Corrections in
Mathematics for Finance
An Introduction to Financial Engineering
by M. Capiński and T. Zastawniak
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page vi, lines 13–15
`Replace the last paragraph by:`
Readers of this book are cordially invited to visit the web page below and click on the accompanying website to check for the latest downloads and corrections, or to contact the authors. Your comments will be greatly appreciated.

page vi, last line
`Replace the web page address by:`
`www.springeronline.com/1-85233-330-8`

page 20, Exercise 1.11
`Replace the text of the exercise by:`
Compute the risk as measured by the standard deviation of the cost of buying one share with and without the option if a) $p = 0.25$, b) $p = 0.5$, c) $p = 0.75$.

page 20, Exercise 1.12
`Replace the text of the exercise by:`
Show that the risk (as measured by the standard deviation of the cost of buying one share) of the above strategy involving an option is a half of that when no option is purchased, no matter what the probability $0 < p < 1$ is.

page 57, line 10
`Replace` three `by` tree

page 93, line 29
`Replace` 13.87% `by` 13.89%

page 108, Proposition 5.8
`Replace the text`
The expected return $\mu_V = E(K_V)$ and variance $\sigma_V^2 = \mathrm{Var}(K_V)$ of a portfolio with weights $\boldsymbol{w}$ are given by
`by`
The expected return $\mu_V = E(K_V)$ and variance $\sigma_V^2 = \mathrm{Var}(K_V)$ of the return $K_V = w_1K_1 + \cdots + w_nK_n$ on a portfolio with weights $\boldsymbol{w} = [w_1, \ldots, w_n]$ are given by

page 109, Proposition 5.9

`Replace the text of the Proposition by:`

The portfolio with the smallest variance in the attainable set has weights

$$\boldsymbol{w} = \frac{\boldsymbol{u}\boldsymbol{C}^{-1}}{\boldsymbol{u}\boldsymbol{C}^{-1}\boldsymbol{u}^T}.$$

page 116, lines 12–13

`Replace` attainable set `by` minimum variance line

page 133, lines 12 and 13

`Replace` $\mathrm{e}^{t(T-t)}$ `by` $\mathrm{e}^{r(T-t)}$ `(2 occurrences)`

page 150, line 3

`Replace` constructed by and writing `by` constructed by writing

page 160, Proposition 7.6

`Replace the proposition by:`

If $X' < X''$, then

$$C^{\mathrm{E}}(X') \geq C^{\mathrm{E}}(X''),$$
$$P^{\mathrm{E}}(X') \leq P^{\mathrm{E}}(X'').$$

This means that $C^{\mathrm{E}}(X)$ is a non-increasing and $P^{\mathrm{E}}(X)$ a non-decreasing function of X.

page 160, Proposition 7.7

`Replace the proposition by:`

If $X' < X''$, then

$$C^{\mathrm{E}}(X') - C^{\mathrm{E}}(X'') \leq \mathrm{e}^{-rT}\left(X'' - X'\right),$$
$$P^{\mathrm{E}}(X'') - P^{\mathrm{E}}(X') \leq \mathrm{e}^{-rT}\left(X'' - X'\right).$$

page 161, lines 3–4 (proof of Proposition 7.7)

`Replace the last two lines of the proof by:`

Since, by Proposition 7.6, both terms on the left-hand side are non-negative, neither of them can exceed the right-hand side.

page 163, Proposition 7.9

`Replace the proposition by:`

If $S' < S''$, then

$$C^{\mathrm{E}}(S') \leq C^{\mathrm{E}}(S''),$$
$$P^{\mathrm{E}}(S') \geq P^{\mathrm{E}}(S''),$$

that is, $C^{\mathrm{E}}(S)$ is a non-decreasing function and $P^{\mathrm{E}}(S)$ a non-increasing function of S.

page 163, proof of Proposition 7.9

`Replace the proof by:`

Suppose that $C^{\mathrm{E}}(S') > C^{\mathrm{E}}(S'')$ for some $S' < S''$, where $S' = x'S(0)$ and $S'' = x''S(0)$. We can write and sell a call on a portfolio with x' shares and buy a call on a portfolio with x'' shares, the two options sharing the same strike price X and exercise time T, and we can invest the balance $C^{\mathrm{E}}(S') - C^{\mathrm{E}}(S'')$ without risk. Since $x' < x''$, the payoffs satisfy $(x'S(T) - X)^+ \leq (x''S(T) - X)^+$. If the option sold is exercised at time T, we can, therefore, exercise the other option to cover our liability and will be left with an arbitrage profit.

