

Financial Derivatives Toolbox™ Release Notes

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Financial Derivatives Toolbox™ Release Notes

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Summary by Version

This table provides quick access to what's new in each version. For clarification, see "Using Release Notes" on page 2.

Version (Release)	New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Latest Version V5.8 (R2011b)	Yes Details	Yes Summary	Bug Reports Includes fixes
V5.7 (R2011a)	Yes Details	No	Bug Reports Includes fixes
V5.6 (R2010b)	Yes Details	No	Bug Reports Includes fixes
V5.5.1 (R2010a)	No	No	Bug Reports Includes fixes
V5.5 (R2009b)	Yes Details	No	Bug Reports Includes fixes
V5.4 (R2009a)	Yes Details	No	Bug Reports Includes fixes
V5.3 (R2008b)	Yes Details	No	Bug Reports Includes fixes
V5.2 (R2008a)	Yes Details	No	Bug Reports Includes fixes
V5.1 (R2007b)	Yes Details	No	Bug Reports
V5.0 (R2007a)	Yes Details	No	Bug Reports
V4.1 (R2006b)	No	No	Bug Reports
V4.0.1 (R2006a)	No	No	Bug Reports

Version (Release)	New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
V4.0 (R14SP3)	Yes Details	No	Bug Reports
V3.0 (R14)	Yes Details	No	No bug fixes

Using Release Notes

Use release notes when upgrading to a newer version to learn about:

- New features
- Changes
- Potential impact on your existing files and practices

Review the release notes for other MathWorks® products required for this product (for example, MATLAB® or Simulink®). Determine if enhancements, bugs, or compatibility considerations in other products impact you.

If you are upgrading from a software version other than the most recent one, review the current release notes and all interim versions. For example, when you upgrade from V1.0 to V1.2, review the release notes for V1.1 and V1.2.

What Is in the Release Notes

New Features and Changes

- New functionality
- Changes to existing functionality

Version Compatibility Considerations

When a new feature or change introduces a reported incompatibility between versions, the **Compatibility Considerations** subsection explains the impact.

Compatibility issues reported after the product release appear under Bug Reports at the MathWorks Web site. Bug fixes can sometimes result in incompatibilities, so review the fixed bugs in Bug Reports for any compatibility impact.

Fixed Bugs and Known Problems

MathWorks offers a user-searchable Bug Reports database so you can view Bug Reports. The development team updates this database at release time and as more information becomes available. Bug Reports include provisions for any known workarounds or file replacements. Information is available for bugs existing in or fixed in Release 14SP2 or later. Information is not available for all bugs in earlier releases.

Access Bug Reports using your MathWorks Account.

Documentation on the MathWorks Web Site

Related documentation is available on mathworks.com for the latest release and for previous releases:

- Latest product documentation
- Archived documentation

Version 5.8 (R2011b) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 5.8 (R2011b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	Yes Summary	Bug Reports Includes fixes

New features and changes introduced in this version are:

- “Pricing and Sensitivity for Step-Up and Step-Down Coupon Bonds with Callable and Puttable Features” on page 4
- “Pricing and Sensitivity for Range Bonds” on page 6
- “Pricing and Sensitivity for Bonds with Sinking Fund Provisions” on page 6
- “Some Bond Pricing Functions No Longer Accept Strings for Numeric Inputs” on page 7
- “Warning and Error ID Changes” on page 8

Pricing and Sensitivity for Step-Up and Step-Down Coupon Bonds with Callable and Puttable Features

Support is added for pricing step-up and step-down bonds with a predetermined coupon structure over time. With these instruments, coupons increase (step up) or decrease (step down) at specific times during the life of the bond. Stepped coupon bonds can also have option features (calls and puts). These functions have a modified `CouponRate` argument to support a new variable coupon schedule allowing pricing of stepped coupon bonds and stepped coupon bonds with callable/puttable features.

Function	Purpose
<code>bondbyzero</code>	Price bonds using a term structure model.
<code>bondbybdt</code>	Price bonds using a BDT tree model.

