Hayashi *Econometrics*: Typo/Error Alert

If you discover typos or errors not listed here, please let me know by sending email to: `hayashi.econometrics at gmail.com` (my previous email address is no longer valid). Please include the word "econometrics" or "Econometrics" in the subject line of your email.

Recent updates:

- November 16, 2010 (new typos on pp. 6, 22, 28, 30, 42, 57, 101, 119, 325, 331, 447)

- February 23, 2010 (new typos on pp. 124, 171).

- September 25, 2009 (new typos on pp. 48, 126, 169, 252, 254, 339, 486).

- October 4, 2007 (a new typo on p. 397)

- September 16, 2007 (p. 580, Example 9.1; I forgot to take the log of the exchange rate)

- January 10, 2007 (p. 275, 6th line from bottom)

- June 8, 2006 (last line of p. 58)

- March 2, 2006 (about the 4th line on p. 382)

- June 11, 2005 (Two typos. One on p.549, the other on p. 554)

- March 14, 2005 (A minor error on p. 648)

- October 22, 2004 (A minor typo on p. 255)

- September 20, 2004 (A new one on p. p. 554)

- September 14, 2004 (A minor change on p. 504)

- September 10, 2004 (minor typos on pp. 494, 497, 648; typos on pp. 382, 417, 468, 571, 593; a notational improvement on p. 491 and p. 496)

- February 23, 2004 (spelling errors on p. 7, p. 86, p. 648; minor corrections on p. 351, p. 355; wrong publication year on p. 220; errors in cross-referencing on p. 351, p. 350; other corrections on p. 112, p. 192, p. 196, 197, P. 337, p. 341, p. 353, p. 354)

- December 13, 2003 (new typos on p. 112, p. 128, p. 152, p. 167, p. 618)

- November 11, 2003 (footnote 16 on p. 37; Analytical Exercise 7(b) on p. 76)

- November 4, 2003 (a misspelling on p. 87; a minor typo in the notation for partial derivatives)

- June 3, 2003 (stylistic typos on p. 33 and p. 97)

- May 28, 2003 (about (5.A.12) on p. 348)

- April 29, 2003 (an error on p. 91, p. 173, p. 402; new typos on p. 185, in Table 10.4 on p. 655)

- February 20, 2003 (new typos on p. 335, p. 348 (5 typos), p. 633)

- February 20, 2003 (a new typo on p. 451)

- December 17, 2002 (new typos on p. 278, p. 524)

- December 6, 2002 (new typos on p. 111, p. 174 (2nd line from bottom))

- September 5, 2002 (new typos on p. 90, p. 256)

- March 3, 2002 (a new typo on p.331, in Proposition 5.1)

- February 24, 2002 (new typos on p. 306)

- February 9, 2002 (new typos on pp. 179, 308, 346, 417, 442)

- January 16, 2002 (new typos on pp. 108, 204, 216)

Chapter 1

- Page 6, 3rd line. The phrase "the marginal effect of education declines with the level of education". A better wording is "the marginal effect of education declines as the level of education increases". (Pointed out by Scott Kostyshak of Princeton University.)

- Page 7, footnote 1. J.-F. Richard's name is misspelled. "Richards" should be "Richard". Same error on p. 86. (Discovered by Athanasios Thanopoulos of U. of Pittsburgh)

- Page 22, line 1. "$\mathbf{x}_i$ as before is the i-th row of $\mathbf{X}$" should be "$\mathbf{x}_i'$ as before is the i-th row of $\mathbf{X}$" (that is, add a prime to $\mathbf{x}_t$). (Discovered by Yunbing Jiang of Lingnan College of Sun-Yet Sen University, China).

- Page 25, Hint to Review Question 1. The summation should be from $i = 1$ to n, not from $k = 1$ to K. (Discovered by Tara Sinclair of Washington University of St. Louis.)

- Page 28, 2nd line from the bottom. Replace "whenever" by "if and only if". (Pointed out by Scott Kostyshak of Princeton University.)

- Page 30, 3rd line from the bottom. "As shown in (1.2.12)" should be "As shown in Review Question 5(b) of Section 1.2". This is because (1.2.12) merely states, but does not prove, the claim that $\mathbf{e}'\mathbf{e} = \varepsilon'\mathbf{M}\varepsilon$. (Pointed out by Scott Kostyshak of Princeton University.)

- Page 33, second paragraph, 5th line: "of testing hypothesis" should be "of testing hypotheses". (Discovered by Alan Mehlenbacher, Expert Decision Software, Alan Mehlenbacher Associates Ltd.)

