2 Predictability of Asset returns

- Page 11, line 4, says:
  \[ S_n = \exp(h_1 + \cdots + h_n), \quad n \geq 1, \]
  Should say
  \[ S_n = S_0 \exp(h_1 + \cdots + h_n), \quad n \geq 1, \]

3 Predictability of Asset Returns (second part)

- Page 8, line 3, says:
  \[ B_n = (1 + r)^n \]
  Should say
  \[ B_n = B_0 (1 + r)^n \]

- Page 9, line -3, says:
  \[ \mathbb{E}_Q \left( \frac{S_{n+1}}{B_{n+1}} \mid \mathcal{F}_N \right) = \frac{S_n}{B_n}, \]
  Should say:
  \[ \mathbb{E}_Q \left( \frac{S_{n+1}}{B_{n+1}} \mid \mathcal{F}_n \right) = \frac{S_n}{B_n}, \]

- Page 11, line -2, says:
  \[ S_n = \exp(h_1 + \cdots + h_n), \quad n \geq 1, \]
  Should say:
  \[ S_n = S_0 \exp(h_1 + \cdots + h_n), \quad n \geq 1, \]

- Page 14, line 5, says:
  \[ \sigma_n^2 = \alpha_0 + \alpha_1 h_{n-1}^2 + \cdots + \alpha_q h_{n-q}^2 + \beta_1 \sigma_1^2 + \cdots + \beta_p \sigma_{n-p}^2, \]
  Should say:
  \[ \sigma_n^2 = \alpha_0 + \alpha_1 h_{n-1}^2 + \cdots + \alpha_q h_{n-q}^2 + \beta_1 \sigma_{n-1}^2 + \cdots + \beta_p \sigma_{n-p}^2, \]

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\[ \text{I thank all the student that made corrections and comments on the Notes. Further comments can be send to ernesto.mordecki@gmail.com} \]
4 Markowitz Diversification Portfolio Investment

- Page 10, line -3, says: gives the minimum variance $\sigma^2/4$
  Should say: gives the minimum variance $\sigma^2/2$

- Page 16, line 3, says:
  - If $\beta = 1/2$, the asset $A$ gives half of the expected return of the market, but 1/4 of the systematic risk, we have a defensive asset.
  Should say:
  - If $\beta = 1/2$, the asset $A$ gives half of the risk premium $E \rho_A - r$, with 1/4 of the systematic risk, we have a defensive asset.

5 Portfolio diversification (II) and CAPM

- Page 11, line -4, says: If $\beta = 0$ then $E \rho_A = \rho$.
  Should say: If $\beta = 1$ then $E \rho_A = \rho$.

7 Statistical Fitting with linear models

- Page 14, line 6, says:
  $$\bar{W}_{hh} = 1 + 2(\bar{\rho}(1)^2 + \cdots + \bar{\rho}(q))$$
  Should say:
  $$\bar{W}_{hh} = 1 + 2(\bar{\rho}(1)^2 + \cdots + \bar{\rho}(q)^2)$$

8 Multivariate linear Time Series

- Page -2, line 5, says: a cross coviance:
  Should say: a cross covariance:

9 Multivariate linear Time Series (II)

- Page 10, lines 1 and 3, says: In order to estimate the matrix $\phi$ we must solve a matrix equation (i.e. $d \times d$ linear equations) of the form
  $$\bar{\Gamma}(1) = \Phi_1 \bar{\Gamma}(0),$$
Should say: In order to estimate the matrix $\Phi$ we must solve a matrix equation (i.e. $d \times d$ linear equations) of the form

$$\Gamma(1) = \Phi \Gamma(0),$$

11 Value at Risk through Monte Carlo

• Page 7, lines 2 and 4, says:
  
  An alternative approach to the historical $\text{var}$, is the simulation or Monte Carlo approach. The main problem that we face when trying to compute $\text{var}$ is that we do not know . . .

