

Package ‘SACCR’

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Type Package

Title SA Counterparty Credit Risk under Basel III

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Description Computes the Exposure-At-Default based on standardized approach of the Basel III Regulatory framework (SA-CCR). Currently, trade types of all the five major asset classes have been created and, given the inheritance-based structure of the application, the addition of further trade types is straightforward. The application returns a list of trees (one per CSA) after automatically separating the trades based on the CSAs, the hedging sets, the netting sets and the risk factors. The basis and volatility transactions are also identified and treated in specific hedging sets whereby the corresponding penalty factors are applied. All the examples appearing on the regulatory paper (including the margined and the un-margined workflow) have been implemented.

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Imports methods,Trading,data.tree,jsonlite

URL www.openriskcalculator.com

Collate 'CalcAddon.R' 'CalcEAD.R' 'CalcPFE.R' 'CalcRC.R'
'ExampleBasisVol.R' 'ExampleComm.R' 'ExampleCredit.R'
'ExampleFX.R' 'ExampleIRD.R' 'ExampleIRDCmmMargined.R'
'ExampleIRDCredit.R' 'HandleBasisVol.R' 'LoadSupervisoryData.R'
'runExampleCalcs.R' 'CalculateFactorMult.R'
'CreateTradeGraph.R' 'GroupCommTrades.R' 'GroupCreditTrades.R'
'GroupEquityTrades.R' 'GroupFXTrades.R' 'GroupIRDTrades.R'
'GroupTrades.R' 'SACCRCalculator.R' 'SingleTradeAddon.R'

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R topics documented:

CalcAddon	2
CalcEAD	3
CalcPFE	3
CalcRC	4
CreateTradeGraph	5
ExampleBasisVol	5
ExampleComm	6
ExampleCredit	6
ExampleFX	7
ExampleIRD	8
ExampleIRDCommMargined	8
ExampleIRDCredit	9
HandleBasisVol	10
LoadSupervisoryData	10
SACCRCalculator	11
SingleTradeAddon	12
Index	13

CalcAddon	<i>Calculates the Addon amount</i>
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Description

Calculates the amount of the addon for each hedging/netting set

Usage

```
CalcAddon(trades_tree, MF)
```

Arguments

trades_tree	A tree structure with the input trades
MF	(Optional) The Maturity Factor based on the collateral agreement

Value

The aggregate amount of the addon summed up for all the asset classes

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

CalcEAD *Calculates the EAD*

Description

Calculates the Exposure at Default

Usage

CalcEAD(RC, PFE)

Arguments

RC the replacement cost
PFE the projected future exposure

Value

The Exposure-at-Default

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

Examples

```
#returns 1.4*(60+500) = 784  
EAD <- CalcEAD(60,500)
```

CalcPFE *Calculates the PFE*

Description

Calculates the Projected Future Exposure (PFE) after applying the relevant multiplier. The purpose of this multiplier is to lessen the risk stemming from the addons in case of excess collateral

Usage

CalcPFE(V_C, Addon_Aggregate)

Arguments

V_C the difference between the sum of the MtMs and the collateral
 Addon_Aggregate the aggregate amount of the Addon

Value

The Projected Future Exposure (PFE)

Author(s)

Project team <info@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

CalcRC	<i>Calculates the RC</i>
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Description

Calculates the Replacement Cost(RC) and the sum of the MtMs for all the trades

Usage

CalcRC(trades, csa, collaterals)

Arguments

trades The full list of the Trade Objects
 csa (Optional) The CSA objects
 collaterals (Optional) The collaterals Objects

Value

The replacement Cost and the sum of the MtMs

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

CreateTradeGraph	<i>Creates a tree-like structure of a list of trades</i>
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Description

Creates a tree-like structure describing the various hedging sets / risk factors that that the input trades can be broken into

Usage

```
CreateTradeGraph(trades)
```

Arguments

trades	The full list of the Trade Objects
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Value

A tree structure based on hedging/netting sets and basis/volatility transactions

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

ExampleBasisVol	<i>Basis+Volatility trades Example</i>
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Description

Calculates the Exposure at Default for a trade set containing basis and volatility transactions

Usage

```
ExampleBasisVol(JSON = FALSE)
```

Arguments

JSON	(optional) if TRUE it returns a json string
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Value