- Page 37, footnote 16. The matrix $\mathbf{A}$ needs to be symmetric as well as idempotent. So "idempotent" should be "symmetric and idempotent". (Discovered by K. Fukushima of University of Tokyo.)

- Page 42, 4th line from bottom. "two different sum of squared residuals" should be "two different sums of squared residuals". (Pointed out by Scott Kostyshak of Princeton University.)

- Page 48, footnote 22. In the last line, "μ" should be in bold. (Discovered by Yueshen Zhou, from the University of Hong Kong.)

- Page 51, equations (1.5.12) and (1.5.14b): "$\partial^2\widetilde{\gamma}$" should be "$\partial\widetilde{\gamma}^2$". (Discovered by H. Ishise of University of Tokyo.)

- Page 57, 7th line from bottom (in part (a) of Proposition 1.7). "Under Assumption 1.1-1.3" should be "Under Assumptions 1.1-1.3". (Pointed out by Scott Kostyshak of Princeton University.)

- Page 58, last line. "the error is" should be "the regressors are". (Discovered by Hsein Kew of University of Melbourne.) This change also means that the "is" in the first line of page 59 should be changed to "are". (Pointed out by Scott Kostyshak of Princeton University.)

- Page 73, Hint to Problem 4(b). All the beta's should be b's. (Discovered by James Tong of Caltech.)

- Page 75, Hint to Problem 6(a). "$\widehat{y}$" should be "$\widehat{y_i}$". (Discovered by Takanori Adachi of U. of Penn.)

- Page 76, Analytical Exercise 7(b). In the first line of part (b), insert "linear" between "any" and "unbiased". $\widetilde{\boldsymbol{\beta}}$ needs to be linear in $\mathbf{y}$ as well as unbiased, because Proposition 1.7(c) is about the set of linear and unbiased estimators. (Discovered by Romans Pancs of Stanford University.)

- Page 83, 6th line from bottom (in (iii)), "β" should be "β_2". (Discovered by Ori Heffetz of Princeton University.)

- Page 86. References. J.-F. Richard's name is misspelled. "Richards" should be "Richard". (Discovered by Athanasios Thanopoulos of U. of Pittsburgh)

- Page 87, line 7, title of Rao's book: "Satistical" should be "Statistical". (Discovered by H. Ishise of University of Tokyo.)

Chapter 2

- Page 90. The symbols in (2.1.6) should be unbolded. (Here, the discussion is about random scalars, rather than random vectors.) (This was pointed out by a number of readers.)

- Page 91, Lemma 2.1. An additional condition is needed to ensure the convergence in moments. Pls insert the following sentence after the first sentence (i.e., before the sentence starting with "Then...") of Lemma 2.1.

  "Suppose that, for some $\delta > 0$, $\mathrm{E}(|z_n|^{s+\delta}) < M < \infty$ for all n."

  (This error was pointed out by Vadym Lepetyuk of University of Minnesota.) Lemma 2.1 thus stated is essentially Theorem 3.4.1 of Amemiya (1985). This lemma is used on p. 173 in part (d) of Analytical Exercise 10 of Chapter 2. The lemma is also used on p. 402 to guess the variance of $\sqrt{n}(\overline{y} - \mu)$ (see the paragraph following Proposition 6.9 on p. 402).

- Page 92. Lemma 2.3 leaves ambiguous the nature of the requirement of continuity of $\mathbf{a}(.)$. For part (a), it need only be continuous at $\boldsymbol{\alpha}$; for (b), it should be continuous everywhere. (Pointed out by J. Hamilton.)

- Page 92. Lemma 2.4(b). The last zero should be a scalar. (Discovered by Takanori Adachi of U. of Penn.)

- Page 97, Section 2.2, first paragraph, 6th line: "a sample path" should be "sample path". (Discovered by Alan Mehlenbacher, Expert Decision Software, Alan Mehlenbacher Associates Ltd.)

- Page 101, in the definition of Ergodicity, the mapping of f should be "$f\colon \mathbb{R}^{k+1} \to \mathbb{R}$" and g should be "$g\colon \mathbb{R}^{\ell+1} \to \mathbb{R}$". (Discovered by Marius del Giudice Rodriguez of UC San Diego.)

- Page 101, definition of ergodicity. The n on the right-hand-side should be dropped.

- Page 108, Review Question 8. The last phrase, "with respect to $\{y_i\}$" is not needed. (Discovered by T. Okimoto of UCSD.)

- Page 111, line 7. "Section 1.2" should be "Section 1.1". (Discovered by Kentaro Takahashi of Keio University.)

