Package ‘SACCR’

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Type Package
Title SA Counterparty Credit Risk under CRR2
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Description Computes the Exposure-At-Default based on the standardized approach of CRR2 (SA-CCR). The simplified version of SA-CCR has been included, as well as the OEM methodology. Multiple trade types of all the five major asset classes are being supported including the 'Other' Exposure and, given the inheritance-based structure of the application, the addition of further trade types is straightforward. The application returns a list of trees per Counterparty and CSA after automatically separating the trades based on the Counterparty, 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 papers (both for the margined and the un-margined workflow) have been implemented including the latest CRR2 developments.

License GPL-3
Imports methods, data.tree, jsonlite, Trading
URL https://openriskcalculator.com/
Collate 'CalcAddon.R' 'CalcEAD.R' 'CalcPFE.R' 'CalcRC.R'
   'ExampleBasisVol.R' 'ExampleComm.R' 'ExampleCredit.R'
   'ExampleFX.R' 'ExampleIRD.R' 'ExampleIRDCommMargined.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'
   'onLoad.R' 'DetermineCCRMethodology.R' 'GroupOtherTrades.R'

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CalcAddon  

Calculates the Addon amount

Description

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

Usage

CalcAddon(trades_tree, MF, simplified = FALSE, OEM = FALSE)
**CalcEAD**

**Arguments**

- `trades_tree`: A tree structure with the input trades
- `MF`: (Optional) The Maturity Factor based on the collateral agreement
- `simplified`: (optional) When TRUE, the add-ons will be calculated as per the simplified SA-CCR
- `OEM`: (optional) When TRUE, the add-ons will be calculated as per the Original Exposure Method

**Value**

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

**Author(s)**

Tasos Grivas <tasos@openriskcalculator.com>

**References**


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Calculates the EAD

**Description**

Calculates the Exposure at Default

**Usage**

```r
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**

CalcPFE  \hspace{1cm} 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, V = 0, Addon_Aggregate, simplified)
```

**Arguments**

- `V_C`  
  the difference between the sum of the MtMs and the collateral
- `V`  
  the sum of MVs of the trades
- `Addon_Aggregate`  
  the aggregate amount of the Addon
- `simplified`  
  (optional) When TRUE, the multiplier will be set to 1 as per the simplified & OEM approach

**Value**

The Projected Future Exposure (PFE)

**Author(s)**

Tasos Grivas <info@openriskcalculator.com>

**References**

CalcRC

Calculated the RC

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

Usage
CalcRC(trades, csa, collaterals, simplified, ignore_margin = FALSE)

Arguments
- trades: The full list of the Trade Objects
- csa: (Optional) The CSA objects
- collaterals: (Optional) The collaterals Objects
- simplified: (optional) When TRUE, collaterals will be ignored as per the simplified & OEM approach
- ignore_margin: (optional) if TRUE, the margin agreement workflow will be turned off

Value
The replacement Cost and the sum of the MtMs

Author(s)
Tasos Grivas <tasos@openriskcalculator.com>

References

CreateTradeGraph

Creates a tree-like structure of a list of trades

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)
DetermineCCRMethodology

Arguments

trades The full list of the Trade Objects

Value

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

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

DetermineCCRMethodology

Specifies the CCR methodology

Description

Determines the CCR methodology that the institution is eligible to utilize. The regulator allows the institutions to select less complicated methodologies when the derivatives trading business is negligible

Usage

DetermineCCRMethodology(trades_filename, total_assets)

Arguments

trades_filename the file holding the trades of the portfolio

total_assets the total assets of the institution in mio EUR

Value

The CCR methodology that the institution is eligible to utilize

Author(s)

Tasos Grivas <info@openriskcalculator.com>

References

ExampleBasisVol  

Basis + Volatility trades Example

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

Value
The exposure at default

Author(s)
Tasos Grivas <tasos@openriskcalculator.com>

References

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)
ExampleCredit

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

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**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)
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  

Splits trades in being basis, volatility or 'normal' transactions

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

Value
A list depicting which trade IDs fall under each hedging set.
Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References


LoadSupervisoryData  Supervisory Data Loading

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


SACCRCalculator  SA-CCR Calculator

Description

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

Usage

SACCRCalculator(
  trades_filename,
  csa_filename,
  coll_filename,
  JSON = FALSE,
  simplified = FALSE,
  OEM = FALSE,
  export_results = FALSE,
  ignore_margin = 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
simplified  (optional) if TRUE, the simplified SA-CCR is being calculated
OEM  (optional) if TRUE, the Original Exposure Method is being calculated
export_results  (optional) if TRUE, a csv with the exposure at the top level will be exported
ignore_margin  (optional) if TRUE, the margin agreement workflow will be turned off

Value

The relevant exposure trees

Author(s)

Tasos Grivas <tasos@openriskcalculator.com>

References


SingleTradeAddon  Calculates the addon information

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>

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