

# Financial Derivatives Toolbox 5

## Model and analyze equity and fixed-income derivatives

Financial Derivatives Toolbox extends Financial Toolbox with tools for analyzing and modeling equity and fixed-income derivatives and securities contingent on interest rates. You can use the toolbox to compute prices and sensitivities, view price evolutions, and perform hedging analyses using common equity and fixed-income modeling methods.

### Working with Equity Options

The toolbox provides functionality for modeling the evolution of stock prices using the Cox-Ross-Rubinstein (CRR), the Equal Probabilities (EQP), or the Implied Trinomial Tree (ITT) method. With these discrete-time modeling methods, you can create binomial or trinomial trees and illustrate the expected stock price for each node in the tree with the corresponding volatility. The toolbox also provides functionality for calculating portfolio prices and sensitivities based on a binary and trinomial equity price tree.

Financial Derivatives Toolbox supports the following equity options:

- Vanilla (American, European, Bermuda)
- Compound
- Barrier
- Asian
- Lookback

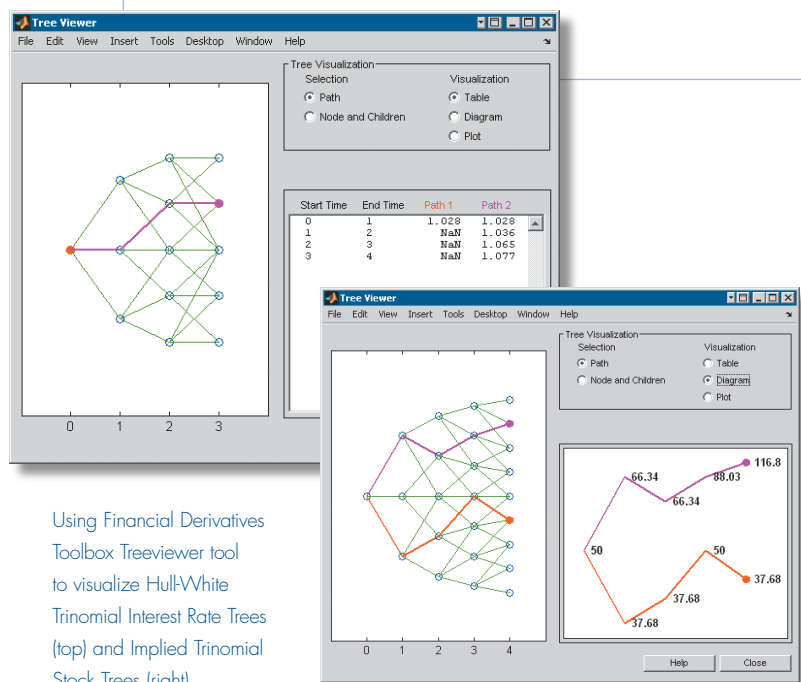
### Working with Fixed-Income Instruments

Financial Derivatives Toolbox includes functions for finding the prices and sensitivities of several financial instruments based on interest-rate curves. You can apply the functions to a portfolio of different types of instruments or to groups of instruments of the same type.

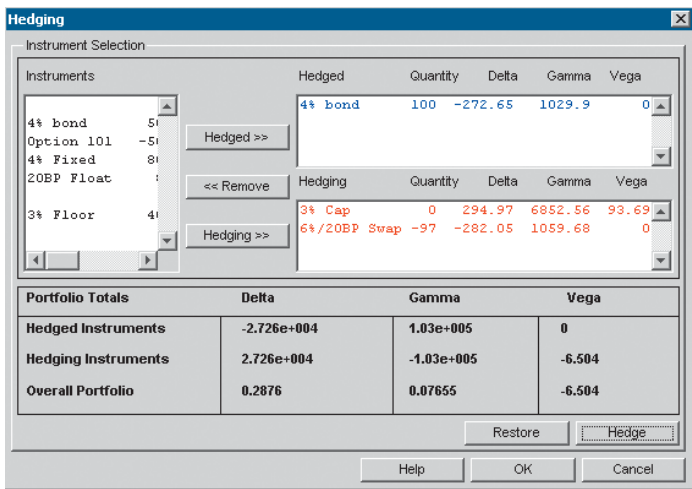
The toolbox also provides functions that use the Heath-Jarrow-Morton (HJM), Black-Derman-Toy (BDT), Black-Karasinski (BK), and Hull-White (HW) models to compute prices and sensitivities for other financial instruments.

### KEY FEATURES

- Computes prices and sensitivities of vanilla and exotic equity options using the CRR, EQP, or ITT model
- Calculates the prices of any set of supported instruments based on an interest-rate structure
- Computes prices and sensitivities of fixed-income instruments using the HJM, BDT, BK, or HW model
- Provides strategies for minimizing the cost of hedging a portfolio given a set of target sensitivities, and minimizing portfolio sensitivities given maximum target costs



Using Financial Derivatives Toolbox Treeviewer tool to visualize Hull-White Trinomial Interest Rate Trees (top) and Implied Trinomial Stock Trees (right).



Hedging strategy developed in Financial Derivatives Toolbox.

Financial Derivatives Toolbox supports the following fixed-income instruments:

- Bonds and options on bonds
- Arbitrary cash flows
- Fixed-rate and floating-rate notes
- Caps and floors
- Vanilla swaps

### Creating Portfolios and Hedging Strategies

Financial Derivatives Toolbox provides functionality for pricing portfolios and applying hedging strategies. You can:

- Create and manage portfolios that include several types of financial instruments
- Calculate the price and sensitivities for each instrument and the total portfolio
- View the results either numerically or graphically
- Define a hedging strategy using selected instruments within a portfolio to achieve a target sensitivity or cost

### Required Products

MATLAB®  
 Financial Toolbox  
 Optimization Toolbox  
 Statistics Toolbox

### Related Products

**Fixed-Income Toolbox.** Model and analyze fixed-income securities

**GARCH Toolbox.** Analyze financial volatility using univariate GARCH models

For more information on related products, visit [www.mathworks.com/products/derivatives](http://www.mathworks.com/products/derivatives)

### Platform and System Requirements

For platform and system requirements, visit [www.mathworks.com/products/derivatives](http://www.mathworks.com/products/derivatives) ■

## Sample Functions

### Portfolio Hedge Allocation

Allocate self-financing hedge

Allocate optimal hedge to trade off cost for sensitivity

### Interest Term Structure

Calculate discounting factors from interest rates

Calculate interest rates from cash flow discounting factors

### Pricing and Sensitivity for Equity and Fixed Income

Calculate instrument prices and sensitivities by term structure, HJM, BDT, BK, HW, CRR, EQP or ITT trees

Price bonds by a set of zero curves

Specify volatility process

Functions in Financial Derivatives Toolbox for interest rate computations, instrument portfolio construction and manipulation, and Heath-Jarrow-Morton and Black-Derman-Toy modeling.

### Resources

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