- Page 112, 6th line from (2.3.2). "$\mathrm{E}(x_{ik}\varepsilon_i)$" should be "$\mathrm{E}(x_{ik}\varepsilon_i) = 0$". (Discovered by Takahiko Kiso of Univ. of Tokyo and Climent Quintana of Princeton University.)

- Page 116, Hint to Questions for Review 2. "$\mathrm{E}(\mathbf{g}_i\mathbf{g}_i')$" should be "$\mathbf{g}_i\mathbf{g}_i'$". (Discovered by Marius del Giudice Rodriguez of UC San Diego.)

- Page 119, 10th line from top. Insert "with mean $\mathbf{0}$" after "normally distributed". (Pointed out by Scott Kostyshak of Princeton University.)

- Page 124. The 10th line below (2.5.3). "..., so we can set $\widehat{\boldsymbol{\beta}} = \mathbf{b}$ ..." rather than "$\mathbf{b} = \widehat{\boldsymbol{\beta}}$" as in the text. (Pointed out by Ying Xue of Stanford GSB.)

- Page 126, Review Question 1. In the first sentence, "In Review Question 9 of Section 1.2" should be "In Review Question 2 of Section 1.4". (Discovered by Yi Che, Division of Social Science, Hong Kong University of Science and Technology.)

- Page 128, line 4. "r" should be "$\#\mathbf{r}$". (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 128, fourth line in (2.6.4). "$\mathbf{x}'$" should be "$\mathbf{x}_i'$". (Discovered by Climent Quintana of Princeton University.)

- Page 131, third line from equation (2.7.2). "in probability" should be "in distribution". (Discovered by Takanori Adachi University of Pennsylvania and University of Tokyo.)

- Page 152, 5th line from (2.11.1). "the Law of Total Expectations" should be "the Law of Iterated Expectations". (Discovered by H. Ishise of Univ. of Tokyo.)

- Page 155, Table 2.1. The standard deviation should be 2.837%, not 2.847%. (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 167, 8th line. "Law of Total Expecations" should be "Law of Iterated Expectations". (Discovered by Kazumi Endo of Univ. of Tokyo.)

- Page 169, part (b) of Prop. 2.1. "Linderberg" should be "Lindeberg". (Discovered by Gustav Sigurdsson of Princeton University)

- Page 169, the first line of the answer to Exercise 5 (8th line from bottom). "σ^2" should be "s^2". (Discovered by Han Chen, University of Pennsylvania.)

- Page 171. Analytical Exercise 7. In the sentence right above equation (**), "Dividing" should be "Multiplying". This is because we want to insert $1/n$ in inverses. (Pointed out by Ying Xue of Stanford GSB.)

- Page 173, part (d) of Analytical Exercise 10. Right before the Hint, insert the following sentence: "Assume that Lemma 2.1 is applicable to $\sqrt{n}\bar{y}_n$."

- Page 174, Hint to Analytical Exercise 11(d). It is not true that $[\mathbf{X} \vdots \mathbf{E}]\widehat{\boldsymbol{\alpha}} = \mathbf{E}\widehat{\boldsymbol{\gamma}}$. Replace the whole hint by the following: "$\frac{1}{n}\mathbf{E}'\mathbf{e} = \widehat{\boldsymbol{\gamma}}$. Show that $\frac{SSR}{n} = \frac{1}{n}\mathbf{e}'\mathbf{e} - \widehat{\boldsymbol{\alpha}}'\begin{bmatrix}\mathbf{0}\\\widehat{\boldsymbol{\gamma}}\end{bmatrix}$." (Discovered by Izumi Miyara of Kobe University.)

- Page 174, 2nd line from bottom. "σ^2" should be "σ^4". (Discovered by Aureo de Paula of Princeton University.)

- Page 179, the fifth line of Gauss Tip of Empirical Exercise (e). "i-th row is $\mathbf{x}_i \cdot e_i$" should be "i-th row is $\mathbf{x}_i' \cdot e_i$". (Discovered by Munenobu Ikegami of University of Tokyo.)

- Page 180, empirical exercise 1(h) (Breusch-Godfrey test). In the fifth line of the question, "$(t = 0, 1, \ldots, -11)$" should be "$(t = 0, -1, \ldots, -11)$. (Discovered by Marko Taipale of University of Helsinki.)

- Page 183, Monte Carlo Exercise 2, line 2. "Box-Ljung" should be "Ljung-Box" (so as to consistent with the previous terms). (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 185. The title of Rao's book is misspelled. "Satistical" should be "Statistical". (Discovered by Yosuke Ono and others).

