

This applies to the first edition of the text.

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Time Series Analysis and Its Applications

Errata

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(the errata added after Aug 8, 2000 appears at the end)

The road to wisdom?—Well, it's plain
and simple to express:

Err
and err
and err again
but less
and less
and less.

Piet Hein

Contents

xii: “T2.14 Hilbert Spaces...” should be “T2.15 Hilbert Spaces...”

Chapter 1

To be consistent, all properties in Chapter 1 should be labeled as Property P1.x.

- p17: Example 1.13. First sentence should read $E(w_t) = 0$ instead of $E(s_t) = 0$.
- p57: After “To prove (iii)” a number of square brackets are not closed.
- p58: Middle of page. $E(x_t^2) < K < \infty$ should be $E(x_t^2) = K < \infty$
- p61: Second paragraph: $\mathbf{x}_n \rightarrow \mathbf{x}$ should be $\mathbf{x}_n \xrightarrow{p} \mathbf{x}$.
- p62: Equation (1.115) and Example 1.33. With $\mathbf{x}_n - \mathbf{a} = O_p(\delta_n)$, (1.115) should have error $O_p(\delta_n^2)$. If $\mathbf{x}_n - \mathbf{a} = o_p(\delta_n)$ is the condition, then the error should be $o_p(\delta_n^2)$. Accordingly, Example 1.33 should be changed to $\log \bar{x} = \log \mu + \mu^{-1}(\bar{x} - \mu) + O_p(n^{-1})$.
- p87: Problem 1.29(b). Should read $E[(\bar{x} - \mu_t)^2] = N^{-1}\gamma_e(t, t)$
- p88: Problem 1.37. Should read “...when $\hat{\rho}_x(1) = .64$ and $n = 100$.”

Chapter 2

- p92: First line of (2.9) in the expectation. Should be $(\sum_{k=0}^{\infty} \phi^k w_{t-k})$ instead of $(\sum_{k=0}^{\infty} \phi^j w_{t-k})$.
- p97: Last paragraph of Example 2.4. Should read “Following the steps that led to (2.7)...” not (2.40).
- p98: Above (2.22). “...can then can be written in concise form as...” has too many *can*s.
- p108: First line of (2.39) in the expectation. Should be $(\sum_{k=0}^q \phi^k w_{t-k})$ instead of $(\sum_{k=0}^q \phi^j w_{t-k})$.
- p112: Example 2.15. First line, a minus sign is missing. Should be $x_t = -\sum_{j=1}^{\infty} \pi_j x_{t-j} + w_t$.
- p115: Just below (2.55), the reference to (2.54) should be to (2.53).
- p122: Equation (2.81) should read

$$\tilde{x}_{n+m}^n = \phi_1 \tilde{x}_{n+m-1}^n + \cdots + \phi_p \tilde{x}_{n+m-p}^n + \theta_1 \tilde{w}_{n+m-1}^n + \cdots + \theta_q \tilde{w}_{n+m-q}^n. \quad (2.81)$$

- p132: Paragraph below (2.106). Should read “... and $w_p = w_{p-1} = w_{p-2} = \cdots = w_{1-q} = 0 \dots$ ”
- p144: Just below (2.131). “In EWMA, the parameter α ...” should be “In EWMA, the parameter θ ...”
- p153: Middle paragraph. ARMA(2, 3) should be ARMA(3, 2).
- p154: 5th line. “given in Problems 1.29 and 1.30.” should be “given in Problems 1.27 and 1.28.” 11th line: “was left out.” should be “were left out.”
- p156: 2nd line. “...Figure 1.15.” should be “...Figure 1.16.”

- p168: 2nd line. Too many *thats*.
- p169: In Equation (2.151), replace $x_{t-j}(d)$ by x_{t-j} .
- p177: Last paragraph. "... equation (2.160) ..." should be "... equation (2.159) ..."
- p181: Should be $\alpha(B) = B^5(1 + \omega_1 B + \omega_1^2 B^2 + \dots)$
- p190: 5th line from bottom: "...that is $x_n \rightarrow x$ if ..." should be "...that is $x_n \rightarrow x \in \mathcal{H}$ if ..."
- p196: Below (2.203). Should read "... Section T1.10, equations (1.101)–(1.105), we may apply ..."
- p199: Middle of page. Should read "We use the fact that w_t and \mathbf{x}_{t-1} are *uncorrelated* (instead of *independent*) to write ..."
- p200: Middle of page: Reference to equation (1.93) should be to equation (1.114), and reference to equation (1.92) should be to equation (1.123).
- p206: Problem 2.23. Hint should be: See Problem 1.18 (instead of T1.19).
- p209: Problem 2.39. Should read "Fit a regression model $\nabla S_t = \beta_0 + \beta_1 \nabla L_{t-3} + x_t$, where x_t is an ARMA process.
- p210: Problem 2.40. Equation at top of page should be $Z' \boldsymbol{\alpha} = z_0$.
- p212: Problem 2.49. The problem should read: Suppose we consider the problem of predicting x_{n+1} from x_1, \dots, x_n . Use the Projection Theorem to show (a) the BLP and (b) its MSE, are given by $x_{n+1}^n = -\frac{1}{n+1} \sum_{k=1}^n k x_k$ with $\text{MSE} = \frac{(n+2)}{(n+1)} \sigma_w^2$.

