

Risk Management Toolbox™ Release Notes



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### *Risk Management Toolbox™ Release Notes*

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# R2020b

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**Version: 1.8**

**New Features**

**Bug Fixes**

## **Market Risk: Backtest expected shortfall (ES) models using minimally biased Acerbi-Szekely tests**

You can perform minimally biased Acerbi-Szekely tests with the `minBiasRelative` and `minBiasAbsolute` functions when using an `esbacktestbysim` object.

## **Market Risk: Expected shortfall (ES) model VaR level extended to 99.9%**

The VaR level is extended to 99.9% for ES backtesting with an `esbacktest` object that uses precomputed tables of critical values.

## **Lifetime Credit Analysis: Probability of default models and examples**

You can perform lifetime credit analysis using `fitLifetimePDMoDel` to create a `Logistic` or `Probit` lifetime probability of default model. You can then use the `predict`, `predictLifetime`, `modelDiscrimination`, and `modelAccuracy` functions to analyze the probability of default model. For more information, see examples:

- “Compare Logistic Model for Lifetime PD to Champion Model”
- “Compare Lifetime PD Models Using Cross-Validation”
- “Expected Credit Loss (ECL) Computation”

## **Insurance Analysis: Chain ladder, expected claims, and Bornhuetter-Ferguson techniques for analyzing insurance claims reserves**

You can use a development triangle with the chain ladder technique, expected claims technique, or Bornhuetter-Ferguson technique to calculate important measures of insurance risk.

- The `developmentTriangle` object supports the following functions:
  - `view`
  - `linkRatios`
  - `linkRatioAverages`
  - `cdfSummary`
  - `ultimateClaims`
  - `fullTriangle`
- The `chainLadder` object supports the following functions:
  - `ibnr`
  - `unpaidClaims`
  - `summary`
- The `expectedClaims` object supports the following functions:
  - `ultimateClaims`
  - `ibnr`



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- unpaidClaims
  - summary
  - The bornhuetterFerguson object supports the following functions:
    - ultimateClaims
    - ibnr
    - unpaidClaims
    - summary



# R2020a

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**Version: 1.7**

**New Features**

**Bug Fixes**

**Compatibility Considerations**

## **Consumer Credit Risk: Screen credit scorecard predictors on data that is too big to fit in memory using tall Arrays**

Tall variable support for screenpredictors.

## **Random number generation for credit copula classes has changed**

In R2019b and previous releases, when using the `creditDefaultCopula` and `creditMigrationCopula` classes to perform nonparallel simulations, the MATLAB® global random number generator was used to generate scenarios.

## **Compatibility Considerations**

In R2020a, the random number generator for the `creditDefaultCopula` and `creditMigrationCopula` classes is set to `Threefry` for both parallel and nonparallel code paths.

# R2019b

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**Version: 1.6**

**New Features**

**Bug Fixes**

**Compatibility Considerations**

## **Market Risk: Backtest expected shortfall (ES) models using Du and Escanciano tests**

The following new functions provide support for performing expected shortfall (ES) backtests by Du and Escanciano:

- `esbacktestbyte`
- `summary`
- `runtests`
- `unconditionalDE`
- `conditionalDE`
- `simulate`

New examples demonstrating workflows using expected shortfall (ES) backtests by Du and Escanciano:

- Workflow for Expected Shortfall (ES) Backtesting by Du and Escanciano
- Rolling Windows and Multiple Models for Expected Shortfall (ES) Backtesting by Du and Escanciano

## **Consumer Credit Risk: Validation of compact credit scorecards using `validateModel`**

Work with compact credit scorecards using the `compactCreditScorecard` class and then use `validateModel` to validate a compact credit scorecard.

## **Credit Scorecard: Example comparing credit score using logistic regression and decision trees**

A new example compares credit score values using logistic regression and decision trees (Comparison of Credit Scoring Using Logistic Regression and Decision Trees).

## **Credit Scorecard: Example using reject inference to incorporate credit rejection data into `creditscorecard` workflow**

A new example demonstrates two approaches for using reject inference techniques to incorporate credit rejection data as part of the `creditscorecard` modeling workflow (Use Reject Inference Techniques with Credit Scorecards).

## **Consumer Credit Risk: Example comparing probability of default using through-the-cycle and point-in-time models**

A new example compares the probability of default using through-the-cycle (TTC) and point-in-time (PIT) models (Comparison of Probability of Default Using Through-the-Cycle and Point-in-Time Models).

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## **Consumer Credit Risk: Example fitting different types of models to loss given default (LGD) data**

A new example demonstrates fitting different types of models to loss given default (LGD) data (Model Loss Given Default).