Function	Purpose
<code>bondbyhjm</code>	Price bonds using an HJM tree model.
<code>bondbyhw</code>	Price bonds using an HW tree model.
<code>bondbybk</code>	Price bonds using a BK tree model.
<code>optembndbybdt</code>	Price bonds with embedded options using a BDT model tree.
<code>optembndbyhjm</code>	Price bonds with embedded options using an HJM model tree.
<code>optembndbybk</code>	Price bonds with embedded options using a BK model tree.
<code>optembndbyhw</code>	Price bonds with embedded options using an HW model tree.
<code>instbond</code>	Construct the bond instrument.
<code>instoptbnd</code>	Construct the bond option instrument.
<code>instoptembnd</code>	Construct the bond with embedded option instrument.
<code>instdisp</code>	Display instruments stored in a variable.
<code>bdtprice</code>	Determine instrument prices from a BDT interest-rate tree.
<code>bdtsens</code>	Determine instrument prices and sensitivities from a BDT interest-rate tree.
<code>hjmprice</code>	Determine instrument prices from an HJM interest-rate tree.
<code>hjmsens</code>	Determine instrument prices and sensitivities from an HJM interest-rate tree.
<code>hwprice</code>	Determine instrument prices from an HW interest-rate tree.
<code>hwsens</code>	Determine instrument prices and sensitivities from an HW interest-rate tree.

Function	Purpose
bkprice	Determine instrument prices from a BK interest-rate tree.
bksens	Determine instrument prices and sensitivities from a BK interest-rate tree.

Pricing and Sensitivity for Range Bonds

Support is added for creating and pricing a range note which is a structured (market-linked) security whose coupon-rate is equal to the reference rate as long as the reference rate is within a certain range. These functions support range bonds.

Function	Purpose
instrangefloat	Create a range note instrument.
rangefloatbybdt	Price a range floating note using a BDT tree.
rangefloatbybk	Price a range floating note using a BK tree.
rangefloatbyhjm	Price a range floating note using an HJM tree.
rangefloatbyhw	Price a range floating note using an HW tree.

Pricing and Sensitivity for Bonds with Sinking Fund Provisions

Support is added for pricing a sinking fund bond which is a coupon bond with a sinking fund provision. This provision obligates the issuer to amortize portions of the principal before maturity, affecting bond prices because the time of the principal repayment changes. These functions have a modified Face argument to support a variable face schedule for pricing bonds with sinking provisions.

Function	Purpose
bondbyzero	Price bonds using a term structure model.
bondbybdt	Price bonds using a BDT tree model.

Function	Purpose
<code>bondbyhjm</code>	Price bonds using an HJM tree model.
<code>bondbyhw</code>	Price bonds using an HW tree model.
<code>bondbybk</code>	Price bonds using a BK tree model.
<code>optembndbybdt</code>	Price bonds with embedded options using a BDT model tree.
<code>optembndbyhjm</code>	Price bonds with embedded options using an HJM model tree.
<code>optembndbybk</code>	Price bonds with embedded options using a BK model tree.
<code>optembndbyhw</code>	Price bonds with embedded options using an HW model tree.
<code>instbond</code>	Construct the bond instrument.
<code>instoptbnd</code>	Constructor the bond option instrument.
<code>instdisp</code>	Display instruments stored in a variable.
<code>cfamounts</code>	Determine cash flow and time mapping for bond portfolio.

Some Bond Pricing Functions No Longer Accept Strings for Numeric Inputs

The bond pricing functions `optbndbybdt`, `optbndbyhw`, `optbndbybk`, and `optbndbyhjm` no longer accept strings for the input arguments `AmericanOpt` and `CouponRate`.

Compatibility Considerations

If you use string inputs for `AmericanOpt` and `CouponRate` arguments for `optbndbybdt`, `optbndbyhw`, `optbndbybk`, `optbndbyhjm`, you will need to change the string input to numeric inputs.

Warning and Error ID Changes

Many warning and error IDs have changed from their previous versions. These warnings or errors typically appear during a function call.

Compatibility Considerations

If you use warning or error IDs, you might need to change the strings you use. For example, if you turned off a warning for a certain ID, the warning might now appear under a different ID. If you use a `try/catch` statement in your code, replace the old identifier with the new identifier. There is no definitive list of the differences, or of the IDs that changed.

Version 5.7 (R2011a) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 5.7 (R2011a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	No	Bug Reports Includes fixes

New features and changes introduced in this version are:

- “OAS Support for Callable and Puttable Bonds” on page 9
- “Additional Algorithm Support for Hull-White Model” on page 9
- “Case Sensitivity for Message IDs” on page 10

OAS Support for Callable and Puttable Bonds

Compute Option Adjusted Spread (OAS) for callable and puttable bonds using interest-rate tree models:

Function	Purpose
oasbybdt	Compute OAS using BDT model.
oasbyhjm	Compute OAS using HJM model.
oasbyhw	Compute OAS using HW model.
oasbybk	Compute OAS using BK model.

