FINCAD®

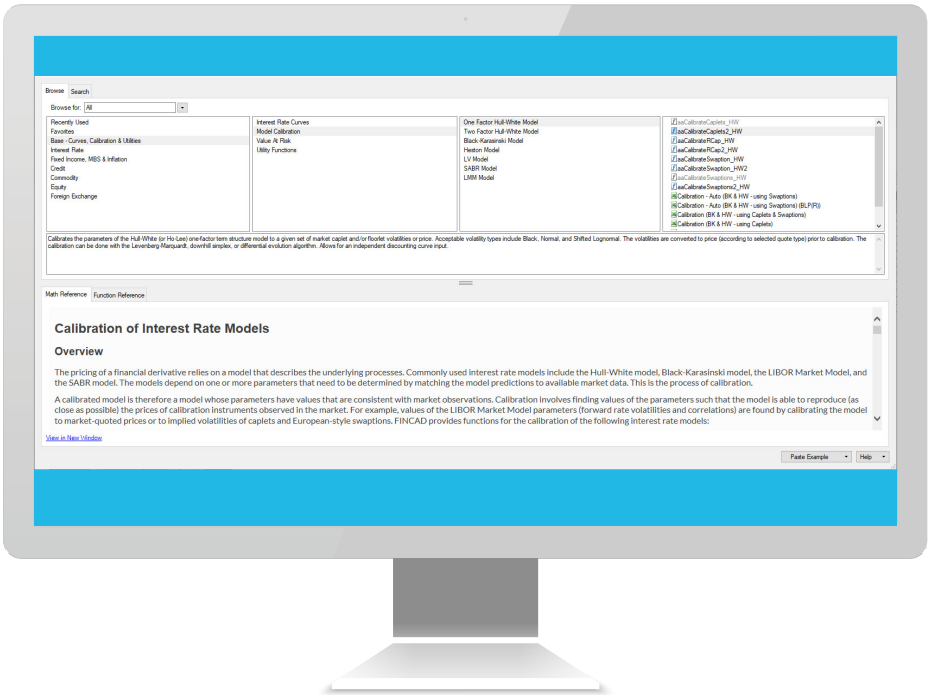
Price Derivative and Fixed Income Instruments in Microsoft Excel

FINCAD makes pricing derivatives and fixed income products easier than ever.

Based on 30 years of experience, FINCAD's analytics for Microsoft Excel are the world's first standard library of predefined calculators and workbooks that simplify valuation and risk analytics for derivatives and fixed income products.

With over 2,000 pre-configured functions and over 200 workbooks at your fingertips, FINCAD's functional analytics library empowers you to calculate pricing, risk, and cash flows within minutes.

GET STARTED RIGHT AWAY, VALUING YOUR PORTFOLIO WITH CONFIDENCE.



FINCAD offers an unmatched user experience.

Find models, workbook solutions and documentation quickly with an Analytics Finder. Review and understand function inputs with a Function Wizard, and get help with error debugging. Easy-to-use Excel tools enable calculation and array management.

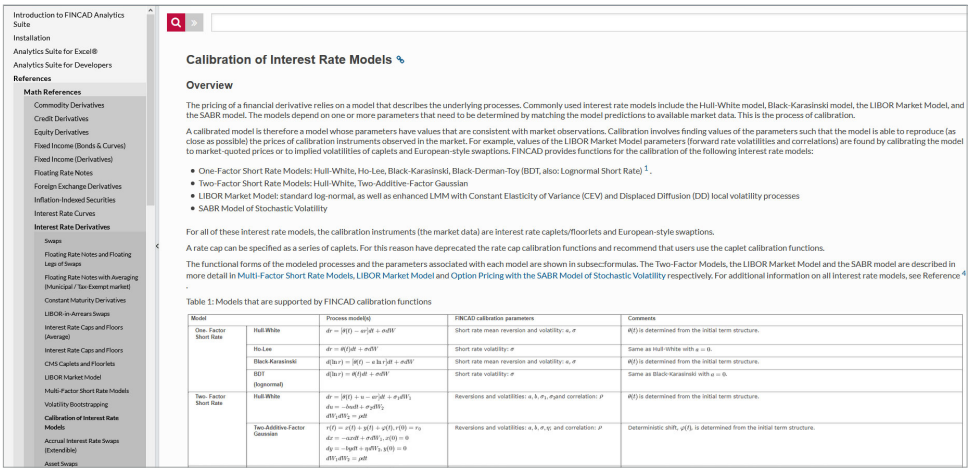
The widest range of instrument capabilities in the market

Get out-of-the-box coverage

for vanilla, structured and exotic instruments across all major asset classes using industry standard models, supported by comprehensive curve-building and model calibration. Calculate risk and implied equivalent metrics. Use building blocks to configure customized trade types and analysis workflows.