The inequality for puts follows by a similar arbitrage argument.

page 163, Proposition 7.10

`Replace the proposition by:`

Suppose that $S' < S''$. Then

$$\begin{aligned} C^{\mathrm{E}}(S'') - C^{\mathrm{E}}(S') &\leq S'' - S', \\ P^{\mathrm{E}}(S') - P^{\mathrm{E}}(S'') &\leq S'' - S'. \end{aligned}$$

page 164, lines 7–8 (proof of Proposition 7.10)

`Replace the last two lines of the proof by:`

Both terms on the left-hand side are non-negative by the previous theorem, so neither can exceed the right-hand side.

page 165, Proposition 7.12

`Replace the proposition by:`

If $X' < X''$, then

$$\begin{aligned} C^{\mathrm{A}}(X') &\geq C^{\mathrm{A}}(X''), \\ P^{\mathrm{A}}(X') &\leq P^{\mathrm{A}}(X''). \end{aligned}$$

page 166, Proposition 7.13

`Replace the proposition by:`

Suppose that $X' < X''$. Then

$$\begin{aligned} C^{\mathrm{A}}(X') - C^{\mathrm{A}}(X'') &\leq X'' - X', \\ P^{\mathrm{A}}(X'') - P^{\mathrm{A}}(X') &\leq X'' - X'. \end{aligned}$$

page 166, proof of Proposition 7.13

`Replace the proof by:`

Suppose that $X' < X''$, but $C^{\mathrm{A}}(X') - C^{\mathrm{A}}(X'') > X'' - X'$. We write and sell a call with strike price X', buy a call with strike price X'' and invest the balance $C^{\mathrm{A}}(X') - C^{\mathrm{A}}(X'')$ without risk. If the written option is exercised at time $t \leq T$, then we shall have to pay $(S(t) - X')^+$. Exercising the other option immediately, we shall receive $(S(t) - X'')^+$. Observe that

$$(S(t) - X'')^+ - (S(t) - X')^+ \geq -(X'' - X')\,.$$

Together with the risk-free investment, amounting to more than $X'' - X'$, we shall therefore end up with a positive amount, realising an arbitrage profit.

The proof is similar for put options.

page 166, line 18

`Replace` $P^{\mathrm{E}}(X')$ `by` $P^{\mathrm{A}}(X')$

page 166, line –4

`Replace the line`

then we exercise both options held. In this way was shall achieve arbitrage

`by`

then we exercise both options held. If the option is not exercised at all, we do not need to do anything. In this way was shall achieve arbitrage

page 167, Proposition 7.15

`Replace the proposition by:`

If $S' < S''$, then

$$C^{\mathrm{A}}(S') \leq C^{\mathrm{A}}(S''),$$
$$P^{\mathrm{A}}(S') \geq P^{\mathrm{A}}(S'').$$

page 167, proof of Proposition 7.15

`Replace the proof by:`

Suppose that $C^{\mathrm{A}}(S') > C^{\mathrm{A}}(S'')$ for some $S' < S''$, where $S' = x'S(0)$ and $S'' = x''S(0)$. We can write and sell a call on a portfolio with x' shares and buy a call on a portfolio with x'' shares, both options having the same strike price X and expiry time T. The balance $C^{\mathrm{A}}(S') - C^{\mathrm{A}}(S'')$ of these transactions can be invested without risk. If the written option is exercised at time $t \leq T$, then we can meet the liability by exercising the other option immediately. Because $x' < x''$, the payoffs satisfy $(x'S(t) - X)^+ \leq (x''S(t) - X)^+$. As a result, this strategy will provide an arbitrage opportunity.

The proof is similar for put options.

page 167, Proposition 7.16

`Replace the proposition by:`

Suppose that $S' < S''$. Then

$$C^{\mathrm{A}}(S'') - C^{\mathrm{A}}(S') \leq S'' - S',$$
$$P^{\mathrm{A}}(S') - P^{\mathrm{A}}(S'') \leq S'' - S'.$$

pages 167–168, proof of Proposition 7.16

`Replace the proof by:`

The inequality for calls follows from Theorem 7.4 and Proposition 7.10.

