Financial Instruments Toolbox™ Release Notes

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Financial Instruments Toolbox™ Release Notes

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Pricing and Valuation: Variance swaps

You can use VarianceSwap to create a VarianceSwap instrument object. You can price a VarianceSwap instrument using the ReplicatingVarianceSwap and Heston pricers.

Vanna-Volga Method: Price vanilla, barrier, double barrier, touch, and double touch instruments

You can use the VannaVolga pricing method with a BlackScholes model object for a Vanilla, Barrier, DoubleBarrier, Touch, or DoubleTouch instrument object.

Touch, Double Touch, and Binary Instruments: Price instruments using Black-Scholes or Asset Monte Carlo methods

You can create instrument objects for Binary, Touch, and DoubleTouch instruments. You can price these instruments using a BlackScholes or AssetMonteCarlo pricing method.

Double-Barrier Instrument: Price instrument using finite difference or Ikeda-Kunitomo methods

You can create a DoubleBarrier instrument object and price the DoubleBarrier instrument using the FiniteDifference or IkedaKunitomo pricing methods.

Call and Put Options: Price callable and puttable float bonds, float bond options, caps, floors, and swaptions by using instruments

You can use call or put options with FloatBondOption, OptionEmbeddedFloatBond, Cap, Floor, and Swaption instruments. You can price these instruments using an IRTree pricing method.

Finite Difference Method: Price vanilla instruments with Bermudan exercise

You can create a Bermudan exercise for a Vanilla instrument object. You can price this instrument using a FiniteDifference pricing method.

Monte Carlo Simulation: Price equity, FX, and commodity instruments

The following equity instruments support Monte Carlo simulation:

- Vanilla
- Lookback
- Barrier
- Asian
- Spread
- DoubleBarrier
- Binary

- `Touch`
- `DoubleTouch`

The following models support Monte Carlo simulation:

- `Bates`
- `Merton`
- `Heston`
- `BlackScholes`

The `AssetMonteCarlo` pricer supports Monte Carlo simulation.

R2020a

Pricing and Valuation: Price various types of financial instruments individually or as a portfolio using new object-oriented framework

The object-based framework supports a workflow for creating instruments, models, and pricer objects to price financial instruments. Using these objects, you can price interest-rate, equity, or credit derivative instruments. The object-based workflow is an alternative to pricing financial instruments using functions. Working with modular objects for instruments, models, and pricers, you can easily reuse these objects to compare instrument prices for different models and pricing engines.

The object-oriented framework supports the following capabilities:

- “Curve Objects” on page 2-2
- “Interest-Rate Instrument Objects” on page 2-3
- “Equity, Commodity, or FX Instrument Objects” on page 2-3
- “Credit Derivative Instrument Objects” on page 2-4
- “Portfolio Object” on page 2-4

For more information on the workflow for creating an instrument object, a model object, and a pricer object, see Get Started with Workflows Using Object-Based Framework for Pricing Financial Instruments.

For more information on the available instruments, models, and pricing methods, see Interest-Rate Instruments with Associated Models and Pricers.

For more information on the mapping of Financial Instruments Toolbox functions to interest-rate instrument objects, see Mapping Financial Instruments Toolbox Functions for Interest-Rate Instruments.

Curve Objects

New objects (`ratecurve`, `parametercurve`, and `defprobcurve`) for creating curve objects. New associated functions enable you to analyze these curve objects.

For interest-rate curves using a `ratecurve` object:

- `forwardrates`
- `zerorates`
- `discountfactors`
- `irbootstrap`

For financial curves using a `parametercurve` object:

- `discountfactors`
- `zerorates`
- `forwardrates`
- `fitNelsonSiegel`
- `fitSvensson`

For default probability curves using a `defprobcurve` object:

- survprobs
- hazardrates
- defprobstrip

Interest-Rate Instrument Objects

New instrument, model, and pricer objects are available for pricing interest-rate instruments.

These instrument objects support interest-rate instruments:

- Deposit
- FixedBond
- FloatBond
- FixedBondOption
- OptionEmbeddedFixedBond
- Cap
- Floor
- Swap
- Swaption
- FRA

These model objects support interest-rate instruments:

- Black.
- HullWhite
- BlackKarasinski
- Normal.
- Sabr

These pricer objects support interest-rate instruments:

- IRTree
- Black
- HullWhite
- Normal
- Sabr
- Discount

Equity, Commodity, or FX Instrument Objects

New instrument, model, and pricer objects are available for pricing equity, commodity, or foreign exchange (FX) instruments.

