

# Fixed-Income Toolbox 1.1

## Model and analyze fixed-income securities

The Fixed-Income Toolbox extends MATLAB® with functions for fixed-income modeling and analysis. You can use the toolbox to determine the price, yield, and cash flow for many types of fixed-income securities, including mortgage-backed securities, corporate bonds, treasury bonds, municipal bonds, certificates of deposit, and treasury bills. The Fixed-Income Toolbox also enables you to work with derivatives, including swaps, convertible bonds, and treasury futures. The built-in functions can be used to create customized fixed-income models based on mortgage-backed securities and debt instruments.

### Mortgage Pools and Balloon Mortgages

With the Fixed-Income Toolbox, you can model generic fixed-rate mortgage pools and balloon mortgages.

Tools are provided for:

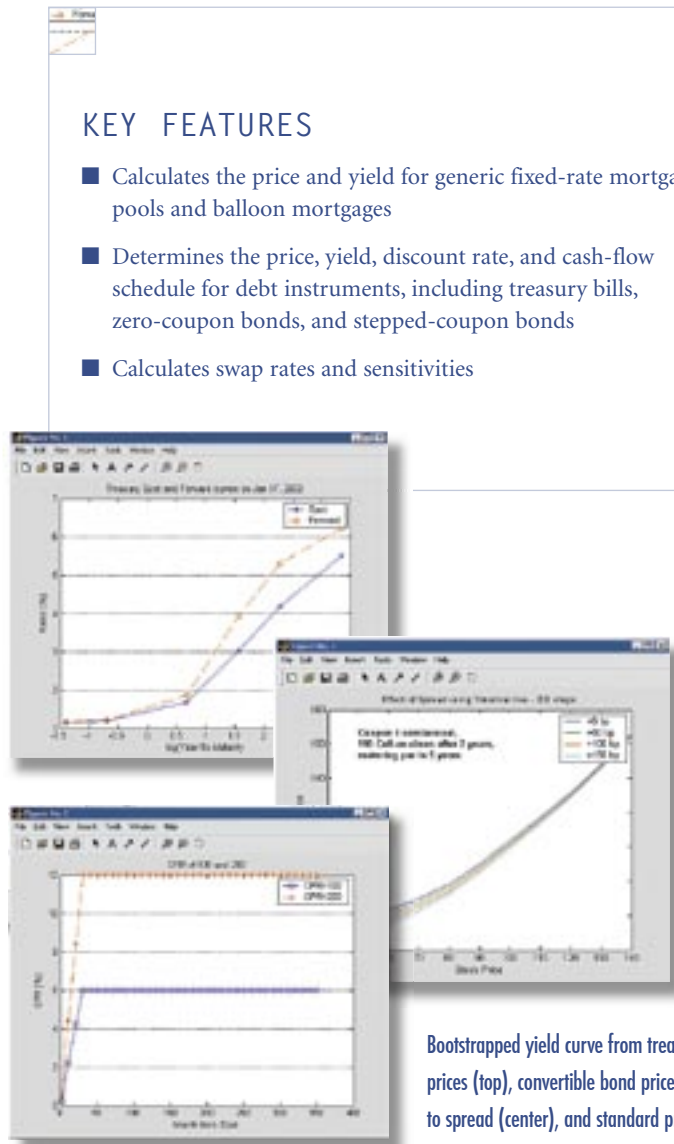
- Calculating the price and yield of mortgage-backed securities using prepayment options derived from uniform practices of the Public Securities Association (PSA)
- Determining the mortgage-pool price or effective duration using the Option Adjusted Spread (OAS) method
- Calculating basic risk measurements for a mortgage-pool portfolio using convexity, duration, and average life

### Debt Instruments

You can use the Fixed-Income Toolbox to work with a variety of debt instruments. You can calculate price, yield, discount rate, and break-even discount rate for treasury bills, as well as determine price, yield, and cash-flow schedules for corporate, treasury, and municipal bonds. The zero-coupon functions in the Fixed-Income Toolbox facilitate the extraction of present value from virtually any fixed-coupon instrument for any time period.

### KEY FEATURES

- Calculates the price and yield for generic fixed-rate mortgage pools and balloon mortgages
- Determines the price, yield, discount rate, and cash-flow schedule for debt instruments, including treasury bills, zero-coupon bonds, and stepped-coupon bonds
- Calculates swap rates and sensitivities



Bootstrapped yield curve from treasury bond prices (top), convertible bond price sensitivity to spread (center), and standard prepayment functions (bottom).

## Sample Functions

### Coupon bond functions

Stepped-coupon bond price

Stepped-coupon bond yield

### U.S. Treasury bill functions

Price of U.S. Treasury bills

Treasury bill break-even repurchase rate

### General zero-coupon functions

Price of zero-coupon bond, given its yield

Yield of zero-coupon bond, given its price

### Swap function

Valuation and revaluation of swap, given swap rate

### Fixed-rate mortgage pool functions

Price, assuming a PSA prepayment speed

OAS, given price and benchmark spot curve

Toolbox functions let you calculate price, yield, and cash-flow schedules for stepped-coupon bonds. The next coupon dates are computed automatically from the last entered input end dates. The payment due on settlement represents the accrued interest due on that day.

### Derivatives Securities

The Fixed-Income Toolbox provides tools based on Black's option functions for working with fixed-income derivatives. These tools let you calculate swap price by computing par yields that equate the floating-rate side of a swap to the fixed-rate side. You can set the present value of the fixed side to the present value of the floating side without aligning and comparing fixed and floating periods.

The duration-hedging capability in the toolbox lets you hedge a portfolio and address interest-rate risk exposure with a swap arrangement.

The Fixed-Income Toolbox lets you use binomial and trinomial trees to value convertible bonds. The value of the convertible bond is determined by the uncertainty of the relative stock.

## Required Products

MATLAB

Financial Toolbox

Statistics Toolbox

Optimization Toolbox

## Related Products

**Datafeed Toolbox.** Acquire financial data from data service providers

**Financial Derivatives Toolbox.** Model and analyze equity and fixed-income derivatives

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

## Platform and System Requirements

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

For demos, application examples, tutorials, user stories, and pricing:

• Visit [www.mathworks.com](http://www.mathworks.com)

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