Additional Algorithm Support for Hull-White Model

hwtree supports two tree-node connectivity algorithms. HW1996 is based on the original paper published in the *Journal of Derivatives*. HW2000 is the general version of the algorithm, as specified in the paper published in August 2000. For more information, see “Calibrating the Hull-White Model Using Market Data”.

Case Sensitivity for Message IDs

Financial Derivatives Toolbox™ message IDs for errors and warnings are now case sensitive. The uppercase message ID `Finderiv:` is changed to lowercase `finderiv:.` For example:

```
error('Finderiv:supersharebybls:InsufficientInputs', ..
```

is now

```
error('finderiv:supersharebybls:InsufficientInputs', ...
```

Version 5.6 (R2010b) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 5.6 (R2010b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	No	Bug Reports Includes fixes

New features and changes introduced in this version are:

- “Support for Leisen-Reimer Binomial Trees for Option Valuation” on page 11
- “New Input and Output Options for Interest-Rate Swap Functionality” on page 12

Support for Leisen-Reimer Binomial Trees for Option Valuation

Support for Leisen-Reimer binomial trees enables modeling of equity options using fewer steps with minimal oscillating behavior:

Function	Purpose
lrtree	Build a Leisen-Reimer stock tree.
lrtimespec	Specify a time structure for a Leisen-Reimer binomial tree.
optstockbylr	Price options on stocks using the Leisen-Reimer binomial tree model.
optstocksensbylr	Calculate option prices and sensitivities using the Leisen-Reimer binomial tree model.

New Input and Output Options for Interest-Rate Swap Functionality

The following functions are enhanced to support new name-value pair arguments:

- `bondbyzero`
- `fixedbyzero`
- `floatbyzero`
- `swapbyzero`

In addition, `swapbyzero` supports new outputs for cash flows, cash flow dates, and accrued interest.

Version 5.5.1 (R2010a) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 5.5.1 (R2010a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
No	No	Bug Reports Includes fixes

There are no new features or changes in this version.

Version 5.5 (R2009b) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 5.5 (R2009b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	No	Bug Reports Includes fixes

New features and changes introduced in this version are:

- “Support for the Basket Option Instrument Using the Longstaff-Schwartz Model and Nengjiu Ju Approximation Model” on page 14
- “Support for the BUS/252 Day-Count Convention” on page 15

Support for the Basket Option Instrument Using the Longstaff-Schwartz Model and Nengjiu Ju Approximation Model

Supports the following using the Longstaff-Schwartz model:

Function	Purpose
basketbyls	Price basket options using the Longstaff-Schwartz model.
basketsensbyls	Calculate price and sensitivities for basket options using the Longstaff-Schwartz model.
basketstockspec	Specify basket stock structure.

Supports the following using the Nengjiu Ju approximation model:

Function	Purpose
basketbyju	Price basket options using the Nengjiu Ju model.
basketsensbyju	Calculate price and sensitivities for basket options using the Nengjiu Ju model.

For more information, see Basket Options in the Financial Derivatives Toolbox User's Guide documentation.

Support for the BUS/252 Day-Count Convention

Support for the Basis day-count convention for BUS/252. BUS/252 is the number of business days between the previous coupon payment and the settlement data divided by 252. BUS/252 business days are non-weekend, non-holiday days. The `holidays.m` file defines holidays.

Version 5.4 (R2009a) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 5.4 (R2009a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	No	Bug Reports Includes fixes

New features and changes introduced in this version are:

- “Support for European Digital Options Using the Black-Scholes Pricing Model” on page 16
- “Support for European Rainbow Options Using the Stulz Option Pricing Model” on page 17
- “Support for Caps and Floors Using the Black Option Pricing Model” on page 18
- “Support for Calibrating the Hull-White Model Using Market Data of Caps and Floors” on page 18

Support for European Digital Options Using the Black-Scholes Pricing Model

Supports the following:

Function	Purpose
cashbybls	Calculate price of cash-or-nothing digital options using the Black-Scholes model.
assetbybls	Calculate price of asset-or-nothing digital options using the Black-Scholes model.
gapbybls	Calculate price of gap digital options using the Black-Scholes model.

