Errata to the 4th Printing of Industrial Organization: Theory & Applications

by
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Chapter 2: Basic Concepts In Noncooperative Game Theory

p.32, line 9, ...that no unilateral [deviation] is beneficial...

Chapter 3: Technology, Production, Cost, And Demand

p.48, Figure 3.2: The AC curve (bottom row) is drawn under the assumption that $0 < \gamma < 1/2$. Observe that when $\gamma = 1/2, AC = WQ$ constituting a ray from the origin. When $1/2 < \gamma < 1$, AC is concave to the origin (rather then convex).

Chapter 6: Markets For Homogeneous Products

p.109, Proposition 6.2(2): This equilibrium is NOT unique since $p_1 = c_2$ and $p_2 = c_2 + \epsilon$ is also an equilibrium.

p.109, Proposition 6.2(2): It is useful to assume that $\lambda \geq 2$ (instead of $\lambda \geq 1$). Under $\lambda = 1$, undercutting by firm 1 may leave it with zero profit.

p.115, line 5: Replace Definition 2.4 by Definition 6.1

p.115, line 6: replace $p_1^c = p_2^c = 3$ by $q_1^c = q_2^c = 3$

p.118, line 4: replace $t = 0, 1, 2, ...$ by $t = 1, 2, ...$

p.128, line -6: "...to enter or the exit..." should be: "...to enter or to exit..."

Chapter 7: Markets For Differentiated Products

p.134. Bottom left side of Figure 7.1 should be:

$\boxed{\text{COURNOT}}$ (Subsec. 7.1.1) and $\boxed{\text{BERTRAND}}$ (Subsec. 7.1.2)

p.136, eq.(7.2): delete > 0 after the "c" (that is, we allow $c < 0$ at this stage)

p.142, 1st line below Proposition 7.4: "It is amazing?" should be: "Is this amazing?"

p.143, equation (7.12): From a technical point of view only, it is more appropriate to write it as: $\sum_{i=1}^{N} q_i^{1/2}$, where N is the number of produced brands

p.144, equation (7.13) should be:

$$\sum_{i=1}^{N} p_i q_i \leq I \equiv L + \sum_{i=1}^{N} \pi_i(q_i).$$

p.144, the last line: The minus sign in front of λ on the RHS of the Lagrangian should be be replaced by the plus sign.

p.145, (7.14) should be:

$$p_i(q_i) = \frac{1}{2\lambda\sqrt{q_i}}$$

p.150: (Style correction: Not a mistake!) the () around $(L - b + a)$ and $(L + b - a)$ in the last two equations are redundant.

p.155, Definition 7.4 (2), second line: $\pi_i(q^o) = 0$ should be $\pi_i(p^o, p^o) = 0$.

p.155, last line: τ/N and $1/N$ should be: τ/N^o and $1/N^o$ respectively.

p.160, Line 13: (Style correction: Not a mistake!) replace maintaining by obtaining

Chapter 8: Concentration, Mergers And Entry Barriers

p.179, 3rd line below Proposition 8.3: "...firm B or firm 1..." should be: "...firm B or firm 2..."

p.182, line 8: ...Nash equilibrium were... should be: ...Nash equilibrium where...

p.184, line -8: "less than the entry cost" should be: "less the entry cost"

p.185, line 1 of 3rd paragraph: "...this analysis be..." should be: "...this analysis by..."

p.186, Proposition 8.6: (Style correction: Not a mistake!) Add: Formally, ((Exit, Stay-in), Enter) is a unique SPE.

p.189, equation (8.17): replace $-k_1$ by $-\bar{k}_1$.

p.199, Figure 8.9: The curve should be convex to the origin (rather than concave).

p.204, eq. (8.27): replace $q_1^1(4) = 5$ by $q_1^1(4) = 3$

Chapter 9: Research and Development

p.227, Proposition 9.1 should read: $E\pi^S(1) > E\pi^S(2)$ but $E\pi_k(2) > 0$, when....

p.230, eq.(9.6) Restrict β to satisfy $(3 - \sqrt{7})/2 < \beta < 1$.

Explanation: making $\beta < 1$ would make the own R&D effect stronger than the rival effect. Now, when $\beta < (3 - \sqrt{7})/2$, the slope of the best-response functions implicitly defined by the FOC of (9.8) is less than -1, which make the system unstable.

