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 includ-
ing 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.

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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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R topics documented:

CalcAddon   *Calculates the Addon amount*

Description

Calculates the amount of the addon for each heding/nettting set

Usage

```
CalcAddon(trades_tree, MF, simplified = FALSE, OEM = FALSE)
```

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

Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 http://data.europa.eu/eli/reg/2019/8

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

Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 http://data.europa.eu/eli/reg/2019/8

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, simplified, V = 0)
```

Arguments

V_C	the difference between the sum of the MtMs and the collateral
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
V	the sum of MVs of the trades

Value

The Projected Future Exposure (PFE)

Author(s)

Tasos Grivas <info@openriskcalculator.com>

References

Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 http://data.europa.eu/eli/reg/2019/8

CalcRC *Calculates 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

Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 http://data.europa.eu/eli/reg/2019/8

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)
```

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

Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 http://data.europa.eu/eli/reg/2019/8

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

Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 http://data.europa.eu/eli/reg/2019/8

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

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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)

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

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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

Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 http://data.europa.eu/eli/reg/2019/8

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

Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 http://data.europa.eu/eli/reg/2019/8

SACCRCalculator   *SA-CCR Calculator*

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,
  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

Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 http://data.europa.eu/eli/reg/2019/8

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>

References

Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 http://data.europa.eu/eli/reg/2019/8

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