These instrument objects support equity, commodity, or FX instruments:

- Vanilla
- Lookback

- Barrier
- Asian
- Spread

These model objects support equity, commodity, or FX instruments:

- BlackScholes.
- Heston.
- Bates.
- Dupire.
- Merton.

These pricer objects support equity, commodity, or FX instruments:

- Levy.
- KemnaVorst.
- TurnbullWakeman.
- BlackScholes.
- ConzeViswanathan.
- GoldmanSosinGatto.
- RollGeskeWhaley.
- Kirk.
- BjerksundStensland.
- FiniteDifference.
- FFT.
- NumericalIntegration.

Credit Derivative Instrument Objects

New instrument, model, and pricer objects are available for pricing credit derivative instruments.

These instrument objects support credit derivative instruments:

- CDS
- CDSOption

This model object supports credit derivative instruments:

- CDSBlack

These pricer objects support credit derivative instruments:

- Credit
- CDSBlack

Portfolio Object

The new finportfolio object and associated functions enable you to manage and price a portfolio of instrument objects:

- `finportfolio`
- `pricePortfolio`
- `addInstrument`
- `removeInstrument`
- `setPricer`

R2019b

Interest-Rate Instruments: Compute prices and option-adjusted spread of amortizing bonds with embedded options using interest-rate tree models

These functions now provide support for amortizing bonds with an embedded option specified with the `'BondType'` name-value pair argument and a variable `Face` schedule.

- `optembndbybdt`
- `optembndbyhw`
- `optembndbybk`
- `optembndbyhjm`
- `optembndbycir`
- `oasbybdt`
- `oasbyhw`
- `oasbybk`
- `oasbyhjm`
- `oasbycir`

Interest-Rate Instruments: Calculate probability of exercise options on embedded bonds and bonds

These functions now return the probability of exercise options on embedded bonds and additional exercise information in new `PriceTree` outputs:

- `optembndbybdt`
- `optembndbyhw`
- `optembndbybk`
- `optembndbyhjm`
- `optembndbycir`

These functions now return option exercise information on bonds in new `PriceTree` outputs:

- `optbndbybdt`
- `optbndbyhw`
- `optbndbybk`
- `optbndbyhjm`
- `optbndbycir`

Equity and Energy Instruments: Compute prices and sensitivities of one-touch and double one-touch options using the Black-Scholes option pricing model

You can now compute prices and sensitivities for one-touch, no-touch, double one-touch, and double no-touch options in the foreign exchange market. Touch options (also known as binary barrier options or American digitals) are path-dependent options in which the existence and payment of the options depends on the movement of the underlying asset through the option life.

To calculate the price and sensitivities of one-touch and no-touch options, use `touchbybls` and `touchsensbybls`.

To calculate the price and sensitivities of double one-touch and double no-touch options, use `dbltouchbybls` and `dbltouchsensbybls`.

R2019a

Normal SABR Model: Support the computation of Normal (Bachelier) volatility for cap or floor volatility stripping

The following functions have the new additional name-value pair argument `'Model'` which enables you to specify a `'normal'` (Bachelier) volatility for cap or floor volatility stripping:

- `capvolstrip`
- `floorvolstrip`

Finite-Difference Methods: Compute prices and sensitivities of double barrier options using the Alternating Direction Implicit (ADI) and Crank-Nicolson methods

The following functions support finite-difference calculations for pricing double barrier options:

- `dblbarrierbyfd`
- `dblbarriersensbyfd`

Monte Carlo Simulation: Compute prices and sensitivities of double barrier options using the Black-Scholes option pricing model

The following functions support the double barrier options and sensitivities using the Black-Scholes option pricing model:

- `dblbarrierbybls`
- `dblbarriersensbybls`

Vanilla European Options: Compute prices and sensitivities using the Bates and Merton76 models with finite differences

The following functions support computing prices and sensitivities for vanilla European options with the Bates and Merton76 models using finite differences:

- `optByBatesFD`
- `optSensByBatesFD`
- `optByMertonFD`
- `optBySensMertonFD`

R2018b

Normal SABR Model: Compute implied Normal (Bachelier) volatility and sensitivity by the SABR model

The following functions support the computation of the implied Normal (Bachelier) volatility and sensitivities using the SABR model:

- `normalvolbysabr`
- `optsensbysabr`

Finite-Difference Methods: Calculate option prices by the Heston and local volatility models using the Alternating Direction Implicit (ADI) and Crank-Nicolson methods

The following new functions support finite-difference calculations for option prices:

- `optByLocalVolFD`
- `optSensByLocalVolFD`
- `optByHestonFD`
- `optSensByHestonFD`

Implied Volatility: Improve performance of the impvbybls and impvbyblk functions when using the Jäckel 2016 method

Improve performance of `impvbybls` and `impvbyblk` by using a new name-value pair argument for `'Method'` with the value of `'search'` or `'jackel2016'`. For computing implied volatility, the default value is `'jackel2016'`.

