

Rmetrics – Subject Classification Scheme



An Environment for Teaching Financial Engineering and Computational Finance with R Rmetrics Built 221.10065

The Rmetrics Subject Classification Scheme is used to identify fields and sub-fields in the financial engineering and computational finance packages. The Classification Scheme is designed to assist in the retrieval of R functions. The Classification Scheme is arranged hierarchically, by subdivision of the whole spectrum of functions for financial applications.

1 fBasics

1.1 Economic and Financial Markets

- Selected Market Data

1.2 Financial Time Series Data

- Time Series Representations
- Time Series Plots
- Basic Statistics

1.3 Distribution Functions in Finance

- Financial Returns
- Central Limit Theorem
- Normal Distribution
- Stable Distribution
- Hyperbolic Distribution
- Empirical Distribution

1.4 Structures and Dependencies

- Short Time Return Correlations
- Long Range Dependent Volatilities
- Lagged Volatility Correlations
- Leverage Effect
- Taylor Effect

1.5 Probability Theory and Hypothesis Testing

- One Sample Tests
- Two Sample Tests

2 fCalendar

2.1 Time and Date Conventions and Standards

- ISO8601 Standard

2.2 POSIX Based Implementation

- Functions and Tools from R's Pbase Package

2.3 'timeDate' Class

- Financial Center Concept
- Time Zone support
- Daylight Savings Time Rules

2.4 'timeSeries' Class

- Representation of timeSeries Objects
- Mathematical Operations on timeSeries Objects
- Operations on Daily Time Schedules

2.5 Calendrical Calculations

- Ecclesiastical and Public Holidays
- Business and Holiday Calendars

3 fSeries

3.1 Stationary Time Series: ARMA Modelling

- Time Series Simulation
- True Model Statistics
- Parameter Estimation
- Diagnostic Analysis
- Forecasting

3.2 Time Series Trends: Unit Roots

3.3 Long Range Dependent Time Series

- FGN and FARIMA Simulations
- True Model Statistics
- Estimation of the Hurst Exponent

NEW Nonstationarity and Structural Breaks

3.4 GARCH/APARCH Volatility Models

- Alternative Conditional Distributions
- Time Series Simulation
- True Model Statistics
- Parameter Estimation
- Diagnostic Analysis
- Ox/G@RCH Interface

8.4 GARCH Option Pricing

Heston-Nandi Options
Duan GARCH Model

8.5 Monte Carlo Simulation of Options

Path Dependent Options
American Options

9. fBonds

NEW Bond Arithmetic

NEW Discount Curve Modelling

NEW Yield Curve Modelling

NEW Interest Rate Options

NEW Mortgages and Savings

10. fPortfolio

10.1 Multivariate Assets Modelling

Multivariate Normal Distribution
Multivariate Student-t Distribution

10.2 Drawdown Statistics

10.3 Value-at-Risk Modeling

10.4 Two-Assets Portfolios

Mean Variance Portfolio
CVaR Portfolio
CDaR Portfolio

10.5 Mean Variance Markowitz Portfolios

10.6 CvaR and CDaR Portfolios

Hedge Funds
Alternative Investments

10.7 Performance Measures and Benchmarks

11. fActuar

NEW Actuarial Models

NEW Survival Models

12. fAgents

NEW Behavioral Finance

NEW Agent Based Modelling

Minority Games
Lux-Marchesi Mode

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This Subject Classification Scheme is still uncomplete and may be cahnged and enhanced. Suggestions are welcome.