terreneuve Reference Manual

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6.1 asset Class Reference

`#include <asset.h>`

Public Member Functions

- **asset** (void)

  default contructor

- **asset** (**Real** price, **yieldCurve** yc, bool areDividendsAsRate=true, **Real** divRate=0.0, valarray< **flowSchedule** > flowsc=valarray< **flowSchedule** >(), **Currency** ccy=USD, **Real** volatility=ASSET_DEFAULT_VOL)

  contructor

- **asset** (**Real** price, **Real** volatility=ASSET_DEFAULT_VOL)
- **Real getDelta** ()

  a stock is delta 1!

- **Real getRho** (**Real** T)

  Rho vs fwd.

- void **setPrice** (**Real** p)

  sets the spot price

- void **setYieldCurve** (**yieldCurve** yc)

  sets the yc

- void **setDivAsRate** (**Real** rate=0.0)

  sets the div rate

- void **setDivFlows** (**flowSchedule** fc)

  sets the flow schedule

- void **setCcy** (**Currency** ccy)

sets the currency

- void **setVolatility** (**Real** volatility)

  sets the volatility

- **Real getPrice** () const

  gets the spot price

- **yieldCurve getYieldCurve** ()

  gets the spot price

- bool **areDivAsRate** ()

  gets the yc

- **Real getRate** ()

  gets the div rate

- valarray< **flowSchedule** > **getFlowSchedule** ()

  gets the div future flow schedule

- **Currency GetCurrencyFormat** ()

  gets the currency

- **Real GetVolatility** () const

  gets the volatility

- virtual **Real Price** ()

  If we have an asset model we can inherit from this class and change the method.

- **Real forwardPrice** (**Date** maturityDate)

  get the forward price

- **Real forwardPrice** (**Real** T)

  get the forward price

- ~**asset** (void)

Private Attributes

- **Real _currentPrice**
- **yieldCurve _yc**
- bool **_areDividendsAsGrowingRate**
- **Real _dividendGrowingRate**
- valarray< **flowSchedule** > **_announcedDividendFlows**
- **Currency _denomCur**
- **Real _volatility**

6.1.1 Constructor & Destructor Documentation

6.1.1.1 asset::asset (void)

default contructor

Definition at line 32 of file asset.cpp.

References _announcedDividendFlows, _areDividendsAsGrowingRate, _currentPrice, _denomCur, _dividendGrowingRate, _volatility, ASSET_DEFAULT_VOL, and USD.

6.1.1.2 asset::asset (Real *price*, yieldCurve *yc*, bool *areDividendsAsRate* = true, Real *divRate* = 0.0, valarray< flowSchedule > *flowsc* = valarray< flowSchedule >(), Currency *ccy* = USD, Real *volatility* = ASSET_DEFAULT_VOL)

contructor

Parameters:

price : current price of the asset

yc : mkt yc

areDividendsAsRate : tells u if divs are a future schedule (usually useless) or a fixed rate

divrate: so called fixed future div rate

flowsc : anticipated future div flows

CCY : currency denomination

volatility : stock's volatility (should be a volsurface but this is a simplification)

Definition at line 43 of file asset.cpp.

References _announcedDividendFlows, _areDividendsAsGrowingRate, _currentPrice, _denomCur, _dividendGrowingRate, _volatility, and Real.

6.1.1.3 asset::asset (Real *price*, Real *volatility* = ASSET_DEFAULT_VOL)

Definition at line 54 of file asset.cpp.

References _announcedDividendFlows, _areDividendsAsGrowingRate, _currentPrice, _denomCur, _dividendGrowingRate, _volatility, Real, and USD.

6.1.1.4 asset::~asset (void)

Definition at line 115 of file asset.cpp.

6.1.2 Member Function Documentation

6.1.2.1 bool asset::areDivAsRate () `[inline]`

gets the yc

Definition at line 112 of file asset.h.

References _areDividendsAsGrowingRate.

6.1.2.2 Real asset::forwardPrice (Real *T*)

get the forward price

Definition at line 78 of file asset.cpp.

References forwardPrice(), Natural, Date::plusDays(), Real, and Date::setDateToToday().

6.1.2.3 Real asset::forwardPrice (Date *maturityDate*)

get the forward price

Definition at line 97 of file asset.cpp.

References _announcedDividendFlows, _areDividendsAsGrowingRate, _currentPrice, _dividendGrowingRate, Day30_360, Date::dayCount(), yieldCurve::discountFactor(), Natural, Real, and Date::setDateToToday().

Referenced by forwardPrice(), getRho(), and mainasset().

6.1.2.4 Currency asset::GetCurrencyFormat () [inline]

gets the currency

Definition at line 121 of file asset.h.

References _denomCur, and Currency.

6.1.2.5 Real asset::getDelta () [inline]

a stock is delta 1!

Definition at line 82 of file asset.h.

References Real.

6.1.2.6 valarray<flowSchedule> asset::getFlowSchedule () [inline]

gets the div future flow schedule

Definition at line 118 of file asset.h.

References _announcedDividendFlows.

6.1.2.7 Real asset::getPrice () const [inline]

gets the spot price

Definition at line 106 of file asset.h.

References _currentPrice, and Real.

Referenced by convertiblebond::delta(), convertiblebond::gamma(), operator<<(), and convertiblebond::parity().

6.1.2.8 Real asset::getRate () [inline]

gets the div rate

Definition at line 115 of file asset.h.

References _dividendGrowingRate, and Real.

6.1.2.9 Real asset::getRho (Real *T*)

Rho vs fwd.

Definition at line 67 of file asset.cpp.

References forwardPrice(), Real, and yieldCurve::shiftZCBRateCurve().

6.1.2.10 Real asset::GetVolatility () const [inline]

gets the volatility

Definition at line 124 of file asset.h.

References _volatility, and Real.

Referenced by convertiblebond::delta(), convertiblebond::gamma(), and operator<<().

6.1.2.11 yieldCurve asset::getYieldCurve () [inline]

gets the spot price

Definition at line 109 of file asset.h.

6.1.2.12 Real asset::Price () [virtual]

If we have an asset model we can inherit from this class and change the method.

Definition at line 90 of file asset.cpp.

References _currentPrice, and Real.

6.1.2.13 void asset::setCcy (Currency *ccy*) [inline]

sets the currency

Definition at line 100 of file asset.h.

References _denomCur.

6.1.2.14 void asset::setDivAsRate (Real *rate* = 0.0)

sets the div rate

Definition at line 84 of file asset.cpp.

References _areDividendsAsGrowingRate, _dividendGrowingRate, and Real.

6.1.2.15 void asset::setDivFlows (flowSchedule *fc*) [inline]

sets the flow schedule

Definition at line 97 of file asset.h.

References _announcedDividendFlows.

6.1.2.16 void asset::setPrice (Real *p*) [inline]

sets the spot price

Definition at line 88 of file asset.h.

References _currentPrice, and Real.

Referenced by mainconvertiblebond().

6.1.2.17 void asset::setVolatility (Real *volatility*) [inline]

sets the volatility

Definition at line 103 of file asset.h.

References _volatility, and Real.

6.1.2.18 void asset::setYieldCurve (yieldCurve *yc*) [inline]

sets the yc

Definition at line 91 of file asset.h.

6.1.3 Member Data Documentation

6.1.3.1 valarray<flowSchedule> asset::_announcedDividendFlows [private]

Definition at line 61 of file asset.h.

Referenced by asset(), forwardPrice(), getFlowSchedule(), and setDivFlows().

6.1.3.2 bool asset::_areDividendsAsGrowingRate [private]

Definition at line 59 of file asset.h.

Referenced by areDivAsRate(), asset(), forwardPrice(), and setDivAsRate().

6.1.3.3 Real asset::_currentPrice [private]

Definition at line 57 of file asset.h.

Referenced by asset(), forwardPrice(), getPrice(), Price(), and setPrice().

6.1.3.4 Currency asset::_denomCur [private]

Definition at line 62 of file asset.h.

Referenced by asset(), GetCurrencyFormat(), and setCcy().

6.1.3.5 Real asset::_dividendGrowingRate [private]

Definition at line 60 of file asset.h.

Referenced by asset(), forwardPrice(), getRate(), and setDivAsRate().

6.1.3.6 Real asset::_volatility [private]

Definition at line 63 of file asset.h.

Referenced by asset(), GetVolatility(), and setVolatility().

6.1.3.7 yieldCurve asset::_yc [private]

Definition at line 58 of file asset.h.

The documentation for this class was generated from the following files:

- **asset.h**
- **asset.cpp**

6.2 binomialTree Class Reference

`#include <binomialTree.h>`

Public Member Functions

- **binomialTree** (void)
  default constructor
- **binomialTree** (**Real** So, **Real r**, **Real** sigma, **Real** T, **Natural** n)
  Constructor.
- **binomialTree** (**Real** So, **Real r**, **Real** sigma, **Real** T, **Natural** n, **Real** u, **Real** d)
- **binomialTree** (const **asset** &theAsset, **yieldCurve** &yc, **Real** T, **Natural** n)
- **binomialTree** (const **binomialTree** &rhs)
- **binomialTree** & **operator**= (const **binomialTree** &rhs)
- virtual ~**binomialTree** (void)
- const valarray< **Real** > * **getStockProcess** (**Natural** step)
- const valarray< **Real** > * **getClaimProcess** (**Natural** step)
- **Real getPrice** ()
- void **runEngineConvertibleBond** (**PayOff** thePayoff, **Real** ConversionRatio, **Real** CallPrice, **Real** PutPrice)
- void **runEngineCall** (**PayOff** thePayoff)

Protected Member Functions

- **Real getSo** () const
- **Real getRate** (**Natural** timestep) const
- **Real getSigma** () const
- **Real getMaturity** () const
- **Natural getSteps** () const
- void **constructStockProcess** ()
- void **setClaimVariables** (**Real** constantRate)
- void **setClaimVariables** (**yieldCurve** &yc)

Private Member Functions

- void **copyObj** (const **binomialTree** &rhs)

Private Attributes

- **Real _So**
- **Real _sigma**
- **Real _maturity**
- **Natural _n**
- **Real _dt**
- **Real _u**
- **Real _d**
- valarray< valarray< **Real** > > **_stockProcess**

- valarray< valarray< **Real** > > **_claimProcess**
- valarray< **Real** > **_discountFactor**
- valarray< **Real** > **_q**

  risk neutral probability of an up move

Friends

- ostream & **operator**<< (ostream &os, const **binomialTree** &bt)
- ostream & **operator**<< (ostream &os, const **binomialTree** *bt)

6.2.1 Constructor & Destructor Documentation

6.2.1.1 binomialTree::binomialTree (void)

default constructor

Definition at line 3 of file binomialTree.cpp.

References _d, _dt, _n, _sigma, _u, BT_DEFAULT_MATURITY, BT_DEFAULT_RATE, BT_DEFAULT_SIGMA, BT_DEFAULT_SO, BT_DEFAULT_STEPS, constructStockProcess(), and setClaimVariables().

6.2.1.2 binomialTree::binomialTree (Real *So*, Real *r*, Real *sigma*, Real *T*, Natural *n*)

Constructor.

Definition at line 20 of file binomialTree.cpp.

References _d, _dt, _u, constructStockProcess(), Natural, r, Real, and setClaimVariables().

6.2.1.3 binomialTree::binomialTree (Real *So*, Real *r*, Real *sigma*, Real *T*, Natural *n*, Real *u*, Real *d*)

Definition at line 56 of file binomialTree.cpp.

References _dt, constructStockProcess(), Natural, r, Real, and setClaimVariables().

6.2.1.4 binomialTree::binomialTree (const asset & *theAsset*, yieldCurve & *yc*, Real *T*, Natural *n*)

Definition at line 38 of file binomialTree.cpp.

References _d, _dt, _sigma, _u, constructStockProcess(), Natural, Real, and setClaimVariables().

6.2.1.5 binomialTree::binomialTree (const binomialTree & *rhs*)

Definition at line 91 of file binomialTree.cpp.

References copyObj().

6.2.1.6 binomialTree::~binomialTree (void) [virtual]

Definition at line 117 of file binomialTree.cpp.

6.2.2 Member Function Documentation

6.2.2.1 void binomialTree::constructStockProcess () [protected]

Definition at line 122 of file binomialTree.cpp.

References _claimProcess, _d, _n, _So, _stockProcess, _u, and Natural.

Referenced by binomialTree().

6.2.2.2 void binomialTree::copyObj (const binomialTree & *rhs*) [private]

Definition at line 102 of file binomialTree.cpp.

References _claimProcess, _d, _discountFactor, _dt, _maturity, _n, _q, _sigma, _So, _stockProcess, and _u.

Referenced by binomialTree(), and operator=().

6.2.2.3 const valarray< Real > * binomialTree::getClaimProcess (Natural *step*)

Definition at line 149 of file binomialTree.cpp.

References _claimProcess, _n, and Natural.

Referenced by convertiblebond::fairvalue().

6.2.2.4 Real binomialTree::getMaturity () const [inline, protected]

Definition at line 61 of file binomialTree.h.

References Real.

Referenced by operator<<().

6.2.2.5 Real binomialTree::getPrice ()

Definition at line 157 of file binomialTree.cpp.

References _claimProcess, and _n.

Referenced by mainbinomialtree().

6.2.2.6 Real binomialTree::getRate (Natural *timestep*) const [inline, protected]

Definition at line 57 of file binomialTree.h.

References _discountFactor, _n, Natural, and Real.

6.2.2.7 Real binomialTree::getSigma () const [inline, protected]

Definition at line 60 of file binomialTree.h.

References _sigma, and Real.

Referenced by operator<<().

6.2.2.8 Real binomialTree::getSo () const [inline, protected]

Definition at line 56 of file binomialTree.h.

References _So, and Real.

Referenced by operator<<().

6.2.2.9 Natural binomialTree::getSteps () const [inline, protected]

Definition at line 62 of file binomialTree.h.

References _n, and Natural.

Referenced by operator<<().

6.2.2.10 const valarray< Real > * binomialTree::getStockProcess (Natural *step*)

Definition at line 141 of file binomialTree.cpp.

References _n, _stockProcess, and Natural.

Referenced by mainbinomialtree().

6.2.2.11 binomialTree & binomialTree::operator= (const binomialTree & *rhs*)

Definition at line 96 of file binomialTree.cpp.

References copyObj().

6.2.2.12 void binomialTree::runEngineCall (PayOff *thePayoff*)

Definition at line 195 of file binomialTree.cpp.

References _claimProcess, _discountFactor, _n, _q, _stockProcess, PayOff::Call(), Integer, and Natural.

Referenced by mainbinomialtree().

6.2.2.13 void binomialTree::runEngineConvertibleBond (PayOff *thePayoff*, Real *ConversionRatio*, Real *CallPrice*, Real *PutPrice*)

Definition at line 214 of file binomialTree.cpp.

References _claimProcess, _discountFactor, _n, _q, _stockProcess, PayOff::Convertible(), Integer, Natural, and Real.

Referenced by convertiblebond::fairvalue().

6.2.2.14 void binomialTree::setClaimVariables (yieldCurve & *yc*) [protected]

Definition at line 84 of file binomialTree.cpp.

References _d, _discountFactor, _dt, _n, _q, _u, yieldCurve::forwardDiscountFactor(), and Natural.

6.2.2.15 void binomialTree::setClaimVariables (Real *constantRate*) [protected]

Definition at line 74 of file binomialTree.cpp.

References _d, _discountFactor, _dt, _n, _q, _u, Natural, q, and Real.

Referenced by binomialTree().

6.2.3 Friends And Related Function Documentation

6.2.3.1 ostream& operator<< (ostream & *os*, const binomialTree * *bt*) [friend]

Definition at line 23 of file binomialTree.h.

6.2.3.2 ostream& operator<< (ostream & *os*, const binomialTree & *bt*) [friend]

Definition at line 162 of file binomialTree.cpp.

6.2.4 Member Data Documentation

6.2.4.1 valarray<valarray <Real> > binomialTree::_claimProcess [private]

Definition at line 77 of file binomialTree.h.

Referenced by constructStockProcess(), copyObj(), getClaimProcess(), getPrice(), operator<<(), runEngineCall(), and runEngineConvertibleBond().

6.2.4.2 Real binomialTree::_d [private]

Definition at line 73 of file binomialTree.h.

Referenced by binomialTree(), constructStockProcess(), copyObj(), operator<<(), and setClaimVariables().

6.2.4.3 valarray<Real> binomialTree::_discountFactor [private]

Definition at line 79 of file binomialTree.h.

Referenced by copyObj(), getRate(), operator<<(), runEngineCall(), runEngineConvertibleBond(), and setClaimVariables().

6.2.4.4 Real binomialTree::_dt [private]

Definition at line 71 of file binomialTree.h.

Referenced by binomialTree(), copyObj(), and setClaimVariables().

6.2.4.5 Real binomialTree::_maturity [private]

Definition at line 69 of file binomialTree.h.

Referenced by copyObj().

6.2.4.6 Natural binomialTree::_n [private]

Definition at line 70 of file binomialTree.h.

Referenced by binomialTree(), constructStockProcess(), copyObj(), getClaimProcess(), getPrice(), getRate(), getSteps(), getStockProcess(), operator<<(), runEngineCall(), runEngineConvertibleBond(), and setClaimVariables().

6.2.4.7 valarray<Real> binomialTree::_q [private]

risk neutral probability of an up move

Definition at line 82 of file binomialTree.h.

Referenced by copyObj(), operator<<(), runEngineCall(), runEngineConvertibleBond(), and setClaimVariables().

6.2.4.8 Real binomialTree::_sigma [private]

Definition at line 68 of file binomialTree.h.

Referenced by binomialTree(), copyObj(), and getSigma().

6.2.4.9 Real binomialTree::_So [private]

Definition at line 67 of file binomialTree.h.

Referenced by constructStockProcess(), copyObj(), and getSo().

6.2.4.10 valarray<valarray <Real> > binomialTree::_stockProcess [private]

Definition at line 75 of file binomialTree.h.

Referenced by constructStockProcess(), copyObj(), getStockProcess(), operator<<(), runEngineCall(), and runEngineConvertibleBond().

6.2.4.11 Real binomialTree::_u [private]

Definition at line 72 of file binomialTree.h.

Referenced by binomialTree(), constructStockProcess(), copyObj(), operator<<(), and setClaimVariables().

The documentation for this class was generated from the following files:

- **binomialTree.h**
- **binomialTree.cpp**

6.3 BlackScholes Class Reference

`#include <BlackScholes.h>`

Public Member Functions

- **BlackScholes** (**Real** spot, **Real** volOrPrice, bool isVol, **Real r**, **Real** K, **Real** T, **TypeOptionBS** typeOption)

  Default constructor.

- **BlackScholes** ()
- virtual ~**BlackScholes** ()
- **Real getPrice** ()

  Return price of the option.

- **Real getDelta** ()

  Return the Delta value for the option.

- **Real getGamma** ()

  Return the Gamma value for the option.

- **Real getVega** ()

  Return the Vega value for the option.

- **Real getTheta** ()

  Return the Theta value for the option.

- **Real getRho** ()

  Return the Rho value for the option.

- **Real getVolatility** () const

  Return the Volatility for the option.

- **Real getStrike** () const

  Return the strike of the option.

- **Real getRate** () const

  Return the risk free rate at maturity of the option.

- **Real getSpot** () const

  Return the spot of the option.

- **Real getMaturity** () const

  Return the maturity of the option.

- bool **isCall** () const

  Return the type of the option.

Protected Member Functions

- void **changeRate** (**Real** newRate)
- void **changeVol** (**Real** newVol)
- void **changeMaturity** (**Real** newMat)
- void **changeSpot** (**Real** newSpot)
- void **changeStrike** (**Real** newVol)

Protected Attributes

- friend **OptionStrategy**

  Allow to change rate for testing sensibility.

Private Member Functions

- void **recalcInformation** ()

Private Attributes

- **Real _spot**
- **Real _vol**
- **Real _r**
- **Real _K**
- **Real _T**
- **Real d1**
- **Real d2**
- **Real _price**
- **TypeOptionBS _type**

6.3.1 Constructor & Destructor Documentation

6.3.1.1 BlackScholes::BlackScholes (Real *spot*, Real *volOrPrice*, bool *isVol*, Real *r*, Real *K*, Real *T*, TypeOptionBS *typeOption*)

Default constructor.

Parameters:

spot: Spot price of the asset

volOrPrice: Parameter given : either vol or price, the other will be computed

isVol: Bool allowing the constructor to know if the col or the price has been given

r: Spot Rate until maturity of option

K: Strike of the option

T: Maturity of the option

typeOption: Type of the option (Call or Put)

Definition at line 10 of file BlackScholes.cpp.

References _K, _price, _r, _spot, _T, _type, _vol, absolute(), BlackScholes(), d1, d2, getPrice(), getVega(), r, and Real.

6.3.1.2 BlackScholes::BlackScholes ()

Definition at line 43 of file BlackScholes.cpp.

Referenced by BlackScholes().

6.3.1.3 BlackScholes::~BlackScholes () [virtual]

Definition at line 46 of file BlackScholes.cpp.

6.3.2 Member Function Documentation

6.3.2.1 void BlackScholes::changeMaturity (Real *newMat*) [protected]

Definition at line 154 of file BlackScholes.cpp.

References _T, Real, and recalcInformation().

Referenced by OptionStrategy::changeMaturity().

6.3.2.2 void BlackScholes::changeRate (Real *newRate*) [protected]

Definition at line 144 of file BlackScholes.cpp.

References _r, Real, and recalcInformation().

Referenced by OptionStrategy::changeRate().

6.3.2.3 void BlackScholes::changeSpot (Real *newSpot*) [protected]

Definition at line 159 of file BlackScholes.cpp.

References _spot, Real, and recalcInformation().

Referenced by OptionStrategy::changeSpot().

6.3.2.4 void BlackScholes::changeStrike (Real *newVol*) [protected]

Definition at line 164 of file BlackScholes.cpp.

References _K, Real, and recalcInformation().

Referenced by OptionStrategy::changeStrike().

6.3.2.5 void BlackScholes::changeVol (Real *newVol*) [protected]

Definition at line 149 of file BlackScholes.cpp.

References _vol, Real, and recalcInformation().

Referenced by OptionStrategy::changeVol().

6.3.2.6 Real BlackScholes::getDelta ()

Return the Delta value for the option.