Function	Purpose
supersharebybls	Calculate price of supershare digital options using the Black-Scholes model.
cashsensbybls	Calculate price and sensitivities of cash-or-nothing digital options using the Black-Scholes model.
assetsensbybls	Calculate price and sensitivities of asset-or-nothing digital options using the Black-Scholes model.
gapsensbybls	Calculate price and sensitivities of gap digital options using the Black-Scholes model.
supersharesensbybls	Calculate price and sensitivities of supershare digital options using the Black-Scholes model.

For more information, see “Digital Option”.

Support for European Rainbow Options Using the Stulz Option Pricing Model

Supports the following:

Function	Purpose
minassetbystulz	Calculate European rainbow option price on minimum of two risky assets using the Stulz option pricing model.
minassetsensbystulz	Calculate European rainbow option prices and sensitivities on minimum of two risky assets using the Stulz pricing model.
maxassetbystulz	Calculate European rainbow option price on maximum of two risky assets using the Stulz option pricing model.
maxassetsensbystulz	Calculate European rainbow option prices and sensitivities on maximum of two risky assets using the Stulz pricing model.

For more information, see “Rainbow Option”.

Support for Caps and Floors Using the Black Option Pricing Model

Supports the following:

Function	Purpose
capbyblk	Price caps using the Black option pricing model.
floorbyblk	Price floors using the Black option pricing model.

For more information, see “Interest-Rate Derivatives Using Closed-Form Solutions”.

Support for Calibrating the Hull-White Model Using Market Data of Caps and Floors

Supports the following:

Function	Purpose
hwcalbycap	Calibrate Hull-White tree using caps.
hwcalbyfloor	Calibrate Hull-White tree using floors.

For more information, see “Calibrating the Hull-White Model Using Market Data”.

Version 5.3 (R2008b) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 5.3 (R2008b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	No	Bug Reports Includes fixes

New features and changes introduced in this version are:

- “Support for European Chooser Options Using the Black-Scholes Model” on page 19
- “Support for the Black Model for European Options” on page 20
- “Support for the Black-Scholes Model for European Options with Different Type of Dividends” on page 20
- “Support for the Bjerksund-Stensland Model for American Options with Continuous Dividend” on page 20
- “Support for the Roll-Geske-Whaley Model for American Call Options with a Single Cash Dividend” on page 21
- “Enhancements to stockspect” on page 21

Support for European Chooser Options Using the Black-Scholes Model

Supports the following:

Function	Purpose
chooserbybls	Prices European simple chooser options using the Black-Scholes model.

Support for the Black Model for European Options

Supports the following:

Function	Purpose
optstockbyblk	Pricing options using the Black option pricing model.
optstocksensbyblk	Calculates option prices and sensitivities on futures using the Black pricing model.
impvbyblk	Calculates implied volatility using the Black option pricing model.

For more information on the Black model, see “Computing Prices and Sensitivities Using the Black Model”.

Support for the Black-Scholes Model for European Options with Different Type of Dividends

Supports the following:

Function	Purpose
optstockbybls	Pricing options using the Black-Scholes option pricing model.
optstocksensbybls	Calculates option prices and sensitivities on futures using the Black-Scholes option pricing model.
impvbybls	Calculate implied volatility using the Black-Scholes option pricing model.

For more information on the Black-Scholes model, see “Computing Prices and Sensitivities Using the Black-Scholes Model”.

Support for the Bjerksund-Stensland Model for American Options with Continuous Dividend

Supports the following:

Function	Purpose
optstockbybjs	Pricing options using the Bjerksund-Stensland option pricing model.
optstocksensbybjs	Calculates option prices and sensitivities on futures using the Bjerksund-Stensland option pricing model.
impvbybjs	Calculates implied volatility using the Bjerksund-Stensland option pricing model.

For more information on the Bjerksund-Stensland model, see “Computing Prices and Sensitivities Using the Bjerksund-Stensland Model”.

Support for the Roll-Geske-Whaley Model for American Call Options with a Single Cash Dividend

Supports the following:

Function	Purpose
optstockbyrgw	Pricing options using the Roll-Geske-Whaley option pricing model.
optstocksensbyrgw	Calculates option prices and sensitivities on futures using the Roll-Geske-Whaley option pricing model.
impvbyrgw	Calculates implied volatility using the Roll-Geske-Whaley option pricing model.