R2018a

Version: 2.7

New Features

Bug Fixes

Vanilla European Options: Compute prices and sensitivities using Heston, Bates, and Merton76 models with FFT and numerical integration

The following functions support computing prices and sensitivities for vanilla European options with the Heston, Bates, and Merton76 models using fast Fourier transform (FFT) or fractional Fourier transform (FRFT) and numerical integration:

- optByHestonFFT
- optSensByHestonFFT
- optByHestonNI
- optSensByHestonNI
- optByBatesFFT
- optSensByBatesFFT
- optByBatesNI
- optSensByBatesNI
- optByMertonFFT
- optSensByMertonFFT
- optByMertonNI
- optSensByMertonNI

Cox-Ingersoll-Ross Lattice Trees: Calculate prices and sensitivities of bonds, caps, floors, swaps, and options

The following functions support Cox-Ingersoll-Ross (CIR) lattice trees:

- cirtree
- cirprice
- cirsens
- bondbycir
- capbycir
- cfbycir
- cirtimespec
- cirvolspec
- fixedbycir
- floatbycir
- floorbycir
- oasbycir
- optbndbycir
- optembndbycir
- optfloatbycir
- optemfloatbycir

- rangefloatbycir
- swapbycir
- swaptionbycir

Asian Options: Use Haug, Haug, Margrabe model for discrete arithmetic fixed Asian options and Turnbull-Wakeman model for continuous arithmetic fixed options

Support for Haug, Haug, Margrabe model for discrete arithmetic fixed Asian options using the following functions:

- asianbyhhm
- asiansensbyhhm

Support for Turnbull-Wakeman model for continuous arithmetic fixed Asian options using the following functions:

- asianbytw
- asiansensbytw

R2017b

Interest-Rate Instruments: Price swaptions with resettable legs and different basis conventions using Black, Normal, and lattice (tree-based) models

The following functions support different swaption leg reset and basis conventions for lattice, Black, and Normal models:

- `instswaption`
- `swaptionbyblk`
- `swaptionbynormal`
- `swaptionbybdt`
- `swaptionbyhw`
- `swaptionbybk`
- `swaptionbyhjm`

Interest-Rate Instruments: Use Hull-White calibration routines for Shifted Black and Normal models

Calibration routines for the following functions support the Shifted Black model and the Normal (Bachelier) model (which can handle negative interest rates):

- `hwcalbycap`
- `hwcalbyfloor`

R2017a

Interest-Rate Instruments: Price interest rate options with negative rates using normal volatility model and shifted SABR model

The following functions support the normal volatility model (Bachelier model) for interest-rate options to handle negative rates:

- `swaptionbynormal`
- `capbynormal`
- `floorbynormal`

The following functions provide an optional `Shift` argument to support the shifted Black model and the shifted SABR model for interest-rate options to handle negative rates:

- `blackvolbysabr` (Shifted SABR)
- `optsensbysabr` (Shifted SABR)
- `swaptionbyblk` (Shifted Black)
- `capbyblk` (Shifted Black)
- `floorbyblk` (Shifted Black)
- `capvolstrip` (Shifted Black)
- `floorvolstrip` (Shifted Black)

Equity Instruments: Price American vanilla options using Barone-Adesi and Whaley model

Support for American vanilla options using the Barone-Adesi and Whaley model:

- `optstockbybaw`
- `optstocksensbybaw`
- `impvbybaw`

bkcaplet and bkfloorlet removal

`bkcaplet` and `bkfloorlet` will be removed in a future release. Use `capbyblk` and `floorbyblk` instead.

Compatibility Considerations

Function Name	What Happens When You Use This Function	Use This Function Instead	Compatibility Considerations
`bkcaplet` and `bkfloorlet`	Errors	`capbyblk` or `floorbyblk`	Replace all instances of `bkcaplet` and `bkfloorlet` with `capbyblk` or `floorbyblk`.

R2016b

Equity Instruments: Price barrier options with closed form, Crank-Nicolson method, and Monte Carlo simulation

The following functions support barrier options for equity or energy derivatives:

- `barrierbyfd` calculates barrier option prices using finite difference method.
- `barriersensbyfd` calculates barrier option prices and sensitivities using finite difference method.
- `barrierbybls` calculates prices for a European barrier option using Black-Scholes option pricing model.
- `barriersensbybls` calculates prices and sensitivities for a European barrier option using Black-Scholes option pricing model.
- `barrierbyls` calculates barrier option prices using Longstaff-Schwartz model.
- `barriersensbyls` calculates barrier option prices and sensitivities using Longstaff-Schwartz model.

