14.54 Solutions to Recitation: IRS

1. Lecture 17

    (a) $TC = F + Qc \Rightarrow AC = \frac{F}{Q} + c$

    (b) $Q = \frac{S}{n} \Rightarrow AC = \frac{nF}{S} + c$

    (c) $P(Q) = \bar{P} - \frac{1}{b}\left[\frac{Q}{S} - \frac{1}{n}\right] \Rightarrow P'(Q) = -\frac{1}{bS}$, negative since $b, S > 0$.
    Demand is downward sloping.

    (d) $MR = P(Q) - \frac{Q}{bS}$

    (e) $P(Q) = c + \frac{Q}{bS}$

    (f) $P(Q) = c + \frac{1}{bn}$

    (g) $c + \frac{1}{bn} = \frac{nF}{S} + c \Rightarrow n = \sqrt{\frac{S}{bF}}$

    (h) $Q = \sqrt{bFS}$

    (i) Home: $b = 2$, $c = .1$, $F = 5$, $S = 1440 \Rightarrow n = 12$, $P = .1417$, $Q = 120$.
    Foreign: $b^* = 2$, $c^* = .1$, $F^* = 5$, $S^* = 250 \Rightarrow n^* = 5$, $P^* = .2$, $Q^* = 50$.

    (j) World: $S^W = 1690 \Rightarrow n^W = 13$, $P^W = .1385$, $Q^W = 130$

    (k) Price goes down. Number of varieties goes down, so it would be welfare reducing.

    (l) They cannot both increase.

2. New demand specification

    (a) $\frac{1}{n}$ $\left(Q = \frac{S}{n}\right)$

    (b) $P(Q) = \sqrt{\frac{S}{nQ}}\bar{P}$

    (c) $P'(Q) = -\frac{1}{2}\sqrt{\frac{S}{nQ^3}}\bar{P}$, $P'(Q)Q = -\frac{1}{2}\sqrt{\frac{S}{nQ}}\bar{P} = -\frac{1}{2}P(Q)$

    (d) $MR = \frac{1}{2}P(Q)$

(e) $P(Q) = 2c$. Prices double when marginal cost doubles. In 1e, prices less than double when marginal cost doubles. Here $\lim_{Q\to\infty} MR(Q) = 0$ while before $MR(Q) = 0$ for finite Q. Before even if marginal cost was zero, production and profit would be finite due to linear demand, but now that is not the case.

(f) $P = 2c$ and $\frac{nF}{S} + c = 2c \Rightarrow n = \frac{cS}{F}$

(g) $Q = \frac{F}{c}$

(h) n goes up, P and Q are constant. Before all 3 went down. In 1, the MR curve was a rotation around the p-intercept, but now the MR curve is a dilation of the demand curve by a factor that is independent of the market size.

(i) It would be good for welfare.

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