For more information on the Roll-Geske-Whaley model, see “Computing Prices and Sensitivities Using the Roll-Geske-Whaley Model”.

Enhancements to stockspec

stockspec is now capable of handling several instruments. This modified implementation of stockspec is particularly useful when pricing equity options using some of the equity models, such as the closed-form solutions and analytical approximations. For the equity tree models, stockspec takes only the first instrument represented in the structure StockSpec to build the equity tree.

Version 5.2 (R2008a) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 5.2 (R2008a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	No	Bug Reports Includes fixes

New features and changes introduced in this version are:

- “Pricing Callable and Puttable Bonds” on page 22
- “Support for Actual/365 (ISDA)” on page 23

Pricing Callable and Puttable Bonds

Supports the following pricing for callable and puttable bonds:

Function	Purpose
optembndbybdt	Price bonds with embedded options by a Black-Derman-Toy interest rate tree.
optembndbybk	Price bonds with embedded options by a Black-Karasinski interest-rate tree.
optembndbyhjm	Price bonds with embedded options by an Heath-Jarrow-Morton interest-rate tree.
optembndbyhw	Price bonds with embedded options by a Hull-White interest-rate tree.
instoptembnd	Constructor for the 'Type', 'OptEmBond' instrument bond option.

In addition, the following functions have been modified to support callable and puttable bonds:

- `instadd`
- `bdtpprice`
- `hwprice`
- `hjmprice`
- `bkprice`
- `bdtsens`
- `hwsens`
- `hjmsens`
- `bksens`

Support for Actual/365 (ISDA)

The following functions now support day count conventions for the `basis` argument based on ISDA (International Swap Dealers Association) actual/365:

- `bondbybdt`
- `bondbybk`
- `bondbyhjm`
- `bondbyhw`
- `bondbyzero`
- `capbybdt`
- `capbybk`
- `capbyhjm`
- `capbyhw`
- `cfbybdt`
- `cfbybk`
- `cfbyhjm`

- cfbyhw
- cfbyzero
- date2time
- disc2rate
- fixedbybdt
- fixedbybk
- fixedbyhjm
- fixedbyhw
- fixedbyzero
- floatbybdt
- floatbybk
- floatbyhjm
- floatbyhw
- floatbyzero
- floorbybdt
- floorbybk
- floorbyhjm
- floorbyhw
- instbond
- instcap
- instcf
- instfixed
- instfloat
- instfloor
- instswap
- instswaption
- intenvset

- `optbndbybdt`
- `optbndbybk`
- `optbndbyhjm`
- `optbndbyhw`
- `rate2disc`
- `swapbybdt`
- `swapbybk`
- `swapbyhjm`
- `swapbyhw`
- `swapbyzero`
- `swaptionbybdt`
- `swaptionbybk`
- `swaptionbyhjm`
- `swaptionbyhw`
- `time2date`

Version 5.1 (R2007b) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 5.1 (R2007b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	No	Bug Reports

New features and changes introduced in this version are:

ISMA Support for 30/360 Basis as a Variant of 30/360E with Annual Compounding

The following functions now support day count conventions for the basis argument to support 30/360 International Securities Market Association (ISMA) convention as a variant of 30/360E with annual compounding:

- bondbybdt
- bondbybk
- bondbyhjm
- bondbyhw
- bondbyzero
- capbybdt
- capbybk
- capbyhjm
- capbyhw
- cfbybdt
- cfbybk
- cfbyhjm

- cfbyhw
- cfbyzero
- date2time
- disc2rate
- fixedbybdt
- fixedbybk
- fixedbyhjm
- fixedbyhw
- fixedbyzero
- floatbybdt
- floatbybk
- floatbyhjm
- floatbyhw
- floatbyzero
- floorbybdt
- floorbybk
- floorbyhjm
- floorbyhw
- instbond
- instcap
- instcf
- instfixed
- instfloat
- instfloor
- instswap
- instswaption
- intenvset

- `optbndbybdt`
- `optbndbybk`
- `optbndbyhjm`
- `optbndbyhw`
- `rate2disc`
- `swapbybdt`
- `swapbybk`
- `swapbyhjm`
- `swapbyhw`
- `swapbyzero`
- `swaptionbybdt`
- `swaptionbybk`
- `swaptionbyhjm`
- `swaptionbyhw`
- `time2date`

Version 5.0 (R2007a) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 5.0 (R2007a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	No	Bug Reports

New features and changes introduced in this version are:

- “Pricing and Sensitivity from the Implied Trinomial Tree Stock Tree” on page 29
- “Implied Trinomial Tree Utilities” on page 30
- “Enhancement to the treeviewer Function” on page 30
- “ISMA Support” on page 30

Pricing and Sensitivity from the Implied Trinomial Tree Stock Tree

The following table summarizes the functions supported for pricing and sensitivity from implied trinomial trees.

