Package 'SACCR'

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Type Package

Title SA Counterparty Credit Risk under Basel III

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Author Tasos Grivas

Maintainer Tasos Grivas <info@openriskcalculator.com>

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 automatically separates the trades on the corresponding hedging and netting sets including the basis and volatility transactions. 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

URL www.openriskcalculator.com

Collate 'CSA.R' 'CalcAddon.R' 'CalcEAD.R' 'CalcPFE.R' 'CalcRC.R' 'Trade.R' 'Swap.R' 'Commodity.R' 'Credit.R' 'ExampleBasisVol.R' 'ExampleComm.R' 'ExampleCredit.R' 'ExampleFX.R' 'ExampleIRD.R' 'ExampleIRDCommMargined.R' 'ExampleIRDCredit.R' 'FX.R' 'HandleBasisVol.R' 'Vol.R' 'IRD.R' 'LoadSupervisoryData.R' 'runExampleCalcs.R'

NeedsCompilation no

Repository CRAN

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R topics documented:

`CalcAddon` *Calculates the Addon amount*

Description

Calculates the aggregate amount of the addon after splitting per asset class and dividing the trades into the corresponding netting sets per currency, timebucket etc.

Usage

```
CalcAddon(trades, MF, factor_mult)
```

Arguments

`trades`	The full list of the Trade Objects
`MF`	(Optional) The Maturity Factor based on the collateral agreement
`factor_mult`	(Optional) The Multiplication Factor applicable for volatility/basis trades

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

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`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 *Calculates the RC*

Description

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

Usage

```
CalcRC(trades, coll_agreement, current_collateral)
```

Arguments

trades	The full list of the Trade Objects
coll_agreement	(Optional) The collateral Agreement object covering the trade list
current_collateral	(Optional) The current value of the collateral posted from the counterparty to the processing org

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

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Commodity-class *Commodity Class*

Description

Creates a Commodity Object with the relevant info needed to calculate the Exposure-at-Default (EAD)

Arguments

Notional	The notional amount of the trade
MTM	The mark-to-market valuation of the trade
Currency	The currency set that the trade belongs to
Si	The number of years that the trade will take to start (zero if already started)
Ei	The number of years that the trade will expire
BuySell	Takes the values of either 'Buy' or 'Sell'
commodity_type	Takes the values of 'Oil/Gas','Silver','Electricity' etc.

Value

An object of type Commodity

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

```
## the Commodity trade given in the Basel regulation Credit example
tr1 = Commodity(Notional=10000,MtM=-50,Si=0,Ei=0.75,
BuySell='Buy',SubClass='Energy',commodity_type='Oil/Gas')
```

CommSwap-class *Commodity Swap Class*

Description

Creates a Commodity Swap Object with the relevant info needed to calculate the Exposure-at-Default (EAD)

Value

An object of type CommSwap

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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CreditIndex-class *Credit Index Class*

Description

Creates a Credit Index Object with the relevant info needed to calculate the Exposure-at-Default (EAD)

Arguments

Notional	The notional amount of the trade
MTM	The mark-to-market valuation of the trade
Currency	The currency set that the belongs
Si	The number of years after which the trade will start (zero if already started)
Ei	The number of years that the trade will expire
BuySell	Takes the values of either 'Buy' or 'Sell'

Value

An object of type CreditIndex

Examples

```
## the CreditIndex trade given in the Basel regulation Credit example
tr3 = CreditIndex(Notional=10000,MtM=0,Currency="USD",Si=0,Ei=5,
BuySell='Buy',SubClass='IG',RefEntity='CDX.IG')
```

CreditSingle-class *Credit Single Class*

Description

Creates a Credit Single Object with the relevant info needed to calculate the Exposure-at-Default (EAD)

Arguments

Notional	The notional amount of the trade
MTM	The mark-to-market valuation of the trade
Currency	The currency set that the trade belongs to
Si	The number of years that the trade will take to start (zero if already started)
Ei	The number of years that the trade will expire
BuySell	Takes the values of either 'Buy' or 'Sell'

Value

An object of type CreditSingle

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

```
## the CreditSingle trade given in the Basel regulation Credit example
tr1 = CreditSingle(Notional=10000,MtM=20,Currency="USD",Si=0,Ei=3,BuySell='Buy',
SubClass='AA',RefEntity='FirmA')
```