Definition at line 50 of file BlackScholes.cpp.

References _type, Call, CumulativeNormal(), d1, Put, and Real.

Referenced by inputBSOption(), and mainoption().

6.3.2.7 Real BlackScholes::getGamma ()

Return the Gamma value for the option.

Definition at line 68 of file BlackScholes.cpp.

References _spot, _T, _vol, d1, NormalDensity(), and Real.

Referenced by inputBSOption(), and mainoption().

6.3.2.8 Real BlackScholes::getMaturity () const

Return the maturity of the option.

Definition at line 136 of file BlackScholes.cpp.

References _T, and Real.

Referenced by OptionStrategy::changeMaturity(), and operator<<().

6.3.2.9 Real BlackScholes::getPrice () [inline]

Return price of the option.

Definition at line 72 of file BlackScholes.h.

References _K, _price, _r, _spot, _T, _type, Call, CumulativeNormal(), d1, d2, Put, and Real.

Referenced by BlackScholes(), VarianceSwap::getPrice(), inputBSOption(), mainbinomialtree(), mainoption(), RainbowOption::PriceByClosedForm_MinOf2_call(), RainbowOption::PriceByClosedForm_MinOf2_put(), and RainbowOption::PriceByClosedForm_WorseOf2().

6.3.2.10 Real BlackScholes::getRate () const

Return the risk free rate at maturity of the option.

Definition at line 128 of file BlackScholes.cpp.

References _r, and Real.

Referenced by OptionStrategy::changeRate(), and operator<<().

6.3.2.11 Real BlackScholes::getRho ()

Return the Rho value for the option.

Definition at line 102 of file BlackScholes.cpp.

References _K, _r, _T, _type, Call, CumulativeNormal(), d2, Put, and Real.

Referenced by inputBSOption(), and mainoption().

6.3.2.12 Real BlackScholes::getSpot () const

Return the spot of the option.

Definition at line 132 of file BlackScholes.cpp.

References _spot, and Real.

Referenced by OptionStrategy::changeSpot(), and operator<<().

6.3.2.13 Real BlackScholes::getStrike () const

Return the strike of the option.

Definition at line 124 of file BlackScholes.cpp.

References _K, and Real.

Referenced by OptionStrategy::changeStrike(), VarianceSwap::getPrice(), and operator<<().

6.3.2.14 Real BlackScholes::getTheta ()

Return the Theta value for the option.

Definition at line 84 of file BlackScholes.cpp.

References _K, _r, _spot, _T, _type, _vol, Call, CumulativeNormal(), d1, d2, NormalDensity(), Put, and Real.

Referenced by inputBSOption(), and mainoption().

6.3.2.15 Real BlackScholes::getVega ()

Return the Vega value for the option.

Definition at line 72 of file BlackScholes.cpp.

References _spot, _T, d1, NormalDensity(), and Real.

Referenced by BlackScholes(), inputBSOption(), and mainoption().

6.3.2.16 Real BlackScholes::getVolatility () const

Return the Volatility for the option.

Definition at line 120 of file BlackScholes.cpp.

References _vol, and Real.

Referenced by OptionStrategy::changeVol(), volsurface::invertBSformula(), mainoption(), and operator<<().

6.3.2.17 bool BlackScholes::isCall () const

Return the type of the option.

Definition at line 140 of file BlackScholes.cpp.

References _type, and Call.

Referenced by VarianceSwap::getPrice(), and operator<<().

6.3.2.18 void BlackScholes::recalcInformation () [private]

Definition at line 169 of file BlackScholes.cpp.

References _K, _r, _spot, _T, _vol, d1, and d2.

Referenced by changeMaturity(), changeRate(), changeSpot(), changeStrike(), and changeVol().

6.3.3 Member Data Documentation

6.3.3.1 Real BlackScholes::_K [private]

Definition at line 66 of file BlackScholes.h.

Referenced by BlackScholes(), changeStrike(), getPrice(), getRho(), getStrike(), getTheta(), and recalcInformation().

6.3.3.2 Real BlackScholes::_price [private]

Definition at line 68 of file BlackScholes.h.

Referenced by BlackScholes(), and getPrice().

6.3.3.3 Real BlackScholes::_r [private]

Definition at line 66 of file BlackScholes.h.

Referenced by BlackScholes(), changeRate(), getPrice(), getRate(), getRho(), getTheta(), and recalcInformation().

6.3.3.4 Real BlackScholes::_spot [private]

Definition at line 66 of file BlackScholes.h.

Referenced by BlackScholes(), changeSpot(), getGamma(), getPrice(), getSpot(), getTheta(), getVega(), and recalcInformation().

6.3.3.5 Real BlackScholes::_T [private]

Definition at line 66 of file BlackScholes.h.

Referenced by BlackScholes(), changeMaturity(), getGamma(), getMaturity(), getPrice(), getRho(), getTheta(), getVega(), and recalcInformation().

6.3.3.6 TypeOptionBS BlackScholes::_type [private]

Definition at line 69 of file BlackScholes.h.

Referenced by BlackScholes(), getDelta(), getPrice(), getRho(), getTheta(), and isCall().

6.3.3.7 Real BlackScholes::_vol [private]

Definition at line 66 of file BlackScholes.h.

Referenced by BlackScholes(), changeVol(), getGamma(), getTheta(), getVolatility(), and recalcInformation().

6.3.3.8 Real BlackScholes::d1 [private]

Definition at line 67 of file BlackScholes.h.

Referenced by BlackScholes(), getDelta(), getGamma(), getPrice(), getTheta(), getVega(), and recalcInformation().

6.3.3.9 Real BlackScholes::d2 [private]

Definition at line 67 of file BlackScholes.h.

Referenced by BlackScholes(), getPrice(), getRho(), getTheta(), and recalcInformation().

6.3.3.10 friend BlackScholes::OptionStrategy [protected]

Allow to change rate for testing sensibility.

Definition at line 57 of file BlackScholes.h.

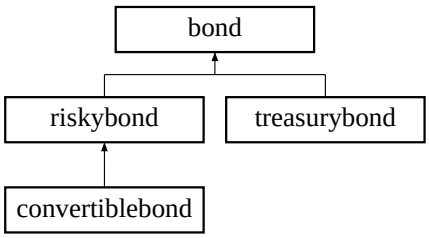
The documentation for this class was generated from the following files:

- **BlackScholes.h**
- **BlackScholes.cpp**

6.4 bond Class Reference

`#include <bond.h>`

Inheritance diagram for bond::



Public Member Functions

- **bond** (**Date** issue, **Date** maturity, **Date** firstcoupondate, **Real** coupon, **Frequency** freq, **Real** faceamount, **DayCountConvention** daycount, **yieldCurve** yc)

  Constructor.

- ~**bond** (void)

  Destructor.

- **cashflow getCashflow** ()
- virtual **Real quotedPrice** (**Date** today)
- virtual **Real fairvalue** (**Date** today)
- virtual **Real yieldToMaturity** (**Date** today)
- virtual **Real duration** (**Date** today)
- virtual **Real convexity** (**Date** today)
- virtual **Real quotedPrice** ()
- virtual **Real fairvalue** ()
- virtual **Real yieldToMaturity** ()
- virtual **Real duration** ()
- virtual **Real convexity** ()
- virtual **Date getMaturity** ()
- virtual **Date getIssue** ()
- virtual **Real getMaturityInYears** ()
- virtual **Real getMaturityInYears** (**Date** today)
- virtual **Real getFaceAmount** () const

Protected Attributes

- **Date _issue**
- **Date _maturity**
- **Date _firstcoupondate**
- **Real _coupon**
- **Frequency _freq**
- **Real _faceamount**
- **yieldCurve _yc**
- **DayCountConvention _daycount**

6.4.1 Constructor & Destructor Documentation

6.4.1.1 bond::bond (Date *issue*, Date *maturity*, Date *firstcoupondate*, Real *coupon*, Frequency *freq*, Real *faceamount*, DayCountConvention *daycount*, yieldCurve *yc*)

Constructor.

Parameters:

issue: date of issue of the bond

maturity: maturity of the bond

firstcoupondate: date of the first coupon

coupon: coupon of the bond, express as a percentqge of the faceamount

freq: frequency of the coupon

faceamount: par value

daycount: daycount convention

yc: yieldcurve

Definition at line 18 of file bond.cpp.

References Real.

6.4.1.2 bond::~bond (void) [inline]

Destructor.

Definition at line 55 of file bond.h.

6.4.2 Member Function Documentation

6.4.2.1 virtual Real bond::convexity () [inline, virtual]

Definition at line 69 of file bond.h.

References _issue, and Real.

6.4.2.2 Real bond::convexity (Date *today*) [virtual]

Definition at line 251 of file bond.cpp.

References _daycount, Date::dayCount(), getCashflow(), cashflow::getCashflows(), cashflow::getDates(), Natural, Real, and yieldToMaturity().

Referenced by inputBond(), and mainbond().

6.4.2.3 virtual Real bond::duration () [inline, virtual]

Definition at line 68 of file bond.h.

References _issue, and Real.

6.4.2.4 Real bond::duration (Date *today*) [virtual]

Definition at line 226 of file bond.cpp.

References _daycount, Date::dayCount(), getCashflow(), cashflow::getCashflows(), cashflow::getDates(), Natural, Real, and yieldToMaturity().

Referenced by inputBond(), and mainbond().

6.4.2.5 virtual Real bond::fairvalue () [inline, virtual]

Reimplemented in **convertiblebond** (p. 46).

Definition at line 66 of file bond.h.

References _issue, and Real.

Referenced by riskybond::rho(), treasurybond::rho(), and yieldToMaturity().

6.4.2.6 Real bond::fairvalue (Date *today*) [virtual]

Reimplemented in **convertiblebond** (p. 46).

Definition at line 116 of file bond.cpp.

References _coupon, _daycount, _faceamount, _firstcoupondate, _freq, _issue, ACT_360, ACT_365, Annual, Bimonthly, Day30_360, Day30_365, Date::dayOfMonth(), EveryFourthMonth, getCashflow(), cashflow::getCashflows(), cashflow::getDates(), Date::month(), Monthly, Natural, NoFrequency, Once, Quarterly, quotedPrice(), Real, Semiannual, Date::serialNumber(), TN_REAL, and Date::year().

Referenced by inputBond(), mainbond(), riskybond::rho(), and treasurybond::rho().

6.4.2.7 cashflow bond::getCashflow ()

Definition at line 31 of file bond.cpp.

References _coupon, _daycount, _faceamount, _firstcoupondate, _freq, Annual, Date::applyConvention(), Bimonthly, Date::dayCount(), EveryFourthMonth, Following, Integer, Monthly, Natural, NoFrequency, Once, Date::plusMonths(), Quarterly, Real, and Semiannual.

Referenced by convexity(), duration(), fairvalue(), riskybond::quotedPrice(), quotedPrice(), and yieldToMaturity().

6.4.2.8 virtual Real bond::getFaceAmount () const [inline, virtual]

Definition at line 75 of file bond.h.

References _faceamount, and Real.

Referenced by convertiblebond::adjustedConversionRatio(), and convertiblebond::fairvalue().

6.4.2.9 virtual Date bond::getIssue () [inline, virtual]

Definition at line 72 of file bond.h.

References _issue.

6.4.2.10 virtual Date bond::getMaturity () [inline, virtual]

Definition at line 71 of file bond.h.

6.4.2.11 virtual Real bond::getMaturityInYears (Date *today*) [inline, virtual]

Definition at line 74 of file bond.h.

References Date::dayCount(), and Real.

6.4.2.12 virtual Real bond::getMaturityInYears () [inline, virtual]

Definition at line 73 of file bond.h.

References _issue, and Real.

Referenced by convertiblebond::fairvalue().

6.4.2.13 virtual Real bond::quotedPrice () [inline, virtual]

Definition at line 65 of file bond.h.

References _issue, and Real.

Referenced by fairvalue().

6.4.2.14 Real bond::quotedPrice (Date *today*) [virtual]

Reimplemented in **riskybond** (p. 193).

Definition at line 200 of file bond.cpp.

References _daycount, Date::dayCount(), yieldCurve::discountFactor(), getCashflow(), cashflow::getCashflows(), cashflow::getDates(), Natural, and Real.

6.4.2.15 virtual Real bond::yieldToMaturity () [inline, virtual]

Definition at line 67 of file bond.h.

References _issue, and Real.

Referenced by convexity(), and duration().

6.4.2.16 Real bond::yieldToMaturity (Date *today*) [virtual]

Definition at line 276 of file bond.cpp.

References _daycount, Date::dayCount(), fairvalue(), getCashflow(), cashflow::getCashflows(), cashflow::getDates(), Natural, and Real.

Referenced by inputBond(), and mainbond().

6.4.3 Member Data Documentation

6.4.3.1 Real bond::_coupon [protected]

Definition at line 35 of file bond.h.

Referenced by fairvalue(), and getCashflow().

6.4.3.2 DayCountConvention bond::_daycount [protected]

Definition at line 40 of file bond.h.

Referenced by convexity(), duration(), fairvalue(), getCashflow(), quotedPrice(), and yieldToMaturity().

6.4.3.3 Real bond::_faceamount [protected]

Definition at line 37 of file bond.h.

Referenced by fairvalue(), getCashflow(), getFaceAmount(), and operator<<().

6.4.3.4 Date bond::_firstcoupondate [protected]

Definition at line 34 of file bond.h.

Referenced by fairvalue(), and getCashflow().

6.4.3.5 Frequency bond::_freq [protected]

Definition at line 36 of file bond.h.

Referenced by fairvalue(), and getCashflow().

6.4.3.6 Date bond::_issue [protected]

Definition at line 32 of file bond.h.

Referenced by convexity(), duration(), fairvalue(), getIssue(), getMaturityInYears(), operator<<(), quotedPrice(), and yieldToMaturity().

6.4.3.7 Date bond::_maturity [protected]

Definition at line 33 of file bond.h.

Referenced by operator<<().

6.4.3.8 yieldCurve bond::_yc [protected]

Definition at line 38 of file bond.h.

The documentation for this class was generated from the following files:

- **bond.h**

- bond.cpp

6.5 cachedval Struct Reference

`#include <types.h>`

Public Attributes

- bool **isCached**
- **Real value**

6.5.1 Member Data Documentation

6.5.1.1 bool cachedval::isCached

Definition at line 28 of file types.h.

6.5.1.2 Real cachedval::value

Definition at line 29 of file types.h.

The documentation for this struct was generated from the following file:

- **types.h**

6.6 cashflow Class Reference

`#include <bond.h>`

Public Member Functions

- **cashflow** (valarray< **Date** > dates, valarray< **Real** > cashflows)
- ~**cashflow** ()
- valarray< **Date** > **getDates** ()
- valarray< **Real** > **getCashflows** ()

Private Attributes

- valarray< **Date** > **_dates**
- valarray< **Real** > **_cashflows**

6.6.1 Constructor & Destructor Documentation

6.6.1.1 cashflow::cashflow (valarray< Date > *dates*, valarray< Real > *cashflows*)

Definition at line 3 of file bond.cpp.

6.6.1.2 cashflow::~cashflow () [inline]

Definition at line 21 of file bond.h.

6.6.2 Member Function Documentation

6.6.2.1 valarray< Real > cashflow::getCashflows ()

Definition at line 13 of file bond.cpp.

References _cashflows.

Referenced by bond::convexity(), bond::duration(), bond::fairvalue(), riskybond::quotedPrice(), bond::quotedPrice(), and bond::yieldToMaturity().

6.6.2.2 valarray< Date > cashflow::getDates ()

Definition at line 9 of file bond.cpp.

References _dates.

Referenced by bond::convexity(), bond::duration(), bond::fairvalue(), riskybond::quotedPrice(), bond::quotedPrice(), and bond::yieldToMaturity().

6.6.3 Member Data Documentation

6.6.3.1 valarray<Real> cashflow::_cashflows [private]

Definition at line 17 of file bond.h.

Referenced by getCashflows().

6.6.3.2 valarray<Date> cashflow::_dates [private]

Definition at line 16 of file bond.h.

Referenced by getDates().

The documentation for this class was generated from the following files:

- **bond.h**
- **bond.cpp**

6.7 CashFlow Class Reference

`#include <CashFlow.h>`

Public Member Functions

- **CashFlow** (**SwapLeg** swapLeg, **Real** fixedRate)

  Constructor for fixed leg.

- **CashFlow** (**SwapLeg** swapLeg, **yieldCurve** floatCurve)

  Constructor for float leg by giving a yield curve object.

- **Real getFairValue** (**yieldCurve** *curve)

  Get the fair value of the swap : discounted value of cash flows.

- ~**CashFlow** (void)

Private Attributes

- valarray< **Real** > **flowAmount**
- valarray< **Date** > **flowDates**

6.7.1 Constructor & Destructor Documentation

6.7.1.1 CashFlow::CashFlow (SwapLeg *swapLeg*, Real *fixedRate*)

Constructor for fixed leg.

Definition at line 3 of file CashFlow.cpp.

References flowAmount, flowDates, Natural, Real, SwapLeg::returnAmounts(), SwapLeg::returnDates(), Date::serialNumber(), and Date::setDateToToday().

6.7.1.2 CashFlow::CashFlow (SwapLeg *swapLeg*, yieldCurve *floatCurve*)

Constructor for float leg by giving a yield curve object.

Definition at line 15 of file CashFlow.cpp.

References Discrete, flowAmount, flowDates, yieldCurve::forwardRate(), Natural, SwapLeg::returnAmounts(), SwapLeg::returnDates(), Date::serialNumber(), and Date::setDateToToday().

6.7.1.3 CashFlow::~CashFlow (void)

Definition at line 36 of file CashFlow.cpp.

6.7.2 Member Function Documentation

6.7.2.1 Real CashFlow::getFairValue (yieldCurve * *curve*)

Get the fair value of the swap : discounted value of cash flows.

Definition at line 27 of file CashFlow.cpp.

References yieldCurve::discountFactor(), Discrete, flowAmount, flowDates, Natural, and Real.

Referenced by VanillaSwap::getFairValue1(), VanillaSwap::getFairValue2(), and mainIRVanilla-Swap().

6.7.3 Member Data Documentation

6.7.3.1 valarray<Real> CashFlow::flowAmount [private]

Definition at line 25 of file CashFlow.h.

Referenced by CashFlow(), and getFairValue().

6.7.3.2 valarray<Date> CashFlow::flowDates [private]

Definition at line 26 of file CashFlow.h.

Referenced by CashFlow(), and getFairValue().

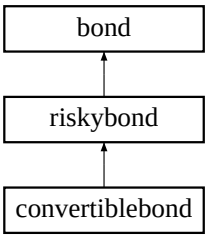
The documentation for this class was generated from the following files:

- **CashFlow.h**
- **CashFlow.cpp**

6.8 convertiblebond Class Reference

`#include <convertiblebond.h>`

Inheritance diagram for convertiblebond::



Public Member Functions

- **convertiblebond** (**asset** Stock, **riskybond** Bond, **Real** conversionRatio=CB_DEFAULT_RATIO, **Natural** nSteps=CB_DEFAULT_STEPS, **Real** callPrice=CB_DEFAULT_CALLPRICE, **Real** putPrice=CB_DEFAULT_PUTPRICE)

  Constructor.

- virtual ~**convertiblebond** (void)
- virtual **Real fairvalue** (**Date** today)
- virtual **Real fairvalue** ()
- **Real adjustedConversionRatio** () const
- **Real parity** (void) const
- **Real delta** (void) const
- **Real delta** (**Date** today) const
- **Real parityDelta** (void) const
- **Real parityDelta** (**Date** today) const
- **convertiblebond shiftedcbond** (**Real** shift)
- **Real rho** (**Date** today)

  return the derivative of the bond price with respect to interest rates

- **Real rho** ()
- **Real interestRateDelta** (void) const
- **Real interestRateDelta** (**Date** today) const
- **Real gamma** (void) const
- **Real gamma** (**Date** today) const
- **Real parityGamma** (void) const
- **Real parityGamma** (**Date** today) const
- **Natural getSteps** (void) const

Protected Attributes

- **binomialTree** * **_bt**
- bool **_btCached**

Private Member Functions

- void **copyObj** (const **convertiblebond** &rhs)

Private Attributes

- **asset _stock**
- **riskybond _bond**
- **Natural _n**
- **Real _callPrice**
- **Real _putPrice**
- **Real _conversionRatio**
- **Real _price**
- bool **_priceCached**
- **Date _datepriceCached**
- **Real _delta**
- bool **_deltaCached**
- **Date _datedeltaCached**
- **Real _interestRateDelta**
- bool **_interestRateDeltaCached**
- **Date _dateinterestRateDeltaCached**
- **Real _gamma**
- bool **_gammaCached**
- **Date _dategammaCached**

Friends

- ostream & **operator<<** (ostream &os, **convertiblebond** &cb)
- ostream & **operator<<** (ostream &os, **convertiblebond** *cb)

6.8.1 Constructor & Destructor Documentation

6.8.1.1 convertiblebond::convertiblebond (asset *Stock*, riskybond *Bond*, Real *conversionRatio* = CB_DEFAULT_RATIO, Natural *nSteps* = CB_DEFAULT_STEPS, Real *callPrice* = CB_DEFAULT_CALLPRICE, Real *putPrice* = CB_DEFAULT_PUTPRICE)

Constructor.

Definition at line 5 of file convertiblebond.cpp.

References _btCached, _deltaCached, _gammaCached, _interestRateDeltaCached, _priceCached, Natural, and Real.

Referenced by delta(), gamma(), and shiftedcbond().

6.8.1.2 convertiblebond::~convertiblebond (void) [virtual]

Definition at line 29 of file convertiblebond.cpp.

6.8.2 Member Function Documentation

6.8.2.1 Real convertiblebond::adjustedConversionRatio () const [inline]

Definition at line 52 of file convertiblebond.h.

References _conversionRatio, bond::getFaceAmount(), and Real.

Referenced by parityDelta(), and parityGamma().

6.8.2.2 void convertiblebond::copyObj (const convertiblebond & *rhs*) [private]

6.8.2.3 Real convertiblebond::delta (Date *today*) const

Definition at line 65 of file convertiblebond.cpp.

References _bond, _callPrice, _conversionRatio, _datedeltaCached, _delta, _deltaCached, _putPrice, _stock, convertiblebond(), fairvalue(), asset::getPrice(), asset::GetVolatility(), and Real.

