# Errata file for
# "Industrial Organization: Practice Exercises with Answer Keys" Springer

Pak-Sing Choi, Eric Dunaway, and Felix Munoz-Garcia

April 23, 2022

1. **Chapter 1**.
   - Exercise 1.17(b). Page 47. The sixth line of the page should read "Taking the first order condition with respect to $A$, yields "
   - Exercise 1.17(c). Page 48. The fourth and fifth lines of the page should read "a larger $\alpha$ indicates that advertising expenditures are more efficient at boosting demand. "
2. **Chapter 2**.
   - Exercise 2.8(b). Page 74. The sixth displayed equation of the page should read: "Rearranging and solving for $q_1$, we find firm 1's equilibrium output

$$q_1^* = \frac{n(1-c)-(n-1)(1-c')}{n+1}.$$

which is positive since $n > n-1$ and $1-c \geq 1-c'$. We can finally insert this output level into firm $i$'s best response function to find its equilibrium output, that is,

$$\begin{aligned} q_i^* =& \frac{1-c'}{n} - \frac{1}{n}\left(\frac{n(1-c)}{n+1} - \frac{(n-1)(1-c')}{n+1}\right) \\ =& \frac{1+c-2c'}{n+1}." \end{aligned}$$

   - Exercise 2.8(c). Pages 74-75. Last sentence of the page should read: "Evaluating firm 1's equilibrium output at $c = c'$, we obtain

$$\begin{aligned} q_1^* &= \frac{n(1-c)-(n-1)(1-c)}{n+1} \\ &= \frac{1-c}{n+1} \end{aligned}$$

Similarly, evaluating its rivals' equilibrium output at $c = c'$, we find

$$\begin{aligned} q_i^* &= \frac{1+c-2c}{n+1} \\ &= \frac{1-c}{n+1} \end{aligned}$$

where $q_1^* = q_i^*$ coincides with the equilibrium output in a standard Cournot model with $n$ symmetric firms. "

- Exercise 2.8(d). Page 75. The answer should read: "First, recall that, as found in part (b), firm 1 is unambiguously active. However, each of its rivals is active if and only if $q_i^* \geq 0$, or

$$\frac{1+c-2c'}{n+1} \geq 0$$

which, solving for firm $i$'s costs, $c'$, simplifies to

$$c' \leq \frac{1+c}{2} \equiv \bar{c}$$

Therefore, when $c' \leq \bar{c}$, all firms are active. Otherwise, only firm 1 is active, as it benefits from a sufficiently strong cost advantage."

- Exercise 2.8(e). Page 75. The answer should read: "When $c = c'$, the inequality in part (d) becomes

$$c \leq \frac{1+c}{2}$$

that simplifies to $c \leq 1$; a condition that holds by definition, so that all firms produce positive units when they are cost symmetric (as in the standard Cournot model with $n$ symmetric firms)."

3. **Chapter 3**.

- Exercise 3.8, page 126, line 18 should read "... the entrant's profits should deduct the fixed costs $F$."

4. **Chapter 6**.

- Exercise 6.6. Page 254. Line 12 should change "their individual " to "its individual."
- Exercise 6.7. Page 258. The last line should read "..., is positive for all $\beta \in [0, 1]$."
- Exercise 6.9.
  - Page 265. Line 20 should read "less efficient "
  - Page 266. The fourth expression (first displayed equation in part c) should read as follows

$$\begin{aligned}
W(t) &= \frac{1}{2}[Q(t)]^2 + N\pi_i(t) - N^2[e_i(t)]^2 \\
&= \frac{N^2}{2}\left(\frac{1-c-t}{N+1}\right)^2 + N\left(\frac{1-c-t}{N+1}\right)^2 + \frac{Nt^2[1+2\beta(N-1)]}{2\gamma} \\
&\quad - N^2\left[\left(\frac{1-c-t}{N+1}\right)^2 - \frac{2t(1-c-t)[1+\beta(N-1)]}{\gamma(N+1)} + \frac{t^2[1+\beta(N-1)]^2}{\gamma^2}\right] \\
&= \frac{2N^2[1+\beta(N-1)](1-c-t)t}{\gamma(N+1)} - \frac{N(N-2)(1-c-t)^2}{2(N+1)^2} \\
&\quad + \frac{N\left[\gamma(1+2\beta(N-1)) - 2N(1+\beta(N-1))^2\right]t^2}{2\gamma^2}
\end{aligned}$$

  - Page 266. The last displayed equation should read as

$$\begin{aligned}
&\frac{2N^2[1+\beta(N-1)](1-c-2t)}{\gamma(N+1)} + \frac{N(N-2)(1-c-t)}{(N+1)^2} \\
&\quad + \frac{N\left[\gamma(1+2\beta(N-1)) - 2N(1+\beta(N-1))^2\right]t}{\gamma^2} = 0
\end{aligned}$$

– Page 267. The first expression should read as follows: "Solving for $t$, the optimal emission fee is

$$t(N) = \frac{\gamma\left[2N(N+1)(1+\beta(N-1)) + \gamma(N-2)\right](1-c)}{4\gamma N(N+1)\left[1+\beta(N-1)\right] + \gamma^2(N-2) - (N+1)^2\left[\gamma(1+2\beta(N-1)) - 2N(1+\beta(N-1))^2\right]}$$

Substituting $c = 0$ and $\gamma = 5$ into the above equation, we find that the optimal emission fee becomes

$$t(N) = \frac{5\left[2N(N+1)(1+\beta(N-1)) + 5(N-2)\right]}{20N(N+1)\left[1+\beta(N-1)\right] + 25(N-2) - (N+1)^2\left[5(1+2\beta(N-1)) - 2N(1+\beta(N-1))^2\right]}$$

– Page 267, immediately before part (d), please remove the second line that says 'where $A \equiv 1 + \beta(N-1)$.'