CSA-class *CSA Class*

Description

Creates a collateral agreement Object containing all the relevant data and methods regarding the maturity factor of the sa-ccr and the 'thresholding' of the exposures

Arguments

thres_cpty	The maximum exposure that can be generated against the counterparty before collateral will need to be posted
thres_PO	The maximum exposure that can be generated against the processing organization before collateral will need to be posted
MTA_cpty	The minimum transfer amount for the counterparty
MTA_PO	The minimum transfer amount for the processing organization
IM_cpty	The initial margin that is posted by the counterparty
IM_PO	The initial margin that is posted by the processing organization
mpor_days	The margin period of risk (in days)
remargin_freq	The frequency of re-margining the exposure (in days)
rounding	The rounding amount of the transfers

Value

An object of type CSA

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

```
## the margin agreement given in the Basel regulation example
coll = CSA(thres_cpty = 0, MTA_cpty = 5, IM_cpty = 150, remargin_freq = 5)
```

ExampleBasisVol *Basis+Volatility trades Example*

Description

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

Usage

```
ExampleBasisVol()
```

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()
```

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()
```

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()
```

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()
```

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()
```

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*

Description

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

Usage

```
ExampleIRDCredit()
```

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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`FXSwap-class` *FX Swap Class*

Description

Creates an FX Swap object with the relevant info needed to calculate the Exposure-at-Default (EAD)

Arguments

`Notional`	The notional amount of the trade
`MTM`	The mark-to-market valuation of the trade
`Currency`	The currency set that the trade belongs to
`Si`	The number of years that the trade will take to start (zero if already started)
`Ei`	The number of years that the trade will expire
`BuySell`	Takes the values of either 'Buy' or 'Sell'

Value

An object of type FXSwap

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

```
tr1 = FXSwap(Notional=10000,MtM=30,ccyPair="EUR/USD",Si=0,Ei=10,BuySell='Buy')
```

HandleBasisVol *Calculates the Addon amount after handling basis and Volatility trades*

Description

Calculates the addon amount after splitting the trades into 'basis swap', 'volatility' and 'normal' transactions. The corresponding penalty factors are applied to the supervisory factors for each trade group.

Usage

```
HandleBasisVol(trades)
```

Arguments

trades	The full list of the Trade Objects

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

IRDSwap-class *IRD Swap Class*

Description

Creates an IRD Swap Object with the relevant info needed to calculate the Exposure-at-Default (EAD)

Arguments

Notional	The notional amount of the trade
MTM	The mark-to-market valuation of the trade
Currency	The currency set that the trade belongs to
Si	The number of years that the trade will take to start (zero if already started)
Ei	The number of years that the trade will expire
BuySell	Takes the values of either 'Buy' or 'Sell'

Value

An object of type IRDSwap

Examples

```
# the IRD Swap trade given in the Basel regulation IRD example
tr1 = IRDSwap(Notional=10000,MtM=30,Currency="USD",Si=0,Ei=10,BuySell='Buy')
```

IRDSwaption-class *IRD Swaption Class*

Description

Creates an IRD Swaption Object with the relevant info needed to calculate the Exposure-at-Default (EAD)

Arguments

Notional	The notional amount of the trade
MTM	The mark-to-market valuation of the trade
Currency	The currency set that the trade belongs to
Si	The number of years that the trade will take to start (zero if already started)
Ei	The number of years that the trade will expire
BuySell	Takes the values of either 'Buy' or 'Sell'
OptionType	Takes the values of either 'Put' or 'Call'
UnderlyingPrice	The current price of the underlying
StrikePrice	The strike price of the option

Value

An object of type IRDSwaption

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

```
# the Swaption trade given in the Basel regulation IRD example
tr3 = IRDSwaption(Notional=5000,MtM=50,Currency="EUR",Si=1,Ei=11,BuySell='Sell',
OptionType='Put',UnderlyingPrice=0.06,StrikePrice=0.05)
```

IRDSwapVol-class *IRD Swap Volatility Class*

Description

Creates an IRD Swap Volatility-based Object with the relevant info needed to calculate the Exposure-at-Default (EAD)

Value

An object of type IRDSwapVol

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

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

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