Function	Purpose
ittprice	Price instruments by an implied trinomial tree.
ittsens	Instrument sensitivities and prices by an implied trinomial tree.
itttree	Build an implied trinomial stock tree.
itttimespec	Specify time structure for an implied trinomial tree.
stockoptspec	Specify European stock options structure.

Implied Trinomial Tree Utilities

The following table summarizes the functions supported for implied trinomial trees.

Function	Purpose
optstockbyitt	Price options on stocks by an implied trinomial tree.
barrierbyitt	Price barrier options by an implied trinomial tree.
asianbyitt	Price Asian options by an implied trinomial tree.
lookbackbyitt	Price lookback option from an implied trinomial tree.
compoundbyitt	Price compound options by an implied trinomial tree.

Enhancement to the treeviewer Function

The treeviewer function, which provides a graphical display of rates and prices, has been modified to accept Implied Trinomial Trees (ITTs) as input.

ISMA Support

The following functions now support the International Securities Market Association (ISMA) convention for the basis argument:

- bondbybdt
- bondbybk
- bondbyhjm
- bondbyhw
- bondbyzero
- capbybdt
- capbybk
- capbyhjm
- capbyhw
- cfbybdt
- cfbybk

- cfbyhjm
- cfbyhw
- cfbyzero
- date2time
- disc2rate
- fixedbybdt
- fixedbybk
- fixedbyhjm
- fixedbyhw
- fixedbyzero
- floatbybdt
- floatbybk
- floatbyhjm
- floatbyhw
- floatbyzero
- floorbybdt
- floorbybk
- floorbyhjm
- floorbyhw
- instbond
- instcap
- instcf
- instfixed
- instfloat
- instfloor
- instswap
- intenvset

- `optbndbybdt`
- `optbndbybk`
- `optbndbyhjm`
- `optbndbyhw`
- `rate2disc`
- `swapbybdt`
- `swapbybk`
- `swapbyhjm`
- `swapbyhw`
- `swapbyzero`
- `time2date`

Version 4.1 (R2006b) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 4.1 (R2006b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
No	No	Bug Reports

Version 4.0.1 (R2006a) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 4.0.1 (R2006a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
No	No	Bug Reports

Version 4.0 (R14SP3) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 4.0 (R14SP3):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	No	Bug Reports

New features and changes introduced in this version are:

- “New Interest Rate Models” on page 35
- “Recombining Trinomial Trees” on page 38
- “Enhancement to the treeviewer Function” on page 38

New Interest Rate Models

Two interest rate models have been introduced with Version 4.0:

- Hull-White (HW) model

The Hull-White model incorporates the initial term structure of interest rates and the volatility term structure to build a trinomial recombining tree of short rates. The resulting tree is used to value interest rate-dependent securities. The implementation of the HW model in Financial Derivatives Toolbox software is limited to one factor.

- Black-Karasinski (BK) model

The BK model is a single-factor, log-normal version of the Hull-White model.

Hull-White and Black-Karasinski Functions

The following tables summarize the Black-Karasinski and Hull-White functions by their category of usage.

Price and Sensitivity from Black-Karasinski Trees

Function	Purpose
bkprice	Instrument prices from Black-Karasinski tree.
bksens	Instrument prices and sensitivities from Black-Karasinski tree.
bktimespec	Specify time structure for Black-Karasinski tree.
bktree	Construct Black-Karasinski interest-rate tree.
bkvolspec	Specify Black-Karasinski interest-rate volatility process.

Price and Sensitivity from Hull-White Trees

Function	Purpose
hwprice	Instrument prices from Hull-White tree.
hwsens	Instrument prices and sensitivities from Hull-White tree.
hwtimespec	Specify time structure for Hull-White tree.
hwtree	Construct Hull-White interest-rate tree.
hwvolspec	Specify Hull-White interest-rate volatility process.

