Technical Note No. 16*
Options, Futures, and Other Derivatives
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Construction of an Interest Rate Tree with Non-Constant Time Steps and Non-Constant Parameters

Consider a one-factor model of the form

$$df(r) = [\theta(t) - a(t)f(r)]\,dt + \sigma(t)\,dz$$

As in the text, we let $x = f(r)$ and first build a tree for the process

$$dx = -a(t)x\,dt + \sigma(t)\,dz$$

The procedure for doing this is given in Technical Note 9. We then convert this tree to a tree for the process

$$dx = [\theta(t) - a(t)x]\,dt + \sigma(t)\,dz$$

so that the zero curve is fitted using the approach given in the text. For more details see "The Generalized Hull–White Model and Supercalibration," *Financial Analysts Journal*, 57, 6, Nov-Dec, 2001. The article is also available on John Hull's website.

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