Equity Instruments: Price European options with finite differences method

The following functions support vanilla options for equity derivatives:

- `optstockbyfd` calculates vanilla option prices using finite differences method.
- `optstocksensbyfd` calculates vanilla option prices and sensitivities using finite differences method.

Hybrid Instruments: Price convertible bonds with a default risk and recovery rate using standard and implied trinomial trees

Support for default for risk and recovery rate using `cbondbycrr`, `cbondbyeqp`, `cbondbystt`, and `cbondbyitt`. To specify a convertible bond risk and recovery rate, use the name-value pair arguments for `DefaultProbability` and `RecoveryRate`.

Numerix CAIL Engine: Access the Numerix Engine directly from MATLAB using an updated API

Support for an updated Numerix® CAIL API, using the `numerixCrossAsset` object and the associated methods for: `applicationCall`, `applicationData`, `applicationMatrix`, `getdata`, and `close`.

Functions moved from Financial Instruments Toolbox to Financial Toolbox

The following functions are moved from Financial Instruments Toolbox to Financial Toolbox™:

- `cdsbootstrap` calculates barrier option prices using finite difference method.
- `cdsprice` calculates barrier option prices and sensitivities using finite difference method.

- `cdsspread` calculates price for a European barrier options using Black-Scholes option pricing model.
- `cdsrpv01` calculates price and sensitivities for a European barrier options using Black-Scholes option pricing model.
- `creditexposures` computes credit exposures from contract values.
- `exposureprofiles` compute exposure profiles from credit exposures.

help fininstdemos removal

The `help fininstdemos` command is removed in this release. Use the `demo` command instead.

Compatibility Considerations

Command Name	What Happens When You Use This Command	Use This Command Instead	Compatibility Considerations
`help fininstdemos`	Errors	`demo 'toolbox' 'financial instruments'`	Replace all instances of `help fininstdemos` with `demo 'toolbox' 'financial instruments'`.

bkcaplet and bkfloorlet removal

`bkcaplet` and `bkfloorlet` will be removed in a future release. Use `capbyblk` and `floorbyblk` instead.

Compatibility Considerations

Function Name	What Happens When You Use This Function	Use This Function Instead	Compatibility Considerations
`bkcaplet` and `bkfloorlet`	Warns	`capbyblk` or `floorbyblk`	Replace all instances of `bkcaplet` and `bkfloorlet` with `capbyblk` or `floorbyblk`.

R2016a

Cap and Floor Instruments: Volatility stripping

The following functions support cap and volatility stripping for interest-rate instruments:

- `capvolstrip` strips caplet volatilities from flat cap volatilities.
- `floorvolstrip` strips floorlet volatilities from flat floor volatilities.

Swap Instruments: Pricing cross-currency, fixed-fixed, and float-float swaps

Support for pricing cross-currency swaps using `swapbyzero`. Support for fixed-fixed and float-float swaps is added to `instswap`, `swapbybdt`, `swapbyhjm`, `swapbybdt`, `swapbybk`, `swapbyzero`.

cbprice removal

`cbprice` is removed in this release. Use `cbondbycrr`, `cbondbyeqp`, `cbondbyitt`, or `cbondbystt` instead.

Compatibility Considerations

Function Name	What Happens When You Use This Function	Use This Function Instead	Compatibility Considerations
`cbprice`	Errors	`cbondbycrr`, `cbondbyeqp`, `cbondbyitt`, or `cbondbystt`	Replace all instances of `cbprice` with `cbondbycrr`, `cbondbyeqp`, `cbondbyitt`, or `cbondbystt`.

R2015b

Hybrid Instruments: Price convertible bonds using standard and implied trinomial trees

The following functions support building a standard trinomial tree:

- `stttree`
- `stttimespec`

`cbondbystt` supports pricing a convertible bond using an `STTTree`.

`ITTree` now supports pricing convertible bonds with `cbondbyitt`.

Equity Instruments: Price equity derivatives using a standard trinomial tree

`STTTree` supports pricing for equity derivatives.

The following modified functions support the following equity instruments:

- Asian options — `asianbystt`
- Lookback options — `lookbackbystt`
- Barrier options — `barrierbystt`
- Vanilla options — `optstockbystt`
- Compound options — `compoundbystt`
- `sttprice`
- `sttsens`

Simple Interest Convention: Calculate zero curves, forward curves, discount curves, rates, and bootstrapping using simple interest

Simple interest support for the following functions.

