprofit curve



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Market demand

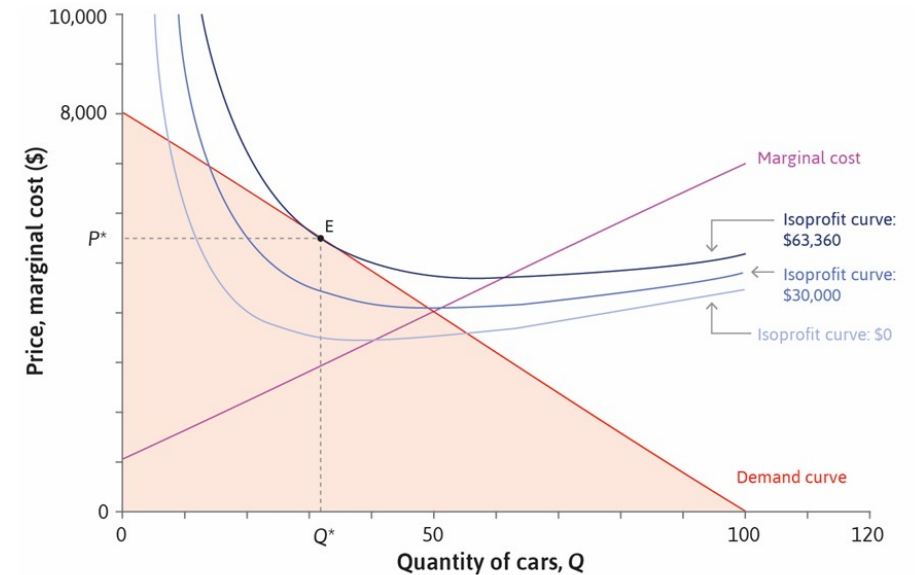
- Represents the number of items consumers are willing to purchase at a given price.
- Depends on
 - income of consumers
 - price of other goods
 - the utility consumers get from the consumption of the good
- Notice the upside down nature of the graph
 - The correct reading of this graph is that for a given price level, what the corresponding quantity demanded is.



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Production

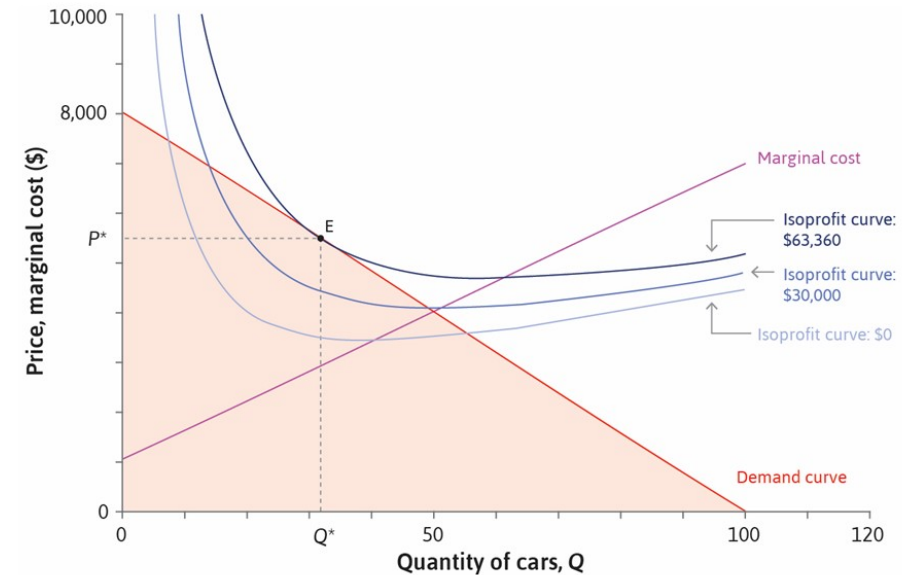
- Demand curve = Firm's feasible frontier
 - Slope = MRT
 - MRT: Marginal rate of transformation of lower prices into greater quantity sold
- Isoprofit curves = Firm's indifference curves
 - Slope = MRS
 - MRS: Marginal rate of substitution in profit creation between selling more and charging more
- Firm maximizes profits by choosing point where $MRS = MRT$
 - Production takes place at point E



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Production, cont'd

- Production has to take place on the demand curve
- Production takes place at point E (where $MRT = MRS$)
- On the left of point E
 - $MRT > MRS$
 - If a firm cuts prices, quantity sold increases more than the amount required to keep profit constants.
 - Firm will produce more.
- On the right of point E
 - $MRT < MRS$
 - If a firm increases prices, quantity sold decreases less than the amount that keeps profit constant.
 - Firm will produce less.

