Errata for
Stochastic Calculus for Finance II
Continuous-Time Models
February 2008

Page VIII of Preface. Add the text:

Acknowledgment added in second printing

Many people have been kind enough to point out typographical and other minor errors in the first printing of this book, and these have been corrected in this second printing. By far the greatest number of corrections have been provided by Professor Izumi Nagayama, who identified these during a reading seminar with her students and during the translation of this book into Japanese. The translation team led by Professor Nagayama consisted of herself and former Carnegie Mellon MSCF students Hisamitsu Tanaka, Yuichi Kono, Hideo Nagamori and Tatsuya Imai. I am deeply grateful to all of them.

Pittsburgh, Pennsylvania, USA — Steven E. Shreve
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Page 17, Definition 1.3.3. Replace by the text:

Definition 1.3.3 Let X be a random variable on a probability space $(\Omega, \mathcal{F}, \mathbb{P})$. The *expectation* (or *expected value*) of X is defined to be

$$\mathbb{E}X = \int_\Omega X(\omega)\, d\mathbb{P}(\omega).$$

This definition makes sense if at least one of $\mathbb{E}X^+$ or $\mathbb{E}X^-$ is finite. If $\mathbb{E}X^+$ is infinite and $\mathbb{E}X^-$ is finite, then $\mathbb{E}X = \infty$. If $\mathbb{E}X^+$ is finite and $\mathbb{E}X^-$ is infinite, then $\mathbb{E}X = -\infty$. If both $\mathbb{E}X^+$ and $\mathbb{E}X^-$ are finite, then $\mathbb{E}X$ is finite; in this case, we say that X is *integrable*. If both $\mathbb{E}X^+$ and $\mathbb{E}X^-$ are infinite, then $\mathbb{E}X$ is not defined.

Page 39, first paragraph of summary. This paragraph should say:

Probability theory begins with a *probability space* $(\Omega, \mathcal{F}, \mathbb{P})$ (Definition 1.1.2). Here Ω is the set of all possible outcomes of a random experiment, $\mathcal{F}$ is the collection of subsets of Ω whose probability is defined, and $\mathbb{P}$ is a function mapping $\mathcal{F}$ to $[0, 1]$ which is a *probability measure*. The two axioms of probability measures are $\mathbb{P}(\Omega) = 1$ and *countable additivity*: the probability of a union of disjoint sets is the sum of the probabilities of the individual sets.

Page 51, last line before footnotes

$\mathcal{F}_t$ should be $\mathcal{F}(t)$.

Page 52, Example 2.1.4
The first line of this example should refer to Example 1.2.1 of Volume I, not Chapter 1. The seventh line of Example 1.2.1 should refer to Figure 1.2.2 of Volume I, not Example 1.2.2 of Chapter 1.

Page 55, lines 1-2. This should say:
Example 2.2.2. Recall the space Ω_3 of three independent coin tosses on which the stock price random variables of Example 1.2.1 of Volume I are constructed.

Page 66, line 8. Change to:
In Chapter 2 of Volume I we discussed ...."

Page 66, equations (2.3.2) and (2.3.3).
Change ω_0 to ω_1 in six places.

Page 73, second line of *Example 2.3.3 continued*.
Replace $f(x, y)$ by $f(X, Y)$.

Page 141, line 4. A right absolute value sign is missing. The integrand should be

$$\big|f_{tx}\big(t, W(t)\big)\big|\, dt.$$

Page 141, line 9. Absolute value signs are missing. The integrand should be

$$\big|f_{tt}\big(t, W(t)\big)\big|.$$

Page 165, fourth line from bottom.
Replace "Itô formula" by "Itô-Doeblin formula."

page 185, line 13.
The line should begin with a +, so the first term is

$$+\frac{1}{2} f_{xx}\big(t, X(t), Y(t)\big)\, dX(t)\, dX(t).$$

Page 210, equation (5.2.1).
Change $dP(\omega)$ to $d\mathbb{P}(\omega)$.

Page 211, equation (5.2.5).
Change $dP(\omega)$ to $d\mathbb{P}(\omega)$.

