Chapter 11: Monopoly

1. Profit maximization by a monopolist
   A. As usual, increase Q provided MR > MC (produce up to point where MR = MC)
      Key difference vs. perfect competition:
      MR < P for monopolist
      MR = P for perfect competitor
   B. Monopolist is only seller, so monopolist's
      D curve is the market D curve
      \[ R = PQ \]
      \[ P = P(Q), \text{ with } \frac{dP}{dQ} = P'(Q) < 0 \]
      i.e., downward-sloping demand curve

C. so \[ MR = \frac{dR}{dQ} = \frac{d[P(Q)Q]}{dQ} = Q\frac{dP}{dQ} + P \frac{dQ}{dQ} \]
   \[ = P \left[ 1 + Q \frac{dP}{P dQ} \right] = P \left[ 1 + \frac{1}{\varepsilon} \right] \]
   where \( \varepsilon = \frac{dQ}{Q} \), the elasticity of demand \( \frac{dP}{P} \) with respect to price

   NB: when
   Since \( \varepsilon < 0 \), MR < P \( (P = AR = PQ/Q) \)
when $\varepsilon < -1$, $MR = P[1 + (1/\varepsilon)] > 0$
when $\varepsilon = -1$, $MR = P[1 + (1/\varepsilon)] = 0$
when $\varepsilon > -1$, $MR = P[1 + (1/\varepsilon)] < 0$

D. profit maximization requires $MR = MC$
or $P[1 + (1/\varepsilon)] = MC$

E. Implications of profit maximization
(1) Since $\varepsilon < 0$, $P > MC$
(2) IEPR (inverse elasticity pricing rule): when profits are maximized, the markup of price over $MC$ (as % of $P$) must satisfy
\[
\frac{P - MC}{P} = -\frac{1}{\varepsilon}
\]
(3) monopolist always produces on the elastic part of the demand curve (where $\varepsilon > 1$ in absolute value)
(4) Note that this applies to any producer with less than infinitely elastic demand, not just to a monopolist
F. Monopoly with a linear demand curve (review Ch. 2, pp. 41-42 and Fig. 2.16): for the linear demand curve $P = a - bQ$, vertical intercept = $a$, slope = $-b$, horizontal intercept = $a/b$

$R = PQ = (a - bQ)Q = aQ - bQ^2$
so $MR = dR/dQ = a - 2bQ$

vertical intercept = $a$, slope = $-2b$, horizontal intercept = $a/2b$
thus, $D$ and $MR$ curves look as follows:

\[
P = a - bQ:
\]

$\text{Demand curve ("P")}$
2. Comparative statics for monopoly
   A. outward shift in market demand curve (with accompanying shift in MR curve!):
      if MC is increasing in Q:
         Q rises, P rises
      if MC is decreasing in Q:
         Q rises, P changes...how?
         (see text, p. 423, and Figure 11.10)

   B. increase in marginal cost (due to higher input prices, etc.):
      optimal Q falls, optimal P rises
3. Multiplant monopoly and cartels
   A. With multiple plants, produce so as to equalize MC in each plant (otherwise, could cut costs by shuffling output) – implies that aggregate MC schedule is the horizontal sum of the individual plants' MC schedules

   B. then, operate where \( \text{MR} = \text{total MC} \), and allocate output among plants to equate the MC of all plants

   ![Graph](image)

   C. Profit maximization by a cartel: act as if all firms were one monopolist with multiple plants – low-MC firms would produce more output (need to set production quotas for each firm, and prevent "cheating")
4. Welfare economics of monopoly
A. Standard of comparison = perfect
   competition (operate where \( P = MC \), since
   \( MC = \) supply curve)
B. relative to perfect competition,
   monopolist raises \( P \) and cuts \( Q \), \( \rightarrow \) DWL

<table>
<thead>
<tr>
<th></th>
<th>perfect competition</th>
<th>monopoly impact</th>
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<tbody>
<tr>
<td>consumer surplus</td>
<td>( A+B+F )</td>
<td>( A )</td>
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<tr>
<td>producer surplus</td>
<td>( E+G+H )</td>
<td>( B+E+H )</td>
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<tr>
<td>total surplus</td>
<td>( A+B+E+ )</td>
<td>( A+B+E+H )</td>
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<td></td>
<td>( F+G+H )</td>
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</table>
5. Why do monopolies exist?
   A. **Natural monopoly:** at any level of total industry output, total cost for one firm producing is less than total cost for 2 or more firms – usually because of scale economies, decreasing ATC
   B. **Barriers to entry:**
      - structural (cost/marketing advantages for an existing firm)
      - legal (franchises)
      - strategic barriers to entry (incumbent acts, or is expected to act, to bar new entrants)

6. **Monopsony:** buyer with market power
   A. **Perfect competition:**  
      \[ MC = \frac{d(TC)}{dQ} = \frac{d(FC + wL)}{dQ} = w\frac{dL}{dQ} = \frac{w}{MPL} \]
      => assumes firm is a price-taker in input market
      \[ MR = MC \text{ implies } P = \frac{w}{MPL} \]
B. **Monopsony:** able to affect price in input market (faces upward-sloping supply curve)

i.e., \( w = w(L) \), with \( dw/dL > 0 \)

then \( TC = rK + wL = rK + w(L)L \)

so \( d(TC)/dQ = MC = \frac{d[w(L)]}{dQ} L + w \frac{dL}{dQ} \)

\[
= \frac{dw(L)}{dL} \frac{dL}{dQ} L + w \frac{dL}{dQ} = \left[ \frac{dw}{dL} \frac{L}{w} + 1 \right] \frac{w}{MPL}
\]

so \( MC = \frac{w}{MPL} \left[ 1 + (1/\varepsilon_{L,w}) \right] \)

where

\( \varepsilon_{L,w} = \text{elasticity of labor supply w.r.t. wage} \)

\[
= \%\Delta L/\%\Delta w = (dL/L)/(dw/w)
\]

\[
= (dL/dw)(w/L)
\]

**NB:** here, \( MC > w/MPL \) since \( \varepsilon_{L,w} > 0 \)
C. Profit maximization and monopsony if a perfect competitor in output market: MR = MC implies

\[ P = \left(\frac{w}{MPL}\right) \left[ 1 + \left(\frac{1}{\varepsilon_{L,w}}\right) \right] \]

or \[ P \times MPL = w \left[ 1 + \left(\frac{1}{\varepsilon_{L,w}}\right) \right] \]

so, relative to perfect competitor, monopsonist pays a lower wage, hires less labor.
D. DWL under monopsony

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<tr>
<th>surplus</th>
<th>perfect comp</th>
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<th>monopsony impact</th>
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<tbody>
<tr>
<td>worker</td>
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<td>-C-G</td>
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<td></td>
<td>D+F+G</td>
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(DWL due to monopsony = F+G.)