For puts, suppose that $P^{\mathrm{A}}(S') - P^{\mathrm{A}}(S'') > S'' - S'$ for some $S' < S''$, where $S' = x'S(0)$ and $S'' = x''S(0)$. We buy $x'' - x' > 0$ shares, buy a put on a portfolio of x'' shares, and sell a put on a portfolio of x' shares, both puts with the same strike price X and expiry T. The cash balance of these transactions is $-(S'' - S') - P^{\mathrm{A}}(S'') + P^{\mathrm{A}}(S') > 0$. Should the holder of the put on x' shares choose to exercise it at time $t \leq T$, we shall need to pay $(X - x'S(t))^+$. By selling $x'' - x'$ shares and exercising the option on x'' shares at time t, we can raise enough cash to settle this liability:

$$(x'' - x')\, S(t) + (X - x''S(t))^+ \geq (X - x'S(t))^+ ,$$

since $x'' > x'$. If the put on x' shares is not exercised at all, we need to take no action. In any case, the initial profit plus interest is ours to keep, resulting in an arbitrage opportunity.

page 184, line 8

`Replace` $f(S(2))$ `by` $f(S(1))$ `in the formula for` $D^{\mathrm{A}}(1)$

page 189, displayed equations (8.11)

`Replace by:`

$$d_1 = \frac{\ln \frac{S(t)}{X} + \left(r + \frac{1}{2}\sigma^2\right)(T-t)}{\sigma\sqrt{T-t}}, \quad d_2 = \frac{\ln \frac{S(t)}{X} + \left(r - \frac{1}{2}\sigma^2\right)(T-t)}{\sigma\sqrt{T-t}}. \quad (8.11)$$

pages 203–207

`Replace by pages downloaded from`
`http://www-users.york.ac.uk/~tz506/m4f/M4F2003print_corr_pp203-207.pdf`

page 211, line 13

`Replace` $u \cong 1.85\%$ `by` $u \cong 1.8571\%$
`Replace` $d \cong -1.70\%$ `by` $d \cong -1.7070\%$

page 211, line 19

`Replace` $\mu_C \cong 14.1268\%$ `by` $\mu_C \cong 14.8453\%$
`Replace` $\sigma_C \cong 153.006\%$ `by` $\sigma_C \cong 153.9693\%$

page 211, line –9

Replace the text
that is \$12 per share
by
that is, \$12 per share

page 212, line 4
Replace 94.77% by 94.7417%

page 212, line 8
Replace $\mu_P \cong 1.3457\%$ by $\mu_P \cong 1.3790\%$

page 212, Table preceding Case 9.3
Replace the table by

Investment	Stock	Call options	Forwards	Calls with risk-free asset
Market price of risk	0.1087	0.0923	0.0931	0.0923
VaR at 94.23%	\$1,931.78	\$15,000.00	\$9,753.85	\$788.75
VaR at 99.41%	\$2,836.84	\$15,000.00	\$14,279.27	\$788.75

page 212, last line
Replace \$62 by \$60

page 213, line 6
Replace $58 \leq S(20) \leq 62$ by $58 \leq S(20) \leq 66$

page 213, first displayed formula, lines 7–8
Replace by

$$\begin{aligned} Q(S(20) = x) &= P(S(20) = x | 58 \leq S(20) \leq 66) \\ &= \begin{cases} \frac{P(S(20)=x)}{P(58 \leq S(20) \leq 66)} & \text{if } 58 \leq x \leq 66, \\ 0 & \text{if } x < 50 \text{ or } x > 66. \end{cases} \end{aligned}$$

page 213, line 16
Replace $\mu_C \cong 8.8816\%$ by $\mu_C \cong 9.5693\%$
Replace $\sigma_C \cong 71.095\%$ by $\sigma_C \cong 71.5441\%$

page 213, lines 18–19
Replace the sentence
The premium received for the latter is \$2.10, hence a single spread costs \$1.18.
by
The premium paid for the former is \$3.2923, hence a single spread costs \$1.1803.

page 213, line 21
`Replace` 94.58% `by` 94.5809%

page 213, last line (in the table)
`Replace` $12,426 `by` $12,409

page 232, Exercise 10.18
`Replace`
LIBOR, the London Interbank Offered Rate, is the rate at which money can be deposited
`by`
LIBOR, the London Interbank Offered Rate, is the rate at which money can be borrowed

`Replace`
LIBID, the London Interbank Bid Rate, is the rate at which money can be borrowed
`by`
LIBID, the London Interbank Bid Rate, is the rate at which money can be deposited

`Swap the table headings as follows:`

Rate	LIBID	LIBOR
1 month	8.41%	8.59%
2 months	8.44%	8.64%
3 months	9.01%	9.23%
6 months	9.35%	9.54%

page 248, lines 12–23
`Replace by:`

Consider time 1. In state u the short rate is determined by the price $B(1,2;\mathrm{u}) = 0.9948$, so we have $r(1;\mathrm{u}) \cong 6.26\%$. Hence $P(1;\mathrm{u}) \cong 109.43$. In state d we use $B(1,2;\mathrm{d}) = 0.9913$ to find $r(1;\mathrm{d}) \cong 10.49\%$ and $P(1;\mathrm{d}) \cong 109.04$.