6.8.2.4 Real convertiblebond::delta (void) const [inline]

Definition at line 56 of file convertiblebond.h.

References Real.

Referenced by gamma(), operator<<(), and parityDelta().

6.8.2.5 virtual Real convertiblebond::fairvalue () [inline, virtual]

Reimplemented from **bond** (p. 35).

Definition at line 50 of file convertiblebond.h.

References Real.

6.8.2.6 Real convertiblebond::fairvalue (Date *today*) [virtual]

Reimplemented from **bond** (p. 35).

Definition at line 33 of file convertiblebond.cpp.

References _bt, _btCached, _callPrice, _conversionRatio, _datepriceCached, _priceCached, _putPrice, _stock, binomialTree::getClaimProcess(), bond::getFaceAmount(), bond::getMaturityInYears(), and binomialTree::runEngineConvertibleBond().

Referenced by delta(), interestRateDelta(), mainconvertiblebond(), and operator<<().

6.8.2.7 Real convertiblebond::gamma (Date *today*) const

Definition at line 123 of file convertiblebond.cpp.

References _bond, _callPrice, _conversionRatio, _dategammaCached, _gamma, _gammaCached, _putPrice, _stock, convertiblebond(), delta(), asset::getPrice(), asset::GetVolatility(), and Real.

6.8.2.8 Real convertiblebond::gamma (void) const [inline]

Definition at line 65 of file convertiblebond.h.

References Real.

Referenced by operator<<(), and parityGamma().

6.8.2.9 Natural convertiblebond::getSteps (void) const [inline]

Definition at line 72 of file convertiblebond.h.

References Natural.

6.8.2.10 Real convertiblebond::interestRateDelta (Date *today*) const

Definition at line 107 of file convertiblebond.cpp.

References _dateinterestRateDeltaCached, _interestRateDelta, _interestRateDeltaCached, and fairvalue().

6.8.2.11 Real convertiblebond::interestRateDelta (void) const [inline]

Definition at line 63 of file convertiblebond.h.

References Real.

Referenced by operator<<(), and rho().

6.8.2.12 Real convertiblebond::parity (void) const [inline]

Definition at line 55 of file convertiblebond.h.

References _conversionRatio, _stock, asset::getPrice(), and Real.

6.8.2.13 Real convertiblebond::parityDelta (Date *today*) const [inline]

Definition at line 59 of file convertiblebond.h.

References adjustedConversionRatio(), delta(), and Real.

6.8.2.14 Real convertiblebond::parityDelta (void) const [inline]

Definition at line 58 of file convertiblebond.h.

References Real.

Referenced by mainconvertiblebond(), and operator<<().

6.8.2.15 Real convertiblebond::parityGamma (Date *today*) const [inline]

Definition at line 68 of file convertiblebond.h.

References adjustedConversionRatio(), gamma(), and Real.

6.8.2.16 Real convertiblebond::parityGamma (void) const [inline]

Definition at line 67 of file convertiblebond.h.

References Real.

Referenced by mainconvertiblebond(), and operator<<().

6.8.2.17 Real convertiblebond::rho () [inline, virtual]

Reimplemented from **riskybond** (p. 193).

Definition at line 62 of file convertiblebond.h.

References Real.

6.8.2.18 Real convertiblebond::rho (Date *today*) [inline, virtual]

return the derivative of the bond price with respect to interest rates

Reimplemented from **riskybond** (p. 194).

Definition at line 61 of file convertiblebond.h.

References interestRateDelta(), and Real.

Referenced by mainconvertiblebond().

6.8.2.19 convertiblebond convertiblebond::shiftedcbond (Real *shift*)

Definition at line 99 of file convertiblebond.cpp.

References _bond, _callPrice, _conversionRatio, _putPrice, _stock, convertiblebond(), Real, riskybond::shiftedbond(), and shiftedcbond().

Referenced by shiftedcbond().

6.8.3 Friends And Related Function Documentation

6.8.3.1 ostream& operator<< (ostream & *os*, convertiblebond * *cb*) [friend]

Definition at line 35 of file convertiblebond.h.

6.8.3.2 ostream& operator<< (ostream & *os*, convertiblebond & *cb*) [friend]

Definition at line 156 of file convertiblebond.cpp.

6.8.4 Member Data Documentation

6.8.4.1 riskybond convertiblebond::_bond [private]

Definition at line 80 of file convertiblebond.h.

Referenced by delta(), gamma(), and shiftedcbond().

6.8.4.2 binomialTree* convertiblebond::_bt [mutable, protected]

Definition at line 75 of file convertiblebond.h.

Referenced by fairvalue(), and operator<<().

6.8.4.3 bool convertiblebond::_btCached [mutable, protected]

Definition at line 76 of file convertiblebond.h.

Referenced by convertiblebond(), fairvalue(), and operator<<().

6.8.4.4 Real convertiblebond::_callPrice [private]

Definition at line 83 of file convertiblebond.h.

Referenced by delta(), fairvalue(), gamma(), operator<<(), and shiftedcbond().

6.8.4.5 Real convertiblebond::_conversionRatio [private]

Definition at line 85 of file convertiblebond.h.

Referenced by adjustedConversionRatio(), delta(), fairvalue(), gamma(), operator<<(), parity(), and shiftedcbond().

6.8.4.6 Date convertiblebond::_datedeltaCached [mutable, private]

Definition at line 94 of file convertiblebond.h.

Referenced by delta().

6.8.4.7 Date convertiblebond::_dategammaCached [mutable, private]

Definition at line 102 of file convertiblebond.h.

Referenced by gamma().

6.8.4.8 Date convertiblebond::_dateinterestRateDeltaCached [mutable, private]

Definition at line 98 of file convertiblebond.h.

Referenced by interestRateDelta().

6.8.4.9 Date convertiblebond::_datepriceCached [mutable, private]

Definition at line 90 of file convertiblebond.h.

Referenced by fairvalue().

6.8.4.10 Real convertiblebond::_delta [mutable, private]

Definition at line 92 of file convertiblebond.h.

Referenced by delta().

6.8.4.11 bool convertiblebond::_deltaCached [mutable, private]

Definition at line 93 of file convertiblebond.h.

Referenced by convertiblebond(), and delta().

6.8.4.12 Real convertiblebond::_gamma [mutable, private]

Definition at line 100 of file convertiblebond.h.

Referenced by gamma().

6.8.4.13 bool convertiblebond::_gammaCached [mutable, private]

Definition at line 101 of file convertiblebond.h.

Referenced by convertiblebond(), and gamma().

6.8.4.14 Real convertiblebond::_interestRateDelta [mutable, private]

Definition at line 96 of file convertiblebond.h.

Referenced by interestRateDelta().

6.8.4.15 bool convertiblebond::_interestRateDeltaCached [mutable, private]

Definition at line 97 of file convertiblebond.h.

Referenced by convertiblebond(), and interestRateDelta().

6.8.4.16 Natural convertiblebond::_n [private]

Definition at line 82 of file convertiblebond.h.

Referenced by operator<<().

6.8.4.17 Real convertiblebond::_price [mutable, private]

Definition at line 88 of file convertiblebond.h.

6.8.4.18 bool convertiblebond::_priceCached [mutable, private]

Definition at line 89 of file convertiblebond.h.

Referenced by convertiblebond(), and fairvalue().

6.8.4.19 Real convertiblebond::_putPrice [private]

Definition at line 84 of file convertiblebond.h.

Referenced by delta(), fairvalue(), gamma(), operator<<(), and shiftedcbond().

6.8.4.20 asset convertiblebond::_stock [private]

Definition at line 79 of file convertiblebond.h.

Referenced by delta(), fairvalue(), gamma(), operator<<(), parity(), and shiftedcbond().

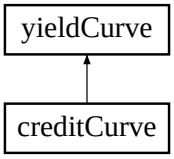
The documentation for this class was generated from the following files:

- **convertiblebond.h**
- **convertiblebond.cpp**

6.9 creditCurve Class Reference

`#include <creditCurve.h>`

Inheritance diagram for creditCurve::



Public Member Functions

- **creditCurve** (void)

  default constructor

- **creditCurve** (valarray< **yieldPoint** > &yp, valarray< **CreditSpreadPoint** > &cp, char *name=CC_DEFAULT_NAME, **Real** recoveryRate=CC_DEFAULT_RECOVERY_RATE, **Currency** currency=CC_DEFAULT_CURRENCY, **Frequency** frequency=CC_DEFAULT_FREQUENCY)

  Constructor.

- **creditCurve** (**yieldCurve** &yc, valarray< **CreditSpreadPoint** > &cp, char *name=CC_DEFAULT_NAME, **Real** recoveryRate=CC_DEFAULT_RECOVERY_RATE, **Currency** currency=CC_DEFAULT_CURRENCY, **Frequency** frequency=CC_DEFAULT_FREQUENCY)
- **creditCurve** (**Real** flatRate, **Real** flatSpread, char *name=CC_DEFAULT_NAME, **Real** recoveryRate=CC_DEFAULT_RECOVERY_RATE, **Currency** currency=CC_DEFAULT_CURRENCY, **Frequency** frequency=CC_DEFAULT_FREQUENCY)
- **creditCurve** (**yieldCurve** &yc, **Real** flatSpread, char *name=CC_DEFAULT_NAME, **Real** recoveryRate=CC_DEFAULT_RECOVERY_RATE, **Currency** currency=CC_DEFAULT_CURRENCY, **Frequency** frequency=CC_DEFAULT_FREQUENCY)
- **creditCurve** (const **creditCurve** &rhs)
- **creditCurve** & **operator=** (const **creditCurve** &rhs)
- virtual ~**creditCurve** (void)
- **yieldCurve** * **createSpreadCurve** (**yieldCurve** &underlying, valarray< **CreditSpreadPoint** > &spreads)
- **yieldCurve** * **combineUnderlyingAndSpreads** (**yieldCurve** &underlying, **yieldCurve** &spreadcurve)
- void **assignFlatSpread** (**Real r**)
- void **resampleSpread** ()
- virtual **Real creditSpread** (**Real** maturity) const
- virtual **Real creditSpread** (**Date** maturityDate) const
- virtual **Real timeOfCurrentSpread** (**Real** maturity) const
- virtual **Natural indexOfCurrentSpread** (**Real** maturity) const
- virtual **Real timeOfPreviousSpread** (**Real** maturity) const
- virtual **Natural indexOfPreviousSpread** (**Real** maturity) const
- virtual **Real survivalProbability** (**Real** maturity) const
- virtual **Real cumulativeDefaultProbability** (**Real** maturity) const
- virtual **Real swapFees** (**Real** maturity) const

- virtual **Real defaultProbability** (**Real** maturity) const

  returns conditional default probability at a given maturity.

- virtual **Real hazardRate** (**Real** maturity) const

  returns hazard rate at a given maturity - this is an alias for defaultProbability i.e.

- virtual **Real spotRate** (**Real** maturity) const

  Calculates the spot ZCB rate.

- virtual **Real spotRate** (**Date** maturityDate) const

  Calculates the spot ZCB rate.

- virtual **Real discountFactor** (**Real** maturity, **interestComposition** composition=Continuous)

  Calculates the discountFactor.

- virtual **Real riskyDiscountFactor** (**Real** maturity, **interestComposition** composition=Continuous)

  Calculates the risky discount factor incorporating the hazard rate.

- virtual **Real discountFactor** (**Date** maturityDate, **interestComposition** composition=Continuous)

  Calculates the discountFactor.

- virtual **Real forwardRate** (**Real** forwardStart, **Real** effectiveLengthOfTheContractAfterStart, **interestComposition** composition=Continuous)

  Calculates the fwd rate.

- virtual **Real forwardRate** (**Date** forwardStart, **Date** forwardEnd, **interestComposition** composition=Continuous)

  Calculates the fwd rate.

- virtual valarray< **Real** > **getMaturitiesInTheZCBCurve** () const

  Return the maturities present in the market curve, both from the Cash and Swap Pointsvalarray<Real>.

- virtual char * **getName** ()
- **Real getRecoveryRate** (void) const
- **Currency getCurrency** (void) const
- **Frequency getFrequency** (void) const

Protected Member Functions

- **yieldCurve** * **getUnderlying** (void) const
- **yieldCurve** * **getCombined** (void) const
- valarray< **CreditSpreadPoint** > **getSpreads** (void) const
- valarray< **cachedval** > **getSurvivalProbability** (void) const
- valarray< **cachedval** > **getDefaultProbability** (void) const
- valarray< **cachedval** > **getSwapFees** (void) const

Protected Attributes

- **yieldCurve** * **_underlying**
- **yieldCurve** * **_combined**

Private Member Functions

- void **copyObj** (const **creditCurve** &rhs)

Private Attributes

- valarray< **CreditSpreadPoint** > **_spreads**
- valarray< **cachedval** > **_survivalProbability**
- valarray< **cachedval** > **_defaultProbability**
- valarray< **cachedval** > **_swapFees**
- **Real _recoveryRate**
- **Currency _currency**
- **Frequency _frequency**

Friends

- ostream & **operator**<< (ostream &os, const **creditCurve** &c)
- ostream & **operator**<< (ostream &os, const **creditCurve** *c)

6.9.1 Constructor & Destructor Documentation

6.9.1.1 creditCurve::creditCurve (void)

default constructor

Definition at line 24 of file creditCurve.cpp.

References CC_MAX_NUM_SPREADS.

6.9.1.2 creditCurve::creditCurve (valarray< yieldPoint > & *yp*, valarray< CreditSpreadPoint > & *cp*, char * *name* = CC_DEFAULT_NAME, Real *recoveryRate* = CC_DEFAULT_RECOVERY_RATE, Currency *currency* = CC_DEFAULT_CURRENCY, Frequency *frequency* = CC_DEFAULT_FREQUENCY)

Constructor.

Parameters:

yp - as with yield curve, array of yield points

cp - array of credit spreads for different maturities

recoveryRate - amount of debt collected in case of default

currency - that the debt is denominated in

frequency - annual, semi-annual, etc.

name - a string identifying the curve

Definition at line 100 of file creditCurve.cpp.

References _combined, _underlying, CC_MAX_NUM_SPREADS, combineUnderlyingAndSpreads(), createSpreadCurve(), Real, resampleSpread(), and yieldCurve::yieldCurve().

6.9.1.3 creditCurve::creditCurve (yieldCurve & *yc*, valarray< CreditSpreadPoint > & *cp*, char * *name* = CC_DEFAULT_NAME, Real *recoveryRate* = CC_DEFAULT_RECOVERY_RATE, Currency *currency* = CC_DEFAULT_CURRENCY, Frequency *frequency* = CC_DEFAULT_FREQUENCY)

Definition at line 32 of file creditCurve.cpp.

References _combined, _underlying, CC_MAX_NUM_SPREADS, combineUnderlyingAndSpreads(), createSpreadCurve(), Real, resampleSpread(), and yieldCurve::yieldCurve().

6.9.1.4 creditCurve::creditCurve (Real *flatRate*, Real *flatSpread*, char * *name* = CC_DEFAULT_NAME, Real *recoveryRate* = CC_DEFAULT_RECOVERY_RATE, Currency *currency* = CC_DEFAULT_CURRENCY, Frequency *frequency* = CC_DEFAULT_FREQUENCY)

Definition at line 55 of file creditCurve.cpp.

References _combined, _underlying, assignFlatSpread(), CC_MAX_NUM_SPREADS, combineUnderlyingAndSpreads(), Real, and yieldCurve::yieldCurve().

6.9.1.5 creditCurve::creditCurve (yieldCurve & *yc*, Real *flatSpread*, char * *name* = CC_DEFAULT_NAME, Real *recoveryRate* = CC_DEFAULT_RECOVERY_RATE, Currency *currency* = CC_DEFAULT_CURRENCY, Frequency *frequency* = CC_DEFAULT_FREQUENCY)

Definition at line 77 of file creditCurve.cpp.

References _combined, _underlying, assignFlatSpread(), CC_MAX_NUM_SPREADS, combineUnderlyingAndSpreads(), Real, and yieldCurve::yieldCurve().

6.9.1.6 creditCurve::creditCurve (const creditCurve & *rhs*)

Definition at line 129 of file creditCurve.cpp.

References copyObj().

6.9.1.7 creditCurve::~creditCurve (void) [virtual]

Definition at line 243 of file creditCurve.cpp.

References _combined, and _underlying.

6.9.2 Member Function Documentation

6.9.2.1 void creditCurve::assignFlatSpread (Real *r*)

Definition at line 214 of file creditCurve.cpp.

References _defaultProbability, _spreads, _survivalProbability, _swapFees, Natural, r, Real, and Relative.

Referenced by creditCurve().

6.9.2.2 yieldCurve * creditCurve::combineUnderlyingAndSpreads (yieldCurve & *underlying*, yieldCurve & *spreadcurve*)

Definition at line 181 of file creditCurve.cpp.

References Cash, yieldCurve::getMaturitiesInTheZCBCurve(), mergeunique(), Natural, yieldCurve::spotRate(), and yieldCurve::yieldCurve().

Referenced by creditCurve().

6.9.2.3 void creditCurve::copyObj (const creditCurve & *rhs*) [private]

Definition at line 140 of file creditCurve.cpp.

References _combined, _currency, _defaultProbability, _frequency, _recoveryRate, _spreads, _survivalProbability, _swapFees, _underlying, getCombined(), getCurrency(), getDefaultProbability(), getFrequency(), getRecoveryRate(), getSpreads(), getSurvivalProbability(), getSwapFees(), getUnderlying(), and yieldCurve::yieldCurve().

Referenced by creditCurve(), and operator=().

6.9.2.4 yieldCurve * creditCurve::createSpreadCurve (yieldCurve & *underlying*, valarray< CreditSpreadPoint > & *spreads*)

Definition at line 153 of file creditCurve.cpp.

References Absolute, Cash, Natural, yieldCurve::spotRate(), and yieldCurve::yieldCurve().

Referenced by creditCurve().

6.9.2.5 virtual Real creditCurve::creditSpread (Date *maturityDate*) const [inline, virtual]

Definition at line 144 of file creditCurve.h.

References _combined, _underlying, Real, and yieldCurve::spotRate().

6.9.2.6 virtual Real creditCurve::creditSpread (Real *maturity*) const [inline, virtual]

Definition at line 139 of file creditCurve.h.

References _combined, _underlying, Real, and yieldCurve::spotRate().

Referenced by defaultProbability(), maincreditcurve(), and swapFees().

6.9.2.7 Real creditCurve::cumulativeDefaultProbability (Real *maturity*) const [virtual]

Definition at line 290 of file creditCurve.cpp.

References Real, and survivalProbability().

Referenced by maincreditcurve().

6.9.2.8 Real creditCurve::defaultProbability (Real *maturity*) const [virtual]

returns conditional default probability at a given maturity.

Parameters:
maturity - time at which to evaluate probability

Returns:
conditional default probability - the same probability will be returned for all times between two spreads

Definition at line 357 of file creditCurve.cpp.

References _defaultProbability, _recoveryRate, _underlying, creditSpread(), yieldCurve::discountFactor(), indexOfCurrentSpread(), Natural, Real, survivalProbability(), swapFees(), timeOfCurrentSpread(), and timeOfPreviousSpread().

Referenced by hazardRate(), maincreditcurve(), survivalProbability(), and swapFees().

6.9.2.9 virtual Real creditCurve::discountFactor (Date *maturityDate*, interestComposition *composition* = Continuous) [inline, virtual]

Calculates the discountFactor.

Parameters:
maturity : just after ZCBrates are computed, it it very easy [done at trhe constructor level]

Reimplemented from **yieldCurve** (p. 224).

Definition at line 206 of file creditCurve.h.

References _combined, and yieldCurve::discountFactor().

6.9.2.10 virtual Real creditCurve::discountFactor (Real *maturity*, interestComposition *composition* = Continuous) [inline, virtual]

Calculates the discountFactor.

Parameters:
maturity : just after ZCBrates are computed, it it very easy [done at trhe constructor level]

Reimplemented from **yieldCurve** (p. 224).

Definition at line 189 of file creditCurve.h.

References _combined, yieldCurve::discountFactor(), and Real.

6.9.2.11 virtual Real creditCurve::forwardRate (Date *forwardStart*, Date *forwardEnd*, interestComposition *composition* = Continuous) [inline, virtual]

Calculates the fwd rate.

Parameters:

forwardStart start of the rate

maturityAfterForward maturity after the start

Reimplemented from **yieldCurve** (p. 224).

Definition at line 229 of file creditCurve.h.

References _combined, and yieldCurve::forwardRate().

6.9.2.12 virtual Real creditCurve::forwardRate (Real *forwardStart*, Real *effectiveLengthOfTheContractAfterStart*, interestComposition *composition* = Continuous) [inline, virtual]

Calculates the fwd rate.

Parameters:

forwardStart start of the rate

maturityAfterForward maturity after the start

Reimplemented from **yieldCurve** (p. 225).

Definition at line 216 of file creditCurve.h.

References _combined, yieldCurve::forwardRate(), and Real.

6.9.2.13 yieldCurve* creditCurve::getCombined (void) const [inline, protected]

Definition at line 248 of file creditCurve.h.

References _combined.

Referenced by copyObj().

6.9.2.14 Currency creditCurve::getCurrency (void) const [inline]

Definition at line 240 of file creditCurve.h.

References _currency, and Currency.

Referenced by copyObj().

6.9.2.15 valarray<cachedval> creditCurve::getDefaultProbability (void) const [inline, protected]

Definition at line 251 of file creditCurve.h.

References _defaultProbability.

Referenced by copyObj().

6.9.2.16 Frequency creditCurve::getFrequency (void) const [inline]

Definition at line 241 of file creditCurve.h.

References _frequency, and Frequency.

Referenced by copyObj().

6.9.2.17 virtual valarray<Real> creditCurve::getMaturitiesInTheZCBCurve () const [inline, virtual]

Return the maturities present in the market curve, both from the Cash and Swap Pointsvalarray<Real>.

Reimplemented from **yieldCurve** (p. 225).

Definition at line 234 of file creditCurve.h.

References _combined, and yieldCurve::getMaturitiesInTheZCBCurve().

6.9.2.18 virtual char* creditCurve::getName () [inline, virtual]

Reimplemented from **yieldCurve** (p. 226).

Definition at line 237 of file creditCurve.h.