  Should say:
  
  An alternative approach to the historical VaR, is the simulation or Monte Carlo approach. The main problem that we face when trying to compute VaR is that we do not know . . .

• Page 9, line 8, says:

  $$f_\varepsilon(x) = \frac{1}{4} \varphi\left(\frac{x}{\sqrt{2}}\right) + \frac{3}{4} \varphi\left(\frac{x}{\sqrt{2/3}}\right)$$

  Should say:

  $$f_\varepsilon(x) = \frac{1}{4\sqrt{2}} \varphi\left(\frac{x}{\sqrt{2}}\right) + \frac{3\sqrt{3}}{4\sqrt{2}} \varphi\left(\frac{x}{\sqrt{2/3}}\right)$$

• Page 16, line 1, says: Comments on Derivatives and $\text{var}$

  Should say: Comments on Derivatives and VaR

12 Conditional heteroscedastic models (ARCH)

• Page 6, line -1, says:

  $$E(X(t) \mid \mathcal{F}(t)) = E(\mu + \sigma \varepsilon(t) \mid \mathcal{F}(t - 1)) = \mu,$$

  Should say:

  $$E(X(t) \mid \mathcal{F}(t - 1)) = E(\mu + \sigma \varepsilon(t) \mid \mathcal{F}(t - 1)) = \mu,$$
• Page 7, lines 3, 4, 5, says:

\[
\text{\text{var}}(X(t) \mid \mathcal{F}(t-1)) \\
= E[X(t)^2 \mid \mathcal{F}(t-1)] - [E[X(t) \mid \mathcal{F}(t)]]^2 \\
= E[(\mu + \epsilon(t))^2 \mid \mathcal{F}(t-1)] - \mu^2 = \sigma^2.
\]

Should say (two missprints):

\[
\text{\text{var}}(X(t) \mid \mathcal{F}(t-1)) \\
= E[X(t)^2 \mid \mathcal{F}(t-1)] - [E[X(t) \mid \mathcal{F}(t-1)]]^2 \\
= E[(\mu + \sigma \epsilon(t))^2 \mid \mathcal{F}(t-1)] - \mu^2 = \sigma^2.
\]

• Page 11, line 7, says:

\[
\sigma(t)^2 = \sqrt{\text{\text{var}}(X(t) \mid \mathcal{F}(t-1))} = \sqrt{\omega + \alpha X(t-1)^2}
\]

Should say:

\[
\sigma(t) = \sqrt{\text{\text{var}}(X(t) \mid \mathcal{F}(t-1))} = \sqrt{\omega + \alpha X(t-1)^2}
\]

14 Calibration in Black Scholes Model and Binomial Trees

• Page 6, line 7, says:

\[
S(t) = S(0) \exp ((\mu - \sigma^2/2)t + W(t)),
\]

Should say:

\[
S(t) = S(0) \exp ((\mu - \sigma^2/2)t + \sigma W(t)),
\]

• Page 8, line 7, says:

\[
S(t) = S(0) \exp ((r - \sigma^2/2)t + W(t)),
\]

Should say:

\[
S(t) = S(0) \exp ((r - \sigma^2/2)t + \sigma W(t)),
\]
• Page 13, line 7, says:

\[ \sigma_1 = \sigma_0 + \frac{C(\sigma_0) - QP}{S(0)\sqrt{T}\phi(d_1)}. \]

Should say:

\[ \sigma_1 = \sigma_0 - \frac{C(\sigma_0) - QP}{S(0)\sqrt{T}\phi(d_1)}. \]

• Page 14, line 4, says:

\[ \sigma_1 = 0.15 + \frac{495 - 460}{2029} = 0.2216 \]

Should say:

\[ \sigma_1 = 0.15 + \frac{495 - 640}{2029} = 0.2216 \]

• Page , line , says:

\[ r(t, T) = \frac{1}{T-t} \int_t^T r(s) ds, \quad \bar{\sigma}(t, T)^2 = \frac{1}{T-t} \int_t^T \sigma(s) ds. \]

Should say:

\[ \bar{r}(t, T) = \frac{1}{T-t} \int_t^T r(s) ds, \quad \bar{\sigma}(t, T)^2 = \frac{1}{T-t} \int_t^T \sigma(s)^2 ds. \]

• Example in pages 18 and 19 is suppressed.

