# Advanced Industrial Economics, $2^{nd}$ edition: typographical errors

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**Abstract**

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# 1. Introduction

This section inserted to maintain consistency between the section numbers of this document and the chapter numbers in the book.

# 2. Foundations of Oligopoly Theory I

- Absolute value signs were omitted in the second expression in (2.31) (page 32); it should read:

$$\left| \left. \frac{d\widehat{q}_1}{dq_2} \right|_* \right| < 1, \quad \left| \left. \frac{d\widehat{q}_2}{dq_1} \right|_* \right| < 1. \tag{2.31}$$

- Equation (2.32) (page 32) should read

$$1 - \left[ \left. -\frac{\frac{\partial^2 \pi_1(\widehat{q}_1, q_2)}{\partial q_1 \partial q_2}}{\frac{\partial^2 \pi_1(\widehat{q}_1, q_2)}{\partial q_1^2}} \right|_* \right] \left[ \left. -\frac{\frac{\partial^2 \pi_2(\widehat{q}_1, q_2)}{\partial q_1 \partial q_2}}{\frac{\partial^2 \pi_2(\widehat{q}_1, q_2)}{\partial q_2^2}} \right|_* \right] > 0. \tag{2.32}$$

- December 2001: on the first line of equation (2.28), the second partial derivative should be of $\widehat{q}_1(q_2) - q_1$, not $\widehat{q}_1(q_2) - q_2$. The complete and correct form of the equation is

$$\widehat{q}_1(q_2) - q_1 \approx$$

$$\widehat{q}_1(q_2^*) - q_1^* + \left. \frac{\partial[\widehat{q}_1(q_2) - q_1]}{\partial q_1} \right|_* (q_1 - q_1^*) + \left. \frac{\partial[\widehat{q}_1(q_2) - q_1]}{\partial q_2} \right|_* (q_2 - q_2^*)$$

$$= (-1)(q_1 - q_1^*) + \left. \frac{d\widehat{q}_1}{dq_2} \right|_* (q_2 - q_2^*). \tag{2.28}$$

- January 2002: there is an incorrect subscript in the numerator on the right in equation (2.8), which should read

$$2p_2 = -\frac{Q(p_2)}{dQ(p_2)/dp}, \tag{2.8}$$

- January 2002: equation (2.62) should read

$$n_{Cour}^{lr} - n_c^{lr} = 2\frac{e}{d}\frac{a-c}{d-b} + \frac{1}{2} > 0. \tag{2.62}$$

## 3. Foundations of Oligopoly Theory II

- November 2001: coefficients are inverted in the statement of problems 3.9 and 3.10. The correct expressions (which now appear in the solutions manual) are
  - Problem 3.9:

$$p = f_1 + \frac{b\left(bg_1 + 2g_2g_1 + g_2b\right)}{\sqrt{(b+g_1)(b+g_2)\left(bg_1 + g_1g_2 + bg_2\right)} - g_1\left(b+g_2\right)}q_1$$

    and

$$p = f_2 + \frac{b\left(bg_1 + 2g_2g_1 + g_2b\right)}{\sqrt{(b+g_1)(b+g_2)\left(bg_1 + g_1g_2 + bg_2\right)} - g_1\left(b+g_1\right)}q_2.$$

  - Problem 3.10:

$$p = f + \frac{\sqrt{g^2 + 2bg + (1-\theta^2)b^2} - g}{b(1-\theta^2)b + 2g}q.$$

- January 2002: equation (3.68) should be

$$q_B = \frac{1+(n-2)\theta}{b(1-\theta)\left[1+(n-1)\theta\right]}\left(p_B - c\right) = \frac{1+(n-2)\theta}{\left[1+(n-1)\theta\right]\left[2+(n-3)\,\theta\right]}\frac{a-c}{b}. \tag{3.68}$$

- August 2003: A superscript is mislabeled in Figure 3.3(d); the equation of the equilibrium inverse demand curve should be

$$p_1 = \left(a - b\theta q_2^B\right) - b\theta q_1.$$

- December 2003, p. 49 (thanks to Pia Weiss): The statement in the paragraph immediately following equation (3.22) that the second-order condition is not satisfied for $\lambda = -2$ is incorrect. It is nonetheless correct that $\lambda = -2$ does not qualify as a consistent conjecture.