Consider time 0. The cash flow at time 1 which we are to replicate includes the coupon due, so it is given by $P(1;\mathrm{u}) + 10 \cong 119.43$ and $P(1;\mathrm{d}) + 10 \cong 119.04$. The short rate $r(0) \cong 11.94\%$ determines the money market account as in Example 11.5, $A(1) = 1.01$, and we find $x \cong 96.25$, $y \cong 24.40$. Hence $P(0) \cong 118.01$ is the present price of the coupon bond.

An alternative is to use the spot yields: $y(0,1) \cong 11.94\%$ and $y(0,2) \cong 10.41\%$ to discount the future payments with the same result: $118.01 \cong 10 \times \exp(-\frac{1}{12} \times 11.94\%) + 110 \times \exp(-\frac{2}{12} \times 10.41\%)$.

page 250, line 16
`Replace` the data `by` the rectified data

page 258, line 16

`Replace` at time 3 `by` at time 2

page 266, Solution 1.11

`Replace the text of the solution by:`

a) If $p = 0.25$, then the standard deviation of the cost of buying one share is about 51.96 dollars when no option is purchased and about 25.98 dollars with the option.

b) If $p = 0.5$, then the standard deviation is 60 dollars and 30 dollars, respectively.

c) For $p = 0.75$ the standard deviation is about 51.96 dollars and 25.98 dollars, respectively.

page 266, Solution 1.12

`Replace the text of the solution by:`

The standard deviation of a random variable taking values a and b with probabilities p and $1-p$, respectively, is $|a-b|\sqrt{p(1-p)}$. If no option is involved, then the cost of buying one share will be 160 or 40 dollars, depending on whether stock goes up or down. In this case $|a-b| = |160-40| = 120$ dollars. If one option is used, then the cost will be 135 or 75 dollars, and $|a-b| = |135-75| = 60$ dollars. Clearly, the standard deviation $|a-b|\sqrt{p(1-p)}$ will be reduced by a half, no matter what p is.

page 284, Solution 5.8

`Replace the solution with the following:`

First, we compute $\mu_1 = 4\%$ and $\mu_2 = 16\%$ from the data in Example 5.6. Next, (5.7) and (5.1) give the system of equations

$$\begin{aligned} 4w_1 + 16w_2 &= 46, \\ w_1 + w_2 &= 1, \end{aligned}$$

for the weights w_1 and w_2. The solution is $w_1 = -2.5$ and $w_2 = 3.5$. Finally, we use (5.8) with the values $\sigma_1^2 \cong 0.0184$, $\sigma_2^2 \cong 0.0024$ and $\rho_{12} \cong -0.96309$ computed in Example 5.6 to find the risk of the portfolio:

$$\begin{aligned} \sigma_V^2 &\cong (-2.5)^2 \times 0.0184 + (3.5)^2 \times 0.0024 \\ &\quad + 2 \times (-2.5) \times 3.5 \times (-0.96309) \times \sqrt{0.0184} \times \sqrt{0.0024} \\ &\cong 0.2564. \end{aligned}$$

page 284, Solution 5.12

`Replace` $\boldsymbol{w} \cong \begin{bmatrix} 0.314 & 0.148 & 0.538 \end{bmatrix}$ `by` $\boldsymbol{w} \cong \begin{bmatrix} 0.228 & 0.235 & 0.537 \end{bmatrix}$

`Replace` $\mu_V \cong 0.173$ `by` $\mu_V \cong 0.167$

`Replace` $\sigma_V \cong 0.151$ `by` $\sigma_V \cong 0.264$

page 285, Solution 5.13

`Replace` $\boldsymbol{w} \cong \begin{bmatrix} 0.672 & -0.246 & 0.574 \end{bmatrix}$ `by` $\boldsymbol{w} \cong \begin{bmatrix} 0.722 & -0.208 & 0.486 \end{bmatrix}$

Replace $\sigma_V \cong 0.192$ by $\sigma_V \cong 0.211$

page 285, Solution 5.14

Replace

$$\boldsymbol{w} \cong \left[\begin{array}{ccc} -2.027 + 13.492\mu_V & 2.728 - 14.870\mu_V & 0.298 + 1.376\mu_V \end{array} \right]$$

by

$$\boldsymbol{w} \cong \left[\begin{array}{ccc} -2.314 + 15.180\mu_V & 2.515 - 13.615\mu_V & 0.799 - 1.566\mu_V \end{array} \right]$$