Chapter 3

- p215: Last line: Should be "An alternate form of (3.1) is..."
- p218: Section 3.3. Reference should be to Theorem 3.1 (a).
- p219: Property P3.1 should read "Spectral Representation *of* the Autocovariance..."
- p237: Equation (3.47): $\sum_{k=0}^{n-1}$. Equations (3.48), (3.49): $\sum_{t=0}^{n-1}$. Omit z in numerator of (3.49).
- p237: After (3.47), should read $X(1/2 + \nu_k) = \overline{X(1/2 - \nu_k)}$
- p250: Below (3.78). For the vector series $\mathbf{x}_t = (x_{t1}, x_{t2}, \dots, x_{tp})'$
- p252: 7th line. "...such as AIC, AICc, and SIC,..."
- p252: (3.88) should be $C = \sqrt{2p/n}$
- p255: All references to (3.96) should be to (3.89)
- p257: Above (3.98), reference to (3.95) should be to (3.93).
- p257: Last paragraph. Delete "GPH" and "...derived from (3.85)" should be "...derived from (3.97)"
- p258: 7th line. Should read "...and jointly estimating the parameters d and $\boldsymbol{\theta}$..."
- p267: Below (3.121). "...and the ARIMA($p, 1, q$) model, in which ..."
- p272: In first line of first equation, write $e^{2\pi i \nu u}$ instead of $e^{2\pi i \nu h}$
- p273: In definition of I_n , $\exp(2\pi i t \nu_j)$ should be $\exp(-2\pi i t \nu_j)$.
- p282: 2nd line. "...of the series x_{tj} by..."
- p285: Above (3.172). Reference to (3.55) should be to (3.162).
- p287: Below (3.181). Should read "Example 3.22 leads to ..."
- p292: Problem 3.11. $\dots = \sum_{k=0}^{n-1} \dots$
- p293: Problem 3.15. Figure 3.19.
- p297: Problem 3.24. Replace a_r by β_r .
- p298: Problem 3.24. Last line. Omit *that*.
- p299: Problem 3.25. Add that v_t and w_t are normally distributed. Replace *var* by *var*.

Chapter 4

- p302: (4.3) is the MLE under the assumption of normality. After (4.5), $\hat{\sigma}$ denotes estimated standard error.
- p304: Below (4.11). Should be $t = p^* + 1, \dots, n$.
- pp312-314: References to Section T2.16 should be to T2.15.
- p317: Last line. J_{t-1} should be J'_{t-1} .
- p320: Last two lines of $P_{t,t-1}^t$ equation (in the proof) should have J_{t-1} instead of J_t .

- p322: End of first paragraph. Reference to (2.137) should be to (2.103).
- p327: Riccati equation. Should read $P = \Phi[P - PA'(APA' + R)^{-1}AP]\Phi' + Q$;
- p332: Last sentence. Change x_t^n to $x_t^{(n)}$.
- p339: First paragraph of § 4.7. Reference to Section 2.7, Example 2.32 should be to Section 2.6, Example 2.30.
- p340: Equation (4.121), brackets should be added to enclose sums over t .
- p345: First paragraph. Section 2.13 should be Section 2.11; Example 2.51 should be Example 2.42; Example 2.34 should be Example 2.32.
- p349: Above (4.142). $j = 1, \dots, m$. (not n).
- p352: Equation (4.151), last sum should be $\sum_{t=1}^n I(A_t = M_j)(\mathbf{y}_t - A_t \mathbf{x}_t)' R^{-1}(\mathbf{y}_t - A_t \mathbf{x}_t)$.
- p353: Example 4.16. First paragraph: Section 2.12, Figure 2.33 should be Section 2.11, Figure 2.31. Last paragraph: Example 2.51 should be Example 2.42.
- p380: Below (4.222). "...and there is measurement error." should read "...and there is *no* measurement error."
- p381: Second paragraph. (see Section 2.12) not (see Section 2.13).
- p402: Equation (4.267). Lower limit on the summation should be $i = (k - h) + 1$ instead of $i = (j - h) + 1$.
- p404: Problem 4.1. It is necessary to have two initial conditions. To this end, add the following to the problem statement: ... where $x_0 \sim N(0, \sigma_0^2)$ and $x_{-1} \sim N(0, \sigma_1^2)$ Further suppose $x_0, x_{-1}, \{w_t\}$, and $\{v_t\}$ are independent.
Change (b) to: Find the values of σ_0^2 and σ_1^2 that make the observations y_t stationary.
Change (c) to: ... using the values of σ_0^2 and σ_1^2 found in (b).
- p405: Problem 4.6. Last equation on the page. Transpose missing: $H_{k+1} = \dots A'_{k+1} [A_{k+1} \dots$
- p406: Problem 4.7 (b). Compare to Example 2.28 *not* 2.41.
- p406: Problem 4.8. The data file for this problem is HL.dat on the web site, and the problem refers to the land based series shown in Figure 4.2.
- p407: Problem 4.10 (b). Should be: ... positive solution of $P^2 + (1 - \phi^2)P - 1 = 0$.
(d) Should read ... $y_{n+1}^n = \sum_{j=1}^{\infty} \phi^j K(1 - K)^{j-1} y_{n+1-j}$.
- p410: Problem 4.24. Should read "Fit ... to the *GNP residuals* analyzed in Example 2.46." Another exercise would be to analyze the stock dividend yield and compare the results to those obtained in Problem 2.43.