– Page 267. The fourth expression should read as

$$\frac{10N\left[1+\beta(N-1)\right] - (N+1)\left[5(1+2\beta(N-1)) - 2N(1+\beta(N-1))^2\right]}{20N(N+1)\left[1+\beta(N-1)\right] + 25(N-2) - (N+1)^2\left[5(1+2\beta(N-1)) - 2N(1+\beta(N-1))^2\right]}$$

– Page 267. The fifth expression should read as

$$\begin{aligned} z_i(N) &= \frac{t(N)}{\gamma} \\ &= \frac{2N(N+1)(1+\beta(N-1)) + 5(N-2)}{20N(N+1)\left[1+\beta(N-1)\right] + 25(N-2) - (N+1)^2\left[5(1+2\beta(N-1)) - 2N(1+\beta(N-1))^2\right]} \end{aligned}$$

– Page 267. The sixth expression should read as

$$\begin{aligned} Z(N) &= \frac{2N^2(N+1) + 5N(N-2)}{20N(N+1) + 25(N-2) - (N+1)^2(5-2N)} \\ &= \frac{N(2N^2+7N-10)}{2N^3 + 19N_2 + 37N - 55}. \end{aligned}$$

– Page 267. The seventh expression (last displayed equation of the page) should read as follows

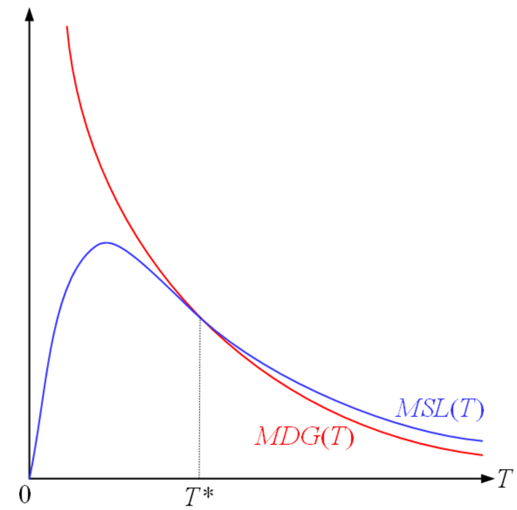
$$\frac{\partial Z(N)}{\partial N} = \frac{24N^4 + 188N^3 + 119N^2 - 770N + 550}{(2N^3 + 19N^2 + 37N - 55)^2}$$

– Page 268. The first displayed equation should read

$$\begin{aligned} Z(N) &= \frac{2N^2(N+1)^2 + 10N(N-2)}{20N(N+1)^2 + 50(N-2) - (N+1)^2\left[10N - N(N+1)^2\right]} \\ &= \frac{2N^4 + 4N^3 + 12N^2 - 20N}{N^5 + 4N^4 + 16N^3 + 24N^2 + 61N - 100}. \end{aligned}$$

– Page 268. The first bullet point should be part (f).

- Exercise 6.11. Page 276. Figure 6.6 should be replaced with the following figure.




  The last paragraph of this exercise should read "...and the $MSL(T)$ curve, which is concave in $T$, and their crossing point at the socially optimal patent length, $T^*$. It is beyond the scope of this exercise, but you may check that, indeed, the $MSL(T)$ curve originates at $MSL(0) = 0$, increases in $T$, reaches a maximum at $T = \frac{\log 2}{r}$, and then decreases in $T$."

- Exercise 6.12.
  - Page 276. Add the following sentence immediately after the description in line 10: “For simplicity, consider $\frac{1}{2} \leq c \leq 1$.”
  - Page 277.
    * The second expression should read

      $$S(T) = \frac{e^{-rT}\left[\frac{(1-\frac{c}{\alpha})^2}{2} - (1 - e^{rT})\left(\frac{(1-c)[\alpha(1+c)-2c]}{2\alpha}\right)\right]}{r},$$

      and the third expression should read

      $$S\left(T\right) = \frac{e^{-rT}}{2\alpha^2 r}\left[c^2\left(\alpha - 1\right)^2 + e^{rT}\alpha\left(1 - c\right)\left(\alpha + \alpha c - 2c\right)\right].$$

    * Line 5. Remove “(an implicit condition suffices)”
    * The fifth expression should read

      $$S\left(T\right) = \frac{e^{-rT}}{2\alpha^2}\left[\alpha\left(1 - c\right)\left(\alpha + \alpha c - 2c\right) - \left(\alpha - c\right)^2\right],$$

    * Lines 8 to 12. Remove the following phrases “For an interior solution of $T$, $MSL(T)$ must be increasing in $T$, . . . when $s = 0.05$. ”
  - Page 278.
    * Line 1. Change to $c = 0.9$.
    * Line 2. Change to $T = 43.9$.
    * Line 5. Change to 37.8 years.

5. **Chapter 7**.

- Exercise 7.16, page 329, line 2 should read “. . . $\delta_{pre}$, found in part (a).”