- Page 192. Second-to-last paragraph of Section 3.1. Drop the last two sentences ("Furthermore, since... the 2SLS estimator."). (Suggested by M. Fujimoto of University of Tokyo.)

- Pages 196, 197. In the production function example, it is necessary to assume that v_i and A_i are independently distributed. Otherwise, B, which should really be the expectation of $\exp(v_i)$ conditional on A_i, can depend on A_i. (Suggested by D. Zusai of Univ. of Tokyo.)

Chapter 3

- Page 204, Review Question 8. In the second line, "$\widetilde{\mathbf{x}}_i$" should be "$\widehat{\mathbf{x}}_i$". (Discovered by T. Okimoto of UCSD.)

- Page 216, Review Question 7. In the third line, "$\mathbf{X}$" should be "$\mathbf{X}'$". (Discovered by T. Okimoto of UCSD.)

- Page 217, line 2. "$\mathbf{S_{xy}}$" should be "$\mathbf{S_{xz}}$", "$\mathbf{s_{xz}}$" should be "$\mathbf{s_{xy}}$". That is, the phrase "Replace $\mathbf{S_{xz}}$ by $\mathbf{AS_{xy}}$, $\mathbf{s_{xz}}$ by $\mathbf{As_{xy}}$," should be "Replace $\mathbf{S_{xz}}$ by $\mathbf{AS_{xz}}$, $\mathbf{s_{xy}}$ by $\mathbf{As_{xy}}$". (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 220. The publication year for Eichenbaum, Hansen, and Singleton is 1988, not 1985. (discovered by Wing Kan Theophilus So.)

- Page 231, last line in equation (3.8.14). The numerator in the last term should be "$(\mathbf{y} - \widehat{\mathbf{y}})'(\mathbf{y} - \widehat{\mathbf{y}})$" rather than "$(\mathbf{y} - \widehat{\mathbf{y}})(\mathbf{y} - \widehat{\mathbf{y}})'$". (Discovered by Albrecht Mueller of Otto Beisheim Graduate School of Management, Koblenz, Germany.)

- Pages 244-5, Analytical Exercise 2. Either add "$\widehat{\mathbf{S}}$" on the LHS of (*) or delete the phrase "on the RHS" in parts (a), (c), and (d). (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 252, Empirical Exercise (f), which asks for the GMM estimation of the wage equation with schooling treated as predetermined. Line 5 of Table 3.3 treats schooling as endogenous. So it is not the answer to (f) (although you need to be able to duplicate Line 5 of Table 3.3 when calculating the C statistic). (Pointed out by Giulio Miglietta of Bocconi University.)

- Page 254. Answers to Empirical Exercise (b) and (e). The answer is in lines 1-3 (not lines 1-5) of Table 3.3. Line 4 of Table 3.3 is the answer to Empirical Exercise (e).

- (October 22, 2004) Page 255. In the banner line of Table 3.3, "*SEE*" should be "*SER*" (just to be consistent with the notation in, e.g., Table 3.2 on p. 240 where the standard error of the regression or the equation is called *SER*. (Discovered by Akihiro Sato of University of Tsukuba, Japan).

- Page 256. The publication year for Eichenbaum, Hansen, and Singleton is 1988, not 1985.

Chapter 4

- Page 267, (4.2.6): For consistency, "y'" in the last matrix may be simplified as "y" because it is a scalar. (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 275, 6th line from bottom. The last symbol, "$\boldsymbol{\delta}$", should be "$\boldsymbol{\delta}_m$". (Discovered by Juan P. Ortiz of Stanford University.)

- Page 278, (4.5.12): The second matrix (which is actually a vector) on the RHS of (4.5.12) should have only one (not two) vertical dots. Two vertical dots give you an impression that there are more than one columns. (Discovered by Ka Hiroshi Gunji of Hosei University.)

- Page 281, line 2. $\mathbf{D}\,\mathrm{E}(\mathbf{xz}')$ in the last equation is not conformable. The "$\mathbf{D}$" should be "$\mathbf{D}'$". (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 306, Table 4.3. The unit for output should be in billions of kilowatt hours, not in kilowatt hours. (Discovered by Roman E. Romero Villarreal of Princeton.)

- Page 306, Table 4.3. The mean and std. deviation of fuel share respectively should be 0.633 and 0.092 rather than 0.631 and 0.095. (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 306, the estimate of $\widehat{\boldsymbol{\Sigma}}$ is by equation-by-equation OLS, not by pooled OLS. (Discovered by Shuhei Aoki of U. of Tokyo.)