Remark: Using the implicit function theorem, the FOC of (9.8) becomes

$$\frac{2(2\beta^2 - 5\beta + 2)}{2\beta^2 - 8\beta - 1},$$

which is negative for $\beta < 0.5$, and positive for $\beta > 0.5$. Finally, note that the model is unstable when there are no spillovers, i.e., when $\beta = 0$.

p.238–239: The Proof of Proposition 9.4 must be divided into 2 cases: First, for $\rho < 0.5$

$$W(1) = \frac{CS_0 + (a-c)^2}{1-\rho} - \frac{(a-c)^2}{2}\frac{(1-2\rho)}{1-\rho} = \frac{CS_0}{1-\rho} + \frac{(a-c)^2}{1-\rho}\frac{(1+2\rho)}{2} \qquad (9.16)$$

$$W(\infty) = \frac{CS_0}{1-\rho} + \frac{(a-c)^2}{(1-\rho)^2} - \frac{(a-c)^2}{2(1-\rho)^2} = \frac{CS_0}{1-\rho} + \frac{(a-c)^2}{2(1-\rho)^2} \qquad (9.17)$$

$$W(1) > W(\infty) \iff \frac{(a-c)^2}{1-\rho}\frac{1+2\rho}{2} > \frac{(a-c)^2}{2(1-\rho)^2} \iff \rho < \frac{1}{2} \qquad (9.18)$$

Second, for $\rho \geq 1/2$ we approximate T as a continuous variable. Differentiating (9.15) with respect to T, and equating to zero yields

$$T^* = \ln[3 + \sqrt{(6 + \rho^2 - 6\rho)} - \rho] - \frac{\ln(3)}{\ln(\rho)} < \infty.$$

Instead of verifying the second order condition, it is easier to verify that for $T = 1$,

$$\frac{dW(T)}{dT} = \frac{(a-c)^2\rho(1 - 5\rho)\ln(\rho)}{2(1-\rho)^2},$$

which is greater than zero for $\rho > 0.2$.

Chapter 10: The Economics Of Compatibility And Standards

p.260, line -11: "...the aggregate the number..." should be: "...the aggregate number..."

P.271: The sentence before Proposition 10.13 should be deleted, since it contradicts the statement made about the 3rd equilibrium of the proposition.

p.272: Equations (10.16) and (10.17) hold for the two equilibria in which all three consumers are served (see Proposition 10.13 on p.271). However, for the third equilibrium, in which consumer AB is not served, equations (10.16) and (10.17) should be modified to $CS^I = 0$ and $W^I = 4\lambda$, respectively.

Chapter 11: Advertising

p.289, Figure 11.2: The graph of $1/[\delta(1-\delta)]$ should be upward sloping for all $\delta > 0.5$, and slope $+\infty$ at $\delta = 1$.

p.289 (bottom 2 lines) and p.290 (first 2 lines): This discussion should be rewritten since in the specified range firms overadvertise (not underadvertised as stated).

p.294, part 2 of the proof, line 2: Replace $\pi^1(I, P) = N$ by $\pi^1(P, I) = N$.

p.295, line 12, "principle" should be "principal"

Chapter 12: Quality, Durability, And Warranties

p.314, equation (12.8), line 2 should be:

$$\pi_B(a,b) = \frac{1}{b-a}\left[\frac{2(b-a)^2}{3} - \frac{4(b-a)^2}{9} + \frac{2(b-a)^2}{9}\right] = \frac{4(b-a)}{9}.$$

p.316, top line should be: "and who desires..."

p.320, Proposition 12.6: Third line should be: $I \leq \max\left\{2(v^N - v^O)\,;\, v^N\right\} - v^0$. That is, the cost of innovation should not exceed the *difference* between profit made from selling the new technology and the profit that could be made without innovation.

p.326, Figure 12.5: There is no reason for assuming that $U^G > N^G/2$. In fact, this assumption may be misleading since it implies that in regions (I) and (II), $p^U > p^N$ (i.e., used cars are priced higher than new cars).

p.330, 1st displayed equation: $p^m q^m$ should be: $(p^m - c - H)q^m$

p.331, line 4: "care or it" should be: "'care of it"

Chapter 13: Pricing Tactics: Two-Part Tariffs And Peak-Load Pricing

p.343, Figure 13.1 the quasi-linear indifference curves are not parallel but they should be parallel.

p.345, Figure 13.2 the quasi-linear indifference curves are not parallel but they should be parallel.

p.346 r-3 (not a typo, just better exposition): $MR_H(Q_H) = MR_B(Q_B) = MC(Q_H + Q_B) = 0$ (same order as on p.77).

