Financial Derivatives Toolbox Release Notes

The “Financial Derivatives Toolbox 3.0 Release Notes” on page 1-1 describe the changes introduced in the latest version of the Financial Derivatives Toolbox.

If you are upgrading from a release earlier than Release 13, you should also see “Financial Derivatives Toolbox 2.0 Release Notes” on page 2-1.

Printing the Release Notes

If you would like to print the Release Notes, you can link to a PDF version.

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Financial Derivatives Toolbox 3.0 Release Notes

New Features

This section summarizes the new features and enhancements introduced in the Financial Derivatives Toolbox Version 3.0. These enhancements are:

- "Support for Equity Derivatives"
- "New Functions in Version 3.0"
- "Enhancement to the treeviewer Function"

Support for Equity Derivatives

Starting with Version 3.0 the Financial Derivatives Toolbox supports two types of recombining tree models to represent the evolution of stock prices: the Cox-Ross-Rubinstein (CRR) model and the Equal Probabilities (EQP) model. The CRR and EQP models are examples of discrete time models. A discrete time model divides time into discrete bits, and prices can be computed at these specific times only.

The CRR model is one of the most common methods used to model the evolution of stock processes. The strength of the CRR model lies in its simplicity. It is a good model when dealing with a large number of tree levels. The CRR model yields the correct expected value for each node of the tree and provides a good approximation for the corresponding local volatility. The approximation becomes better as the number of time steps represented in the tree is increased.

The EQP model is another discrete time model. It has the advantage of building a tree with the exact volatility in each tree node, even with small numbers of time steps. It also provides better results than CRR in some given trading environments, e.g., when stock volatility is low and interest rates are high. However, this additional precision causes increased complexity, which is reflected in the number of calculations required to build a tree.

New Functions in Version 3.0

Price and Sensitivity from Cox-Ross-Rubinstein Trees

`crrprice`	Instrument prices from a CRR tree
`crrsens`	Instrument prices and sensitivities by a CRR tree
`crrtimespec`	Specify time structure for CRR tree
`crrtree`	Construct CRR stock tree

Cox-Ross-Rubinstein Utilities

`asianbycrr`	Price Asian option by a CRR tree
`barrierbycrr`	Price barrier option by a CRR tree
`compoundbycrr`	Price compound option by a CRR tree
`lookbackbycrr`	Price lookback option by a CRR tree
`optstockbycrr`	Price stock option by a CRR tree

Price and Sensitivity from Equal Probabilities Binomial Trees

`eqpprice`	Instrument prices from an EQP binomial tree
`eqpsens`	Instrument prices and sensitivities from an EQP binomial tree
`eqptimespec`	Specify time structure for EQP tree
`eqptree`	Construct EQP stock tree

Equal Probabilities Tree Utilities

`asianbyeqp`	Price Asian option by an EQP tree
`barrierbyeqp`	Price barrier option by an EQP tree
`compoundbyeqp`	Price compound option by an EQP tree
`lookbackbyeqp`	Price lookback option by an EQP tree
`optstockbyeqp`	Price stock option by an EQP tree

Instrument Portfolio Handling

`instasian`	Construct Asian option instrument
`instbarrier`	Construct barrier option instrument
`instcompound`	Construct compound option instrument
`instlookback`	Construct lookback instrument
`instoptstock`	Construct stock option

Enhancement to the treeviewer Function

The `treeviewer` function, which provides a graphical display of rates and prices, has been modified to accept Cox-Ross-Rubenstein (CRR) and Equal Probabilites (EQP) equity trees as input.

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Financial Derivatives Toolbox 2.0 Release Notes

New Features

This section introduces the new features and enhancements added in the Financial Derivatives Toolbox 2.0 since Version 1.0 (Release 12.1).

Note The Financial Derivatives Toolbox 2.0 was initially released in Web-downloadable form after Release 12.1 was released, but before Release 13. There are no changes between the post-Release 12.1 version of the Financial Derivatives Toolbox 2.0 and the version shipped with Release 13.

Black-Derman-Toy Model

Version 2.0 of the Financial Derivatives Toolbox adds support for the Black-Derman-Toy (BDT) model for pricing interest rate derivatives. In the BDT model all security prices and rates depend upon the short rate (annualized one-period interest rate). The model uses long rates and their volatilities to construct a tree of possible future short rates. It then determines the value of interest rate sensitive securities from this tree.

The Black-Derman-Toy model works with a recombining tree. A recombining tree is the opposite of a bushy tree (used with the Heath-Jarrow-Morton (HJM) introduced in Version 1). A recombining tree has branches that recombine over time. From any given node, the node reached by taking the path up-down is the same node reached by taking the path down-up.

New Functions in Version 2.0

The following set of functions has been added to the toolbox to support operations with the BDT model. These functions are the counterparts of the HJM functions from Version 1.

Fixed Income Pricing and Sensitivity from Black-Derman-Toy Tree

Function	Purpose
`bdtprice`	Fixed income instrument prices by BDT interest rate tree
`bdtsens`	Fixed income instrument prices and sensitivities by BDT interest rate tree
`bdttimespec`	Specify time structure for BDT interest rate tree
`bdttree`	Construct BDT interest rate tree
`bdtvolspec`	BDT volatility process specification

Black-Derman-Toy Utilities

Function	Purpose
`bondbybdt`	Price bond by BDT interest rate tree
`capbybdt`	Price cap by BDT interest rate tree
`cfbybdt`	Price arbitrary set of cash flows by BDT interest rate tree
`fixedbybdt`	Price fixed rate note by BDT interest rate tree
`floatbybdt`	Price floating rate note by BDT interest rate tree
`floorbybdt`	Price floor instrument by BDT interest rate tree
`mmktbybdt`	Create money market tree from BDT
`optbndbybdt`	Price bond option by BDT interest rate tree
`swapbybdt`	Price swap instrument by BDT interest rate tree

Black-Derman-Toy Recombining Tree Manipulation

Function	Purpose
`mktree`	Create recombining tree
`treepath`	Extract entries from node of recombining tree
`treeshape`	Retrieve shape of recombining tree