- `rate2disc` — Support added for `Compounding` = `0` for simple interest where there is no compounding.
- `disc2rate` — Support added for `Compounding` = `0` for simple interest where there is no compounding.
- `ratetimes` — Support added for `Compounding` = `0` for simple interest where there is no compounding.
- `IRDataCurve` — Support added for `Compounding` = `0` for simple interest for “zero” and “discount” curve types only (not supported for “forward” curves) where there is no compounding.
- `getForwardRates` — Support added for `Compounding` = `0` for simple interest where there is no compounding.
- `getZeroRates` — Support added for `Compounding` = `0` for simple interest where there is no compounding.
- `bootstrap` — Support added for `Compounding` = `0` for simple interest for “zero” and “discount” curve types only (not supported for “forward” curves) where there is no compounding.

- `intenvset` — Support added for `Compounding = 0` for simple interest where there is no compounding.

cbprice removal

`cbprice` will be removed in a future release. Use `cbondbycrr`, `cbondbyeqp`, `cbondbyitt`, or `cbondbystt` instead.

Compatibility Considerations

Function Name	What Happens When You Use This Function	Use This Function Instead	Compatibility Considerations
`cbprice`	Warns	`cbondbycrr`, `cbondbyeqp`, `cbondbyitt`, or `cbondbystt`	Replace all instances of `cbprice` with `cbondbycrr`, `cbondbyeqp`, `cbondbyitt`, or `cbondbystt`.

R2015a

Price convertible bonds using CRR and EQP lattice models

cbondbycrr and cbondbyeqp calculate the price of convertible bonds using the Tsiveriotis and Fernandes model. instcbond is the constructor for the CBond instrument type

The following modified functions support the new convertible bond (CBond) instrument:

- instadd
- instdisp
- crrprice
- eqpprice
- crrsens
- eqpsens

Collateral-level computation from credit exposure simulations

creditexposures is enhanced to support computing exposures for counterparties under collateral agreements.

Wrong-way risk example

The example for modeling wrong-way risk for counterparty credit risk using a Gaussian copula is available as Example_WrongWayRisk.m at \finist\fininstdemos. For more information, see Wrong Way Risk with Copulas.

R2014b

Pricing functionality for forward options

Support is provided for pricing forward options using a modified Black approximation model with `optstockbyblk` and `optstocksensbyblk` using a new name-value pair argument for `ForwardMaturity`, which is the maturity date of the forward contract.

Amortizing caps and floors pricing using lattice models

Support is provided for name-value pair argument, `Principal`, to pass the schedule to compute the price for amortizing caps (`capbybdt`, `capbybk`, `capbyhjm`, and `capbyhw`) and floors (`floorbybdt`, `floorbybk`, `floorbyhjm`, and `floorbyhw`). In addition, `instcap` and `instfloor` are enhanced to support the creation of cap and floor instruments with amortizing caps and floors.

Power price simulation example

The example for simulating power price and mean reverting jump diffusion is available as `SimulateElectricityPricesExample.m` at `\fininst\fininstdemos`. For more information, see Simulating Electricity Prices with Mean-Reversion and Jump-Diffusion.

Hull-White single-factor model calibration using volatility surface

`hwcalbycap` and `hwcalbyfloor` support a new syntax.

```
[Alpha, Sigma, OptimOut] = hwcalbycap(RateSpec, MarketStrike, MarketMaturity, MarketVolatility, N
```

```
[Alpha, Sigma, OptimOut] = hwcalbyfloor(RateSpec, MarketStrike, MarketMaturity, MarketVolatility,
```

The `Strike`, `Settle`, and `Maturity` input arguments are no longer required input arguments. By omitting these input arguments, you can use the `MarketStrike`, `MarketMaturity`, and `MarketVolatility` input arguments calibrate the HW model using the entire cap or floor surface.

SABR option greeks computation

Support is provided for `Delta`, `Vega`, `ModifiedDelta`, and `ModifiedVega` sensitivities for the SABR stochastic model using `optsensbysabr`.

Amortizing caps and floors pricing using closed form solutions (Black or Linear Gaussian two-factor models)

For the Black model, support is available for an enhanced name-value pair argument, `Principal`, to pass the schedule to compute the price for amortizing caps (`capbyblk`) and floors (`floorbyblk`). For the Linear Gaussian two-factor model, support is available for an enhanced name-value pair argument, `Notional`, to pass the schedule to compute the price for amortizing caps (`capbylg2f`) and floors (`floorbylg2f`).