Raw Rate Bumps Analysis

		TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE
Select Bucket	Point	Overnight Deposits	FRAs	Overnight Futures	Overnight Swaps	Overnight FRNs	Fixed Rate Bonds	Overnight Caps/Floors	Overnight Swaptions	Net Exposure
TRUE	parallel shift - deposit rates	-11.86	-18.97	-58.82	250.59	16.51	26.17	-0.38	199.14	**402.39**
TRUE	parallel shift - futures rates	-3.57	211.01	326.46	-229.19	-101.40	342.03	-9.96	-2,670.04	**-2,134.65**
TRUE	parallel shift - swap rates	0.00	-8.47	-0.83	-835.85	4.77	-375.30	4.13	0.00	**-1,211.54**
TRUE	AllPts	-11.86	-18.97	-58.82	250.59	16.51	26.17	-0.38	199.14	**402.39**
TRUE	11-01-2020	-11.86	-11.81	-19.33	250.59	16.51	25.29	2.65	61.24	**313.30**
TRUE	12-01-2020	0.00	-15.63	-40.31	252.25	4.77	24.86	1.34	125.45	**352.73**
TRUE	01-01-2021	0.00	-8.47	-0.83	252.25	4.77	24.94	3.89	30.20	**306.75**
TRUE	AllPts futures	-3.57	211.01	326.46	-229.19	-101.40	342.03	-9.96	-2,670.04	**-2,134.65**
TRUE	V20 futures	-3.57	2.56	54.29	101.47	-24.57	61.88	-4.32	-164.52	**23.22**
TRUE	F21 futures	0.00	17.91	138.98	100.25	-26.80	62.36	1.82	-292.12	**2.40**
TRUE	J21 futures	0.00	20.09	27.29	92.49	-26.80	62.30	11.96	-315.59	**-128.25**
TRUE	N21 futures	0.00	269.57	27.51	234.14	-28.25	62.00	2.23	-304.28	**262.92**
TRUE	V21 futures	0.00	269.57	27.51	234.14	-28.25	62.00	2.23	-304.28	**262.92**
TRUE	F22 futures	0.00	-10.68	0.26	252.00	-1.43	62.27	3.09	-297.07	**8.44**
TRUE	J22 futures	0.00	-8.12	-1.03	251.96	7.26	61.64	5.53	-294.75	**22.49**
TRUE	N22 futures	0.00	-8.47	-0.83	252.42	18.89	61.38	5.09	-289.53	**38.95**
TRUE	V22 futures	0.00	-8.47	-0.83	251.84	17.33	45.10	-3.02	-287.84	**14.11**
TRUE	F23 futures	0.00	-8.47	-0.83	251.76	9.59	20.71	-1.01	-34.42	**237.33**
TRUE	J23 futures	0.00	-8.47	-0.83	251.69	3.81	23.97	-1.04	6.42	**275.55**
TRUE	N23 futures	0.00	-8.47	-0.83	252.20	4.77	24.46	10.07	3.86	**286.06**
TRUE	AllPts swap	0.00	-8.47	-0.83	-835.85	4.77	-375.30	4.13	0.00	**-1,211.54**
TRUE	3y swap	0.00	-8.47	-0.83	259.89	4.77	-293.73	4.13	0.00	**-34.24**
TRUE	4y swap	0.00	-8.47	-0.83	412.99	4.77	-109.53	4.13	0.00	**303.07**
TRUE	5y swap	0.00	-8.47	-0.83	-593.58	4.77	19.49	4.13	0.00	**-574.49**
TRUE	7y swap	0.00	-8.47	-0.83	-233.63	4.77	97.69	4.13	0.00	**-136.34**
TRUE	10y swap	0.00	-8.47	-0.83	296.44	4.77	18.29	4.13	0.00	**314.34**
TRUE	12y swap	0.00	-8.47	-0.83	252.25	4.77	24.46	4.13	0.00	**276.31**
TRUE	15y swap	0.00	-8.47	-0.83	697.26	4.77	23.87	4.13	0.00	**720.73**
TRUE	20y swap	0.00	-8.47	-0.83	1,004.01	4.77	17.42	4.13	0.00	**1,021.04**
TRUE	25y swap	0.00	-8.47	-0.83	1,310.77	4.77	10.97	4.13	0.00	**1,321.34**
TRUE	30y swap	0.00	-8.47	-0.83	1,617.52	4.77	4.53	4.13	0.00	**1,621.65**
TRUE	40y swap	0.00	-8.47	-0.83	1,924.28	4.77	-1.92	4.13	0.00	**1,921.96**
TRUE	AllPts basis swap	0.00	-8.47	-0.83	2,231.03	4.77	-8.37	4.13	0.00	**2,222.27**