References _combined, and yieldCurve::getName().

6.9.2.19 Real creditCurve::getRecoveryRate (void) const [inline]

Definition at line 239 of file creditCurve.h.

References _recoveryRate, and Real.

Referenced by copyObj().

6.9.2.20 valarray<CreditSpreadPoint> creditCurve::getSpreads (void) const [inline, protected]

Definition at line 249 of file creditCurve.h.

References _spreads.

Referenced by copyObj().

6.9.2.21 valarray<cachedval> creditCurve::getSurvivalProbability (void) const [inline, protected]

Definition at line 250 of file creditCurve.h.

References _survivalProbability.

Referenced by copyObj().

6.9.2.22 valarray<cachedval> creditCurve::getSwapFees (void) const [inline, protected]

Definition at line 252 of file creditCurve.h.

References _swapFees.

Referenced by copyObj().

6.9.2.23 yieldCurve* creditCurve::getUnderlying (void) const [inline, protected]

Definition at line 247 of file creditCurve.h.

References _underlying.

Referenced by copyObj().

6.9.2.24 virtual Real creditCurve::hazardRate (Real *maturity*) const [inline, virtual]

returns hazard rate at a given maturity - this is an alias for defaultProbability i.e.

probability of default at time t conditional on no earlier default.

Parameters:
maturity - time at which to evaluate probability

Returns:
conditional default probability

Definition at line 172 of file creditCurve.h.

References defaultProbability(), and Real.

Referenced by maincreditcurve().

6.9.2.25 Natural creditCurve::indexOfCurrentSpread (Real *maturity*) const [virtual]

Definition at line 254 of file creditCurve.cpp.

References _spreads, Natural, and Real.

Referenced by defaultProbability(), survivalProbability(), swapFees(), and timeOfCurrentSpread().

6.9.2.26 Natural creditCurve::indexOfPreviousSpread (Real *maturity*) const [virtual]

Definition at line 272 of file creditCurve.cpp.

References _spreads, Natural, and Real.

Referenced by timeOfPreviousSpread().

6.9.2.27 creditCurve & creditCurve::operator= (const creditCurve & *rhs*)

Definition at line 134 of file creditCurve.cpp.

References copyObj().

6.9.2.28 void creditCurve::resampleSpread ()

Definition at line 228 of file creditCurve.cpp.

References _combined, _defaultProbability, _spreads, _survivalProbability, _swapFees, _underlying, Natural, Relative, and yieldCurve::spotRate().

Referenced by creditCurve().

6.9.2.29 Real creditCurve::riskyDiscountFactor (Real *maturity*, interestComposition *composition* = Continuous) [virtual]

Calculates the risky discount factor incorporating the hazard rate.

Parameters:

maturity - maturity to calculate risky discount factor for

risky discount = risk free discount * survival probability

In the class notes we have RF = DF * (1 - Q(T)) Q(T) is cumulative default probability so it is the complement of S(T), the cumulative survival probability.

In discrete time we have the identity: (S(n) - S(n+1)) / S(n) = q(n) where q(n) is the default probability for period n conditional on no earlier default. q(n) is a discrete time version of hazard rate. In the limit (as dt -> 0) this leads to the expression S(t) = exp(-(integral from 0 to t)*h(t)*dt)

The risky discount factor is a "discounted" discount factor - the discounting applied is the survival probability. In continuous time we can use the expression above but since we have calculated everything to this point in discrete time and we have an explicit expression for the survival probability we use this as the discount factor rather than the continuous time expression above.

Definition at line 394 of file creditCurve.cpp.

References _underlying, yieldCurve::discountFactor(), Real, and survivalProbability().

Referenced by maincreditcurve(), and riskybond::quotedPrice().

6.9.2.30 virtual Real creditCurve::spotRate (Date *maturityDate*) const [inline, virtual]

Calculates the spot ZCB rate.

Parameters:

maturityDate : maturityDate of the ZCB

Reimplemented from **yieldCurve** (p. 228).

Definition at line 180 of file creditCurve.h.

References _combined, Real, and yieldCurve::spotRate().

6.9.2.31 virtual Real creditCurve::spotRate (Real *maturity*) const [inline, virtual]

Calculates the spot ZCB rate.

Parameters:

maturity : if it is exact it just gives the result from a Point, else an interpolated one based on interpolator

Reimplemented from **yieldCurve** (p. 228).

Definition at line 176 of file creditCurve.h.

References _combined, Real, and yieldCurve::spotRate().

6.9.2.32 Real creditCurve::survivalProbability (Real *maturity*) const [virtual]

Definition at line 295 of file creditCurve.cpp.

References _survivalProbability, defaultProbability(), indexOfCurrentSpread(), Natural, Real, timeOfCurrentSpread(), and timeOfPreviousSpread().

Referenced by cumulativeDefaultProbability(), defaultProbability(), maincreditcurve(), riskyDiscountFactor(), and swapFees().

6.9.2.33 Real creditCurve::swapFees (Real *maturity*) const [virtual]

Definition at line 320 of file creditCurve.cpp.

References _swapFees, _underlying, creditSpread(), defaultProbability(), yieldCurve::discountFactor(), indexOfCurrentSpread(), Natural, Real, survivalProbability(), timeOfCurrentSpread(), and timeOfPreviousSpread().

Referenced by defaultProbability().

6.9.2.34 Real creditCurve::timeOfCurrentSpread (Real *maturity*) const [virtual]

Definition at line 249 of file creditCurve.cpp.

References _spreads, indexOfCurrentSpread(), and Real.

Referenced by defaultProbability(), survivalProbability(), and swapFees().

6.9.2.35 Real creditCurve::timeOfPreviousSpread (Real *maturity*) const [virtual]

Definition at line 285 of file creditCurve.cpp.

References _spreads, indexOfPreviousSpread(), and Real.

Referenced by defaultProbability(), survivalProbability(), and swapFees().

6.9.3 Friends And Related Function Documentation

6.9.3.1 ostream& operator<< (ostream & *os*, const creditCurve * *c*) [friend]

Definition at line 69 of file creditCurve.h.

6.9.3.2 ostream& operator<< (ostream & *os*, const creditCurve & *c*) [friend]

Definition at line 423 of file creditCurve.cpp.

6.9.4 Member Data Documentation

6.9.4.1 yieldCurve* creditCurve::_combined [protected]

Definition at line 245 of file creditCurve.h.

Referenced by copyObj(), creditCurve(), creditSpread(), discountFactor(), forwardRate(), getCombined(), getMaturitiesInTheZCBCurve(), getName(), operator<<(), resampleSpread(), spotRate(), and ~creditCurve().

6.9.4.2 Currency creditCurve::_currency [private]

Definition at line 264 of file creditCurve.h.

Referenced by copyObj(), and getCurrency().

6.9.4.3 valarray<cachedval> creditCurve::_defaultProbability [mutable, private]

Definition at line 260 of file creditCurve.h.

Referenced by assignFlatSpread(), copyObj(), defaultProbability(), getDefaultProbability(), and resampleSpread().

6.9.4.4 Frequency creditCurve::_frequency [private]

Definition at line 265 of file creditCurve.h.

Referenced by copyObj(), and getFrequency().

6.9.4.5 Real creditCurve::_recoveryRate [private]

Definition at line 263 of file creditCurve.h.

Referenced by copyObj(), defaultProbability(), and getRecoveryRate().

6.9.4.6 valarray<CreditSpreadPoint> creditCurve::_spreads [private]

Definition at line 256 of file creditCurve.h.

Referenced by assignFlatSpread(), copyObj(), getSpreads(), indexOfCurrentSpread(), indexOfPreviousSpread(), resampleSpread(), timeOfCurrentSpread(), and timeOfPreviousSpread().

6.9.4.7 valarray<cachedval> creditCurve::_survivalProbability [mutable, private]

Definition at line 259 of file creditCurve.h.

Referenced by assignFlatSpread(), copyObj(), getSurvivalProbability(), resampleSpread(), and survivalProbability().

6.9.4.8 valarray<cachedval> creditCurve::_swapFees [mutable, private]

Definition at line 261 of file creditCurve.h.

Referenced by assignFlatSpread(), copyObj(), getSwapFees(), resampleSpread(), and swapFees().

6.9.4.9 yieldCurve* creditCurve::_underlying [protected]

Definition at line 244 of file creditCurve.h.

Referenced by copyObj(), creditCurve(), creditSpread(), defaultProbability(), getUnderlying(), resampleSpread(), riskyDiscountFactor(), swapFees(), and ~creditCurve().

The documentation for this class was generated from the following files:

- **creditCurve.h**
- **creditCurve.cpp**

6.10 CreditSpreadPoint Class Reference

used to encapsulate a spread at a given maturity

`#include <creditCurve.h>`

Public Member Functions

- **CreditSpreadPoint** (void)
  Default Constructor.
- **CreditSpreadPoint** (**Real r**, **Real** T, **CreditSpreadType** t)
  Constructor.
- ~**CreditSpreadPoint** (void)
  Destructor.
- **Real getRate** ()
  Associated rate.
- **Real getMaturity** ()
- **CreditSpreadType getSpreadType** ()
- void **setRate** (**Real r**)
- void **setMaturity** (**Real m**)
- void **setType** (**CreditSpreadType** t)

Static Public Member Functions

- char * **TypeAsString** (**CreditSpreadType** t)

Private Attributes

- **Real _rate**
- **Real _maturity**
- **CreditSpreadType _spreadtype**

6.10.1 Detailed Description

used to encapsulate a spread at a given maturity

Definition at line 30 of file creditCurve.h.

6.10.2 Constructor & Destructor Documentation

6.10.2.1 CreditSpreadPoint::CreditSpreadPoint (void)

Default Constructor.

Definition at line 5 of file creditCurve.cpp.

References Relative.

6.10.2.2 CreditSpreadPoint::CreditSpreadPoint (Real *r*, Real *T*, CreditSpreadType *t*)

Constructor.

Parameters:

s: Real spread between risky asset and risk free rate

T: Real maturity of the spread

t: Absolute or relative spread

Definition at line 7 of file creditCurve.cpp.

References r, and Real.

6.10.2.3 CreditSpreadPoint::~CreditSpreadPoint (void)

Destructor.

Definition at line 9 of file creditCurve.cpp.

6.10.3 Member Function Documentation

6.10.3.1 Real CreditSpreadPoint::getMaturity () [inline]

Definition at line 50 of file creditCurve.h.

References Real.

6.10.3.2 Real CreditSpreadPoint::getRate () [inline]

Associated rate.

Definition at line 48 of file creditCurve.h.

References Real.

6.10.3.3 CreditSpreadType CreditSpreadPoint::getSpreadType () [inline]

Definition at line 52 of file creditCurve.h.

References _spreadtype, and CreditSpreadType.

6.10.3.4 void CreditSpreadPoint::setMaturity (Real *m*) [inline]

Definition at line 56 of file creditCurve.h.

References m, and Real.

6.10.3.5 void CreditSpreadPoint::setRate (Real *r*) [inline]

Definition at line 54 of file creditCurve.h.

References r, and Real.

6.10.3.6 void CreditSpreadPoint::setType (CreditSpreadType *t*) [inline]

Definition at line 58 of file creditCurve.h.

References _spreadtype.

6.10.3.7 char * CreditSpreadPoint::TypeAsString (CreditSpreadType *t*) [static]

Definition at line 11 of file creditCurve.cpp.

References Absolute, and Relative.

Referenced by CSVParser::operator>>().

6.10.4 Member Data Documentation

6.10.4.1 Real CreditSpreadPoint::_maturity [private]

Definition at line 61 of file creditCurve.h.

6.10.4.2 Real CreditSpreadPoint::_rate [private]

Definition at line 60 of file creditCurve.h.

6.10.4.3 CreditSpreadType CreditSpreadPoint::_spreadtype [private]

Definition at line 62 of file creditCurve.h.

Referenced by getSpreadType(), and setType().

The documentation for this class was generated from the following files:

- **creditCurve.h**
- **creditCurve.cpp**

6.11 CSVParser Class Reference

`#include <csvparser.h>`

Public Member Functions

- **CSVParser** ()
- const **CSVParser** & **operator**<< (const string &sIn)
- const **CSVParser** & **operator**<< (const char *sIn)
- **CSVParser** & **operator**>> (int &nOut)
- **CSVParser** & **operator**>> (**Natural** &nOut)
- **CSVParser** & **operator**>> (double &nOut)
- **CSVParser** & **operator**>> (string &sOut)
- **CSVParser** & **operator**>> (**TypeOfRate** &tOut)

  used to parse yield curve points - type of rate can be cash or swap

- **CSVParser** & **operator**>> (**CreditSpreadType** &tOut)

  used to parse credit curve spreads - type of rate can be absolute or relative

- **CSVParser** & **operator**>> (**Date** &dOut)

Private Member Functions

- void **SkipSpaces** (void)

Private Attributes

- string **m_sData**
- string::size_type **m_nPos**

6.11.1 Constructor & Destructor Documentation

6.11.1.1 CSVParser::CSVParser ()

Definition at line 41 of file csvparser.cpp.

References m_nPos, and m_sData.

6.11.2 Member Function Documentation

6.11.2.1 const CSVParser & CSVParser::operator<< (const char * *sIn*)

Definition at line 60 of file csvparser.cpp.

References m_nPos, and m_sData.

6.11.2.2 const CSVParser & CSVParser::operator<< (const string & *sIn*)

Definition at line 53 of file csvparser.cpp.

References m_nPos, and m_sData.

6.11.2.3 CSVParser & CSVParser::operator>> (Date & *dOut*)

Definition at line 162 of file csvparser.cpp.

References Day, m, m_nPos, m_sData, Month, StringTokenizer::nextIntToken(), SkipSpaces(), and Year.

6.11.2.4 CSVParser & CSVParser::operator>> (CreditSpreadType & *tOut*)

used to parse credit curve spreads - type of rate can be absolute or relative

Definition at line 111 of file csvparser.cpp.

References Absolute, m_nPos, m_sData, Relative, SkipSpaces(), and CreditSpreadPoint::TypeAsString().

6.11.2.5 CSVParser & CSVParser::operator>> (TypeOfRate & *tOut*)

used to parse yield curve points - type of rate can be cash or swap

Definition at line 97 of file csvparser.cpp.

References Cash, m_nPos, m_sData, SkipSpaces(), Swap, and yieldPoint::TypeAsString().

6.11.2.6 CSVParser & CSVParser::operator>> (string & *sOut*)

Definition at line 127 of file csvparser.cpp.

References m_nPos, m_sData, and SkipSpaces().

6.11.2.7 CSVParser & CSVParser::operator>> (double & *nOut*)

Definition at line 84 of file csvparser.cpp.

References m_nPos, m_sData, and SkipSpaces().

6.11.2.8 CSVParser & CSVParser::operator>> (Natural & *nOut*)

Definition at line 79 of file csvparser.cpp.

References Natural, and operator>>().

6.11.2.9 CSVParser & CSVParser::operator>> (int & *nOut*)

Definition at line 67 of file csvparser.cpp.

References m_nPos, m_sData, and SkipSpaces().

Referenced by operator>>().

6.11.2.10 void CSVParser::SkipSpaces (void) [private]

Definition at line 47 of file csvparser.cpp.

References m_nPos, and m_sData.

Referenced by operator>>().

6.11.3 Member Data Documentation

6.11.3.1 string::size_type CSVParser::m_nPos [private]

Definition at line 46 of file csvparser.h.

Referenced by CSVParser(), operator<<(), operator>>(), and SkipSpaces().

6.11.3.2 string CSVParser::m_sData [private]

Definition at line 45 of file csvparser.h.

Referenced by CSVParser(), operator<<(), operator>>(), and SkipSpaces().

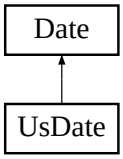
The documentation for this class was generated from the following files:

- **csvparser.h**
- **csvparser.cpp**

6.12 Date Class Reference

`#include <date.h>`

Inheritance diagram for Date::



Public Member Functions

- **Date** (void)
  Default constructor.
- **Date** (**LongInteger** serialNumber)
  Constructor taking a serial number.
- **Date** (**Day** d, **Month m**, **Year** y)
  Constructor taking day, month and year.
- **Date** (**Day** d, **ShortNatural m**, **Year** y)
  Constructor taking day, month as an integer and year.
- ~**Date** (void)
- **Weekday weekday** () const
- **Day dayOfMonth** () const
- **Day dayOfYear** () const
- **Month month** () const
- **Year year** () const
- **LongInteger serialNumber** () const
- bool **isEndOfMonth** () const
- **Day lastDayOfMonth** () const
- void **setDateToToday** ()
  Set Date to system today's date.
- **Date** & **operator+=** (**LongInteger** days)
  increments date by the given number of days
- **Date** & **operator-=** (**LongInteger** days)
  decrement date by the given number of days
- **Date** & **operator++** ()
  1-day pre-increment
- **Date operator++** (int)
  1-day post-increment

- **Date** & **operator**– ()

  1-day pre-decrement

- **Date operator**– (int)

  1-day post-decrement

- **Date operator**+ (**LongInteger** days) const

  returns a new date incremented by the given number of days

- **Date operator-** (**LongInteger** days) const

  returns a new date decremented by the given number of days

- bool **operator**== (const **Date** &d2)
- bool **operator!**= (const **Date** &d2)
- bool **operator**< (const **Date** &d2)
- bool **operator**<= (const **Date** &d2)
- bool **operator**> (const **Date** &d2)
- bool **operator**>= (const **Date** &d2)
- **Date plusDays** (**Integer** n) const
- **Date plusWeeks** (**Integer** n) const
- **Date plusMonths** (**Integer** n) const
- **Date plusYears** (**Integer** n) const
- **Date plus** (**Integer** n, **TimeUnit** units) const
- bool **isBusinessDay** ()

  Apply Conventions (use for **UsDate**(p. 206) *for example).*

- void **applyConvention** (**BusinessDayConvention** convention=Following)
- **Date returnDateConvention** (const **Date** &date, **BusinessDayConvention** convention=Following)
- **Real dayCount** (const **Date** &d, **DayCountConvention** dayconvention=ACT_365) const

  DayCount Between Dates.

- char * **toString** () const

  Return char version of the date.*

Static Public Member Functions

- **Date minDate** ()

  earliest allowed date

- **Date maxDate** ()

  latest allowed date

- bool **isLeap** (**Year** y)

  whether the given year is a leap one

- **Date endOfMonth** (const **Date** &d)

  last day of the month to which the given date belongs

- bool **isEOM** (const **Date** &d)

  whether a date is the last day of its month

- **Date nextWeekday** (const **Date** &d, **Weekday**)

  next given weekday following or equal to the given date

- **Date nthWeekday** (**ShortInteger** n, **Weekday**, **Month m**, **Year** y)

  n-th given weekday in the given month and year

Static Private Member Functions

- **Date advance** (const **Date** &d, **Integer** units, **TimeUnit**)
- **Integer monthLength** (**Month m**, bool leapYear)
- **Integer monthOffset** (**Month m**, bool leapYear)
- **LongInteger yearOffset** (**Year** y)
- **LongInteger minimumSerialNumber** ()
- **LongInteger maximumSerialNumber** ()

Private Attributes

- **LongInteger _serialNumber**

6.12.1 Constructor & Destructor Documentation

6.12.1.1 Date::Date (void)

Default constructor.

Definition at line 4 of file date.cpp.

References LongInteger.

Referenced by advance(), applyConvention(), Date(), endOfMonth(), nthWeekday(), operator+(), operator-(), and returnDateConvention().

6.12.1.2 Date::Date (LongInteger *serialNumber*)

Constructor taking a serial number.

Definition at line 8 of file date.cpp.

References LongInteger.

6.12.1.3 Date::Date (Day *d*, Month *m*, Year *y*)

Constructor taking day, month and year.

Definition at line 12 of file date.cpp.

References _serialNumber, Day, isLeap(), m, monthLength(), monthOffset(), Year, and yearOffset().

6.12.1.4 Date::Date (Day *d*, ShortNatural *m*, Year *y*)

Constructor taking day, month as an integer and year.

Definition at line 18 of file date.cpp.

References April, August, Date(), Day, December, February, January, July, June, m, March, May, November, October, September, ShortNatural, and Year.

6.12.1.5 Date::~Date (void)

Definition at line 418 of file date.cpp.

6.12.2 Member Function Documentation

6.12.2.1 Date Date::advance (const Date & *d*, Integer *units*, TimeUnit) [static, private]

Definition at line 175 of file date.cpp.

References Date(), Day, dayOfMonth(), Days, February, Integer, isLeap(), m, Month, month(), monthLength(), Months, Weeks, year(), Year, and Years.

Referenced by plus(), plusDays(), plusMonths(), plusWeeks(), and plusYears().

6.12.2.2 void Date::applyConvention (BusinessDayConvention *convention* = Following)

Definition at line 366 of file date.cpp.

References _serialNumber, Date(), Following, isBusinessDay(), LongInteger, ModifiedFollowing, ModifiedPreceding, month(), and Preceding.

Referenced by bond::getCashflow(), returnDateConvention(), and SwapLeg::SwapLeg().

6.12.2.3 Real Date::dayCount (const Date & *d*, DayCountConvention *dayconvention* = ACT_365) const

DayCount Between Dates.

Definition at line 397 of file date.cpp.

References _serialNumber, ACT_360, ACT_365, Day30_360, Day30_365, dayOfMonth(), month(), Real, serialNumber(), TN_REAL, and year().

Referenced by bond::convexity(), yieldCurve::discountFactor(), bond::duration(), asset::forwardPrice(), yieldCurve::forwardRate(), volsurface::forwardVolatility(), bond::getCashflow(), bond::getMaturityInYears(), riskybond::quotedPrice(), bond::quotedPrice(), volsurface::setvolsurface(), yieldCurve::spotRate(), volsurface::volatility(), and bond::yieldToMaturity().

6.12.2.4 Day Date::dayOfMonth () const

Definition at line 53 of file date.cpp.

References Day, dayOfYear(), isLeap(), month(), monthOffset(), and year().

Referenced by advance(), dayCount(), bond::fairvalue(), UsDate::isBusinessDay(), isEOM(), lastDayOfMonth(), and toString().

6.12.2.5 Day Date::dayOfYear () const

Definition at line 57 of file date.cpp.

References _serialNumber, Day, year(), and yearOffset().

Referenced by dayOfMonth(), and month().