15 Calibration in Black Scholes Model and Binomial Trees (second part)

• Page 8, line 3, says:

\[ \mathbf{E}(1 + X) = u^2 p + (1 - p) d^2 \]

Should say:

\[ \mathbf{E}(1 + X)^2 = u^2 p + (1 - p) d^2 \]

• Page 16, line 1, says: First we compute the Call Option price with the Binomial Tree formula:

Should say: First we compute the Put Option price with the Binomial Tree formula:
16 Time dependence in Black Scholes

- Page 15, line -5, says:
  \[ C(S(0); K; r; \sigma) = QP, \]
  Should say:
  \[ C(S(0); K; T; r; \sigma) = QP, \]

17 The volatility Smile and its Implied Tree

- Page 5, line -4, says: A downward movement to a value \( S_B \) with probability \( 1 - p \),
  Should say: A downward movement to a value \( S_B \) with probability \( 1 - p_1 \),

- Page 8, line -1, says:
  \[ \sigma = 19.54 + 16.5 \left( \frac{19.47 - 19.54}{200} \right) = 19.52 \]
  Should say:
  \[ \sigma = 19.54 + 16.5 \left( \frac{19.47 - 19.54}{200} \right) = 19.534 \]

- Page 9, line 2, says:
  \[ \text{Call} = e^{-rT} p(S_A - S_0), \]
  Should say:
  \[ \text{Call} = e^{-rT} p_1(S_A - S_0), \]

- Page 9, line 4, says:
  \[ \frac{FS_A - S_0^2}{S_A + S_0} = e^{rT} \text{Call}, \]
  Should say:
  \[ \frac{F_1S_A - S_0^2}{S_A + S_0} = e^{rT} \text{Call}, \]
18 Diffusion processes for stocks and interest rates

• Page 4, line -2, says:

\[ X(t + \Delta) = \alpha \Delta + \beta \Delta W, \]

Should say:

\[ X(t + \Delta) = x + \alpha \Delta + \beta \Delta W, \]

• Page 6, lines 7 to 10, says:

- If \( X(t) < b/a \) then the drift \( \alpha \) is positive, and the process tends to go up,
- If \( X(t) > b/a \) then the drift is negative, and the process tends to go down.

Should say:

- If \( X(t) < a/b \) then the drift \( \alpha \) is positive, and the process tends to go up,
- If \( X(t) > a/b \) then the drift is negative, and the process tends to go down.

21 Option Pricing for Diffusion with Jumps

• Page 3, line -2, says:

\( Y_i \) is the jump of the log-stock price, assumed to be lognormal with parameters \((\nu, \delta)\),

Should say:

\( Y_i \) is the jump of the log-stock price, assumed to be normal with parameters \((\nu, \delta)\),

22 Fixed Income Finance

• Page 6, line -1, says: ... the coupon will pay 7.27 points.

Should say: ... the coupon will pay 5.47 points
• Page 17, line 2, says:

\[ V = 100 e^{y(T-t)} + C \times \sum_k e^{y(t_k-t)}. \]

Should say:

\[ V = 100 e^{-y(T-t)} + C \times \sum_k e^{-y(t_k-t)}. \]

24 Pricing Fixed Income Derivatives through Black’s Formula

• Page 8, line 8,9,10, says: Example. Compute the Bond Call Option price under the following characteristics. Thea 10.month European call option on a The underlying is a 9.75 year Bond with a face value of $1,000.

Should say: Example. Compute the Bond Call Option price under the following characteristics The underlying is a 9.75 year Bond with a face value of $1,000.

25 Interest rates models

• Page 18, line 3, says: Option prices can be computed also as

Should say: Zero coupon bond prices can be computed also as