### **Calculation of p-value for bin has changed**

In R2019a and previous releases, the binomial VaR backtest reports the tail probability as the  $p$ -value and compares the reported  $p$ -value to half of the  $alpha$  ( $1 - \text{TestLevel}$ ) of the bin test.

In R2019b, the binomial VaR backtest `bin` calculates the  $p$ -value contained in the `TestResults` output using the 2\*tail probability convention and the  $p$ -value can be compared to  $alpha$ . For more information, see Algorithms.





# R2019a

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**Version: 1.5**

**New Features**

**Bug Fixes**

## **Consumer Credit Risk: Predictor screening for credit scorecards**

Perform predictor screening for credit scorecards using the `screenpredictors` function. For more information, see [Feature Screening with `screenpredictors`](#).

## **Consumer Credit Risk: Support for compact credit scorecards for easier deployment and reduced memory usage**

Work with compact credit scorecards using the `compactCreditScorecard` class along with associated functions for `displaypoints`, `score`, and `probdefault`. In addition, you can create a compact credit scorecard by using the `compact` function from [Financial Toolbox™](#) with a `creditscorecard` object. For more information, see [compactCreditScorecard Object Workflow and Validate the Quality of a Compact Credit Scorecard Model](#).

# R2018b

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**Version: 1.4**

**New Features**

**Bug Fixes**

**Compatibility Considerations**

## Binning Explorer: Bin data automatically using merge and split algorithms

The Binning Explorer app supports the merge and split algorithms. For more information, see **Binning Explorer**.

## Binning Explorer: Bin missing data in a separate bin

The **Binning Explorer** app supports binning missing data for a predictor in a separate <missing> bin. For more information, see **Binning Explorer**.

## Binning Explorer: Load data from the command line

The Binning Explorer app supports loading data or a `creditscorecard` object from the command line. For more information, see **Binning Explorer**.

## Corporate Credit Risk: Perform parallel simulations using `creditDefaultCopula` and `creditMigrationCopula`

The `creditDefaultCopula` and `creditMigrationCopula` classes support the 'UseParallel' property for parallel simulations when using the `simulate` and `riskContributions` functions. You can set the 'UseParallel' property when creating `creditDefaultCopula` or `creditMigrationCopula` objects only if you have Parallel Computing Toolbox™.

## `creditCopula` object removed

The `creditCopula` object is removed.

## Compatibility Considerations

Object Name	What Happens When You Use It	Use This Instead	Compatibility Considerations
<code>creditCopula</code>	Removed	<code>creditDefaultCopula</code>	Replace all instances of <code>creditCopula</code> object with a <code>creditDefaultCopula</code> object using <code>creditDefaultCopula</code> .

# R2018a

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**Version: 1.3**

**New Features**

**Bug Fixes**

## **Corporate Credit Risk: Calculate standard deviation and value-at-risk contributions for each counterparty in a credit portfolio**

The `riskContribution` function for `creditDefaultCopula` and the `riskContribution` function for `creditMigrationCopula` support returned information for counterparty contributions for standard deviation of the losses (Std) and value at risk (VaR) at the threshold `VaRLevel`.

# R2017b

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**Version: 1.2**

**New Features**

**Bug Fixes**

**Compatibility Considerations**

## **Corporate Credit Risk: Compute regulatory capital and value-at-risk using an asymptotic single risk factor (ASRF) model**

The `asrf` function provides an ASRF model for credit risk analysis. `asrf` accepts the risk characteristics of a portfolio of credit-sensitive instruments as input and computes the necessary capital using an ASRF model.

## **Corporate Credit Risk: Perform credit portfolio simulation with random loss given default (LGD)**

Support is provided for specifying random LGD (loss given default) for `creditDefaultCopula` and `creditMigrationCopula` objects. You can now specify the LGD input argument as a `NumCounterparties-by-2` matrix, where the first column contains the LGD mean values and the second column contains the LGD standard deviations. In this case, LGD values are drawn randomly from a beta distribution with the parameters provided for the defaulting counterparty.

## **Market Risk: Backtest expected shortfall models**

The following tools support expected shortfall (ES) backtesting for table-based tests for the unconditional Acerbi-Szekely test.

- `esbacktest`
- `summary`
- `runtests`
- `unconditionalNormal`
- `unconditionalT`

The following tools support expected shortfall (ES) backtesting for distribution tests for normal and `t` distributions.