One should write the equation of the inverse demand curve as

$$p = \begin{cases} 6 - q_1 - q_2 & 0 \le q_1 + q_2 \le 6 \\ 0 & 6 \le q_1 + q_2 \end{cases}.$$

Then firm 's profit, equation (3.15), is

$$\pi_1 = \begin{cases} \left(6 - \frac{5}{4}q_1 - q_2\right) q_1 & 0 \leq q_1 + q_2 \leq 6 \\ -\frac{1}{4}q_1^2 & 6 \leq q_1 + q_2 \end{cases}.$$

The first-order condition for profit-maximization in the range $0 \leq q_1 + q_2 \leq 6$ is equation (3.16)

$$\frac{\partial \pi_1}{\partial q_1} = 6 - \left(\frac{5}{2} + \lambda_1\right) q_1 - q_2 \equiv 0,$$

and this leads to equation (3.21) and the two roots $\lambda = -2, -\frac{1}{2}$. From equation (3.23),

$$q_1 = q_2 = \frac{12}{7 + 2\lambda},$$

$\lambda = -\frac{1}{2} \Rightarrow q_1 = q_2 = 2$, hence $p = 2$. Mechanically substituting $\lambda = -2$ leads to $q_1 = q_2 = 4$, but this places total output in the range where price equals zero, rather than the $6 - q_1 - q_2$ that was used to reach equation (3.21). The root $\lambda = 2$ must therefore be discarded, and $\lambda = -\frac{1}{2}$ is the unique consistent conjecture.

## 4. Foundations of Oligopoly Theory III

- (2 June 2004) the left-hand side of equation (4.58) should be $q_B$, not $q_A$:

$$q_B = \frac{\theta_H - \theta_{AB}}{\theta_H - \theta_L}. \tag{4.58}$$

## 5. Early Empirical Studies of Structure–Conduct–Performance Relationships

## 6. Debates Over Interpretation and Specification

- (December 2001) Equations (6.76) and (6.78) are valid if marginal cost is constant (with respect to output) and if the firm's marginal cost is constant.

They are also valid in oligopoly if marginal cost is constant and firms maintain matching conjectures. A general expression for the Rosse-Panzar statistic $\psi$ in terms of the Lerner index $L$, the firm's price-elasticity of demand $\varepsilon$, and the firm's cost function $C$ is

$$\psi = \frac{(L-1)^2}{L(L-1) + \frac{q}{\varepsilon^2}\frac{\partial \varepsilon}{\partial q} - \frac{q}{p}C_{qq}}.$$

If the firm's price-elasticity of demand falls as the firm's output rises, one can show

$$\frac{1}{L} > 1 - \psi \qquad L < \frac{1}{1-\psi}.$$

See lecture notes at URL http://www.mgmt.purdue.edu/faculty/smartin/aie2/aie2.htm.

## 7. Empirical Studies of Market Performance

The text around equation (7.25) and should read (leaving the final footnote as is):

Following Steen and Salvanes (1999), suppose demand and marginal cost are both linear. Let the equation of the demand function be

$$Q = \alpha_0 + \alpha_p p + \alpha_Z Z + \alpha_{pZ} PZ + \varepsilon \tag{7.25}$$

where $Z$ is a variable that affects demand and $\varepsilon$ an error term. Let marginal cost be

$$c'(q_i) = \beta_0 + \beta_Q q_i + \beta_W W \tag{7.26}$$

where $W$ is a variable that affects marginal cost.[1]

Substituting (7.26) in (7.24), adding an error term $\eta$, and rearranging terms slightly gives a version of the supply relation that can be estimated simultaneously with the demand function (7.25):

$$P = \beta_0 + \beta_Q q_i + \beta_W W - \Theta_i \frac{q_i}{\alpha_p + \alpha_{pZ} Z} + \eta. \tag{7.27}$$

Bresnahan (1982) and Lau (1982) show that the conjectural parameter $\Theta_i$ is identified so long as the true value of the interaction coefficient $\alpha_{pZ}$ in the demand equation is not equal to zero. Informally, for $\alpha_{pZ} \neq 0$, the variable $q_i$ and the ratio $q_i/(\alpha_p + \alpha_{pZ} Z)$ in (7.27) move in different ways and their respective coefficients can be estimated. If the true value of $\alpha_{pZ}$ is zero, what could be estimated in (7.27) is the coefficient of $q_i$, the sum $\beta_Q +$ $(\Theta_i/\alpha_p)$, which would not permit recovery of $\beta_Q$ or $\Theta_i$.

[1] $Z$ and $W$ can be made to be vectors without changing the argument.

## 8. Strategic Behavior

- There is a typographical error in the text immediately after equation (8.49), which should read

  If $q_{12} > q_{limit}$, (8.49) implies $\mu = 0$. Then in turn (8.47) and (8.48) imply that $q_{12} = q_{limit} = S_{c+s}/2$, a contradiction. Thus if the incumbent is to sell more in the second period than in the first, it must be the case that $q_{12} = q_{limit}$.