Chapter 5

- p420: In the equation preceding (5.15), replace $f_{xx}(\nu)$ by $f_x(\nu)$.
- p433: (5.62) should be

$$SSR(\nu) = \sum_{\ell=-(L-1)/2}^{(L-1)/2} [s_{y \cdot 1}^2(\nu_k + \ell/n) - s_{y \cdot z}^2(\nu_k + \ell/n)]$$

- p449: Below (5.104) add to the last sentence, when spectra are smoothed over L frequencies.
- p522, 524: In Problems 5.4 and 5.9, replace \mathcal{B} by \mathbf{B} for consistent notation.
- p523: In Problem 5.7, replace by

$$\widehat{M}(\nu) = \frac{Y(\nu) - \overline{\phi(\nu)} B_w(\nu)}{1 - |\phi(\nu)|^2}$$

and

$$\widehat{A}(\nu) = \frac{B_w(\nu) - \phi(\nu) Y(\nu)}{1 - |\phi(\nu)|^2}$$

- p525: In the next to the last line of Problem 5.13, omit the word multivariate. Add $\ln \frac{\pi_1}{\pi_2}$ to the first equation.
- p525: In the last line, replace F-distribution by chi-squared distribution.

Added After Aug 8, 2000

Chapter 2

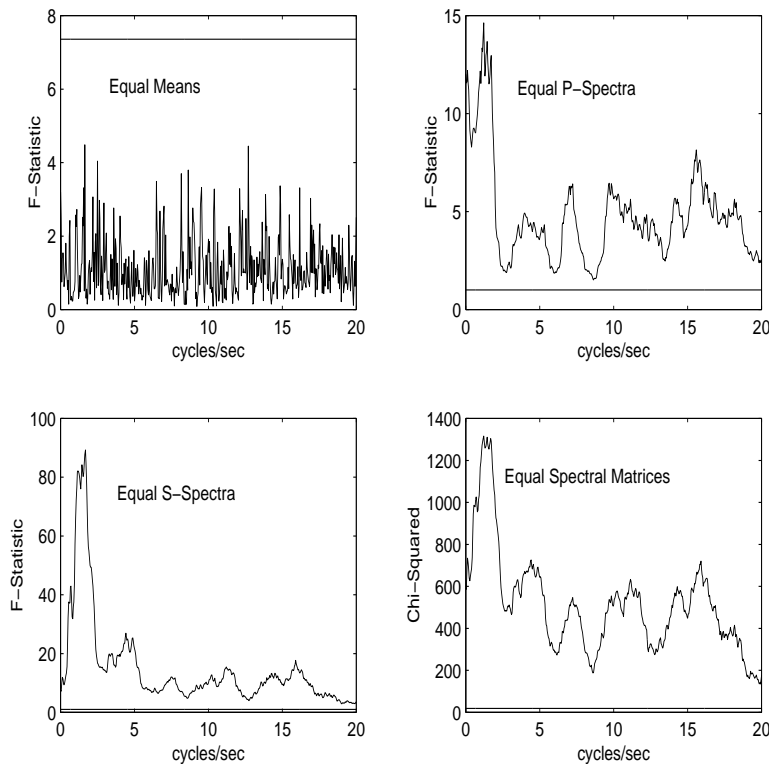
- p110: Second line, reference to (2.37) should be to (2.36).
- p172: Figure 2.31: Should read deaths per 10,000 not 1,000.
- pp173-175: In Example 2.42, the threshold value is 0.05, not 0.5.
- p187: Equation (2.185), delete $\text{var}(y_t^2) =$.
- p207: In Problem 2.30, replace 1.19 by 1.24.

Chapter 3

- p244: Replace second sentence by: In such cases, it may be reasonable to employ resampling techniques, such as one of the parametric bootstraps proposed by Hurvich and Zeger (1987) or a nonparametric *local bootstrap* proposed by Paparoditis and Politis (1999).
- p247: Equation(3.73) is not an approximation, so change \approx to $=$.
- p250: Equation (3.78). Upper limit should be $(L - 1)/2$.
- p289: Problem 3.3. θ instead of θ_1 in equation.
- p290: Problem 3.5(b). Replace (b) by (a).
- p294: Problem 3.16(a). Delete extra period after first sentence.

Chapter 5

- p449: In (5.100), the * goes after the second term.
- p449: In (5.103), replace $(r + 1)$ by $(p - 1)$.
- p451: Figure 5.12 has been redone to incorporate an added constant and a smoothing error in the MATLAB program (see below). We are indebted to Michael Fugate of Los Alamos National Labs for checking our program and pointing out this error.



New Figure 5.12