Black-Karasinski Utilities

Function	Purpose
bondbybk	Price bond from Black-Karasinski interest-rate tree.
capbybk	Price cap instrument from Black-Karasinski interest-rate tree.
cfbybk	Price arbitrary set of cash flows from Black-Karasinski interest-rate tree.
fixedbybk	Price fixed-rate note from Black-Karasinski interest-rate tree.

Function	Purpose
floatbybk	Price floating-rate note from Black-Karasinski interest-rate tree.
floorbybk	Price floor instrument from Black-Karasinski interest-rate tree.
optbndbybk	Price bond option from Black-Karasinski interest-rate tree.
swapbybk	Price swap instrument from Black-Karasinski interest-rate tree.

Hull-White Utilities

Function	Purpose
bondbyhw	Price bond from Hull-White interest-rate tree.
capbyhw	Price cap instrument from Hull-White interest-rate tree.
cfbyhw	Price arbitrary set of cash flows from Hull-White interest-rate tree.
fixedbyhw	Price fixed-rate note from Hull-White interest-rate tree.
floatbyhw	Price floating-rate note from Hull-White interest-rate tree.
floorbyhw	Price floor instrument from Hull-White interest-rate tree.
optbndbyhw	Price bond option from Hull-White interest-rate tree.
swapbyhw	Price swap instrument from HJM interest-rate tree.

Tree Manipulation

Function	Purpose
<code>cvtree</code>	Convert inverse discount tree to interest-rate tree.
<code>mktrintree</code>	Create recombining trinomial tree.
<code>trintreepath</code>	Extract entries from node of recombining trinomial tree.
<code>trintreeshape</code>	Retrieve shape of recombining trinomial tree.

Recombining Trinomial Trees

The interest-rate or price trees supported in this toolbox can be either *binomial* (two branches per node) or *trinomial* (three branches per node). Typically, binomial trees assume that underlying interest rates or prices can only either increase or decrease at each node. Trinomial trees allow for a more complex movement of rates or prices. With trinomial trees the movement of rates or prices at each node is unrestricted (for example, up-up-up or unchanged-down-down).

Enhancement to the `treeviewer` Function

The `treeviewer` function, which provides a graphical display of rates and prices, has been modified to display recombining trinomial trees.

Version 3.0 (R14) Financial Derivatives Toolbox Software

This table summarizes what's new in Version 3.0 (R14):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems
Yes Details below	No	No bug fixes

New features and changes introduced in this version are:

- “Support for Equity Derivatives” on page 39
- “Enhancement to the treeviewer Function” on page 41

Support for Equity Derivatives

Starting with Version 3.0, Financial Derivatives Toolbox software 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

The following set of functions has been added to the toolbox for Version 3.0.

Price and Sensitivity from Cox-Ross-Rubinstein Trees

Function	Purpose
crrprice	Instrument prices from a CRR tree.
crrsens	Instrument prices and sensitivities by a CRR tree.
crrtimespec	Specify time structure for a CRR tree.
crrtimespec	Construct a CRR stock tree.

Cox-Ross-Rubinstein Utilities

Function	Purpose
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

Function	Purpose
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

Function	Purpose
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

Function	Purpose
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 Probabilities (EQP) equity trees as input.

Compatibility Summary for Financial Derivatives Toolbox Software

This table summarizes new features and changes that might cause incompatibilities when you upgrade from an earlier version, or when you use files on multiple versions. Details are provided with the description of the new feature or change.

Version (Release)	New Features and Changes with Version Compatibility Impact
Latest Version V5.8 (R2011b)	See the Compatibility Considerations subheading for each of these new features and changes: <ul style="list-style-type: none"> • “Some Bond Pricing Functions No Longer Accept Strings for Numeric Inputs” on page 7 • “Warning and Error ID Changes” on page 8
V5.7 (R2011a)	None
V5.6 (R2010b)	None
V5.5.1 (R2010a)	None
V5.5 (R2009b)	None
V5.4 (R2009a)	None
V5.3 (R2008b)	None
V5.2 (R2008a)	None
V5.1 (R2007b)	None
V5.0 (R2007a)	None
V4.1 (R2006b)	None
V4.0.1 (R2006a)	None
V4.0 (R14SP3)	None
V3.0 (R14)	None