- Page 306, Table 4.5. The substitution elasticity between capital and fuel should be 0.29, while the substitution elasticity between labor and fuel should be 0.27. (Discovered by Roman E. Romero Villarreal of Princeton.)

- Page 307, Hint to Review Question 4. $\mathbf{y}_1 + \mathbf{y}_2 + \mathbf{y}_3$ should be equal to the vector of ones, not zeros. (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 308. In the RHS of the definition of $\underset{Mn \times 1}{\boldsymbol{\varepsilon}}$, $(\varepsilon_1, \dots, \varepsilon_M)$ should be bolded.

- Page 308, In the RHS of the definition of $\boldsymbol{\varepsilon}_m$, "$\boldsymbol{\varepsilon}_{1m}$" and "$\boldsymbol{\varepsilon}_{nm}$" should be unbolded. (Discovered by Munenobu Ikegami of University of Tokyo.)

Chapter 5

- Page 325, line 1 to line 2. "common to all equations" should be "common to all M equations of observation i" (the latter is clearer). (Pointed out by Scott Kostyshak of Princeton University.)

- Page 331, line 1. "Substituting (5.2.1) into (5.2.4)" should be "Substituting the top equation of (5.2.1) into (5.2.4)". (Pointed out by Scott Kostyshak of Princeton University.)

- Page 331, Proposition 5.1. The fixed-effects estimator does *not* require (5.1.8a). Thus, in the third line of the proposition, "relax the SUR assumption (5.1.8b)" should be "relax the SUR assumption (5.1.8a,b)". (Discovered by Gustav Sigurdsson of Princeton University)

- Page 335, 2nd line from (5.2.21). Drop the phrase ", because it is zero". (5.2.21) holds not because the asymptotic covariance between $\widehat{\boldsymbol{\beta}}_{FE}$ and $\widehat{\boldsymbol{\beta}}_{RE}$ is zero. (Discovered by Tatsuyoshi Okimoto of UCSD.)

- Page 337, Review Question 5, 4th line. "$\mathrm{E}(\widetilde{\mathbf{f}}_{im}\widetilde{\mathbf{f}}'_{im})$" should be "$\mathrm{E}(\widetilde{\mathbf{f}}_{im}\widetilde{\mathbf{f}}'_{ih})$". (Discovered by Kazumi Endo of Univ. of Tokyo.)

- Page 339, the formula in the 12th line from bottom, " $\underset{(M \times M)}{\widetilde{\mathbf{y}}_i}$ " should be " $\underset{(M \times 1)}{\widetilde{\mathbf{y}}_i}$ ". That is, the size of $\widetilde{\mathbf{y}}_i$ should be $M \times 1$, not $M \times M$. (Discovered by Luigi Benfratello, Dipartimento di Scienze Economiche e Finanziarie "G. Prato" Universit di Torino.)

- Page 341, Answer to Review Question 3(b). "$[\mathrm{E}(\mathbf{Z}_i\mathbf{Z}'_i)]^{-1}\,\mathrm{E}(\mathbf{Z}_i\boldsymbol{\varepsilon}_i\boldsymbol{\varepsilon}'_i\mathbf{Z}'_i)[\mathrm{E}(\mathbf{Z}_i\mathbf{Z}'_i)]^{-1}$" should be "$[\mathrm{E}(\mathbf{Z}'_i\mathbf{Z}_i)]^{-1}\,\mathrm{E}(\mathbf{Z}'_i\boldsymbol{\varepsilon}_i\boldsymbol{\varepsilon}'_i\mathbf{Z}_i)[\mathrm{E}(\mathbf{Z}'_i\mathbf{Z}_i)]^{-1}$". (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 341, Review Question 3(c). In the last line, "$\mathbf{Q}$ by $\mathbf{I}_M$, and $\widetilde{\boldsymbol{\eta}}_i$ by $\boldsymbol{\varepsilon}_i$" should be "and $\breve{\boldsymbol{\eta}}_i$ by $\boldsymbol{\varepsilon}_i$".

- Page 346, the last line of Review Question 2. The (4,2) element of the matrix, "$\mathrm{E}(s_{i1})$", should be "$\mathrm{E}(s_{i2})$". (Discovered by Munenobu Ikegami of University of Tokyo.)

- Page 348. Equation (5.A.7) There are two $\mathbf{B}$'s. The second $\mathbf{B}$ should be transposed: $\mathbf{B}'$. (Discovered by Takashi Matsuki of Osaka Gakuin University).

