

# 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 unmargined 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' 'DetermineCCRM methodology.R' 'GroupOtherTrades.R'

**NeedsCompilation** no

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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, 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/2019/876>

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CalcEAD

*Calculates the EAD*

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**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/2019/876>

**Examples**

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

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 CalcPFE

*Calculates the PFE*


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### 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

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

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 CalcRC

*Calculates the RC*


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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, 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/2019/876>

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CreateTradeGraph      *Creates a tree-like structure of a list of trades*

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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>

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DetermineCCRMethodology  
*Specifies the CCR methodology*

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**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/2019/876>

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ExampleBasisVol            *Basis+Volatility trades Example*

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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

**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/2019/876>

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ExampleComm

*Commodities Example*

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**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>

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ExampleCredit	<i>Credit Products Example</i>
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**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>

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ExampleFX	<i>FX Example</i>
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**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*

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**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>

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ExampleIRDCommMargined

*Margined IRDs+Commodity Example*

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**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>

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ExampleIRDCredit

*IRDs+Commodity Example*

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**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*

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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

**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/2019/876>

LoadSupervisoryData     *Supervisory Data Loading*

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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**

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

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SACCRCalculator     *SA-CCR Calculator*

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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,  
  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/2019/876>

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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**

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

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