Market Power:
Monopoly
• market power
• single seller has a cost function

\[ c(q), \quad c'(q) \geq 0, \quad c''(q) \geq 0 \]

to produce quantity (or quality) \( q \)

• aggregate demand is given by downward sloping demand function

\[ q(p), \quad q'(p) < 0 \]

• alternatively, inverse demand associates price to quantity offered:

\[ p(\cdot) = q^{-1}(\cdot), \quad p'(q) < 0 \]
• the problem of the monopolist is to choose price \( p \):

\[
\max_p \{pq(p) - c(q(p))\}
\]

• or alternatively quantity \( q \):

\[
\max_q \{p(q)q - c(q)\}
\]

• solving the monopolist’s problem

\[
p'(q)q + p(q) - c'(q) = 0
\]
• the first order conditions are:

\[ p'(q)q + p(q) - c'(q) = 0 \]

• marginal revenue function

\[ p'(q)q + p(q) \]

• marginal revenue arises from two sources: (i) marginal buyer and (ii) inframarginal buyer, and in particular

\[ p'(q)q + p(q) < p(q) \]

• compare with the competitive solution

\[ p - c'(q) = 0, \]

where price equals marginal cost and associated welfare cost
Linear Demand and Constant Marginal Cost

• consider inverse demand

\[ p(q) = a - bq, \quad a, b > 0 \]

• consider cost function (constant marginal cost)

\[ c(q) = c \cdot q, \quad c > 0 \]

• the problem for the monopolist is

\[ \max_q \{ p(q)q - c(q) \} \]

or

\[ \max_q \{ (a - bq)q - cq \} \]
Marginal Revenue and Demand Elasticity

- the first order conditions are:

\[ p'(q)q + p(q) - c'(q) = 0 \]

- marginal revenue function

\[ MR(q) = p(q) + p'(q)q = p\left(1 + \frac{q}{\frac{dp}{dq}}\right) \]

- we remember

\[ \varepsilon_p = \frac{\frac{dq}{dp}q}{p} \]

and thus

\[ p(q) + p'(q)q = p\left(1 + \frac{1}{\varepsilon_p}\right) \]
• marginal revenue = marginal cost

\[ MR = p \left(1 + \frac{1}{\varepsilon_p}\right) = MC \]

or mark-up \( p/MC \)

\[ \frac{p}{MC} = \frac{\varepsilon_p}{1 + \varepsilon_p} > 0, \]

• thus the monopolist will always choose an elastic segment of the demand function:

\[ \varepsilon_p < -1. \]
Price Discrimination and Efficiency

- think Disneyland, entrance fee for the park and price per use of attraction
- two part tariff \((F, p)\)
- first degree price discrimination (or perfect price discrimination): seller knows consumer’s preference and can price each unit separately offer different price to different consumer
- second degree price discrimination: seller can charge different amounts for different quantities (qualities)
- third degree price discrimination: seller can charge different price to different consumer segments, identity based.
An Example: Two Part Tariff

- think Disneyland, entrance fee for the park and price per use of attraction
- two part tariff \((F, p)\)
- implements perfect price discrimination