- Page 348. Equation (5.A.8). "$\mathbf{F}_i\mathbf{Q}\mathbf{F}'^i$" should be "$\mathbf{F}'_i\mathbf{Q}\mathbf{F}_i$". (Discovered by Takashi Matsuki of Osaka Gakuin University).

- Page 348. Equation (5.A.9). There are two $\widehat{\mathbf{B}}$'s. The second $\widehat{\mathbf{B}}$ should be transposed: $\widehat{\mathbf{B}}'$. (Discovered by Takashi Matsuki of Osaka Gakuin University).

- Page 348. Equation (5.A.10). $\mathbf{B}$ should be primed: $\mathbf{B}'$. $\boldsymbol{\Sigma}_{\mathbf{xz}}$ should be $\boldsymbol{\Sigma}_{\mathbf{xx}}$. (Discovered by Takashi Matsuki of Osaka Gakuin University).

- Page 348. 2nd line from (5.A.10). $\boldsymbol{\Sigma}_{\mathbf{xz}}^{-1}$ should be $\boldsymbol{\Sigma}_{\mathbf{xx}}^{-1}$. (Discovered by Takashi Matsuki of Osaka Gakuin University).

- Page 348. (5.A.12). "$\mathbf{z}'_{i1}, ..., \mathbf{z}'_{iM}$" should be "$\mathbf{f}'_{i1}, ..., \mathbf{f}'_{iM}$". (Discovered by Toshio Honda, Institute of Social Sciences, University of Tsukuba).

- Page 350, Analytical Exercise 1(a), line 3. "Analytical Exercise 4(c)" should be "Analytical Exercise 4(b)".

- Page 351, 4th line. "(1)" should be "(5)".

- Page 351. 3rd line from bottom. "exogenous" should be "strictly exogenous".

- Page 353. 4th line. Add (5.1.15) to the list of assumptions of the error-components model.

- Page 354. Part (f). "$\boldsymbol{\delta}$" should be "$\boldsymbol{\beta}$".

- Page 355. 3rd line in (i). "section" should be "question".

- Page 357, Analytical Exercise 6. 5th line. $\mathbf{e}_m$ is the m-th *column*, not the m-th *row*, of $\mathbf{I}_M$. So $\mathbf{e}_m$ is $M \times 1$. The matrix $\mathbf{A}_m$ picks up $\mathbf{f}_{im}$ in the sense that $\mathbf{f}'_{im} = \mathbf{x}'_i \mathbf{A}_m$, where

$$\mathbf{x}'_i = (\mathbf{f}'_{i1}, \ldots, \mathbf{f}'_{iM}, \mathbf{b}'_i).$$

  The size of $\mathbf{x}_i$ is $K \times 1$. (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 360, Part (a). Just one line above the word "Hint" (in bold type) and the third last line: "$1/n$" should be "$1/\sqrt{n}$". (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 360, Part (a). The third last line: "$1/n$" should be "$1/\sqrt{n}$". (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 362, Equation (3). ε_{im} should be a scalar, not in bold type. So unbold $\boldsymbol{\varepsilon}$. (Discovered by Ka Chung Law of City University of Hong Kong.)

Chapter 6

- Page 380, right below (6.2.9). "$\phi(1) \neq 1$" should be "$\phi(1) \neq 0$". (Discovered by Tomoyuki Ichiba of U. of Tokyo.)

- Page 382, line 4. The equations assume that the normalization $\theta_0 = 1$ is imposed. (Pointed out by Luigi Benfratello, Dipartimento di Scienze Economiche e Finanziarie "G. Prato", Universita' di Torino.)

- Page 397, (6.4.8). In the first equation, "$\lim_{n\to\infty} \widehat{p}_{\mathrm{BIC}}$" should be "$\plim_{n\to\infty} \widehat{p}_{\mathrm{BIC}}$". (Discovered by Alexis Akira Toda of University of Tokyo.)

- Page 402, Proposition 6.9. In the first sentence, "$\sum_{j=0}^n$" should be "$\sum_{j=0}^\infty$". (Discovered by Takanori Adachi of U. of Penn.)

- Page 402, the paragraph following Proposition 6.9. In the fifth line of the paragraph, insert "$\mathrm{E}(|x_n|^{2+\delta}) < M$" right before "$\Rightarrow$".

- Page 417, right above (6.7.13). "$\mathbf{C}'\mathbf{C} = \mathbf{V}$" should be "$\mathbf{C}'\mathbf{C} = \mathbf{V}^{-1}$". (Discovered by Munenobu Ikegami of University of Tokyo.)