6.12.2.6 Date Date::endOfMonth (const Date & *d*) [static]

last day of the month to which the given date belongs

Definition at line 263 of file date.cpp.

References Date(), isLeap(), m, month(), Month, monthLength(), year(), and Year.

Referenced by lastDayOfMonth().

6.12.2.7 bool Date::isBusinessDay ()

Apply Conventions (use for **UsDate**(p. 206) for example).

Reimplemented in **UsDate** (p. 206).

Definition at line 362 of file date.cpp.

Referenced by applyConvention().

6.12.2.8 bool Date::isEndOfMonth () const

Definition at line 83 of file date.cpp.

References isEOM().

6.12.2.9 bool Date::isEOM (const Date & *d*) [static]

whether a date is the last day of its month

Definition at line 269 of file date.cpp.

References dayOfMonth(), isLeap(), month(), monthLength(), and year().

Referenced by isEndOfMonth().

6.12.2.10 bool Date::isLeap (Year *y*) [static]

whether the given year is a leap one

Definition at line 215 of file date.cpp.

References Year.

Referenced by advance(), Date(), dayOfMonth(), endOfMonth(), isEOM(), month(), and setDateToToday().

6.12.2.11 Day Date::lastDayOfMonth () const

Definition at line 87 of file date.cpp.

References Day, dayOfMonth(), and endOfMonth().

Referenced by maindate().

6.12.2.12 Date Date::maxDate () [static]

latest allowed date

Definition at line 170 of file date.cpp.

References maximumSerialNumber().

6.12.2.13 LongInteger Date::maximumSerialNumber () [static, private]

Definition at line 358 of file date.cpp.

References LongInteger.

Referenced by maxDate().

6.12.2.14 Date Date::minDate () [static]

earliest allowed date

Definition at line 165 of file date.cpp.

References minimumSerialNumber().

6.12.2.15 LongInteger Date::minimumSerialNumber () [static, private]

Definition at line 354 of file date.cpp.

References LongInteger.

Referenced by minDate().

6.12.2.16 Month Date::month () const

Definition at line 61 of file date.cpp.

References Day, dayOfYear(), Integer, isLeap(), m, Month, monthOffset(), and year().

Referenced by advance(), applyConvention(), dayCount(), dayOfMonth(), endOfMonth(), bond::fairvalue(), UsDate::isBusinessDay(), isEOM(), and toString().

6.12.2.17 Integer Date::monthLength (Month *m*, bool *leapYear*) [static, private]

Definition at line 285 of file date.cpp.

References Integer, and m.

Referenced by advance(), Date(), endOfMonth(), isEOM(), and setDateToToday().

6.12.2.18 Integer Date::monthOffset (Month *m*, bool *leapYear*) [static, private]

Definition at line 295 of file date.cpp.

References Integer, and m.

Referenced by Date(), dayOfMonth(), month(), and setDateToToday().

6.12.2.19 Date Date::nextWeekday (const Date & *d*, Weekday) [static]

next given weekday following or equal to the given date

Definition at line 273 of file date.cpp.

References weekday(), and Weekday.

6.12.2.20 Date Date::nthWeekday (ShortInteger *n*, Weekday, Month *m*, Year *y*) [static]

n-th given weekday in the given month and year

Definition at line 278 of file date.cpp.

References Date(), m, ShortInteger, Weekday, and Year.

6.12.2.21 bool Date::operator!= (const Date & *d2*) [inline]

Definition at line 124 of file date.h.

References _serialNumber, and serialNumber().

6.12.2.22 Date Date::operator+ (LongInteger *days*) const

returns a new date incremented by the given number of days

Definition at line 137 of file date.cpp.

References _serialNumber, Date(), and LongInteger.

6.12.2.23 Date Date::operator++ (int)

1-day post-increment

Definition at line 117 of file date.cpp.

References _serialNumber, and LongInteger.

6.12.2.24 Date & Date::operator++ ()

1-day pre-increment

Definition at line 111 of file date.cpp.

References _serialNumber, and LongInteger.

6.12.2.25 Date & Date::operator+= (LongInteger *days*)

increments date by the given number of days

Definition at line 99 of file date.cpp.

References _serialNumber, and LongInteger.

6.12.2.26 Date Date::operator- (LongInteger *days*) const

returns a new date decremented by the given number of days

Definition at line 141 of file date.cpp.

References _serialNumber, Date(), and LongInteger.

6.12.2.27 Date Date::operator– (int)

1-day post-decrement

Definition at line 130 of file date.cpp.

References _serialNumber, and LongInteger.

6.12.2.28 Date & Date::operator– ()

1-day pre-decrement

Definition at line 124 of file date.cpp.

References _serialNumber, and LongInteger.

6.12.2.29 Date & Date::operator-= (LongInteger *days*)

decrement date by the given number of days

Definition at line 105 of file date.cpp.

References _serialNumber, and LongInteger.

6.12.2.30 bool Date::operator< (const Date & *d2*) [inline]

Definition at line 125 of file date.h.

References _serialNumber, and serialNumber().

6.12.2.31 bool Date::operator<= (const Date & *d2*) [inline]

Definition at line 126 of file date.h.

References _serialNumber, and serialNumber().

6.12.2.32 bool Date::operator== (const Date & *d2*) [inline]

Definition at line 123 of file date.h.

References _serialNumber, and serialNumber().

6.12.2.33 bool Date::operator> (const Date & *d2*) [inline]

Definition at line 127 of file date.h.

References _serialNumber, and serialNumber().

6.12.2.34 bool Date::operator>= (const Date & *d2*) [inline]

Definition at line 128 of file date.h.

References _serialNumber, and serialNumber().

6.12.2.35 Date Date::plus (Integer *n*, TimeUnit *units*) const

Definition at line 161 of file date.cpp.

References advance(), and Integer.

Referenced by mainconvertiblebond().

6.12.2.36 Date Date::plusDays (Integer *n*) const

Definition at line 145 of file date.cpp.

References advance(), Days, and Integer.

Referenced by Drift::Drift(), asset::forwardPrice(), Exotics::getTheta(), inputBond(), inputBSOption(), inputButterflySpread(), inputCallSpread(), inputConvertibleBond(), inputPutSpread(), inputRatioCallSpread(), inputStraddle(), inputStrangle(), inputVanillaSwap(), mainasset(), RainbowOption::reassignVolsAtThemoney(), and RainbowOption::reassignVolsAtThestrike().

6.12.2.37 Date Date::plusMonths (Integer *n*) const

Definition at line 153 of file date.cpp.

References advance(), Integer, and Months.

Referenced by bond::getCashflow(), mainasset(), mainIRVanillaSwap(), and mainyieldcurve().

6.12.2.38 Date Date::plusWeeks (Integer *n*) const

Definition at line 149 of file date.cpp.

References advance(), Integer, and Weeks.

6.12.2.39 Date Date::plusYears (Integer *n*) const

Definition at line 157 of file date.cpp.

References advance(), Integer, and Years.

Referenced by mainasset(), and mainIRVanillaSwap().

6.12.2.40 Date Date::returnDateConvention (const Date & *date*, BusinessDayConvention *convention* = Following)

Definition at line 391 of file date.cpp.

References applyConvention(), Date(), and serialNumber().

6.12.2.41 LongInteger Date::serialNumber () const

Definition at line 79 of file date.cpp.

References _serialNumber, and LongInteger.

Referenced by CashFlow::CashFlow(), dayCount(), Drift::Drift(), bond::fairvalue(), operator!=(), operator<(), operator<=(), operator==(), operator>(), operator>=(), returnDateConvention(), and SwapLeg::SwapLeg().

6.12.2.42 void Date::setDateToToday ()

Set Date to system today's date.

Definition at line 91 of file date.cpp.

References _serialNumber, Day, isLeap(), Month, monthLength(), monthOffset(), and yearOffset().

Referenced by CashFlow::CashFlow(), yieldCurve::discountFactor(), asset::forwardPrice(), yieldCurve::forwardRate(), Exotics::getTheta(), importData::importVolSurface(), inputBond(), inputBSOption(), inputButterflySpread(), inputCallSpread(), inputConvertibleBond(), inputPutSpread(), inputRainbowOption(), inputRatioCallSpread(), inputStraddle(), inputStrangle(), inputVanillaSwap(), mainasset(), mainconvertiblebond(), maindate(), mainIRVanillaSwap(), mainmc(), mainrainbowoptions(), mainyieldcurve(), RainbowOption::RainbowOption(), and yieldCurve::spotRate().

6.12.2.43 char * Date::toString () const

Return char* version of the date.

Definition at line 412 of file date.cpp.

References dayOfMonth(), month(), and year().

Referenced by mainasset(), maindate(), mainvolsurface(), and operator<<().

6.12.2.44 Weekday Date::weekday () const

Definition at line 48 of file date.cpp.

References _serialNumber, Integer, and Weekday.

Referenced by UsDate::isBusinessDay(), and nextWeekday().

6.12.2.45 Year Date::year () const

Definition at line 72 of file date.cpp.

References _serialNumber, Year, and yearOffset().

Referenced by advance(), dayCount(), dayOfMonth(), dayOfYear(), endOfMonth(), bond::fairvalue(), isEOM(), month(), and toString().

6.12.2.46 LongInteger Date::yearOffset (Year *y*) [static, private]

Definition at line 306 of file date.cpp.

References LongInteger, and Year.

Referenced by Date(), dayOfYear(), setDateToToday(), and year().

6.12.3 Member Data Documentation

6.12.3.1 LongInteger Date::_serialNumber [private]

Definition at line 167 of file date.h.

Referenced by applyConvention(), Date(), dayCount(), dayOfYear(), operator!=(), operator+(), operator++(), operator+=(), operator-(), operator–(), operator-=(), operator<(), operator<=(), operator==(), operator>(), operator>=(), serialNumber(), setDateToToday(), weekday(), and year().

The documentation for this class was generated from the following files:

- **date.h**
- **date.cpp**

6.13 Drift Class Reference

`#include <Drift.h>`

Public Member Functions

- **Drift** (**Date** startDate, **Real** ExpiryInYears, **LongNatural** &nDates, **yieldCurve** *pyieldCurve, **volsurface** *pvolsurface, **Real** Strike)

  Default constructor.

- **Drift** (void)

  Default constructor needed.

- **Drift** (**Date** startDate, **Real** ExpiryInYears, **Real** rateToMaturity, **Real** volToMaturity)

  Simpler constructor - for 1 date (non path dependant payoffs, not need to have yc and volsurface.

- ~**Drift** ()
- valarray< **Real** > **GetvDrift** (void)

  Return Drift.

- **Real GetDriftattimei** (**LongNatural** i)

  Get Drift for time i.

- valarray< **LongInteger** > **GetvDates** (void)

  Return serial numbers of dates computed for the drift.

- **LongInteger GetTimeBtwDates** (**LongNatural** i, **LongNatural** j)

  Return Difference in days between two dates of the drift.

Private Attributes

- valarray< **LongInteger** > **vDates**
- valarray< **Real** > **vDrift**
- unsigned long **m_nDates**

6.13.1 Detailed Description

Author:
Simon

Definition at line 11 of file Drift.h.

6.13.2 Constructor & Destructor Documentation

6.13.2.1 Drift::Drift (Date *startDate*, Real *ExpiryInYears*, LongNatural & *nDates*, yieldCurve * *pyieldCurve*, volsurface * *pvolsurface*, Real *Strike*)

Default constructor.

Parameters:

startDate: Start **Date**(p. 71) of the drift

ExpiryInYears: Length of the drift to be computed

nDates: Number of dates to cut the drift

pyieldCurve: Yield Curve to compute the spot rate between each date

pvolsurface: Volatility Surface to compute the forward volatility between each date

Strike: Strike of the option, used to compute the colatility (function of the strike)

Definition at line 5 of file Drift.cpp.

References yieldCurve::forwardRate(), volsurface::forwardVolatility(), LongNatural, Natural, Date::plusDays(), Real, Date::serialNumber(), vDates, and vDrift.

6.13.2.2 Drift::Drift (void)

Default constructor needed.

Author:
Yann

Definition at line 26 of file Drift.cpp.

6.13.2.3 Drift::Drift (Date *startDate*, Real *ExpiryInYears*, Real *rateToMaturity*, Real *volToMaturity*)

Simpler constructor - for 1 date (non path dependant payoffs, not need to have yc and volsurface.

Author:
Yann

Parameters:

startDate: Start **Date**(p. 71) of the drift

ExpiryInYears: Length of the drift to be computed

rateToMaturity: spot rate to matrurity - can come from a yc in calling classes

volToMaturity: volatility to matrurity - can come from a volsurface in calling classes

Definition at line 30 of file Drift.cpp.

References m_nDates, Natural, Date::plusDays(), Real, Date::serialNumber(), vDates, and vDrift.

6.13.2.4 Drift::~Drift ()

Definition at line 47 of file Drift.cpp.

6.13.3 Member Function Documentation

6.13.3.1 Real Drift::GetDriftattimei (LongNatural *i*)

Get Drift for time i.

Definition at line 60 of file Drift.cpp.

References LongNatural, m_nDates, Real, and vDrift.

6.13.3.2 LongInteger Drift::GetTimeBtwDates (LongNatural *i*, LongNatural *j*)

Return Difference in days between two dates of the drift.

Definition at line 78 of file Drift.cpp.

References LongInteger, LongNatural, m_nDates, and vDates.

6.13.3.3 valarray< LongInteger > Drift::GetvDates (void)

Return serial numbers of dates computed for the drift.

Definition at line 68 of file Drift.cpp.

References m_nDates, Natural, and vDates.

Referenced by mainmc().

6.13.3.4 valarray< Real > Drift::GetvDrift (void)

Return Drift.

Definition at line 51 of file Drift.cpp.

References m_nDates, Natural, and vDrift.

Referenced by mainmc().

6.13.4 Member Data Documentation

6.13.4.1 unsigned long Drift::m_nDates [private]

Definition at line 52 of file Drift.h.

Referenced by Drift(), GetDriftattimei(), GetTimeBtwDates(), GetvDates(), and GetvDrift().

6.13.4.2 valarray<LongInteger> Drift::vDates [private]

Definition at line 50 of file Drift.h.

Referenced by Drift(), GetTimeBtwDates(), and GetvDates().

6.13.4.3 valarray<Real> Drift::vDrift [private]

Definition at line 51 of file Drift.h.

Referenced by Drift(), GetDriftattimei(), and GetvDrift().

The documentation for this class was generated from the following files:

- **Drift.h**
- **Drift.cpp**

6.14 Exotics Class Reference

`#include <Exotics.h>`

Public Member Functions

- **Exotics** (**exoticsType** type, **yieldCurve** *curve, **volsurface** *surface, **Real** spot, **Real** strike, **Real** Expiry, **LongNatural** nDates=10, **Real** strike2=-1., **LongNatural** nPaths=100000)

  Default Constructor.

- ~**Exotics** (void)
- **Real getPrice** ()

  return the price of the option by MC

- **Real getRho** ()

  return the sensitivity to interest rate of the option by MC

- **Real getTheta** ()

  return the sensitivity to time of the option by MC (+defaultAdvDays)

- **Real getVega** ()

  return the sensitivity to volatility of the option by MC

- **Real getDelta** ()

  return the sensitivity to the spot price of the option by MC

Private Attributes

- **exoticsType _type**
- **Real _expiry**
- **Real _spot**
- **Real _strike**
- **Real _strike2**
- **volsurface** * **_volSurface**
- **yieldCurve** * **_yieldCurve**
- **LongNatural _nPaths**
- **LongNatural _nDates**

6.14.1 Constructor & Destructor Documentation

6.14.1.1 Exotics::Exotics (exoticsType *type*, yieldCurve * *curve*, volsurface * *surface*, Real *spot*, Real *strike*, Real *Expiry*, LongNatural *nDates* = 10, Real *strike2* = -1., LongNatural *nPaths* = 100000)

Default Constructor.

Parameters:

type: type of exotics product

curve: pointer to the yield curve

surface: pointer to a vol surface for the underlying

spot: spot of the underlying

strike: strike1 of the option

expiry: maturity of the option

nPaths: number of paths to be generated by the MC pricer

nDates: number of dates to be generated

strike2: second strike for the option (for collared cliquet here)

Definition at line 3 of file Exotics.cpp.

References LongNatural, and Real.

6.14.1.2 Exotics::~Exotics (void)

Definition at line 17 of file Exotics.cpp.

6.14.2 Member Function Documentation

6.14.2.1 Real Exotics::getDelta ()

return the sensitivity to the spot price of the option by MC

Definition at line 46 of file Exotics.cpp.

References getPrice(), and Real.

Referenced by inputExoticOptionOnSingleAsset().

6.14.2.2 Real Exotics::getPrice ()

return the price of the option by MC

Definition at line 21 of file Exotics.cpp.

References _expiry, _nDates, _nPaths, _strike2, _volSurface, AsianCall, AsianPut, BarrierCall, BarrierPut, CappedCliquet, CollaredCliquet, FlooredCliquet, mainmc(), Real, RevLookbackCall, and RevLookbackPut.

Referenced by getDelta(), getRho(), getTheta(), getVega(), and inputExoticOptionOnSingle-Asset().

6.14.2.3 Real Exotics::getRho ()

return the sensitivity to interest rate of the option by MC

Definition at line 55 of file Exotics.cpp.

References getPrice(), Real, and yieldCurve::shiftZCBRateCurve().

Referenced by inputExoticOptionOnSingleAsset().

6.14.2.4 Real Exotics::getTheta ()

return the sensitivity to time of the option by MC (+defaultAdvDays)

Definition at line 64 of file Exotics.cpp.

References _volSurface, volsurface::forwardvolsurface(), yieldCurve::forwardZCBCurve(), getPrice(), Integer, Date::plusDays(), Real, and Date::setDateToToday().

Referenced by inputExoticOptionOnSingleAsset().

6.14.2.5 Real Exotics::getVega ()

return the sensitivity to volatility of the option by MC

Definition at line 80 of file Exotics.cpp.

References _volSurface, getPrice(), Real, and volsurface::shiftedvolsurface().

Referenced by inputExoticOptionOnSingleAsset().

6.14.3 Member Data Documentation

6.14.3.1 Real Exotics::_expiry [private]

Definition at line 64 of file Exotics.h.

Referenced by getPrice().

6.14.3.2 LongNatural Exotics::_nDates [private]

Definition at line 71 of file Exotics.h.

Referenced by getPrice().

6.14.3.3 LongNatural Exotics::_nPaths [private]

Definition at line 70 of file Exotics.h.

Referenced by getPrice().

6.14.3.4 Real Exotics::_spot [private]

Definition at line 65 of file Exotics.h.

6.14.3.5 Real Exotics::_strike [private]

Definition at line 66 of file Exotics.h.

6.14.3.6 Real Exotics::_strike2 [private]

Definition at line 67 of file Exotics.h.

Referenced by getPrice().

6.14.3.7 exoticsType Exotics::_type [private]

Definition at line 63 of file Exotics.h.

6.14.3.8 volsurface* Exotics::_volSurface [private]

Definition at line 68 of file Exotics.h.

Referenced by getPrice(), getTheta(), and getVega().

6.14.3.9 yieldCurve* Exotics::_yieldCurve [private]

Definition at line 69 of file Exotics.h.

The documentation for this class was generated from the following files:

- **Exotics.h**
- **Exotics.cpp**

6.15 FileReader Class Reference

`#include <filereader.h>`

Static Public Member Functions

- bool **fileexists** (const char *filename)

  test for file existence

- bool **fileexists** (string filename)

  test for file existence - string version

- bool **setdatadir** (const char *command)
- char * **getdatadir** (void)
- string **getdatadirasstring** (void)
- valarray< **yieldPoint** > * **buildYieldPointArray** (string filename)

  Read data from a file to create an array of yield points which can be used to construct a yield curve object.

- valarray< **CreditSpreadPoint** > * **buildCreditSpreadPointArray** (string filename)

  Read data from a file to create an array of credit spread points which can be used to construct a credit curve object.

- **volsurfaceparams** * **buildVolSurfaceParams** (string filename)

  Read data from a file to create an array of strikes and maturities which can be used to construct a vol surface object.

Static Protected Attributes

- char **_datadir** [128] = ""

6.15.1 Member Function Documentation

6.15.1.1 valarray< CreditSpreadPoint > * FileReader::buildCreditSpreadPoint-Array (string *filename*) [static]

Read data from a file to create an array of credit spread points which can be used to construct a credit curve object.

Parameters:
filename - source of data

Returns:
valarray of CreditSpreadPoints or null pointer if file not found

Definition at line 132 of file filereader.cpp.

References CC_MAX_NUM_SPREADS, CreditSpreadType, fileexists(), and Natural.

Referenced by importData::importCreditCurve(), and maincreditcurve().

6.15.1.2 volsurfaceparams * FileReader::buildVolSurfaceParams (string *filename*) [static]

Read data from a file to create an array of strikes and maturities which can be used to construct a vol surface object.

Parameters:
filename - source of data

Returns:
structure containing strikes, maturities, etc.

Definition at line 185 of file filereader.cpp.

References volsurfaceparams::callputprices, fileexists(), volsurfaceparams::iscallputprices, volsurfaceparams::maturities, Natural, and volsurfaceparams::strikes.

Referenced by importData::importVolSurface(), and mainvolsurface().

6.15.1.3 valarray< yieldPoint > * FileReader::buildYieldPointArray (string *filename*) [static]

Read data from a file to create an array of yield points which can be used to construct a yield curve object.

Parameters:
filename - source of data

Returns:
valarray of yieldPoints or null pointer if file not found

Definition at line 79 of file filereader.cpp.

References fileexists(), Natural, TypeOfRate, and YC_MAX_NUMBER_POINTS.

Referenced by importData::importYieldCurve(), mainasset(), maincreditcurve(), mainIRVanillaSwap(), and mainyieldcurve().

6.15.1.4 bool FileReader::fileexists (string *filename*) [static]

test for file existence - string version

Parameters:
filename - file to test

Returns:
true if file exists, otherwise false

Definition at line 27 of file filereader.cpp.

References fileexists().

6.15.1.5 bool FileReader::fileexists (const char * *filename*) [static]

test for file existence

Parameters:
filename - file to test

Returns:
true if file exists, otherwise false

Definition at line 12 of file filereader.cpp.