Asian options pricing example

The example comparing multiple approaches to pricing Asian options is available as `AsianOptionExample.m` at `\fininst\fininstdemos`. For more information, see Pricing Asian Options.

Numerix CrossAsset Integration Layer (CAIL) 11 example

The example for Numerix CAIL 11 support is available at `\fininst\fininstdemos\NumerixFileProcessor.m`.

R2014a

Dual curve construction

Support for bootstrapping an interest rate curve using a different curve for discounting the cash flows with the following enhancements:

- `bootstrap` accepts a new optional input argument for `DiscountCurve`.
- `bootstrap` accepts a new bootstrapping instrument type called FRA for a forward rate agreement instrument.

For more information on using `bootstrap` for dual curve construction, see the example: Dual Curve Bootstrapping.

Dual curve pricing of caps, floors, and swaptions using the Black model

`capbyblk`, `floorbyblk`, and `swaptionbyblk` accept an optional input argument for `ProjectionCurve`.

Dual curve pricing of swaps and floating-rate notes

`swapbyzero` and `floatbyzero` have new examples to demonstrate pricing a swap and a floating-rate note with two curves.

Monte Carlo and analytical pricing of lookback options

Support for lookback options using closed-form solutions or Monte Carlo simulations.

Function	Purpose
`lookbackbycvgsg`	Calculate prices of European lookback fixed- and floating-strike options using the Conze-Viswanathan and Goldman-Sosin-Gatto models.
`lookbacksensbycvgsg`	Calculate prices and sensitivities of European fixed- and floating-strike lookback options using the Conze-Viswanathan and Goldman-Sosin-Gatto models.
`lookbackbyls`	Calculate prices of lookback fixed- and floating-strike options using the Longstaff-Schwartz model.
`lookbacksensbyls`	Calculate prices and sensitivities of lookback fixed- and floating-strike options using the Longstaff-Schwartz model.

Implied Black volatility computation for the SABR stochastic volatility model

Support for `blackvolbysabr` to calibrate the SABR model parameters and to compute SABR implied Black volatilities.

User-specified simulation paths for Longstaff-Schwartz pricing functions

Support for `optpricebysim` to calculate the price and sensitivities of European or American call or put options based on simulation results of the underlying asset. For American options, the Longstaff-Schwartz least squares method is used to calculate the early exercise premium.

creditexposures function to compute credit exposures from mark-to-market OTC contract values

Support for computing credit exposures as a part of a counterparty credit risk workflow. For more information, see `creditexposures`.

exposureprofiles function to derive credit exposure profiles from credit exposures

Support for computing various credit exposure profiles, including potential future exposure and expected exposure. For more information, see `exposureprofiles`.

Enhanced pricing functions for instruments and portfolios with cash flows between tree levels

The pricing algorithms for vanilla stock options have been enhanced to support `ExerciseDates` between tree levels. While `ExerciseDates` previously allowed only values that coincided with tree dates, the new pricing algorithm allows arbitrary `ExerciseDates` between the tree valuation date and tree maturity. For more information see the Bermuda option examples in `optstockbycrr`, `optstockbyeqp`, and `optstockbyitt`.

Swing option pricing example

New example for Pricing Swing Options using the Longstaff-Schwartz Method.

R2013b

Support for Numerix CrossAsset Integration Layer (CAIL) API

Support for accessing Numerix instruments and risk models.

Class	Purpose
numerix	Create a numerix object to set up the Numerix CrossAsset Integration Layer (CAIL) environment.

Method	Purpose
numerix.parseResults	Converts Numerix CAIL data to MATLAB® data types.

Kirk's approximation and Bjerksund-Stensland closed-form pricing models for spread options

Support pricing and sensitivity of spread options for the energy market using closed-form solutions.

Function	Purpose
spreadbykirk	Price European spread options using the Kirk pricing model.
spreadsensbykirk	Calculate European spread option prices and sensitivities using the Kirk pricing model.
spreadbybjs	Price European spread options using the Bjerksund-Stensland pricing model.
spreadsensbybjs	Calculate European spread option prices and sensitivities using the Bjerksund-Stensland pricing model.

Finite difference and Monte Carlo simulation pricing for American spread options

Support pricing and sensitivity of spread options for the energy market using Monte Carlo simulation.

Function	Purpose
spreadbyfd	Price European or American spread options using the Alternate Direction Implicit (ADI) finite difference method.
spreadsensbyfd	Calculate price and sensitivities of European or American spread options using the Alternate Direction Implicit (ADI) finite difference method.
spreadbyls	Price European or American spread options using Monte Carlo simulations.
spreadsensbyls	Calculate price and sensitivities for European or American spread options using Monte Carlo simulations.

