

# RQuantLib: Bridging QuantLib and R

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Submitted to *useR! 2010*

## Abstract

**RQuantLib** is a package for the R language and environment which connects R with QuantLib (<http://www.quantlib.org>), the premier open source library for quantitative finance. Written in portable C++, QuantLib aims at providing a comprehensive library spanning most aspects of quantitative finance such as pricing engines for various instruments, yield curve modeling, Monte Carlo and Finite Difference engines, PDE solvers, Risk management and more. At the same time, R has become the preeminent language and environment for statistical computing and data analysis—which are key building blocks for financial modeling, risk management and trading. So it seems natural to combine the features and power of R and QuantLib. **RQuantLib** is aimed at this goal, and provides a collection of functions for option and bond pricing, yield curve interpolation, financial markets calendaring and more.

**RQuantLib** was started in 2002 with coverage of equity options containing pricing functionality for vanilla European and American exercise as well as for several exotics such as Asian, Barrier and Binary options. Implied volatility calculations and option analytics were also included. Coverage of Fixed Income markets was first added to **RQuantLib** in 2005. Yield curve building functionality was provided via the `DiscountCurve` function which constructs spot rates from market data including the settlement date, deposit rates, futures prices, FRA rates, or swap rates, in various combinations. The function returns the corresponding discount factors, zero rates, and forward rates for a vector of times that is specified as input. In 2009, this functionality was significantly extend via the `FittedBondCurve` function which fits a term structure to a set of bonds using one of three different popular fitting methods `ExponentialSplines`, `SimplePolynomial`, or `NelsonSiegel`. It returns a `data.frame` with three columns `date`, `zero.rate` and `discount.rate` which can be converted directly into a `zoo` object and used in time series analysis or as further input for bond pricing functions. Bond pricing for zero coupon, fixed coupon, floating rate, callable, convertible zeros, convertible fixed coupon, and convertible floating coupon bonds are supported. These functions return, when applicable, the NPV, the clean price, the dirty price, accrued amount based on the input dates, yield and the cash flows of the bond.

**RQuantLib** is the only R package that brings the quantitative analytics of QuantLib to R while connecting the rich interactive R environment for data analysis, statistics and visualization to QuantLib. Besides providing convenient and easy access to QuantLib for R users who do not have the necessary experience in C++ to employ QuantLib directly, it also sets up a framework for users who wants to interface their own QuantLib-based functions with R.

**Keywords:** QuantLib, fixed income, yield curve, bond pricing, option pricing, quantitative finance, R, C++