Referenced by buildCreditSpreadPointArray(), buildVolSurfaceParams(), buildYieldPointArray(), fileexists(), fr_basic(), importData::runUserDefinedInterface(), and setdatadir().

6.15.1.6 char* FileReader::getdatadir (void) [inline, static]

Definition at line 17 of file filereader.h.

References _datadir.

6.15.1.7 string FileReader::getdatadirasstring (void) [inline, static]

Definition at line 18 of file filereader.h.

References _datadir.

Referenced by fr_basic(), mainasset(), maincreditcurve(), mainIRVanillaSwap(), mainyield-curve(), importData::runInterface(), and importData::runUserDefinedInterface().

6.15.1.8 bool FileReader::setdatadir (const char * *command*) [static]

Definition at line 31 of file filereader.cpp.

References _datadir, and fileexists().

Referenced by importData::importData(), and maintests().

6.15.2 Member Data Documentation

6.15.2.1 char FileReader::_datadir = "" [static, protected]

Definition at line 6 of file filereader.cpp.

Referenced by getdatadir(), getdatadirasstring(), and setdatadir().

The documentation for this class was generated from the following files:

- **filereader.h**
- **filereader.cpp**

6.16 flowSchedule Class Reference

`#include <asset.h>`

Public Member Functions

- **flowSchedule** (void)
  Default Constructor.
- ~**flowSchedule** (void)
- **flowSchedule** (**Date** date, **Real** percent, **BusinessDayConvention** bd=Unadjusted)
  Constructor.
- void **setDate** (**Date** date)
  Sets a date in the schedule.
- void **setAmount** (**Real** percent)
  Sets an amount in the schedule.
- void **setBusDayConv** (**BusinessDayConvention** bd)
  Sets a bus day convention in the schedule.
- **Date getDate** ()
- **Real getAmount** ()
- **BusinessDayConvention getBusDayConv** ()

Private Attributes

- **Date _dateOfFlowPayment**
- **Real _FlowAmountInPercent**
- **BusinessDayConvention _businessDayConventionOnPaymentDate**

6.16.1 Detailed Description

Author:
Yann Should have include vol surface / yc, etc to just pass assets and not all parameters into the product classes but this one was not the most important

Definition at line 19 of file asset.h.

6.16.2 Constructor & Destructor Documentation

6.16.2.1 flowSchedule::flowSchedule (void)

Default Constructor.

Definition at line 8 of file asset.cpp.

References _businessDayConventionOnPaymentDate, _dateOfFlowPayment, _FlowAmountInPercent, and Unadjusted.

6.16.2.2 flowSchedule::~flowSchedule (void)

Definition at line 22 of file asset.cpp.

6.16.2.3 flowSchedule::flowSchedule (Date *date*, Real *percent*, BusinessDayConvention *bd* = Unadjusted)

Constructor.

Definition at line 15 of file asset.cpp.

References _businessDayConventionOnPaymentDate, _dateOfFlowPayment, _FlowAmountInPercent, and Real.

6.16.3 Member Function Documentation

6.16.3.1 Real flowSchedule::getAmount () [inline]

Returns:
the amount member of the object

Definition at line 48 of file asset.h.

References _FlowAmountInPercent, and Real.

6.16.3.2 BusinessDayConvention flowSchedule::getBusDayConv () [inline]

Returns:
the bus day convention member of the object

Definition at line 51 of file asset.h.

References _businessDayConventionOnPaymentDate, and BusinessDayConvention.

6.16.3.3 Date flowSchedule::getDate () [inline]

Returns:
the date member of the object

Definition at line 45 of file asset.h.

References _dateOfFlowPayment.

6.16.3.4 void flowSchedule::setAmount (Real *percent*) [inline]

Sets an amount in the schedule.

Definition at line 39 of file asset.h.

References _FlowAmountInPercent, and Real.

6.16.3.5 void flowSchedule::setBusDayConv (BusinessDayConvention *bd*) [inline]

Sets a bus day convention in the schedule.

Definition at line 42 of file asset.h.

References _businessDayConventionOnPaymentDate.

6.16.3.6 void flowSchedule::setDate (Date *date*) [inline]

Sets a date in the schedule.

Definition at line 36 of file asset.h.

References _dateOfFlowPayment.

6.16.4 Member Data Documentation

6.16.4.1 BusinessDayConvention flowSchedule::_businessDayConventionOnPaymentDate [private]

Definition at line 24 of file asset.h.

Referenced by flowSchedule(), getBusDayConv(), and setBusDayConv().

6.16.4.2 Date flowSchedule::_dateOfFlowPayment [private]

Definition at line 22 of file asset.h.

Referenced by flowSchedule(), getDate(), and setDate().

6.16.4.3 Real flowSchedule::_FlowAmountInPercent [private]

Definition at line 23 of file asset.h.

Referenced by flowSchedule(), getAmount(), and setAmount().

The documentation for this class was generated from the following files:

- **asset.h**
- **asset.cpp**

6.17 GaussianProcess Class Reference

`#include <GaussianProcess.h>`

Public Member Functions

- **GaussianProcess** (const valarray< **LongInteger** > schedule, const **LongNatural** &nDates, const **Real** &initialRate, const valarray< **Real** > drift, const **Real** &meanReversionSpeed, **Real** &vol)

  Default constructor.

- **GaussianProcess** (const valarray< **LongInteger** > schedule, const **LongNatural** &nDates, const **Real** &initialRate, const valarray< **Real** > drift, const **Real** &meanReversionSpeed, **volsurface** *vol, **Real** strike)
- **GaussianProcess** (void)
- ~**GaussianProcess** ()
- valarray< **Real** > **BuildPath** (valarray< **Real** > gaussianShocks)

  Build the Path according to given gaussian shocks.

- **Real BuildTerminalPoint** (**Real** gaussianShock)

  For a 1D, only one termial Point (non path dependant).

- void **GetStepIncrements** (valarray< **Real** > stepIncrements)

  Return Step Increments.

Private Attributes

- valarray< **LongInteger** > **m_vDates**
- valarray< **Real** > **m_vDrift**
- valarray< **Real** > **m_vStepSize**
- **Real m_dbMeanReversionSpeed**
- **Real m_dbVol**
- **volsurface** * **_vol**
- **Real _strike**
- **Real m_dbInitialRate**
- **LongNatural m_nDates**

6.17.1 Constructor & Destructor Documentation

6.17.1.1 GaussianProcess::GaussianProcess (const valarray< LongInteger > *schedule*, const LongNatural & *nDates*, const Real & *initialRate*, const valarray< Real > *drift*, const Real & *meanReversionSpeed*, Real & *vol*)

Default constructor.

Parameters:

schedule: Start **Date**(p. 71) of the drift

nDates: Number of dates to simulate the path

initialRate:

pyieldCurve: Yield Curve to compute the spot rate between each date

pvolsurface: Volatility Surface to compute the forward volatility between each date

Strike: Strike of the option, used to compute the colatility (function of the strike)

Definition at line 7 of file GaussianProcess.cpp.

References LongNatural, m_dbInitialRate, m_dbMeanReversionSpeed, m_dbVol, m_vDates, m_vDrift, m_vStepSize, Natural, and Real.

6.17.1.2 GaussianProcess::GaussianProcess (const valarray< LongInteger > *schedule*, const LongNatural & *nDates*, const Real & *initialRate*, const valarray< Real > *drift*, const Real & *meanReversionSpeed*, volsurface * *vol*, Real *strike*)

Definition at line 28 of file GaussianProcess.cpp.

References _strike, LongNatural, m_dbInitialRate, m_dbMeanReversionSpeed, m_dbVol, m_vDates, m_vDrift, m_vStepSize, Natural, and Real.

6.17.1.3 GaussianProcess::GaussianProcess (void)

Definition at line 52 of file GaussianProcess.cpp.

6.17.1.4 GaussianProcess::~GaussianProcess ()

Definition at line 56 of file GaussianProcess.cpp.

6.17.2 Member Function Documentation

6.17.2.1 valarray< Real > GaussianProcess::BuildPath (valarray< Real > *gaussianShocks*)

Build the Path according to given gaussian shocks.

Definition at line 60 of file GaussianProcess.cpp.

References _strike, LongNatural, m_dbInitialRate, m_dbMeanReversionSpeed, m_dbVol, m_vDates, m_vDrift, Real, and volsurface::volatility().

Referenced by MCEngine::RunEngineAsianCall(), MCEngine::RunEngineAsianPut(), MCEngine::RunEngineBarrierCall(), MCEngine::RunEngineBarrierPut(), MCEngine::RunEngineCall(), MCEngine::RunEngineCappedCliquet(), MCEngine::RunEngineFlooredCliquet(), MCEngine::RunEnginePut(), MCEngine::RunEngineRevLookbackCall(), and MCEngine::RunEngineRevLookbackPut().

6.17.2.2 Real GaussianProcess::BuildTerminalPoint (Real *gaussianShock*)

For a 1D, only one termial Point (non path dependant).

Author:
Yann

Parameters:

gaussianShock: the shock that we'll get from the sample given drift, etc

Definition at line 86 of file GaussianProcess.cpp.

References m_dbInitialRate, m_dbVol, m_vDates, m_vDrift, and Real.

6.17.2.3 void GaussianProcess::GetStepIncrements (valarray< Real > *stepIncrements*)

Return Step Increments.

Definition at line 95 of file GaussianProcess.cpp.

References LongNatural, and m_vStepSize.

Referenced by mainmc().

6.17.3 Member Data Documentation

6.17.3.1 Real GaussianProcess::_strike [private]

Definition at line 50 of file GaussianProcess.h.

Referenced by BuildPath(), and GaussianProcess().

6.17.3.2 volsurface* GaussianProcess::_vol [private]

Definition at line 49 of file GaussianProcess.h.

6.17.3.3 Real GaussianProcess::m_dbInitialRate [private]

Definition at line 51 of file GaussianProcess.h.

Referenced by BuildPath(), BuildTerminalPoint(), and GaussianProcess().

6.17.3.4 Real GaussianProcess::m_dbMeanReversionSpeed [private]

Definition at line 47 of file GaussianProcess.h.

Referenced by BuildPath(), and GaussianProcess().

6.17.3.5 Real GaussianProcess::m_dbVol [private]

Definition at line 48 of file GaussianProcess.h.

Referenced by BuildPath(), BuildTerminalPoint(), and GaussianProcess().

6.17.3.6 LongNatural GaussianProcess::m_nDates [private]

Definition at line 52 of file GaussianProcess.h.

6.17.3.7 valarray<LongInteger> GaussianProcess::m_vDates [private]

Definition at line 43 of file GaussianProcess.h.

Referenced by BuildPath(), BuildTerminalPoint(), and GaussianProcess().

6.17.3.8 valarray<Real> GaussianProcess::m_vDrift [private]

Definition at line 44 of file GaussianProcess.h.

Referenced by BuildPath(), BuildTerminalPoint(), and GaussianProcess().

6.17.3.9 valarray<Real> GaussianProcess::m_vStepSize [private]

Definition at line 46 of file GaussianProcess.h.

Referenced by GaussianProcess(), and GetStepIncrements().

The documentation for this class was generated from the following files:

- **GaussianProcess.h**
- **GaussianProcess.cpp**

6.18 importData Class Reference

`#include <importData.h>`

Public Member Functions

- **importData** (void)

  constructor with a reference to local files - need for default data import

- **importData** (char *argv)

  constructor with a reference to local files - need for default data import

- bool **runInterface** ()

  default user interface for data import

- **Natural displayFileFormatsMenu** ()

  Help output on the file format needed to import.

- bool **runUserDefinedInterface** ()

  User interface to input the data files.

- void **importYieldCurve** (string path="yctest.csv")

  Import the yield curve from the file.

- void **importVolSurface** (string path="voltest2.csv", Real spot=2994.0)

  Import the call/put points from the file.

- void **importCreditCurve** (string path="ccspread.csv")

  Import the credit spreads from the file.

- **marketData getData** ()
- **yieldCurve getYieldCurve** ()
- **creditCurve getCreditCurve** ()
- **volsurface getVolatilitySurface** ()

Private Member Functions

- void **setMarketData** ()

Private Attributes

- string **_datadir**
- **yieldCurve _yc**
- **creditCurve _cc**
- **volsurface _vs**
- **marketData _marketData**

6.18.1 Constructor & Destructor Documentation

6.18.1.1 importData::importData (void)

constructor with a reference to local files - need for default data import

Definition at line 3 of file importData.cpp.

6.18.1.2 importData::importData (char * *argv*)

constructor with a reference to local files - need for default data import

Definition at line 7 of file importData.cpp.

References runInterface(), and FileReader::setdatadir().

6.18.2 Member Function Documentation

6.18.2.1 Natural importData::displayFileFormatsMenu ()

Help output on the file format needed to import.

Definition at line 132 of file importData.cpp.

References Natural.

Referenced by runInterface().

6.18.2.2 creditCurve importData::getCreditCurve () [inline]

Definition at line 57 of file importData.h.

References _cc.

6.18.2.3 marketData importData::getData () [inline]

Definition at line 55 of file importData.h.

References _marketData.

Referenced by inputExoticOptionOnSingleAsset().

6.18.2.4 volsurface importData::getVolatilitySurface () [inline]

Definition at line 58 of file importData.h.

References _vs.

6.18.2.5 yieldCurve importData::getYieldCurve () [inline]

Definition at line 56 of file importData.h.

References _yc.

6.18.2.6 void importData::importCreditCurve (string *path* = "ccspread.csv")

Import the credit spreads from the file.

Definition at line 36 of file importData.cpp.

References _cc, _yc, and FileReader::buildCreditSpreadPointArray().

Referenced by runInterface(), and runUserDefinedInterface().

6.18.2.7 void importData::importVolSurface (string *path* = "voltest2.csv", Real *spot* = 2994.0)

Import the call/put points from the file.

Definition at line 23 of file importData.cpp.

References _vs, _yc, FileReader::buildVolSurfaceParams(), Real, Date::setDateToToday(), and volsurface::setvolsurface().

Referenced by runInterface(), and runUserDefinedInterface().

6.18.2.8 void importData::importYieldCurve (string *path* = "yctest.csv")

Import the yield curve from the file.

Definition at line 13 of file importData.cpp.

References _yc, and FileReader::buildYieldPointArray().

Referenced by runInterface(), and runUserDefinedInterface().

6.18.2.9 bool importData::runInterface ()

default user interface for data import

Definition at line 45 of file importData.cpp.

References displayFileFormatsMenu(), FileReader::getdatadirasstring(), importCreditCurve(), importVolSurface(), importYieldCurve(), Natural, runUserDefinedInterface(), and setMarketData().

Referenced by importData().

6.18.2.10 bool importData::runUserDefinedInterface ()

User interface to input the data files.

Definition at line 80 of file importData.cpp.

References FileReader::fileexists(), FileReader::getdatadirasstring(), importCreditCurve(), importVolSurface(), importYieldCurve(), Real, and setMarketData().

Referenced by inputExoticOptionOnSingleAsset(), and runInterface().

6.18.2.11 void importData::setMarketData () [private]

Definition at line 74 of file importData.cpp.

References _cc, _marketData, _vs, _yc, marketData::creditcurve, marketData::vols, and marketData::yieldcurve.

Referenced by runInterface(), and runUserDefinedInterface().

6.18.3 Member Data Documentation

6.18.3.1 creditCurve importData::_cc [private]

Definition at line 32 of file importData.h.

Referenced by getCreditCurve(), importCreditCurve(), and setMarketData().

6.18.3.2 string importData::_datadir [private]

Definition at line 30 of file importData.h.

6.18.3.3 marketData importData::_marketData [private]

Definition at line 34 of file importData.h.

Referenced by getData(), and setMarketData().

6.18.3.4 volsurface importData::_vs [private]

Definition at line 33 of file importData.h.

Referenced by getVolatilitySurface(), importVolSurface(), and setMarketData().

6.18.3.5 yieldCurve importData::_yc [private]

Definition at line 31 of file importData.h.

Referenced by getYieldCurve(), importCreditCurve(), importVolSurface(), importYieldCurve(), and setMarketData().

The documentation for this class was generated from the following files:

- **importData.h**
- **importData.cpp**

6.19 interpolator Class Reference

`#include <interpolator.h>`

Public Member Functions

- **interpolator** ()

  Default Constructor.

- **interpolator** (valarray< **Real** > x, valarray< **Real** > y)

  Constructor for 1 dimension.

- **interpolator** (valarray< **Real** > x1, valarray< **Real** > x2, valarray< valarray< **Real** > > ymat)

  Constructor for 2 dimensions.

- **Real interpolate** (**Real** x)

  Interpolate for point x in dimension 1.

- **Real interpolate** (**Real** x1, **Real** x2)

  Interpolate for point (x1, x2) in dimension 2.

- valarray< **Real** > **interpolate** (valarray< **Real** > vec)

  Interpolate for all points x in vec in dimension 1.

- valarray< valarray< **Real** > > **interpolate** (valarray< **Real** > vec1, valarray< **Real** > vec2)

  Interpolate for all points (x1, x2) in (vec1, vec2) in dimension 2.

- **Real getInterpolation** (valarray< **Real** > xa, valarray< **Real** > ya, **Real** x)
- **Integer getPlace** (**Real** x)
- **Integer getPlaceOnXi** (**Real** x, **Integer** i)

Private Attributes

- valarray< **Real** > **_x**
- valarray< **Real** > **_y**
- valarray< **Real** > **_x1**
- valarray< **Real** > **_x2**
- valarray< valarray< **Real** > > **_ymat**

6.19.1 Constructor & Destructor Documentation

6.19.1.1 interpolator::interpolator ()

Default Constructor.

Definition at line 6 of file interpolator.cpp.

Referenced by interpolate().

6.19.1.2 interpolator::interpolator (valarray< Real > *x*, valarray< Real > *y*)

Constructor for 1 dimension.

Parameters:

x: array of points

y: array, f(x)

Definition at line 8 of file interpolator.cpp.

6.19.1.3 interpolator::interpolator (valarray< Real > *x1*, valarray< Real > *x2*, valarray< valarray< Real > > *ymat*)

Constructor for 2 dimensions.

Parameters:

x1: array of first components of points

x2: array of second components of points

y: matrix, f(x1, x2)

Definition at line 15 of file interpolator.cpp.

6.19.2 Member Function Documentation

6.19.2.1 Real interpolator::getInterpolation (valarray< Real > *xa*, valarray< Real > *ya*, Real *x*)

Definition at line 22 of file interpolator.cpp.

References Integer, and Real.

Referenced by interpolate().

6.19.2.2 Integer interpolator::getPlace (Real *x*)

Definition at line 46 of file interpolator.cpp.

References _x, Integer, and Real.

Referenced by interpolate().

6.19.2.3 Integer interpolator::getPlaceOnXi (Real *x*, Integer *i*)

Definition at line 55 of file interpolator.cpp.

References _x1, _x2, Integer, and Real.

Referenced by interpolate().

6.19.2.4 valarray< valarray< Real > > interpolator::interpolate (valarray< Real > *vec1*, valarray< Real > *vec2*)

Interpolate for all points (x1, x2) in (vec1, vec2) in dimension 2.

Definition at line 179 of file interpolator.cpp.

References Integer, and interpolate().

6.19.2.5 valarray< Real > interpolator::interpolate (valarray< Real > *vec*)

Interpolate for all points x in vec in dimension 1.

Definition at line 35 of file interpolator.cpp.

References Integer, and interpolate().

6.19.2.6 Real interpolator::interpolate (Real *x1*, Real *x2*)

Interpolate for point (x1, x2) in dimension 2.

Definition at line 103 of file interpolator.cpp.

References _x1, _x2, _ymat, getInterpolation(), getPlaceOnXi(), Integer, interpolate(), interpolator(), M, N, and Real.

6.19.2.7 Real interpolator::interpolate (Real *x*)

Interpolate for point x in dimension 1.

Definition at line 75 of file interpolator.cpp.

References _x, _y, getInterpolation(), getPlace(), Integer, and Real.

Referenced by interpolate(), interpolatormain(), maininterpolator(), and volsurface::volatility().

6.19.3 Member Data Documentation

6.19.3.1 valarray<Real> interpolator::_x [private]

Definition at line 26 of file interpolator.h.

Referenced by getPlace(), and interpolate().

6.19.3.2 valarray<Real> interpolator::_x1 [private]

Definition at line 30 of file interpolator.h.

Referenced by getPlaceOnXi(), and interpolate().

6.19.3.3 valarray<Real> interpolator::_x2 [private]

Definition at line 31 of file interpolator.h.

Referenced by getPlaceOnXi(), and interpolate().

6.19.3.4 valarray<Real> interpolator::_y [private]

Definition at line 27 of file interpolator.h.

Referenced by interpolate().

6.19.3.5 valarray<valarray<Real> > interpolator::_ymat [private]

Definition at line 32 of file interpolator.h.

Referenced by interpolate().

The documentation for this class was generated from the following files:

- **interpolator.h**
- **interpolator.cpp**

6.20 marketData Struct Reference

`#include <importData.h>`

Public Attributes

- **yieldCurve yieldcurve**
- **creditCurve creditcurve**
- **volsurface vols**

6.20.1 Member Data Documentation

6.20.1.1 creditCurve marketData::creditcurve

Definition at line 24 of file importData.h.

Referenced by inputBond(), inputConvertibleBond(), and importData::setMarketData().

6.20.1.2 volsurface marketData::vols

Definition at line 25 of file importData.h.

Referenced by inputBSOption(), inputButterflySpread(), inputCallSpread(), inputExoticOption-OnSingleAsset(), inputPutSpread(), inputRainbowOption(), inputRatioCallSpread(), input-Straddle(), inputStrangle(), and importData::setMarketData().

6.20.1.3 yieldCurve marketData::yieldcurve

Definition at line 23 of file importData.h.

Referenced by inputBond(), inputBSOption(), inputButterflySpread(), inputCallSpread(), inputConvertibleBond(), inputExoticOptionOnSingleAsset(), inputPutSpread(), inputRainbow-Option(), inputRatioCallSpread(), inputStraddle(), inputStrangle(), inputVanillaSwap(), and importData::setMarketData().

