ECON 321, Professor Hogendorn

Problem Set 2 Answers

1. *Windy* _a._

(a) The indifferent consumer gets equal utility from either restaurant, so

\[ v - p_a - x = v - p_b - R(1 - x) \]
\[ -p_a + p_b + R = (1 + R)x \]
\[ x = \frac{p_b - p_a + R}{1 + R} \]

(b) This is a simultaneous game. Restaurants a and b solve

\[
\begin{align*}
\text{FOC : } & \frac{\partial \pi_a}{\partial p_a} = x - \frac{p_a}{1+R} = 0 & \text{FOC : } & \frac{\partial \pi_b}{\partial p_b} = (1 - x) - \frac{p_b}{1+R} = 0 \\
p_b - p_a + R - p_a = 0 & \quad 1 - p_b + p_a - p_b = 0 \\
p_a(p_b) = \frac{p_b + R}{2} & \quad p_b(p_a) = \frac{1 + p_a}{2} \\
\end{align*}
\]

Solving the reaction functions simultaneously results in

\[
p_a = \frac{1 + p_a}{4} + \frac{R}{2} \Rightarrow \frac{3}{4} p_a = \frac{1 + 2R}{4} \Rightarrow p_a^* = \frac{1 + 2R}{3}
\]

And then

\[
p_b^* = \frac{1}{2} + \frac{1 + 2R}{6} = \frac{2 + R}{3}
\]

It’s not surprising that \( p_a^* \) increases in \( R \), but it is a little surprising that so does \( p_b^* \). This indicates that even product differentiation that is negative from the point of view of restaurant b can still help it increase its price.