- Page 417, Review Question 4. In the Hint, "$\widehat{\omega}_j = \widehat{\varepsilon}_t \widehat{\varepsilon}_{t-j}$ for $0 \le j \le q$ and 0 for $j > q$" should be "$\widehat{\omega}_{ij} = \widehat{\varepsilon}_i \widehat{\varepsilon}_j$ for $|i - j| \le q$ and 0 for $|i - j| > q$ where $\widehat{\omega}_{ij}$ is the (i, j) element of $\widehat{\boldsymbol{\Omega}}$". In the last line, "$\widehat{\omega}_j$" should be "$\widehat{\omega}_{ij}$". (Discovered by H. Tanaka of University of Tokyo.)

- Page 428, Hint to Analytical Exercise 1 (b). In Chebychev's inequality, the right hand side should be

$$\frac{1}{\varepsilon^2}||z - z'||^2$$

instead of

$$\frac{1}{\varepsilon^2} \operatorname{E}\left[||z - z'||^2\right].$$

That is, there is no need to take the expected value because the norm is already an expectation. (Discovered by Tomoyuki Ichiba of U. of Tokyo.)

- Page 437, Analytical Exercise 9 (a). The result to be proved is

$$\lim_{j \to \infty} a_j = 0 \Rightarrow \lim_{n \to \infty} \frac{1}{n} \sum_{j=1}^{n} |a_j| = 0.$$

That is, take the absolute value of a_j in the summation. Also, the first inequality in the hint is not needed; drop the left hand side of the inequality and start from the expression $\frac{1}{n} \sum_{j=1}^{n} |a_j|$. (Discovered by Masayuki Kudamatsu U. of Tokyo.)

- Page 439, Empirical Exercise 1(c), line 2. "Box-Ljung" should be "Ljung-Box". (Discovered by Ka Chung Law of City University of Hong Kong.)

- Page 440, Empirical Exercise 1(f). The lag length determined by the Newey-West (1994) procedure is 13 (not 12) for the yen, 9 (not 8) for DM, and 17 (not 16) for the pound. So for the yen, for example, the autocovariances included in the calculation of $\widehat{\mathbf{S}}$ is up to 12 lags. (Note that when $q(n) = 13$, for example, the Bartlett kernel does not include the 13th lag in the calculation of $\widehat{\mathbf{S}}$, see (6.6.8) for the case of $q(n) = 3$.) (Pointed out by Ka Chung Law of City University of Hong Kong.)

- Page 442, line 4. "This times σ^2 is" should be "This times σ^2 is greater than or equal to". (Discovered by Munenobu Ikegami of University of Tokyo.)

- Page 444. The 1987 Newey-West paper in the references should be: "A Simple Positive Semidefinite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix", *Econometrica*, 55, 703-708. (Discovered by Masato Shirai of University of Tokyo.)

- Page 447, 4th line from top. Insert "necessarily" after "not". (Pointed out by Scott Kostyshak of Princeton University.)

Chapter 7

- Page 451, In example 7.2, on the line following eq. (7.1.12), $f(\mathbf{y}_t|\mathbf{x}_t; \boldsymbol{\theta})$ should have y_t as a scalar and not as a vector. (Discovered by Nicola Tosini of University of Pennsylvania.)

- Page 461, footnote 7. Replace "non-negative" by "non-positive." This occurs twice in the footnote. (Discovered by Takanori Adachi of University of Pennsylvania and University of Tokyo.)

- Page 468, Review Quesiton 1, line 5. "conditional mean identification" should be "conditional density identification". (Discovered by M. Fujimoto of U. of Tokyo.)

- Page 486, last line of Review Question 3 (or 8th line from bottom of the page). "No" should be "Yes". To see this, go back to the expression for $\mathbf{H}(\mathbf{w}_t; \boldsymbol{\theta})$ (7.3.17) on p. 476. If you set $\boldsymbol{\theta}$ (the hypothetical parameter vector) to $(\widehat{\boldsymbol{\beta}}, \widehat{\sigma}^2)$, the off-diagonal block of $\frac{1}{n} \sum_{t=1}^{n} \mathbf{H}(\mathbf{w}_t; \boldsymbol{\theta})$, which is proportional to $\frac{1}{n} \sum_{t=1}^{n} \mathbf{x}_t \widehat{\varepsilon}_t$, is zero thanks to the normal equations.

- Page 491. Equation (7.4.13). The summation is from $t = 1$ to n, as in other summations. (Pointed out by Hiroshi Gunji; the equation number in question is (7.4.13) instead of (7.4.3), as pointed out by Giovanni Puma.)