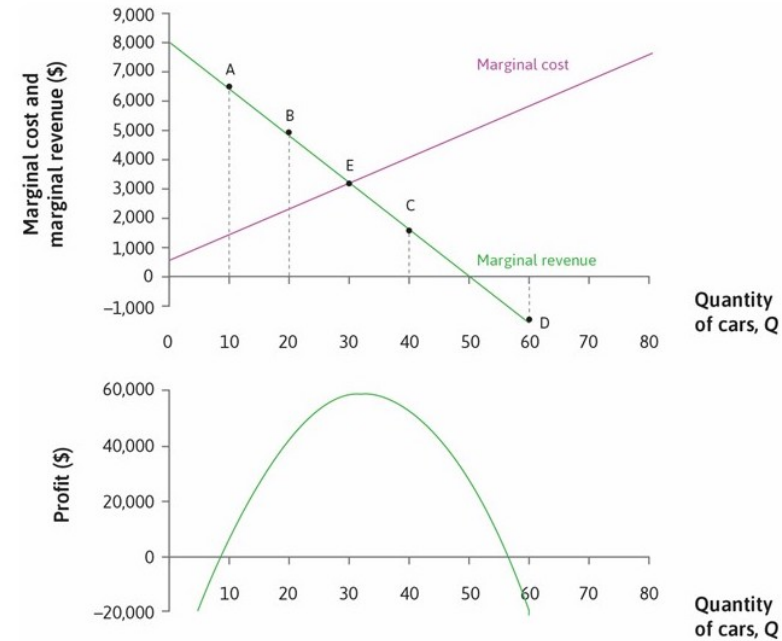


Profit Maximization

- Marginal revenue (MR) = change in revenue from selling an additional unit of output

$$MR = \frac{dP(Q)Q}{dQ}$$

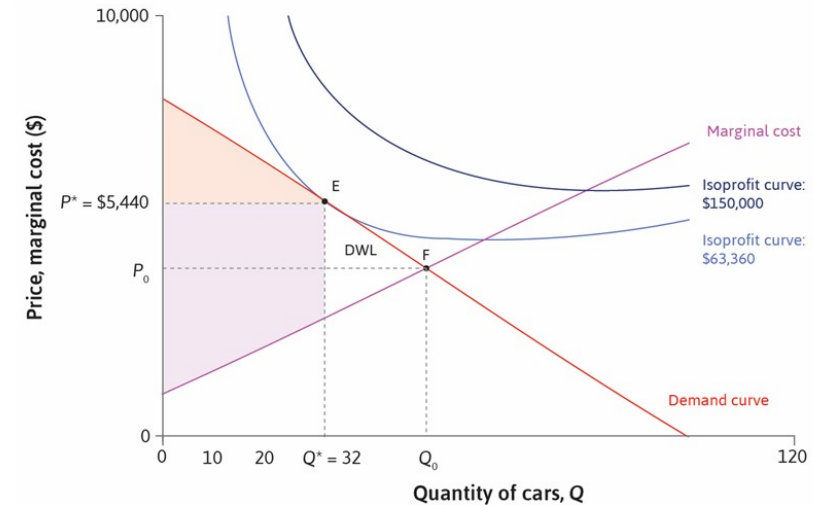
- Profit is maximized when $MR = MC$
- If $MR < MC$
 - Firm will produce less to increase profits.
- If $MR > MC$
 - Firm will produce more to increase profits.



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Welfare analysis

- Consumer surplus (CS): total difference between willingness to pay and actual price
- Producer surplus (PS): total difference between MC and actual price
- Total surplus (total gains from trade) = $CS + PS$
- Deadweight loss: A loss of gains from trade relative to the pareto optimal allocation
 $MC = P$



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Price elasticity of demand

$$\epsilon = - \frac{\% \text{Change in quantity demanded}}{\% \text{Change in price}}$$

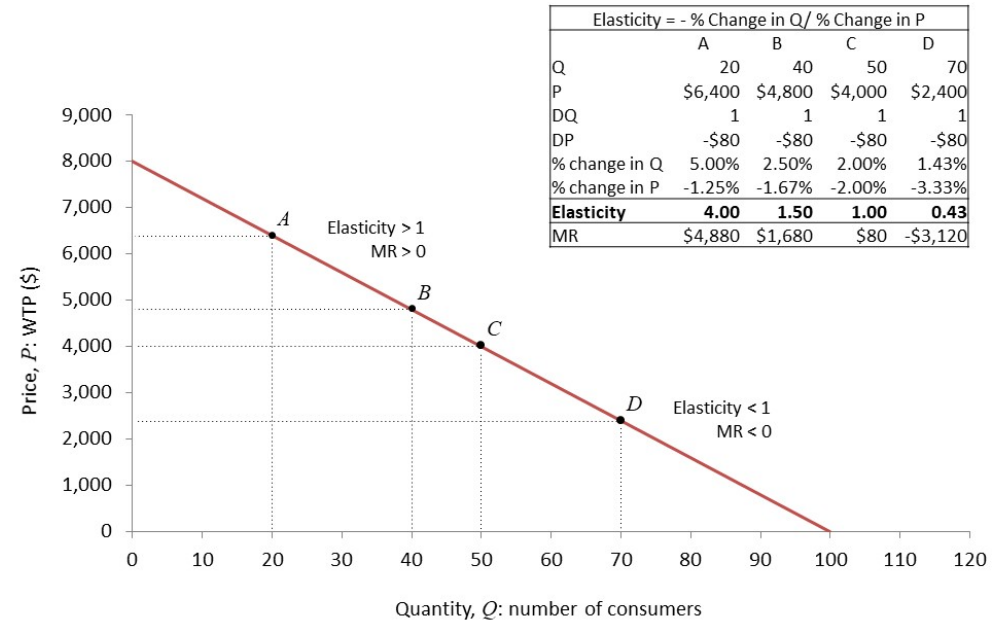
$$\epsilon = - \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}}$$