Page 254, line 12.
Change the first $X_1(0)$ to $X_1(t)$, so that the line reads:
"portfolio value process $X_1(t)$ such that $X_1(0) = 0$".

Page 264, line 21.
Change "Brownian motions" to "Brownian motion."

Page 292, line 5.
Replace "Itô's formula" by "the Itô-Doeblin formula".

Page 309, line 6.
Replace "Subsection 7.4.3" by "Subsection 7.4.4."

Page 329, line 16.
The closing parenthesis is $\gamma(t)e^{-rt}(dS(t) - rS(t)\, dt)$ should be after the dt, not before it.

Page 349, line 14.
The left-hand side of the equation should be $\widetilde{\mathbb{E}}e^{-r\tau_L}$.

Page 355, lines 7 and 11. L^* should be L_* in two places.

Page 357, line 4 above the footnote.
"with" is misspelled.

Page 358, line 7.
The equation holds "for $(t,x) \in \mathcal{S}$".

Page 360, line 2.
The text should say, "In particular, $X(u) \geq (K - S(u))^+$ for ...."

Page 365, line 8.
Replace $c(t,0) = 0$ by $c_n(t,0) = 0$.

Page 366, line 2 from bottom.
Change "American call expiring immediately before" to "European call expiring immediately before".

Page 367, line 8 from bottom.
The label (8.5.24) should not appear, and the subsequent labels on this page and page 368 should be reduced by 1.

Page 397, line 14.
Change "Itô's formula" to "the Itô-Doeblin formula".

Page 444, line 15.
Change "it does not provide" to "the model does not provide".

Page 464, line 6 from bottom.
The integral should be $\int_0^s v^{n-1}\,dv$, that is, the integrator should be dv, not ds.

Page 465, last line and page 466, first line. The sentence should read: In both cases, one is simply counting the number of jumps that occur in a time interval of length t, and the time intervals between these jumps are independent and exponentially distributed with mean $\frac{1}{\lambda}$.

Page 470. Replace the proof of Theorem 11.3.1 by the following:

PROOF: Let $0 \leq s < t$ be given and let $\mathcal{F}(s)$ be the σ-algebra associated with observing the compound Poisson process up to time s. Then the increment $Q(t) - Q(s)$ is independent of $\mathcal{F}(s)$ and has mean $\beta\lambda(t-s)$. We have

$$\begin{aligned}\mathbb{E}\big[Q(t) - \beta\lambda t\big|\mathcal{F}(s)\big] &= \mathbb{E}\big[Q(t) - Q(s)\big|\mathcal{F}(s)\big] + Q(s) - \beta\lambda t \\ &= \beta\lambda(t-s) + Q(s) - \beta\lambda t \\ &= Q(s) - \beta\lambda s.\end{aligned}$$

□

Page 472, line 9.
The lower limit on the index of the sum should be 1, not 0. That is, we should have

$$\overline{Q}(t) = \sum_{i=1}^{\overline{N}(t)} \overline{Y}_i, \quad t \geq 0.$$

Page 480, line 2 from bottom.
$X^c(t_j)$ should be $X_1^c(t_j)$.

Page 485, line 13.
The integral on the right-hand side should have lower limit u, not v. That is, it should be

$$\int_u^{\tau_{j+1}} f'\big(X(s)\big)\, dX^c(s).$$

Page 485, line 20. The second integral on the right-hand side should have upper limit τ_{j+1}, not t_{j+1}. That is, it should be

$$\frac{1}{2}\int_{\tau_j}^{\tau_{j+1}} f''\big(X(s)\big)\, dX^c(s)\, dX^c(s)$$

Page 496, line 11 from bottom.
The right hand side should be $N_m(t) - \lambda_m t$, not $N_m(t) - \lambda_m\, dt$.

Page 497, line 6.
The equation hold for all $A \in \mathcal{F}$, not all $Z \in \mathcal{F}$.

Page 501, line 3 from bottom.
The first integral should be

$$\int_0^t X(s-)Z(s-)\, d\big(V(s) - \tilde{\lambda} s \widetilde{\varphi}_Y(u)\big).$$

There should be no ds term in this integral.

Page 523, line 9 from bottom.
Poisson is misspelled.

Page 525, line 7.
Poisson is misspelled.