- Page 494, first line of Proposition 7.11. insert "be" between "$\widehat{\boldsymbol{\theta}}$" and "the". (Discovered by Hiroshi Gunji.)

- Page 496. The first equation on the page. The summation is from $t = 1$ to n, as in other summations. (Pointed out by Hiroshi Gunji.)

- Page 497, equation (7.5.2). In the definition of $\mathbf{s}_n(\boldsymbol{\theta})$, there is no need to transpose $\boldsymbol{\theta}$ (that is, get rid of the prime "′"). (Discovered by Hiroshi Gunji.)

- Page 504. Hint to Part (c). Drop the last sentence of the hint (the sentence that starts with "Given the consistency...").

Chapter 8

- Page 523, the line between (8.4.8) and (8.4.9). "Question 2" should be "Question 1". (Pointed out by Ka Chung Law of City University of Hong Kong.)

- Page 524, footnote 6. In the first line, "minimizer" should be "maximizer". (Discovered by Ka Hiroshi Gunji of Hosei University.)

- Page 529. 2nd line from (8.5.8). "Example 8.1 below" should be "Example 8.1 above". (Discovered by Takanori Adachi of U. of Penn.)

- Page 548, line 5. The subscript "2" of $\widehat{\sigma}$ should be in the superscript position, i.e., $\widehat{\sigma}^2$. (Pointed out by Ka Chung Law of City University of Hong Kong.)

- Page 549, line 10. "ϕ" should be "ϕ_0".

- Page 554, line 1. Insert "plim" before "$|\widehat{\Omega}(\boldsymbol{\delta})|$".

- Page 554, 3rd line from bottom. "$\boldsymbol{\Pi}_0$" should be "$\boldsymbol{\Pi}_0'$".

Chapter 9

- Page 571, lines 14 and 15. Specialize the random walk $\{\xi_t\}$ by requiring that its initial value ξ_0 is fixed (so add "and with ξ_0 fixed" to the sentence that ends in line 15). (If ξ_0 is random, then $\text{Var}(\xi_t) = \text{E}(\xi_0^2) + \sigma^2 \cdot t$, and $T \cdot \text{E}(\xi_0^2)$ must be added to the expression for $\text{E}\left[\sum_{t=1}^{T} (\xi_{t-1})^2\right]$ in (9.2.18). However, this change does not affect the fact that this expectation grows at rate T^2.) (Pointed out by H. Tanaka of U. of Tokyo.)

- Page 580, Example 9.1. The estimated AR(1) equation and the test statistics are for the level of the exchange rate. That is, y_t is the level of the exchange rate, not the log of the exchange rate, and so "log of the" in the second line of the example should be dropped. Alternatively, if y_t is the log of the exchange rate, the y_{t-1} coefficient in the AR(1) equation, its standard error, and the DF ρ^μ and t^μ statistics will change slightly. The *SER* (standard error of the regression) will be a lot lower. (Pointed out by Markus Hertrich of University of Basel, Switzerland.)

- Page 584, Hint to Analytical Exercise 5. "$E(y_{t-1})^2$" should be "$E(y_{t-1}^2)$". (Discovered by Aureo de Paula of Princeton.)

- Page 593, (9.4.30). The dependent variable should be y_t, not Δy_t. (Discovered by H. Tanaka of University of Tokyo.)

- Page 618, last line. "$\to_d$" should be "$\to$". (Discovered by Kazumi Endo of Univ. of Tokyo.)

Chapter 10

- Page 633. Review Question 3. The expression for $\text{Var}(\mathbf{a}'\mathbf{y}_t)$ for $t = 0$ should be 0, not $\mathbf{0}$.

- p. 648. 5th line of Example 10.5. "the log of the saving rate" should be "$-\log(1-s)$ with s being the saving rate". $-\log(1-s)$ is approximately equal to the saving rate s, not the log of the saving rate. (Pointed out by Gideon Magnus of University of Chicago.)

- p. 648. 10th line of Example 10.5. "obervations" should be "observations". (Discovered by Wim Gielis of University of Antwerp)

- p. 648. In the 6th line of the second paragraph of Example 10.5, there is no need to put "$12 \cdot (T/100)^{1/4}$" in brackets. That is, get rid of "[" and "]". (Discovered by Jun Sato.)

- Page 666, Table 10.4. The Wald statistic should be 5.95 rather than 1.85, and the p-value should be 0.11 rather than 0.60. (This is an error discovered by Matias Eklof of Uppsala University.)