Levy and Kemna-Vorst closed-form pricing and Monte Carlo simulation pricing for Asian options

Support pricing and sensitivity of Asian options for the energy market using Monte Carlo simulation and closed-form solutions.

Function	Purpose
asianbyls	Price European or American Asian options using the Longstaff-Schwartz model.
asiansensbyls	Calculate prices and sensitivities of European or American Asian options using the Longstaff-Schwartz model.
asianbykv	Price European geometric Asian options using the Kemna-Vorst model.
asiansensbykv	Calculate prices and sensitivities of European geometric Asian options using the Kemna-Vorst model.
asianbylevy	Price European arithmetic Asian options using the Levy model.
asiansensbylevy	Calculate prices and sensitivities of European arithmetic Asian options using the Levy model.

Additional CDS option pricing functionality for index swaptions

New example for Pricing a CDS Index Option.

Pricing functions for vanilla options using Monte Carlo simulation

Support pricing and sensitivity of vanilla options for the energy market using Monte Carlo simulation.

Function	Purpose
optstockbyls	Price European, Bermudan, or American vanilla options using the Longstaff-Schwartz model.
optstocksensbyls	Calculate European, Bermudan, or American vanilla option prices and sensitivities using the Longstaff-Schwartz model.

Hedging strategies using spread options example

New example for Hedging Strategies Using Spread Options.

Pricing European and American spread options example

New example for Pricing European and American Spread Options.

First-to-default (FTD) swaps example

New example for First-to-Default Swaps.

New function for risky present value of a basis point

`cdsrpv01` computes risky present value of a basis point (RPV01) for a credit default swap (CDS) and conforms to the industry standards (ISDA CDS Standard Model).

Compatibility Considerations

Compared with the previous version of Financial Instruments Toolbox, there are minor changes in the values computed by `cdsbootstrap`, `cdsspread`, `cdsprice`, and `cdsoptprice` when the starting dates do not fall on a payment date. The affected output arguments are as follows:

- `cdsbootstrap`: `ProbData`, `HazData`
- `cdsspread`: `Spread`
- `cdsprice`: `Price`
- `cdsoptprice`: `Payer`, `Receiver`

While the magnitudes of the value changes are very small, they might affect users who depend on exact matches to previous values. These changes are caused by the modification of the way risky present value of a basis point (RPV01) is computed and these changes were made to better reflect the industry practice of paying CDS premiums only on specific payment dates.

optimoptions support

`optimoptions` support for `IRFitOptions`, `fitFunction` method, `hwcalbycap`, and `hwcalbyfloor`.

Functions moved from Financial Instruments Toolbox to Financial Toolbox

The following functions are moved from Financial Instruments Toolbox to Financial Toolbox:

- `cdai`
- `cdprice`
- `cdyield`
- `tbilldisc2yield`
- `tbillprice`
- `tbillrepo`
- `tbillval01`
- `tbillyield`
- `tbillyield2disc`

R2013a

Version: 1.1

New Features

Pricing functions for options on floating-rate notes (FRNs)

Support for pricing a floating-rate note instrument with an option using tree models.

Function	Purpose
optfloatbybdt	Price an option for a floating-rate note using a Black-Derman-Toy interest-rate tree.
optfloatbyhjm	Price an option for a floating-rate note using a Heath-Jarrow-Morton interest-rate tree.
optfloatbyhw	Price an option for a floating-rate note using a Hull-White interest-rate tree.
optfloatbybk	Price an option for a floating-rate note using a Black-Karasinski interest-rate tree.
instoptfloat	Define the option instrument for a floating-rate note.

Pricing functions for FRNs with embedded options

Support for pricing a floating-rate note instrument with an embedded option using tree models.

Function	Purpose
optemfloatbybdt	Price an embedded option for a floating-rate note using a Black-Derman-Toy interest-rate tree.
optemfloatbybk	Price an embedded option for a floating-rate note using a Black-Karasinski interest-rate tree.
optemfloatbyhjm	Price an embedded option for a floating-rate note using a Heath-Jarrow-Morton interest-rate tree.
optemfloatbyhw	Price an embedded option for a floating-rate note using a Hull-White interest-rate tree.
instoptemfloat	Define the floating-rate note with an embedded option instrument.

Performance enhancements in implied volatility calculations

Improved performance for calculating implied volatility when using `impvbybjs` and `impvbyrgw`.