Replace

$$\sigma_V \cong \sqrt{0.625 - 6.946\mu_V + 20.018\mu_V^2}$$

by

$$\sigma_V \cong \sqrt{0.584 - 6.696\mu_V + 19.996\mu_V^2}$$

page 290, Solution 7.14

Replace the solution by:

Suppose that $X' < X''$, but $C^{\mathrm{E}}(X') < C^{\mathrm{E}}(X'')$. We can write and sell a call with strike price X'' and buy a call with strike price X', investing the difference $C^{\mathrm{E}}(X'') - C^{\mathrm{E}}(X') > 0$ without risk. If the option with strike price X'' is exercised at expiry, we will need to pay $(S(T) - X'')^+$. This amount can be raised by exercising the option with strike price X' and cashing the payoff $(S(T) - X')^+$. Since $X' < X''$, and so $(S(T) - X')^+ \geq (S(T) - X'')^+$, an arbitrage profit will be realised.

The inequality for puts follows by a similar arbitrage argument.

page 291, Solution 7.16

Replace the solution by:

Suppose that $P^{\mathrm{E}}(S') < P^{\mathrm{E}}(S'')$ for some $S' < S''$, where $S' = x'S(0)$ and $S'' = x''S(0)$. Write and sell a put option on a portfolio with x'' shares and buy a put option on a portfolio with x' shares, investing the balance $P^{\mathrm{E}}(S'') - P^{\mathrm{E}}(S') > 0$ without risk. If the written option is exercised at time T, then the liability can be met by exercising the other option. Since $x' < x''$, the payoffs satisfy $(X - x'S(T))^+ \geq (X - x''S(T))^+$. It follows that this is an arbitrage strategy.

page 291, Solution 7.17

Replace the solution by:

Suppose that $X' < X''$, but $C^{\mathrm{A}}(X') < C^{\mathrm{A}}(X'')$. We can write and sell the call option with strike price X'' and purchase the call option with strike price X', investing the balance $C^{\mathrm{A}}(X'') - C^{\mathrm{A}}(X') > 0$ without risk. If the written option is exercised at time $t \leq T$, we will have to pay $(S(t) - X'')^+$. This liability can be met by exercising the other option immediately, receiving the payoff $(S(t) - X')^+$. Since $(S(t) - X'')^+ \leq (S(t) - X')^+$, this strategy leads to arbitrage.

The inequality for put options can be proved in a similar manner.

page 297, Solution 9.10

`Replace the solution by:`

The cost of a single bull spread is \$0.8585, with expected return 29.6523%, standard deviation 99.169%, and VaR equal to \$15,094.74 (at 74.03% confidence level). If 92.9456% of the capital is invested without risk and the remainder in the bull spread, then the expected return will be the same as on stock, with risk of 6.9958% and VaR equal to \$1064.85.

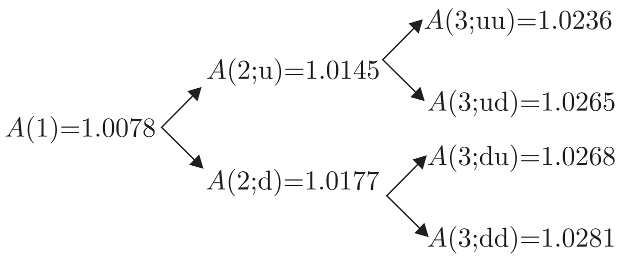
page 297, Solution 9.11

`Replace the solution by:`

A put with strike price \$56 costs \$0.4260. A put with strike price \$58 costs \$0.9282. The expected return on the bear spread is 111.4635%, the risk reaching 174.2334%. The worst case scenario (among those admitted by the analyst) is when the stock price drops to \$58.59. In this scenario, which will happen with conditional probability 0.3901, the investor will lose everything, so VaR = 15,094.74 dollars at 60.99% confidence level (which includes the cost of lost opportunity concerned with risk-free investment).

page 301, Figure S.12

`Replace the figure by:`



page 304

`Insert reference:`

Etheridge, A. (2002), *A Course in Financial Calculus*, Cambridge University Press, Cambridge.

page 304

`Replace`

Jarrow, R. A. and Turnbull, S. M., *Derivative Securities*, South-Western College, Cincinnati, Ohio.

`by`

Jarrow, R. A. and Turnbull, S. M. (1996), *Derivative Securities*, South-Western College, Cincinnati, Ohio.