- `esbacktestbysim`
- `summary`
- `runtests`
- `conditional`
- `unconditional`
- `quantile`
- `simulate`

## **Consumer Credit Risk: Specify weights in credit scorecards using Binning Explorer**

Specify weights in a credit scorecard when using the Binning Explorer app. For more information on defining weights for a `creditscorecard` object, see the optional name-value pair argument `WeightsVar` for `creditscorecard`.



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## creditCopula object renamed

The `creditCopula` object is renamed to the `creditDefaultCopula` object.

### Compatibility Considerations

Object Name	What Happens When You Use This Object	Use This Object Instead	Compatibility Considerations
<code>creditCopula</code>	Errors	<code>creditDefaultCopula</code>	<p>Replace all instances of <code>creditCopula</code> object with <code>creditDefaultCopula</code> object using <code>creditDefaultCopula</code>.</p> <hr/> <p><b>Note</b> The <code>CounterpartyLosses</code> property of the <code>creditCopula</code> object is removed in the <code>creditDefaultCopula</code> object. To obtain counterparty losses, use the <code>getScenarios</code> function.</p>



# R2017a

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**Version: 2.5**

**New Features**

**Bug Fixes**

**Compatibility Considerations**

## **Corporate Credit Risk: Estimate the probability of credit rating migration based on multifactor copula model**

The following tools support corporate credit portfolio analysis for credit migration simulation using a `creditMigrationCopula` object for copula-based simulations:

- `creditMigrationCopula`
- `simulate`
- `portfolioRisk`
- `riskContribution`
- `confidenceBands`
- `getScenarios`

## **Corporate Credit Risk: Quantify credit concentration risk by Herfindahl index and other concentration measures**

The `concentrationIndices` function supports the following concentration indices:

- CR — Concentration ratio
- Deciles — Deciles of the portfolio weights distribution
- Gini — Gini coefficient
- HH — Herfindahl-Hirschman index
- HK — Hannah-Kay index
- HT — Hall-Tideman index
- TE — Theil entropy index

## **Corporate Credit Risk: Model corporate default risk using Merton model**

The `mertonmodel` and `mertonByTimeSeries` functions estimate the default probability using Merton's model.

### **creditCopula object renamed**

The `creditCopula` object is renamed to the `creditDefaultCopula` object.

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## Compatibility Considerations

Object Name	What Happens When You Use This Object	Use This Object Instead	Compatibility Considerations
creditCopula	Warns	creditDefaultCopula	<p>Replace all instances of <code>creditCopula</code> object with <code>creditDefaultCopula</code> object using the <code>creditDefaultCopula</code> constructor.</p> <hr/> <p><b>Note</b> The <code>CounterpartyLosses</code> property of <code>creditCopula</code> object is removed in the <code>creditDefaultCopula</code> object. To obtain counterparty losses, use the <code>getScenarios</code> function.</p>



# R2016b

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**Version: 2.4**

**New Features**

## Consumer Credit Risk: Binning Explorer for Credit Scorecards

**Binning Explorer** is an app for developing and modifying binning assignments for a `creditscorecard` object. For more information, see [Binning Explorer](#).

## Corporate Credit Risk: Copula-based simulation framework

The following tools support corporate credit portfolio analysis using a `creditCopula` object for copula-based simulations:

- `creditCopula` — Creates a `creditCopula` object.
- `simulate` — Simulates credit defaults using a `creditCopula` object.
- `portfolioRisk` — Generates portfolio-level risk measurements for a `creditCopula` object.
- `confidenceBands` — Generates confidence interval bands for a `creditCopula` object.
- `riskContribution` — Generates risk contributions for each counterparty in the `creditCopula` object.

## Market Risk: Value-at-Risk Backtesting Tools

Value-at-risk (VaR) is an important measure of financial risk. VaR is an estimate of how much value a portfolio can lose in a given time period with a given confidence level. VaR backtesting tools assess the accuracy of VaR models. The following VaR backtesting tools are supported:

- `varbacktest` — Creates a `varbacktest` object using portfolio outcomes data and corresponding value-at-risk (VaR) data.
- `bin` — Binomial test.
- `cc` — Christoffersen's conditional coverage mixed test.
- `cci` — Christoffersen's conditional coverage independence test.
- `pof` — Kupiec's proportion of failures test.
- `tbf` — Haas's time between exceptions independence test.
- `tbf_i` — Haas's mixed time between exceptions (independence and frequency) test.
- `tl` — Traffic light test.
- `tuff` — Kupiec's time until the first failure test.
- `summary` — Summary report on the given `varbacktest` data.
- `runtests` — Runs all tests and reports the final test results.