The exposure at default

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

ExampleComm

Commodities Example

Description

Calculates the Exposure at Default for the Commodities example as given in the Basel III regulatory paper

Usage

ExampleComm(JSON = FALSE)

Arguments

JSON (optional) if TRUE it returns a json string

Value

The exposure at default (expected value based on the Basel paper is 5406)

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

ExampleCredit

Credit Products Example

Description

Calculates the Exposure at Default for the Credit example as given in the Basel III regulatory paper

Usage

ExampleCredit(JSON = FALSE)

Arguments

JSON (optional) if TRUE it returns a json string

Value

The exposure at default (expected value based on the Basel paper is 381)

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

ExampleFX

FX Example

Description

Calculates the Exposure at Default for the FX product type

Usage

ExampleFX(JSON = FALSE)

Arguments

JSON (optional) if TRUE it returns a json string

Value

The exposure at default

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

ExampleIRD

IRDs Example

Description

Calculates the Exposure at Default for the IRD example as given in the Basel III regulatory paper

Usage

ExampleIRD(JSON = FALSE)

Arguments

JSON (optional) if TRUE it returns a json string

Value

The exposure at default (expected value based on the Basel paper is 569)

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

ExampleIRDCommMargined

Margined IRDs+Commodity Example

Description

Calculates the Exposure at Default for the margined IRDs + Commodity example as given in the Basel III regulatory paper

Usage

ExampleIRDCommMargined(JSON = FALSE)

Arguments

JSON (optional) if TRUE it returns a json string

Value

The exposure at default (expected value based on the Basel paper is 1879)

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

ExampleIRDCredit *IRDs+Commodity Example*

Description

Calculates the Exposure at Default for the IRDs + Commodity example as given in the Basel III regulatory paper

Usage

```
ExampleIRDCredit(JSON = FALSE)
```

Arguments

JSON (optional) if TRUE it returns a json string

Value

The exposure at default (expected value based on the Basel paper is 936)

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

HandleBasisVol	<i>Splits trades in being basis, volatility or 'normal' transactions</i>
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Description

Receives a list of trades and splits them according to being basis, volatility or 'normal' transactions

Usage

```
HandleBasisVol(trades)
```

Arguments

trades	The full list of the Trade Objects
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Value

A list depicting which trade IDs fall under each hedging set.

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

LoadSupervisoryData	<i>Supervisory Data Loading</i>
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Description

Loads the supervisory data (factors, correlation and option volatility) for each Asset Class and SubClass

Usage

```
LoadSupervisoryData()
```

Value

A data frame with the required data

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

SACCRCalculator	<i>SA-CCR Calculator</i>
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Description

Returns a tree structure depicting the add-on calculations on different hedging/netting sets

Usage

```
SACCRCalculator(trades_filename, csa_filename, coll_filename, JSON = FALSE)
```

Arguments

trades_filename	a .csv file containing the trades
csa_filename	a .csv file containing CSAs
coll_filename	a .csv file containing collaterals
JSON	(optional) if TRUE it returns a json string

Value

The exposure at default (expected value based on the Basel paper is 569)

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

SingleTradeAddon	<i>Calculates the addon information</i>
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Description

Calculates the addon information (including Adj notional, superv delta etc) for each trade

Usage

SingleTradeAddon(trade, MF)

Arguments

trade	A trade object
MF	(Optional) The Maturity Factor based on the collateral agreement

Value

A list of addon information

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References

Basel Committee: The standardised approach for measuring counterparty credit risk exposures
<http://www.bis.org/publ/bcbs279.htm>

Index

CalcAddon, [2](#)
CalcEAD, [3](#)
CalcPFE, [3](#)
CalcRC, [4](#)
CreateTradeGraph, [5](#)

ExampleBasisVol, [5](#)
ExampleComm, [6](#)
ExampleCredit, [6](#)
ExampleFX, [7](#)
ExampleIRD, [8](#)
ExampleIRDCommMargined, [8](#)
ExampleIRDCredit, [9](#)

HandleBasisVol, [10](#)

LoadSupervisoryData, [10](#)

SACRCalculator, [11](#)
SingleTradeAddon, [12](#)