Section 13.3: Peak-load pricing: The analysis is conducted under the assumption that low-season demand is "significantly" lower than the high-season demand. This assumption must be added to Proposition 13.4 on page 350. In future editions, I will add an analysis of peak-load pricing when the two demand functions are similar, in which case capacity should be treated as a "public" good.

p.351, line 2: Replace "determined by is..." by "determined by..."

p.354, line 16: The assumption $c_D \geq c_N$ is not needed. Replace it with $c_D \geq 0$ and $c_N \geq 0$.

p.354, equation (13.11) should be:

$$TC(\hat{\delta}) = r \max \left\{ \hat{\delta} - a, b - \hat{\delta} \right\} + (\hat{\delta} - a)c_N + (b - \hat{\delta})c_D. \qquad (13.11)$$

p.354, last line should be: $K = (b - a)/2$ instead of $K = (a + b)/2$.

p.355, Figure 13.6 should be:
$$\frac{(b - a)(r + c_D + c_N)}{2}$$

p.357, Proposition 13.7, the signs of the r should be reversed (twice) so that

1. under vertical differentiation

$$\hat{\delta} = \min \left\{ \frac{\beta(1 + b) + r + c_D - c_N}{2\beta} ; \frac{a + b}{2} \right\}, \quad \text{and}$$

2. under horizontal differentiation

$$\hat{\delta} = \max \left\{ \frac{\beta(1 + b) - r + c_D - c_N}{2\beta} ; \frac{a + b}{2} \right\}.$$

p.358. Proof: the signs of the r should be reversed (twice) so that

$$\beta(1 + b) - 2\beta\hat{\delta} = -r + c_N - c_D.$$

$$\beta(1 + b) - 2\beta\hat{\delta} = +r + c_N - c_D.$$

Chapter 14: Marketing Tactics: Bundling, Upgrading, And Dealerships

p.364, line -8: "bundling" should be "tying"

p.368, Proposition 14.5 (2) "bundling" should be "tying"

p.369, line -4: Replace "the North America" by "North America"

p.375, Line -6: Replace $\equiv$ by $=$.

p.375, Line -5 should be "... if and only if $w > \frac{1}{2}$. Hence,"

p.375, bottom line should be: "That is, $\bar{s} < s^*$."

p.376, Line 3 should be: "That is, $\bar{s} > s^*$."

p.376, line 8: Replace "...to overtaken" by "...to be overtaken"

p.378–379, the sentence before (14.16) should be: "...we know that a necessary condition (but not sufficient) for a new edition to be introduced in period 2 is"

p.379, equation (14.17) should be:

$$\pi = n(p_1 - c) + \pi_2 = \begin{cases} n(V - c) + n(V - c) - F & \text{if a new edition is introduced} \\ n(V + c - c) + 0 & \text{no revision is made.} \end{cases}$$

p.387, line -5: $p_i^D = B - F$ should be $p_i^D = B$.

p.388, line 6: $[0, 1/2)$ should be: selling in the neighborhood of consumer 1.

p.388, line 7: $[1/2, 1]$ should be: selling in the neighborhood of consumer 2.

Chapter 15: Monitoring, Management, Compensation, And Regulation

p.404 line-16: delete the sentence: "In other words, the contract that $w^H - w^L$ is minimized."

p.411 eq.(15.30) should be:

$$\max_{\alpha_i} \left[-a\alpha_i c + 2a\alpha_j c + 6\alpha_i c^2 - 2\alpha_i^2 c^2 - 3\alpha_j c^2 - \alpha_i \alpha_j c^2 + \alpha_j^2 c^2 \right] \qquad (15.30)$$

however the best-response function is correct.

p.412, eq.(15.34) should be:

$$\max_{\alpha} (\pi_1 + \pi_2) = 2(ac\alpha - 2c^2\alpha^2 + 3\alpha c^2).$$

However, the solution to the maximization of the joint profit is correct.

p.414, line-10: $1/2$ should be $3/4$

p.417, line 5: $S()$ should be s() [lower case]

Chapter 16: Price Dispersion And Search Theory

p. 424, line 17: "In addition, on average, half of..." should be "In addition, on average, $1/3$ of...".

p.426, top line: Delete "since we assumed that $H > 3L$." That is, $p_D < p_{ND}$ always holds.

p.427, Assumption 16.1: Add: From consumers' point of view, the number of stores of each type is "large." Consequently, from consumers' perspective, the price distribution associated with the next search does not vary during the sequential search process.

p.427, Assumption 16.1 (2): Not an error, but an incomplete assumption, which should be: $0 < s < (n-1)/2$.

p.428, line 9: as long as he or she likes instead of as long as he she likes

p.431, subsection 16.2.2, line 9: Replace "when he or her" with "when he or she"

p.432, delete Exercise 1.

Chapter 17: Miscellaneous Industries

p.444, Proposition 17.2: Replace "increases exponentially" with increases quadratically"

p.445, eq.(17.6): the last term of profit expression should be:

$$-2c \left(\frac{3n}{4c} \right)^2 \text{ instead of } -2 \left(\frac{3n}{4c} \right)^2 .$$

I.e., c is missing.

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