- A measure of responsiveness of demand to price changes
- Notice that elasticity decreases as one moves down the line

$$\epsilon = - \frac{\Delta Q}{\Delta P} \frac{P}{Q}$$

- $\frac{\Delta Q}{\Delta P}$ is constant in a linear line, and P/Q falls down the line.

Figure 7.15. The elasticity of demand for cars.



Price elasticity and market power

- Flat demand curve: less elastic demand (inelastic)
- Steep demand curve: more elastic demand

Figure 7.16. A firm facing highly elastic demand.

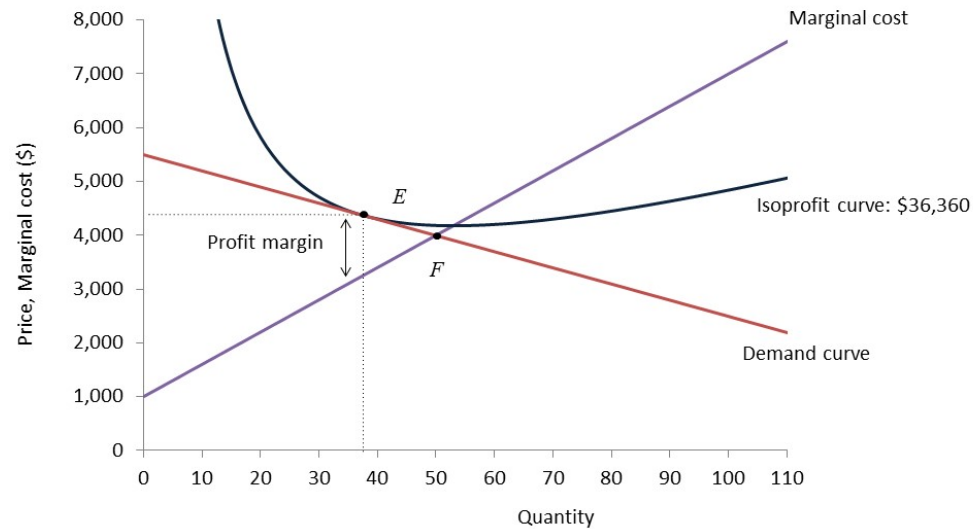
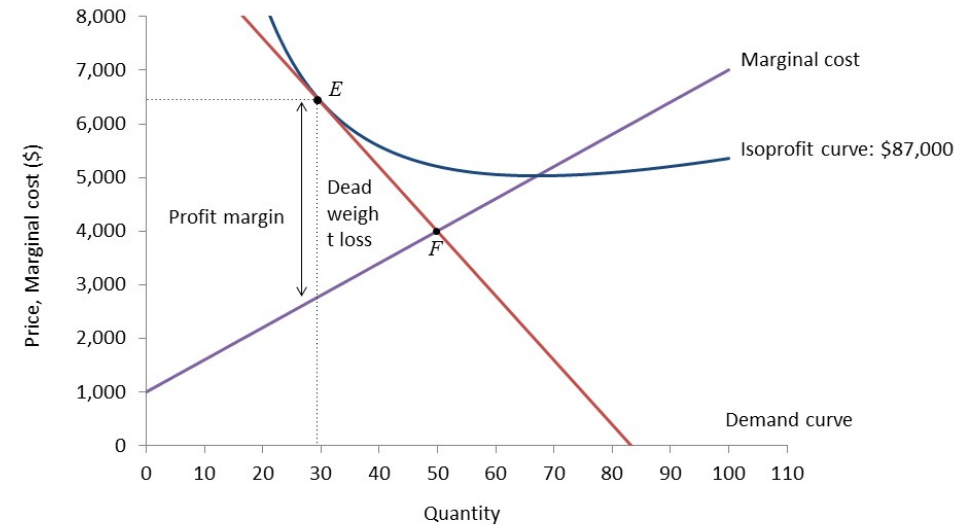


Figure 7.17. A firm facing less elastic demand.



- Profit margin is higher with less elastic demand
 - Firms have more market power

Next lecture

- Supply and demand in perfect competition