Calibration and Monte Carlo simulation of single-factor and multifactor interest-rate models, including Hull-White, Linear Gaussian, and LIBOR Market Models

Support for pricing interest-rate instruments for caps, floors, and swaptions using Monte Carlo simulation with Hull-White, Shifted Gaussian, and LIBOR Market Models. There are three new classes, three new methods, and four new functions.

Class	Purpose
HullWhite1F	Create a Hull-White one-factor model.
LinearGaussian2F	Create a two-factor additive Gaussian interest-rate model.

Class	Purpose
`LiborMarketModel`	Create a LIBOR Market Model.

Method	Purpose
`HullWhite1F.simTermStructs`	Simulate term structures for a Hull-White one-factor model.
`LinearGaussian2F.simTermStructs`	Simulate term structures for a two-factor additive Gaussian interest-rate model.
`LiborMarketModel.simTermStructs`	Simulate term structures for a LIBOR Market Model.

Function	Purpose
`capbylg2f`	Price caps using a Linear Gaussian two-factor model.
`floorbylg2f`	Price floors using a Linear Gaussian two-factor model.
`swaptionbylg2f`	Price European swaptions using a Linear Gaussian two-factor model.
`blackvolbyrebonato`	Compute the Black volatility for a LIBOR Market Model using the Rebonato formula.

R2012b

Merge of Fixed-Income Toolbox and Financial Derivatives Toolbox to Financial Instruments Toolbox

Fixed-Income Toolbox™ and Financial Derivatives Toolbox™ are merged into the new product Financial Instruments Toolbox.

Cap and floor floating-rate note pricing using trees

Support for pricing capped, collared, and floored floating-rate notes using the `CapRate` and `FloorRate` arguments.

Function	Purpose
`floatbybdt`	Price a capped floating-rate note using a Black-Derman-Toy interest-rate tree.
`floatbyhjm`	Price a capped floating-rate note using a Heath-Jarrow-Morton interest-rate tree.
`floatbyhw`	Price a capped floating-rate note using a Hull-White interest-rate tree.
`floatbybk`	Price a capped floating-rate note using a Black-Karasinski interest-rate tree.
`instfloat`	Create a capped floating-rate note instrument.
`instadd`	Add capped floating-rate note instruments to a portfolio.

Forward-swap pricing using trees or term structure

Support for interest-rate forward swaps using the new `StartDate` argument to define the future date for the swap instrument.

Function	Purpose
`swapbyzero`	Price a bond using a set of zero curves.
`swapbybdt`	Price a forward swap using a Black-Derman-Toy interest-rate tree.
`swapbyhjm`	Price a forward swap using a Heath-Jarrow-Morton interest-rate tree.
`swapbyhw`	Price a forward swap using a Hull-White interest-rate tree.
`swapbybk`	Price a forward swap using a Black-Karasinski interest-rate tree.
`instswap`	Create a forward swap instrument.
`instadd`	Add forward swap instruments to a portfolio.

Functions for fitting and extracting calibrated parameters from IRFunctionCurve objects

New enhancements for `IRFunctionCurve` object, including the ability to get calibrated parameters, the ability to specify linear inequality parameter constraints, and support for curve type in `fitSmoothingSpline` to be forward, zero, and discount.

LIBOR market model example

New example for mortgage prepayment that uses a LIBOR market model to generate interest-rate evolutions. For more information, see Prepayment Modeling with a Two Factor Hull White Model and a LIBOR Market Model.

Counterparty credit risk example

New example for computing the unilateral Credit Value (Valuation) Adjustment (CVA) for a bank holding a portfolio of vanilla interest-rate swaps with several counterparties. For more information, see Counterparty Credit Risk and CVA.

Conversion of error and warning message identifiers

For R2012b, error and warning message identifiers have changed in Financial Instruments Toolbox.

Compatibility Considerations

If you have scripts or functions that use message identifiers that changed, you must update the code to use the new identifiers. Typically, message identifiers are used to turn off specific warning messages, or in code that uses a `try/catch` statement and performs an action based on a specific error identifier.

For example, because Fixed-Income Toolbox and Financial Derivatives Toolbox merged to become Financial Instruments Toolbox, the `finfixed` and `finderiv` message identifiers have changed to `fininst`. If your code checks for `finfixed` or `finderiv` message identifiers, you must update it to check for `finisnt` instead.

To determine the identifier for an error, run the following command just after you see the error:

```
exception = MException.last;
MSGID = exception.identifier;
```

To determine the identifier for a warning, run the following command just after you see the warning:

```
[MSG,MSGID] = lastwarn;
```

This command saves the message identifier to the variable `MSGID`.