Introduction to FINCAD Analytics Suite
Installation
Analytics Suite for Excel®
Analytics Suite for Developers
References
Math References
Commodity Derivatives
Credit Derivatives
Equity Derivatives
Fixed Income (Bonds & Curves)
Fixed Income (Derivatives)
Floating Rate Notes
Foreign Exchange Derivatives
Inflation-Indexed Securities
Interest Rate Curves
Interest Rate Derivatives
Swaps
Floating Rate Notes and Floating Legs of Swaps
Floating Rate Notes with Averaging (Municipal / Tax-Exempt market)
Constant Maturity Derivatives
LIBOR-in-Arrears Swaps
Interest Rate Caps and Floors (Average)
Interest Rate Caps and Floors
CMS Caplets and Floorlets
LIBOR Market Model
Multi-Factor Short Rate Models
Volatility Bootstrapping
Calibration of Interest Rate Models
Accrual Interest Rate Swaps (Extendible)
Asset Swaps

Calibration of Interest Rate Models

Overview

The pricing of a financial derivative relies on a model that describes the underlying processes. Commonly used interest rate models include the Hull-White model, Black-Karasinski model, the LIBOR Market Model, and the SABR model. The models depend on one or more parameters that need to be determined by matching the model predictions to available market data. This is the process of calibration.

A calibrated model is therefore a model whose parameters have values that are consistent with market observations. Calibration involves finding values of the parameters such that the model is able to reproduce (as close as possible) the prices of calibration instruments observed in the market. For example, values of the LIBOR Market Model parameters (forward rate volatilities and correlations) are found by calibrating the model to market-quoted prices or to implied volatilities of caplets and European-style swaptions. FINCAD provides functions for the calibration of the following interest rate models:

- One-Factor Short Rate Models: Hull-White, Ho-Lee, Black-Karasinski, Black-Derman-Toy (BDT, also: Lognormal Short Rate) [1].
- Two-Factor Short Rate Models: Hull-White, Two-Additive-Factor Gaussian
- LIBOR Market Model: standard log-normal, as well as enhanced LMM with Constant Elasticity of Variance (CEV) and Displaced Diffusion (DD) local volatility processes
- SABR Model of Stochastic Volatility

For all of these interest rate models, the calibration instruments (the market data) are interest rate caplets/floorlets and European-style swaptions.

A rate cap can be specified as a series of caplets. For this reason have deprecated the rate cap calibration functions and recommend that users use the caplet calibration functions.

The functional forms of the modeled processes and the parameters associated with each model are shown in subsec:formulas. The Two-Factor Models, the LIBOR Market Model and the SABR model are described in more detail in Multi-Factor Short Rate Models, LIBOR Market Model and Option Pricing with the SABR Model of Stochastic Volatility respectively. For additional information on all interest rate models, see Reference [4].

Table 1: Models that are supported by FINCAD calibration functions

Model		Process model(s)	FINCAD calibration parameters	Comments
One- Factor Short Rate	Hull-White	$dr = [\theta(t) - ar]dt + \sigma dW$	Short rate mean reversion and volatility: a, σ	$\theta(t)$ is determined from the initial term structure.
	Ho-Lee	$dr = \theta(t)dt + \sigma dW$	Short rate volatility: σ	Same as Hull-White with $a = 0$.
	Black-Karasinski	$d(\ln r) = [\theta(t) - a\ln r]dt + \sigma dW$	Short rate mean reversion and volatility: a, σ	$\theta(t)$ is determined from the initial term structure.
	BDT (lognormal)	$d(\ln r) = \theta(t)dt + \sigma dW$	Short rate volatility: σ	Same as Black-Karasinski with $a = 0$.
Two- Factor Short Rate	Hull-White	$dr = [\theta(t) + u - ar]dt + \sigma_1 dW_1$ $du = -budt + \sigma_2 dW_2$ $dW_1 dW_2 = \rho dt$	Reversions and volatilities: a, b, σ_1, σ_2 and correlation: ρ	$\theta(t)$ is determined from the initial term structure.
	Two-Additive-Factor Gaussian	$r(t) = x(t) + y(t) + \varphi(t), r(0) = r_0$ $dx = -axdt + \sigma dW_1, x(0) = 0$ $dy = -bydt + \eta dW_2, y(0) = 0$ $dW_1 dW_2 = \rho dt$	Reversions and volatilities: a, b, σ, η; and correlation: ρ	Deterministic shift, $\varphi(t)$, is determined from the initial term structure.

Access comprehensive documentation

explaining what each instrument is, all the way down to the mathematical formulas used in each calculation. With FINCAD, you will have utmost confidence in the math and models underlying your valuation and risk.

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