The documentation for this struct was generated from the following file:

- **importData.h**

6.21 Matrix Class Reference

`#include <matrix.h>`

Public Member Functions

- **Matrix** ()
- **Matrix** (double InitVal, int Rows, int Cols)
- **Matrix** (double *Data, int Rows, int Cols)
- **Matrix** (double **Data, int Rows, int Cols)
- **Matrix** (const **Matrix** &obj)
- ~**Matrix** ()
- **Matrix** & **operator+** (const **Matrix** &obj) const
- **Matrix** & **operator-** (const **Matrix** &obj) const
- **Matrix** & **operator** * (const **Matrix** &obj) const
- **Matrix** & **operator** * (const double _d) const
- **Matrix** & **operator** * (const int _i) const
- **Matrix** & **operator/** (const **Matrix** &obj) const
- **Matrix** & **operator/** (const double _d) const
- **Matrix** & **operator/** (const int _i) const
- **Matrix** & **operator+=** (const **Matrix** &obj)
- **Matrix** & **operator-=** (const **Matrix** &obj)
- **Matrix** & **operator** *= (const **Matrix** &obj)
- **Matrix** & **operator** *= (const double _d)
- **Matrix** & **operator** *= (const int _i)
- **Matrix** & **operator/=** (const **Matrix** &obj)
- **Matrix** & **operator/=** (const double _d)
- **Matrix** & **operator/=** (const int _i)
- **Matrix** & **operator=** (const **Matrix** &obj)
- **Matrix** & **operator~** () const
- bool **operator==** (const **Matrix** &obj) const
- bool **operator!=** (const **Matrix** &obj) const
- double * **operator[]** (const int _i) const
- double & **operator()** (const int _i, const int _j) const
- bool **IsIdentity** () const
- bool **IsEmpty** () const
- double **Determinant** () const
- double **SumAll** () const
- double **SumAllSquared** () const
- double **SumRow** (const int Row) const
- double **SumColumn** (const int Col) const
- double **SumRowSquared** (const int Row) const
- double **SumColumnSquared** (const int Col) const
- double **GetMax** () const
- double **GetMin** () const
- double **GetRowMax** (const int Row) const
- double **GetRowMin** (const int Row) const
- double **GetColumnMax** (const int Col) const
- double **GetColumnMin** (const int Col) const
- double **GetRange** () const

- double **GetRowRange** (const int Row) const
- double **GetColumnRange** (const int Col) const
- double * **GetDataOneDimen** () const
- double ** **GetDataTwoDimen** () const
- int **GetRows** () const
- int **GetColumns** () const
- **Matrix** & **Clear** ()
- **Matrix** & **ClearRow** (const int Row)
- **Matrix** & **ClearColumn** (const int Col)
- **Matrix** & **SetValue** (int Row, int Col, double _d)
- **Matrix** & **Fill** (const double _d)
- **Matrix** & **FillRow** (const int Row, const double _d)
- **Matrix** & **FillColumn** (const int Col, const double _d)
- **Matrix** & **GetInverse** () const
- **Matrix** & **Invert** ()
- **Matrix** & **AddRows** (const int SourceRow, const int DestRow, const double factor=1)
- **Matrix** & **MultiplyRow** (const int Row, const double _d)
- **Matrix** & **DivideRow** (const int Row, const double _d)
- **Matrix** & **AddColumns** (const int SourceCol, const int DestCol, const double factor=1)
- **Matrix** & **MultiplyColumn** (const int Col, const double _d)
- **Matrix** & **DivideColumn** (const int Col, const double _d)
- **Matrix** & **REF** ()
- **Matrix** & **RREF** ()
- **Matrix** & **GetREF** () const
- **Matrix** & **GetRREF** () const
- **Matrix** & **CholeskyDecomposition** ()

  Cholesky decomposition I added.

- **Matrix** & **GetMinor** (const int RowSpot, const int ColSpot) const
- **Matrix** * **GetMinorNew** (const int RowSpot, const int ColSpot) const
- **Matrix** & **GetSubMatrix** (const int RowSpot, const int ColSpot, const int RowLen, const int ColLen) const
- **Matrix** & **SetSubMatrix** (const int RowSpot, const int ColSpot, const int RowLen, const int ColLen)
- **Matrix** & **SwapRows** (const int Row1, const int Row2)
- **Matrix** & **SwapCols** (const int Col1, const int Col2)
- **Matrix** & **GetTransposed** () const
- **Matrix** & **Transpose** ()
- **Matrix** & **GetNumericRange** (double &Min, double &Max) const
- **Matrix** & **GetNumericRangeOfRow** (double &Min, double &Max, const int Row) const
- **Matrix** & **GetNumericRangeOfColumn** (double &Min, double &Max, const int Col) const
- **Matrix** & **CMAR** (const **Matrix** &obj)
- **Matrix** & **CMAC** (const **Matrix** &obj)
- **Matrix** & **GetCMAR** (const **Matrix** &obj) const
- **Matrix** & **GetCMAC** (const **Matrix** &obj) const
- **Matrix** & **ConcatenateRow** (const double *RowData)
- **Matrix** & **ConcatenateColumn** (const double *ColumnData)
- **Matrix** & **SpliceInRow** (const double *RowData, const int RowSpot)
- **Matrix** & **SpliceInColumn** (const double *ColumnData, const int ColumnSpot)

- **Matrix** & **RemoveRow** (const int Row)
- **Matrix** & **RemoveColumn** (const int Column)
- **Matrix** & **SortAscend** ()
- **Matrix** & **SortDescend** ()
- **Matrix** & **GetNormalized** (const double Min, const double Max) const
- **Matrix** & **Normalize** (const double Min, const double Max)
- **Matrix** & **GetCovariant** () const
- **Matrix** & **MakeCovariant** ()
- void **Display** () const
- void **Output** (ostream &ostr=cout) const
- void **Input** (istream &istr=cin)
- void **Read** (ifstream &istr)
- void **Write** (ofstream &ostr) const

Static Public Member Functions

- **Matrix** & **IdentityMatrix** (int Diagonal)

Private Member Functions

- **Matrix** & **RightAppendIdentity** ()
- **Matrix** & **LeftRemoveIdentity** ()

Private Attributes

- double ** **m_pData**
- int **m_nCols**
- int **m_nRows**

6.21.1 Detailed Description

Author:
Yann

Definition at line 19 of file matrix.h.

6.21.2 Constructor & Destructor Documentation

6.21.2.1 Matrix::Matrix ()

Definition at line 55 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

Referenced by CholeskyDecomposition(), GetMinor(), GetMinorNew(), GetSubMatrix(), GetTransposed(), IdentityMatrix(), LeftRemoveIdentity(), operator *(), operator+(), operator-(), operator/(), RightAppendIdentity(), SortAscend(), and SortDescend().

6.21.2.2 Matrix::Matrix (double *InitVal*, int *Rows*, int *Cols*)

Definition at line 64 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.2.3 Matrix::Matrix (double * *Data*, int *Rows*, int *Cols*)

Definition at line 81 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.2.4 Matrix::Matrix (double ** *Data*, int *Rows*, int *Cols*)

Definition at line 98 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.2.5 Matrix::Matrix (const Matrix & *obj*)

Definition at line 113 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.2.6 Matrix::~Matrix ()

Definition at line 128 of file matrix.cpp.

References m_nRows, and m_pData.

6.21.3 Member Function Documentation

6.21.3.1 Matrix & Matrix::AddColumns (const int *SourceCol*, const int *DestCol*, const double *factor* = 1)

Definition at line 794 of file matrix.cpp.

References m_nRows, and m_pData.

6.21.3.2 Matrix & Matrix::AddRows (const int *SourceRow*, const int *DestRow*, const double *factor* = 1)

Definition at line 762 of file matrix.cpp.

References m_nCols, and m_pData.

Referenced by REF(), and RREF().

6.21.3.3 Matrix & Matrix::CholeskyDecomposition ()

Cholesky decomposition I added.

Definition at line 1062 of file matrix.cpp.

References GetRows(), m_pData, Matrix(), and Real.

Referenced by mainmatrix(), MCEngine::RunEngineRainbow2AssetsBasketMax(), MCEngine::RunEngineRainbow2SpreadOptionMax(), MCEngine::RunEngineRainbowBestOf2AssetsCash(), MCEngine::RunEngineRainbowMax2AssetsCall(), MCEngine::RunEngineRainbowMax2AssetsPut(), MCEngine::RunEngineRainbowMin2AssetsCall(), MCEngine::RunEngineRainbowMin2AssetsPut(), and MCEngine::RunEngineRainbowWorstOf2AssetsCash().

6.21.3.4 Matrix & Matrix::Clear ()

Definition at line 664 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.5 Matrix & Matrix::ClearColumn (const int *Col*)

Definition at line 686 of file matrix.cpp.

References m_nRows, and m_pData.

6.21.3.6 Matrix & Matrix::ClearRow (const int *Row*)

Definition at line 676 of file matrix.cpp.

References m_nCols, and m_pData.

6.21.3.7 Matrix & Matrix::CMAC (const Matrix & *obj*)

Definition at line 1118 of file matrix.cpp.

References ErrorMsg(), m_nCols, m_nRows, and m_pData.

Referenced by GetCMAC().

6.21.3.8 Matrix & Matrix::CMAR (const Matrix & *obj*)

Definition at line 1094 of file matrix.cpp.

References ErrorMsg(), m_nCols, m_nRows, and m_pData.

Referenced by GetCMAR().

6.21.3.9 Matrix & Matrix::ConcatenateColumn (const double * *ColumnData*)

Definition at line 1183 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.10 Matrix & Matrix::ConcatenateRow (const double * *RowData*)

Definition at line 1163 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.11 double Matrix::Determinant () const

Definition at line 430 of file matrix.cpp.

References ErrorMsg(), GetMinorNew(), m_nCols, m_nRows, m_pData, and q.

6.21.3.12 void Matrix::Display () const

Definition at line 1379 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.13 Matrix & Matrix::DivideColumn (const int *Col*, const double _ *d*)

Definition at line 814 of file matrix.cpp.

References ErrorMsg(), m_nRows, and m_pData.

6.21.3.14 Matrix & Matrix::DivideRow (const int *Row*, const double _ *d*)

Definition at line 782 of file matrix.cpp.

References ErrorMsg(), m_nCols, and m_pData.

Referenced by REF(), and RREF().

6.21.3.15 Matrix & Matrix::Fill (const double _ *d*)

Definition at line 705 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.16 Matrix & Matrix::FillColumn (const int *Col*, const double _ *d*)

Definition at line 727 of file matrix.cpp.

References m_nRows, and m_pData.

6.21.3.17 Matrix & Matrix::FillRow (const int *Row*, const double _ *d*)

Definition at line 717 of file matrix.cpp.

References m_nCols, and m_pData.

6.21.3.18 Matrix & Matrix::GetCMAC (const Matrix & *obj*) const

Definition at line 1152 of file matrix.cpp.

References CMAC().

6.21.3.19 Matrix & Matrix::GetCMAR (const Matrix & *obj*) const

Definition at line 1140 of file matrix.cpp.

References CMAR().

6.21.3.20 double Matrix::GetColumnMax (const int *Col*) const

Definition at line 564 of file matrix.cpp.

References m_nRows, and m_pData.

6.21.3.21 double Matrix::GetColumnMin (const int *Col*) const

Definition at line 576 of file matrix.cpp.

References m_nRows, and m_pData.

6.21.3.22 double Matrix::GetColumnRange (const int *Col*) const

Definition at line 608 of file matrix.cpp.

References GetNumericRangeOfColumn().

6.21.3.23 int Matrix::GetColumns () const

Definition at line 658 of file matrix.cpp.

References m_nCols.

Referenced by operator<<().

6.21.3.24 Matrix & Matrix::GetCovariant () const

Definition at line 1359 of file matrix.cpp.

References Transpose().

Referenced by MakeCovariant().

6.21.3.25 double * Matrix::GetDataOneDimen () const

Definition at line 619 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

Referenced by SortAscend(), and SortDescend().

6.21.3.26 double ** Matrix::GetDataTwoDimen () const

Definition at line 636 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.27 Matrix & Matrix::GetInverse () const

Definition at line 737 of file matrix.cpp.

References ErrorMsg(), LeftRemoveIdentity(), m_nCols, m_nRows, RightAppendIdentity(), and RREF().

Referenced by Invert(), operator/(), and operator~().

6.21.3.28 double Matrix::GetMax () const

Definition at line 512 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.29 double Matrix::GetMin () const

Definition at line 526 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.30 Matrix & Matrix::GetMinor (const int *RowSpot*, const int *ColSpot*) const

Definition at line 877 of file matrix.cpp.

References m_nCols, m_nRows, m_pData, and Matrix().

6.21.3.31 Matrix * Matrix::GetMinorNew (const int *RowSpot*, const int *ColSpot*) const

Definition at line 905 of file matrix.cpp.

References m_nCols, m_nRows, m_pData, and Matrix().

Referenced by Determinant().

6.21.3.32 Matrix & Matrix::GetNormalized (const double *Min*, const double *Max*) const

Definition at line 1325 of file matrix.cpp.

References Normalize().

6.21.3.33 Matrix & Matrix::GetNumericRange (double & *Min*, double & *Max*) const

Definition at line 1020 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

Referenced by GetRange(), and Normalize().

6.21.3.34 Matrix & Matrix::GetNumericRangeOfColumn (double & *Min*, double & *Max*, const int *Col*) const

Definition at line 1048 of file matrix.cpp.

References m_nRows, and m_pData.

Referenced by GetColumnRange().

6.21.3.35 Matrix & Matrix::GetNumericRangeOfRow (double & *Min*, double & *Max*, const int *Row*) const

Definition at line 1035 of file matrix.cpp.

References m_nCols, and m_pData.

Referenced by GetRowRange().

6.21.3.36 double Matrix::GetRange () const

Definition at line 588 of file matrix.cpp.

References GetNumericRange().

6.21.3.37 Matrix & Matrix::GetREF () const

Definition at line 854 of file matrix.cpp.

References REF().

6.21.3.38 double Matrix::GetRowMax (const int *Row*) const

Definition at line 540 of file matrix.cpp.

References m_nCols, and m_pData.

6.21.3.39 double Matrix::GetRowMin (const int *Row*) const

Definition at line 552 of file matrix.cpp.

References m_nCols, and m_pData.

6.21.3.40 double Matrix::GetRowRange (const int *Row*) const

Definition at line 598 of file matrix.cpp.

References GetNumericRangeOfRow().

6.21.3.41 int Matrix::GetRows () const

Definition at line 652 of file matrix.cpp.

References m_nRows.

Referenced by CholeskyDecomposition(), RainbowOption::getCorrelRisk(), operator<<(), RainbowOption::RainbowOption(), MCEngine::RunEngineRainbow2AssetsBasketMax(), MCEngine::RunEngineRainbow2SpreadOptionMax(), MCEngine::RunEngineRainbowBestOf2AssetsCash(), MCEngine::RunEngineRainbowMax2AssetsCall(), MCEngine::RunEngineRainbowMax2AssetsPut(), MCEngine::RunEngineRainbowMin2AssetsCall(), MCEngine::RunEngineRainbowMin2AssetsPut(), and MCEngine::RunEngineRainbowWorstOf2AssetsCash().

6.21.3.42 Matrix & Matrix::GetRREF () const

Definition at line 865 of file matrix.cpp.

References RREF().

6.21.3.43 Matrix & Matrix::GetSubMatrix (const int *RowSpot*, const int *ColSpot*, const int *RowLen*, const int *ColLen*) const

Definition at line 933 of file matrix.cpp.

References m_pData, and Matrix().

Referenced by SetSubMatrix().

6.21.3.44 Matrix & Matrix::GetTransposed () const

Definition at line 997 of file matrix.cpp.

References m_nCols, m_nRows, m_pData, and Matrix().

Referenced by mainmatrix(), and Transpose().

6.21.3.45 Matrix & Matrix::IdentityMatrix (int *Diagonal*) [static]

Definition at line 1452 of file matrix.cpp.

References m_pData, Matrix(), and q.

Referenced by IdentityMatrix().

6.21.3.46 void Matrix::Input (istream & *istr* = cin)

Definition at line 1406 of file matrix.cpp.

References getint(), m_nCols, m_nRows, and m_pData.

6.21.3.47 Matrix & Matrix::Invert ()

Definition at line 754 of file matrix.cpp.

References GetInverse().

6.21.3.48 bool Matrix::IsEmpty () const

Definition at line 418 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.49 bool Matrix::IsIdentity () const

Definition at line 401 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.50 Matrix & Matrix::LeftRemoveIdentity () [private]

Definition at line 37 of file matrix.cpp.

References m_nCols, m_nRows, m_pData, and Matrix().

Referenced by GetInverse().

6.21.3.51 Matrix & Matrix::MakeCovariant ()

Definition at line 1370 of file matrix.cpp.

References GetCovariant().

6.21.3.52 Matrix & Matrix::MultiplyColumn (const int *Col*, const double _ *d*)

Definition at line 804 of file matrix.cpp.

References m_nRows, and m_pData.

6.21.3.53 Matrix & Matrix::MultiplyRow (const int *Row*, const double _ *d*)

Definition at line 772 of file matrix.cpp.

References m_nCols, and m_pData.

6.21.3.54 Matrix & Matrix::Normalize (const double *Min*, const double *Max*)

Definition at line 1336 of file matrix.cpp.

References GetNumericRange(), m_nCols, m_nRows, and m_pData.

Referenced by GetNormalized().

6.21.3.55 Matrix & Matrix::operator * (const int _ *i*) const

Definition at line 216 of file matrix.cpp.

References m_nCols, m_nRows, m_pData, and Matrix().

6.21.3.56 Matrix & Matrix::operator * (const double _ *d*) const

Definition at line 201 of file matrix.cpp.

References m_nCols, m_nRows, m_pData, and Matrix().

6.21.3.57 Matrix & Matrix::operator * (const Matrix & *obj*) const

Definition at line 175 of file matrix.cpp.

References ErrorMsg(), m_nCols, m_nRows, m_pData, Matrix(), and q.

6.21.3.58 Matrix & Matrix::operator *= (const int _i)

Definition at line 295 of file matrix.cpp.

6.21.3.59 Matrix & Matrix::operator *= (const double _d)

Definition at line 289 of file matrix.cpp.

6.21.3.60 Matrix & Matrix::operator *= (const Matrix & obj)

Definition at line 283 of file matrix.cpp.

6.21.3.61 bool Matrix::operator!= (const Matrix & obj) const

Definition at line 367 of file matrix.cpp.
References m_nCols, m_nRows, and m_pData.

6.21.3.62 double & Matrix::operator() (const int _i, const int _j) const

Definition at line 392 of file matrix.cpp.
References ErrorMsg(), m_nCols, m_nRows, and m_pData.

6.21.3.63 Matrix & Matrix::operator+ (const Matrix & obj) const

Definition at line 139 of file matrix.cpp.
References ErrorMsg(), m_nCols, m_nRows, m_pData, and Matrix().

6.21.3.64 Matrix & Matrix::operator+= (const Matrix & obj)

Definition at line 271 of file matrix.cpp.

6.21.3.65 Matrix & Matrix::operator- (const Matrix & obj) const

Definition at line 157 of file matrix.cpp.
References ErrorMsg(), m_nCols, m_nRows, m_pData, and Matrix().

6.21.3.66 Matrix & Matrix::operator-= (const Matrix & obj)

Definition at line 277 of file matrix.cpp.

6.21.3.67 Matrix & Matrix::operator/ (const int _i) const

Definition at line 254 of file matrix.cpp.
References ErrorMsg(), m_nCols, m_nRows, m_pData, and Matrix().

6.21.3.68 Matrix & Matrix::operator/ (const double _d) const

Definition at line 237 of file matrix.cpp.

References ErrorMsg(), m_nCols, m_nRows, m_pData, and Matrix().

6.21.3.69 Matrix & Matrix::operator/ (const Matrix & *obj*) const

Definition at line 231 of file matrix.cpp.

References GetInverse().

6.21.3.70 Matrix & Matrix::operator/= (const int _*i*)

Definition at line 313 of file matrix.cpp.

6.21.3.71 Matrix & Matrix::operator/= (const double _*d*)

Definition at line 307 of file matrix.cpp.

6.21.3.72 Matrix & Matrix::operator/= (const Matrix & *obj*)

Definition at line 301 of file matrix.cpp.

6.21.3.73 Matrix & Matrix::operator= (const Matrix & *obj*)

Definition at line 319 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.74 bool Matrix::operator== (const Matrix & *obj*) const

Definition at line 352 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.75 double * Matrix::operator[] (const int _*i*) const

Definition at line 383 of file matrix.cpp.

References ErrorMsg(), m_nRows, and m_pData.

6.21.3.76 Matrix & Matrix::operator~ () const

Definition at line 346 of file matrix.cpp.

References GetInverse().

6.21.3.77 void Matrix::Output (ostream & *ostr* = cout) const

Definition at line 1394 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.78 void Matrix::Read (ifstream & *istr*)

Definition at line 1424 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.79 Matrix & Matrix::REF ()

Definition at line 826 of file matrix.cpp.

References AddRows(), DivideRow(), m_nRows, and m_pData.

Referenced by GetREF(), and RREF().

6.21.3.80 Matrix & Matrix::RemoveColumn (const int *Column*)

Definition at line 1263 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.81 Matrix & Matrix::RemoveRow (const int *Row*)

Definition at line 1246 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.82 Matrix & Matrix::RightAppendIdentity () [private]

Definition at line 15 of file matrix.cpp.

References m_nCols, m_nRows, m_pData, Matrix(), and q.

Referenced by GetInverse().

6.21.3.83 Matrix & Matrix::RREF ()

Definition at line 839 of file matrix.cpp.

References AddRows(), DivideRow(), m_nRows, m_pData, and REF().

Referenced by GetInverse(), and GetRREF().

6.21.3.84 Matrix & Matrix::SetSubMatrix (const int *RowSpot*, const int *ColSpot*, const int *RowLen*, const int *ColLen*)

Definition at line 949 of file matrix.cpp.

References GetSubMatrix().

