

Q 15.3 Friberg: Managing risk and uncertainty

a) The monopolist would set quantity for the old product as follows

$$\max_q (10 - q)q - cq$$

with first order condition

$$\begin{aligned}\frac{d\Pi}{dq} &= 10q - 2q - c = 0 \\ q &= \left(\frac{10 - c}{2}\right)\end{aligned}$$

and profit

$$\begin{aligned}\Pi_{old} &= \left(10 - \left(\frac{10 - c}{2}\right)\right) \left(\frac{10 - c}{2}\right) - c \left(\frac{10 - c}{2}\right) \\ \Pi_{old} &= \left(\frac{10 - c}{2}\right) \left(10 - \left(\frac{10 - c}{2}\right) - c\right) \\ \Pi_{old} &= \left(\frac{10 - c}{2}\right)^2\end{aligned}$$

For the new product quantity would be set to

$$\max_x (12 - x)x - cx$$

with profit analogously given by

$$\Pi_{new} = \left(\frac{12 - c}{2}\right)^2$$

so the incentive for the current monopolist to launch the product is

$$\Pi_{new} - \Pi_{old} = \left(\frac{12 - c}{2}\right)^2 - \left(\frac{10 - c}{2}\right)^2.$$

b) For a new entrant the incentive is simply

$$\Pi_{new} = \left(\frac{12 - c}{2}\right)^2$$

which is trivially higher than the incentive for the incumbent. The incumbent is "replacing" itself which weakens incentives for new product introductions.

c) The profits accruing from this product would be given by

$$\Pi_{new2} = \left(\frac{8 - c}{2}\right)^2$$

So the incumbent would choose not to launch it (since $\Pi_{new2} < \Pi_{old}$) whereas an entrant would launch as long as profit since $\Pi_{new2} > 0$ (under the implicit assumption that $c < 8$).i