Problem Set #9 – Monopoly, Monopolistic Competition

1. Done in section

2. Suppose that a monopolist has a total cost (LTC) of $16 + 4Q$. Suppose the demand curve is $P = 20 – Q$. If the monopolist can charge only one price calculate:

The diagram below shows the various cost curves etc for the monopolist

(a) The profit maximizing price and quantity, and the economic profits.

$$MR = MC \Rightarrow 20 - 2Q = 4 \Rightarrow Q = 8, P = 12$$
\[ \pi = TR - TC = PQ - (16 + 4Q) = \$48 \]

(b) Suppose the monopolist can PERFECTLY PRICE DISCRIMINATE. What are his profits now?

Q is now where \( P = MC \Rightarrow P = 4 \Rightarrow Q = 16 \)

\[ \pi = TR - TC = [0.5 \times (20 - 4) \times 16 + 4 \times 16] - [16 + 4 \times 16] = 12 \times 16 - 5 \times 16 = \$112 \]

(c) Suppose the government regulates the monopolist by insisting that economic profits be 0, so that \( P = LAC \). What prices could the monopolist choose to satisfy the regulator? What would the social gain from the regulation be in the first period it was applied?

\[ LAC = (16/Q) + 4 = P = 20 - Q \Rightarrow 16 + 4Q = 20Q - Q^2 \]

\[ \Rightarrow Q^2 - 16Q + 16 = 0 \]

\[ \Rightarrow Q = (8 \pm 0.5 \sqrt{(16 \times 16 - 4 \times 16)}) \]

\[ \Rightarrow Q = (8 \pm 4 \sqrt{3}) = 1.07, 14.93 \]

\[ \Rightarrow P = 18.93, 5.07 \]

(my mistake, this was supposed to be have a simple solution!)

Social Gain = Increase in Total Surplus (TS)

\[ TS = CS + \pi \]

At unregulated profit max one-price quantity, \( TS = 0.5 \times (20 - 12) \times 8 + 48 = \$80 \)

At regulated price (\( P = 5.07 \)), \( TS = CS + \pi = CS + 0 \)

\[ = 0.5 \times (20 - 5.07) \times 14.93 \]

\[ = 0.5 \times 14.93^2 = 111.5 \]

So gain is \$31.5

(d) Why in practice would the gains be smaller over time?
The monopolist under regulation will not work to reduce costs, and will instead consume other benefits than profits.

(e) If the monopolist can charge only one price, and a tax of $2 per unit is collected from him by the government what is the new profit maximizing output, the amount of tax revenue collected, and the new profits? Does the tax make the outcome more or less efficient? What is the excess burden of the tax per $ collected?

\[
\text{MR is now } 20-2Q-2. \quad \text{MR} = \text{MC} \Rightarrow Q = 7, \ P = 13
\]

Tax Revenue = $14.

\[
\pi = TR - TC - \text{tax revenue} = PQ - (16+4Q) - 2Q = 91 - 44 - 14 = $33
\]

Since Q falls under the tax, the outcome is less efficient.

Excess Burden is decline in TS. After tax TS = CS + \pi + \text{tax revenue}

\[
= .5 \times (20-13) \times 7 + 33 + 14 = $71.5
\]
So decline in TS = $80 - $71.5 = $8.5

Excess burden per $ collected is 8.5/14 = 61%.

(f) Suppose instead the government imposes a flat excess profits tax of $14 on the monopolist. What is the output now? What is the excess burden of the tax per $ collected?

Since MR is unchanged, so is the output. There is thus no excess burden. Profits just fall by the amount of the tax.

(g) Would an excess profits tax work in practice? Discuss.

Over time this would run into the same problems as setting P = LAC. The monopolist will not work to reduce costs, and will instead consume other benefits than profits.