- January 2002: equation (8.22) should read

$$p = c + r + \frac{1}{2} b S_{c+r} - \frac{1}{2} b q_1. \tag{8.22}$$

- January 2002: equation (8.37) should read

$$G_1 = b(S_{c+s} - q_{11})q_{11} + \frac{b}{1+r}(S_{c+s} - q_{12})q_{12}. \tag{8.37}$$

- January 2002: the value of $\lambda$ given in footnote 16 is incorrect. Footnote 16 should read

  It follows that $\lambda = s/\left(2 + r\right)$.

- January 2002: there is a closing parentheses missing in footnote 17, which should read

  An additional consistency condition is that $\mu = b\left(S_{c+s} - 4\sqrt{F/b}\right)/(1+r) \geq 0$, but this is satisfied if (8.50) is satisfied.

- January 2002: the subscript of the second rho in equation (8.63) should be 1, not 2:

$$\alpha = \frac{f}{2\rho_2}\left(\frac{\rho_1}{f} - \frac{1}{b}\right). \tag{8.63}$$

## 9. Advertising

## 10. Collusion and Noncooperative Collusion

- January 2002: equation (10.31) should read

$$\pi_{i,Cournot} = b\left(\frac{S}{n+1}\right)^2. \tag{10.31}$$

- 15 March 2002: the first term after the equals sign in equation (10.82) should be $E_\mu[\pi(r, q_\chi)]$, not $E_\mu[\pi(q_{NC})]$. The correct expression is

$$\begin{aligned} V(r, q_\chi) = {} & E_\mu[\pi(r, q_\chi)] + \alpha V(r, q_\chi)\Pr(p \geq \overline{p}) + \\ & \left\{\tfrac{\alpha}{1-\alpha}(1-\alpha^\omega)E_\mu[\pi(q_{NC})] + \alpha^{\omega+1}V(r, q_\chi)\right\}\Pr(p < \overline{p}), \end{aligned} \tag{10.82}$$

- 28 March 2002: equation (10.108) should read

$$(1-\theta)(a-c)-2(p_{11}-c)+\theta\left[R(p_{10}-c)+(1-R)(p_R-c)\right]+\alpha(p_{12}-c)\theta R = 0.$$

- 11 February 2003: the correct value of the coefficient of $\Delta GNP/GNP$ in equation (10.98) is 0.876. The equation should read

$$\frac{\Delta P_{cement}}{P_{cement}} = \underset{(4.635)}{0.037} - \underset{(5.879)}{0.876}\frac{\Delta GNP}{GNP} \tag{10.98)}$$

## 11. Market Structure, Entry, and Exit

## 12. Firm Structure, Mergers, and Joint Ventures

- 8 April 2002: on page 404, the first sentence of the second paragraph should read

  In the market of figure 12.2(a), an upstream firm $U$ produces an input at constant average and marginal cost, which we normalize to zero.

- 8 April 2002:

  - Section 12.10.2, the third sentence of the first paragraph should read

These $n$ firms form $J$ joint ventures, identified with a superscript $J$. The ownership share of parent $i$ in joint venture $j$ is $\phi_{ij}$.

- – p. 417: The first full sentence should read

  The ownership share of firm $i$ in firm $j$ is $\phi_{ij}$, and $\phi_{1j}+\phi_{2j}+\ldots+\phi_{nj}=\nu$.

## 13. Vertical Restraints

- 8 April 2002: the sentence before equation (13.8) should begin

  From the demand curves ((13.2) and (13.3)) we obtain an expression for retailer 1's profit:

- 8 April 2002: the first sentence after equation (13.102) should read

  Tying and bundling have strategic effects because they alter — indeed, may even create — substitutability relationships.

## 14. Research & Development

- 24 February 2003: the slope coefficient is omitted on the right in equation (14.5), which should read

$$q_i = \frac{1}{2b}\left[a - c + x_i + \sigma x_j - bq_j\right]. \tag{14.5}$$

- 24 February 2003: an exponent is omitted in the numerator of the expression for equilibrium firm payoffs, which should read

$$\pi^{AJ}_{NN} = \frac{1}{9}\gamma\frac{b\gamma - \frac{2}{9}\left(2-\sigma\right)^2}{\left[b\gamma - \frac{2}{9}\left(1+\sigma\right)\left(2-\sigma\right)\right]^2}\left(a-c\right)^2. \tag{14.13}$$