6.21.3.85 Matrix & Matrix::SetValue (int *Row*, int *Col*, double _ *d*)

Author:
Yann - I added setters for (i,j) - not clean but needed

Definition at line 696 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

Referenced by RainbowOption::getCorrelRisk(), RainbowOption::getDelta(), RainbowOption::getGamma(), RainbowOption::getVega(), mainmatrix(), RainbowOption::RainbowOption(), MCEngine::RunEngineRainbow2AssetsBasketMax(), MCEngine::RunEngineRainbow2SpreadOptionMax(), MCEngine::RunEngineRainbowBestOf2AssetsCash(), MCEngine::RunEngineRainbowMax2AssetsCall(), MCEngine::RunEngineRainbowMax2AssetsPut(), MCEngine::RunEngineRainbowMin2AssetsCall(), MCEngine::RunEngineRainbowMin2AssetsPut(), MCEngine::RunEngineRainbowWorstOf2AssetsCash(), transform1DvalarrayToColumnMatrix(), and transform2DvalarrayToMatrix().

6.21.3.86 Matrix & Matrix::SortAscend ()

Definition at line 1281 of file matrix.cpp.

References GetDataOneDimen(), m_nCols, m_nRows, and Matrix().

6.21.3.87 Matrix & Matrix::SortDescend ()

Definition at line 1303 of file matrix.cpp.

References GetDataOneDimen(), m_nCols, m_nRows, and Matrix().

6.21.3.88 Matrix & Matrix::SpliceInColumn (const double * *ColumnData*, const int *ColumnSpot*)

Definition at line 1226 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.89 Matrix & Matrix::SpliceInRow (const double * *RowData*, const int *RowSpot*)

Definition at line 1204 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.3.90 double Matrix::SumAll () const

Definition at line 450 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

Referenced by SumAllSquared().

6.21.3.91 double Matrix::SumAllSquared () const

Definition at line 464 of file matrix.cpp.

References SumAll().

6.21.3.92 double Matrix::SumColumn (const int *Col*) const

Definition at line 484 of file matrix.cpp.

References m_nRows, and m_pData.

Referenced by RainbowOption::getDelta(), RainbowOption::getGamma(), RainbowOption::getVega(), and SumColumnSquared().

6.21.3.93 double Matrix::SumColumnSquared (const int *Col*) const

Definition at line 504 of file matrix.cpp.

References SumColumn().

6.21.3.94 double Matrix::SumRow (const int *Row*) const

Definition at line 472 of file matrix.cpp.

References m_nCols, and m_pData.

Referenced by SumRowSquared().

6.21.3.95 double Matrix::SumRowSquared (const int *Row*) const

Definition at line 496 of file matrix.cpp.

References SumRow().

6.21.3.96 Matrix & Matrix::SwapCols (const int *Col1*, const int *Col2*)

Definition at line 979 of file matrix.cpp.

References m_nRows, and m_pData.

6.21.3.97 Matrix & Matrix::SwapRows (const int *Row1*, const int *Row2*)

Definition at line 961 of file matrix.cpp.

References m_nCols, and m_pData.

6.21.3.98 Matrix & Matrix::Transpose ()

Definition at line 1012 of file matrix.cpp.

References GetTransposed().

Referenced by GetCovariant().

6.21.3.99 void Matrix::Write (ofstream & *ostr*) const

Definition at line 1439 of file matrix.cpp.

References m_nCols, m_nRows, and m_pData.

6.21.4 Member Data Documentation

6.21.4.1 int Matrix::m_nCols [private]

Definition at line 22 of file matrix.h.

Referenced by AddRows(), Clear(), ClearRow(), CMAC(), CMAR(), ConcatenateColumn(), ConcatenateRow(), Determinant(), Display(), DivideRow(), Fill(), FillRow(), GetColumns(), GetDataOneDimen(), GetDataTwoDimen(), GetInverse(), GetMax(), GetMin(), GetMinor(), GetMinorNew(), GetNumericRange(), GetNumericRangeOfRow(), GetRowMax(), GetRowMin(), GetTransposed(), Input(), IsEmpty(), IsIdentity(), LeftRemoveIdentity(), Matrix(), MultiplyRow(), Normalize(), operator *(), operator!=(), operator()(), operator+(), operator-(), operator/(), operator=(), operator==(), Output(), Read(), RemoveColumn(), RemoveRow(), RightAppendIdentity(), SetValue(), SortAscend(), SortDescend(), SpliceInColumn(), SpliceInRow(), SumAll(), SumRow(), SwapRows(), and Write().

6.21.4.2 int Matrix::m_nRows [private]

Definition at line 23 of file matrix.h.

Referenced by AddColumns(), Clear(), ClearColumn(), CMAC(), CMAR(), ConcatenateColumn(), ConcatenateRow(), Determinant(), Display(), DivideColumn(), Fill(), FillColumn(), GetColumnMax(), GetColumnMin(), GetDataOneDimen(), GetDataTwoDimen(), GetInverse(), GetMax(), GetMin(), GetMinor(), GetMinorNew(), GetNumericRange(), GetNumericRangeOfColumn(), GetRows(), GetTransposed(), Input(), IsEmpty(), IsIdentity(), LeftRemoveIdentity(), Matrix(), MultiplyColumn(), Normalize(), operator *(), operator!=(), operator()(), operator+(), operator-(), operator/(), operator=(), operator==(), operator[](), Output(), Read(), REF(), RemoveColumn(), RemoveRow(), RightAppendIdentity(), RREF(), SetValue(), SortAscend(), SortDescend(), SpliceInColumn(), SpliceInRow(), SumAll(), SumColumn(), SwapCols(), Write(), and ~Matrix().

6.21.4.3 double** Matrix::m_pData [private]

Definition at line 21 of file matrix.h.

Referenced by AddColumns(), AddRows(), CholeskyDecomposition(), Clear(), ClearColumn(), ClearRow(), CMAC(), CMAR(), ConcatenateColumn(), ConcatenateRow(), Determinant(), Display(), DivideColumn(), DivideRow(), Fill(), FillColumn(), FillRow(), GetColumnMax(), GetColumnMin(), GetDataOneDimen(), GetDataTwoDimen(), GetMax(), GetMin(), GetMinor(), GetMinorNew(), GetNumericRange(), GetNumericRangeOfColumn(), GetNumericRangeOfRow(), GetRowMax(), GetRowMin(), GetSubMatrix(), GetTransposed(), IdentityMatrix(), Input(), IsEmpty(), IsIdentity(), LeftRemoveIdentity(), Matrix(), MultiplyColumn(), MultiplyRow(), Normalize(), operator *(), operator!=(), operator()(), operator+(), operator-(), operator/(), operator=(), operator==(), operator[](), Output(), Read(), REF(), RemoveColumn(), RemoveRow(), RightAppendIdentity(), RREF(), SetValue(), SpliceInColumn(), SpliceInRow(), SumAll(), SumColumn(), SumRow(), SwapCols(), SwapRows(), Write(), and ~Matrix().

The documentation for this class was generated from the following files:

- matrix.h
- matrix.cpp

6.22 MCEngine Class Reference

`#include <MCEngine.h>`

Public Member Functions

- **MCEngine** (**LongNatural** nPaths, **LongNatural** nDates, valarray< **Real** > DiscFactors)

  Default constructor.

- ~**MCEngine** ()
- **MCEngine** (void)

  Default constructor.

- **MCEngine** (**LongNatural** nPaths, **Real** DFToMaturity)

  for 1 date (non path dependant payOffs)

- void **RunEngineRainbow2SpreadOptionMax** (**Random** *pRandom, valarray< **GaussianProcess** > pHazardRateProcesses, **PayOff** thePayOff, **Real** gaussianSample, valarray< **Real** > TerminalPoints, valarray< **Real** > weights, **Matrix** Correlation, **Real** Mult)

  Price Spread option with 2 assets.

- void **RunEngineRainbow2AssetsBasketMax** (**Random** *pRandom, valarray< **GaussianProcess** > pHazardRateProcesses, **PayOff** thePayOff, **Real** gaussianSample, valarray< **Real** > TerminalPoints, valarray< **Real** > weights, **Matrix** Correlation, **Real** Mult)

  Price basker option with 2 assets.

- void **RunEngineRainbowBestOf2AssetsCash** (**Random** *pRandom, valarray< **GaussianProcess** > pHazardRateProcesses, **PayOff** thePayOff, **Real** gaussianSample, valarray< **Real** > TerminalPoints, valarray< **Real** > weights, **Matrix** Correlation)

  Price best of + cash option with 2 assets.

- void **RunEngineRainbowWorstOf2AssetsCash** (**Random** *pRandom, valarray< **GaussianProcess** > pHazardRateProcesses, **PayOff** thePayOff, **Real** gaussianSample, valarray< **Real** > TerminalPoints, valarray< **Real** > weights, **Matrix** Correlation)

  Price worst of + cash option with 2 assets.

- void **RunEngineRainbowMax2AssetsCall** (**Random** *pRandom, valarray< **GaussianProcess** > pHazardRateProcesses, **PayOff** thePayOff, **Real** gaussianSample, valarray< **Real** > TerminalPoints, valarray< **Real** > weights, **Matrix** Correlation, **Real** Mult)

  Price max call option with 2 assets.

- void **RunEngineRainbowMin2AssetsCall** (**Random** *pRandom, valarray< **GaussianProcess** > pHazardRateProcesses, **PayOff** thePayOff, **Real** gaussianSample, valarray< **Real** > TerminalPoints, valarray< **Real** > weights, **Matrix** Correlation, **Real** Mult)

  Price min call option with 2 assets.

- void **RunEngineRainbowMax2AssetsPut** (**Random** *pRandom, valarray< **GaussianProcess** > pHazardRateProcesses, **PayOff** thePayOff, **Real** gaussianSample, valarray< **Real** > TerminalPoints, valarray< **Real** > weights, **Matrix** Correlation, **Real** Mult)

  Price max put option with 2 assets.

- void **RunEngineRainbowMin2AssetsPut** (**Random** *pRandom, valarray< **GaussianProcess** > pHazardRateProcesses, **PayOff** thePayOff, **Real** gaussianSample, valarray< **Real** > TerminalPoints, valarray< **Real** > weights, **Matrix** Correlation, **Real** Mult)

  Price min put option with 2 assets.

- void **RunEngineAsianCall** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath)

  Price Asian Call.

- void **RunEngineAsianPut** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath)

  Price Asian Put.

- void **RunEngineCall** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath)

  Price European standard Call.

- void **RunEnginePut** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath)

  Price uropean standard Put.

- void **RunEngineRevLookbackCall** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath)

  Price Lokback Call.

- void **RunEngineRevLookbackPut** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath)

  Price Lokback Put.

- void **RunEngineBarrierCall** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath)

  Price Barrier Call.

- void **RunEngineBarrierPut** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath)

  Price Barrier Put.

- void **RunEngineFlooredCliquet** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath)

  Price FlooredCliquet.

- void **RunEngineCappedCliquet** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath)

  Price CappedCliquet.

- void **RunEngineGeneral** (**Random** *pRandom, **GaussianProcess** *pHazardRateProcess, **PayOff** thePayOff, valarray< **Real** > gaussianSample, valarray< **Real** > vHazardRatePath, **Natural** Product)

  Run Monte Carlo Engine with code for the product.

- **Real MCResult** ()

  Return result of Monte carlo simulation.

Private Attributes

- **Real m_price**
- **Real m_DiscFactor**
- **LongNatural m_nPaths**
- **LongNatural m_nDates**

6.22.1 Constructor & Destructor Documentation

6.22.1.1 MCEngine::MCEngine (LongNatural *nPaths*, LongNatural *nDates*, valarray< Real > *DiscFactors*)

Default constructor.

Parameters:

price: Start **Date**(p. 71) of the drift

nPaths: Length of the drift to be computed

nDates: Number of dates to cut the drift

Vol: Yield Curve to compute the spot rate between each date

Spot: Volatility Surface to compute the forward volatility between each date

Strike: Strike of the option, used to compute the colatility (function of the strike)

Definition at line 3 of file MCEngine.cpp.

References LongNatural, m_DiscFactor, and m_price.

6.22.1.2 MCEngine::~MCEngine ()

Definition at line 20 of file MCEngine.cpp.

6.22.1.3 MCEngine::MCEngine (void)

Default constructor.

Author:
Yann

Definition at line 24 of file MCEngine.cpp.

6.22.1.4 MCEngine::MCEngine (LongNatural *nPaths*, Real *DFToMaturity*)

for 1 date (non path dependant payOffs)

Author:
Yann

Parameters:
nPaths: to compute the MC

DFToMaturity: 1 date so only one Df needed

Definition at line 11 of file MCEngine.cpp.

References LongNatural, m_price, and Real.

6.22.2 Member Function Documentation

6.22.2.1 Real MCEngine::MCResult ()

Return result of Monte carlo simulation.

Definition at line 353 of file MCEngine.cpp.

References m_nPaths, m_price, and Real.

Referenced by mainmc(), RainbowOption::PriceByMc_2AssetsBasketMax(), RainbowOption::PriceByMc_2SpreadOptionMax(), RainbowOption::PriceByMc_BestOf2AssetsCash(), RainbowOption::PriceByMc_Max2AssetsCall(), RainbowOption::PriceByMc_Max2AssetsPut(), RainbowOption::PriceByMc_Min2AssetsCall(), RainbowOption::PriceByMc_Min2AssetsPut(), and RainbowOption::PriceByMc_WorstOf2AssetsCash().

6.22.2.2 void MCEngine::RunEngineAsianCall (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*)

Price Asian Call.

Definition at line 213 of file MCEngine.cpp.

References PayOff::AsianCall(), GaussianProcess::BuildPath(), Random::GetGaussians(), LongNatural, m_DiscFactor, m_nPaths, and m_price.

Referenced by RunEngineGeneral().

6.22.2.3 void MCEngine::RunEngineAsianPut (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*)

Price Asian Put.

Definition at line 224 of file MCEngine.cpp.

References PayOff::AsianPut(), GaussianProcess::BuildPath(), Random::GetGaussians(), LongNatural, m_DiscFactor, m_nPaths, and m_price.

Referenced by RunEngineGeneral().

6.22.2.4 void MCEngine::RunEngineBarrierCall (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*)

Price Barrier Call.

Definition at line 285 of file MCEngine.cpp.

References PayOff::BarrierCall(), GaussianProcess::BuildPath(), Random::GetGaussians(), LongNatural, m_DiscFactor, m_nPaths, and m_price.

Referenced by RunEngineGeneral().

6.22.2.5 void MCEngine::RunEngineBarrierPut (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*)

Price Barrier Put.

Definition at line 296 of file MCEngine.cpp.

References PayOff::BarrierPut(), GaussianProcess::BuildPath(), Random::GetGaussians(), LongNatural, m_DiscFactor, m_nPaths, and m_price.

Referenced by RunEngineGeneral().

6.22.2.6 void MCEngine::RunEngineCall (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*)

Price European standard Call.

Definition at line 235 of file MCEngine.cpp.

References GaussianProcess::BuildPath(), PayOff::Call(), Random::GetGaussians(), LongNatural, m_DiscFactor, m_nPaths, and m_price.

Referenced by RunEngineGeneral().

6.22.2.7 void MCEngine::RunEngineCappedCliquet (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*)

Price CappedCliquet.

Definition at line 318 of file MCEngine.cpp.

References GaussianProcess::BuildPath(), PayOff::CappedCliquet(), Random::GetGaussians(), LongNatural, m_DiscFactor, m_nPaths, and m_price.

Referenced by RunEngineGeneral().

6.22.2.8 void MCEngine::RunEngineFlooredCliquet (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*)

Price FlooredCliquet.

Definition at line 307 of file MCEngine.cpp.

References GaussianProcess::BuildPath(), PayOff::FlooredCliquet(), Random::GetGaussians(), LongNatural, m_DiscFactor, m_nPaths, and m_price.

Referenced by RunEngineGeneral().

6.22.2.9 void MCEngine::RunEngineGeneral (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*, Natural *Product*)

Run Monte Carlo Engine with code for the product.

Definition at line 329 of file MCEngine.cpp.

References Natural, RunEngineAsianCall(), RunEngineAsianPut(), RunEngineBarrierCall(), RunEngineBarrierPut(), RunEngineCall(), RunEngineCappedCliquet(), RunEngineFlooredCliquet(), RunEnginePut(), RunEngineRevLookbackCall(), and RunEngineRevLookbackPut().

Referenced by mainmc().

6.22.2.10 void MCEngine::RunEnginePut (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*)

Price uropean standard Put.

Definition at line 252 of file MCEngine.cpp.

References GaussianProcess::BuildPath(), Random::GetGaussians(), LongNatural, m_DiscFactor, m_nPaths, m_price, and PayOff::Put().

Referenced by RunEngineGeneral().

6.22.2.11 void MCEngine::RunEngineRainbow2AssetsBasketMax (Random * *pRandom*, valarray< GaussianProcess > *pHazardRateProcesses*, PayOff *thePayOff*, Real *gaussianSample*, valarray< Real > *TerminalPoints*, valarray< Real > *weights*, Matrix *Correlation*, Real *Mult*)

Price basker option with 2 assets.

Definition at line 51 of file MCEngine.cpp.

References Matrix::CholeskyDecomposition(), Random::GetGaussian(), Matrix::GetRows(),

LongNatural, m_DiscFactor, m_nPaths, m_price, Natural, PayOff::Rainbow2AssetsBasketMax(), Real, and Matrix::SetValue().

Referenced by RainbowOption::PriceByMc_2AssetsBasketMax().

6.22.2.12 void MCEngine::RunEngineRainbow2SpreadOptionMax (Random * *pRandom*, valarray< GaussianProcess > *pHazardRateProcesses*, PayOff *thePayOff*, Real *gaussianSample*, valarray< Real > *TerminalPoints*, valarray< Real > *weights*, Matrix *Correlation*, Real *Mult*)

Price Spread option with 2 assets.

Definition at line 28 of file MCEngine.cpp.

References Matrix::CholeskyDecomposition(), Random::GetGaussian(), Matrix::GetRows(), LongNatural, m_DiscFactor, m_nPaths, m_price, Natural, PayOff::Rainbow2SpreadOptionMax(), Real, and Matrix::SetValue().

Referenced by RainbowOption::PriceByMc_2SpreadOptionMax().

6.22.2.13 void MCEngine::RunEngineRainbowBestOf2AssetsCash (Random * *pRandom*, valarray< GaussianProcess > *pHazardRateProcesses*, PayOff *thePayOff*, Real *gaussianSample*, valarray< Real > *TerminalPoints*, valarray< Real > *weights*, Matrix *Correlation*)

Price best of + cash option with 2 assets.

Definition at line 75 of file MCEngine.cpp.

References Matrix::CholeskyDecomposition(), Random::GetGaussian(), Matrix::GetRows(), LongNatural, m_DiscFactor, m_nPaths, m_price, Natural, PayOff::RainbowBestOf2AssetsCash(), Real, and Matrix::SetValue().

Referenced by RainbowOption::PriceByMc_BestOf2AssetsCash().

6.22.2.14 void MCEngine::RunEngineRainbowMax2AssetsCall (Random * *pRandom*, valarray< GaussianProcess > *pHazardRateProcesses*, PayOff *thePayOff*, Real *gaussianSample*, valarray< Real > *TerminalPoints*, valarray< Real > *weights*, Matrix *Correlation*, Real *Mult*)

Price max call option with 2 assets.

Definition at line 121 of file MCEngine.cpp.

References Matrix::CholeskyDecomposition(), Random::GetGaussian(), Matrix::GetRows(), LongNatural, m_DiscFactor, m_nPaths, m_price, Natural, PayOff::RainbowMax2AssetsCall(), Real, and Matrix::SetValue().

Referenced by RainbowOption::PriceByMc_Max2AssetsCall().

6.22.2.15 void MCEngine::RunEngineRainbowMax2AssetsPut (Random * *pRandom*, valarray< GaussianProcess > *pHazardRateProcesses*, PayOff *thePayOff*, Real *gaussianSample*, valarray< Real > *TerminalPoints*, valarray< Real > *weights*, Matrix *Correlation*, Real *Mult*)

Price max put option with 2 assets.

Definition at line 167 of file MCEngine.cpp.

References Matrix::CholeskyDecomposition(), Random::GetGaussian(), Matrix::GetRows(), LongNatural, m_DiscFactor, m_nPaths, m_price, Natural, PayOff::RainbowMax2AssetsPut(), Real, and Matrix::SetValue().

Referenced by RainbowOption::PriceByMc_Max2AssetsPut().

6.22.2.16 void MCEngine::RunEngineRainbowMin2AssetsCall (Random * *pRandom*, valarray< GaussianProcess > *pHazardRateProcesses*, PayOff *thePayOff*, Real *gaussianSample*, valarray< Real > *TerminalPoints*, valarray< Real > *weights*, Matrix *Correlation*, Real *Mult*)

Price min call option with 2 assets.

Definition at line 144 of file MCEngine.cpp.

References Matrix::CholeskyDecomposition(), Random::GetGaussian(), Matrix::GetRows(), LongNatural, m_DiscFactor, m_nPaths, m_price, Natural, PayOff::RainbowMin2AssetsCall(), Real, and Matrix::SetValue().

Referenced by RainbowOption::PriceByMc_Min2AssetsCall().

6.22.2.17 void MCEngine::RunEngineRainbowMin2AssetsPut (Random * *pRandom*, valarray< GaussianProcess > *pHazardRateProcesses*, PayOff *thePayOff*, Real *gaussianSample*, valarray< Real > *TerminalPoints*, valarray< Real > *weights*, Matrix *Correlation*, Real *Mult*)

Price min put option with 2 assets.

Definition at line 190 of file MCEngine.cpp.

References Matrix::CholeskyDecomposition(), Random::GetGaussian(), Matrix::GetRows(), LongNatural, m_DiscFactor, m_nPaths, m_price, Natural, PayOff::RainbowMin2AssetsPut(), Real, and Matrix::SetValue().

Referenced by RainbowOption::PriceByMc_Min2AssetsPut().

6.22.2.18 void MCEngine::RunEngineRainbowWorstOf2AssetsCash (Random * *pRandom*, valarray< GaussianProcess > *pHazardRateProcesses*, PayOff *thePayOff*, Real *gaussianSample*, valarray< Real > *TerminalPoints*, valarray< Real > *weights*, Matrix *Correlation*)

Price worst of + cash option with 2 assets.

Definition at line 98 of file MCEngine.cpp.

References Matrix::CholeskyDecomposition(), Random::GetGaussian(), Matrix::GetRows(), LongNatural, m_DiscFactor, m_nPaths, m_price, Natural, PayOff::RainbowWorstOf2Assets-Cash(), Real, and Matrix::SetValue().

Referenced by RainbowOption::PriceByMc_WorstOf2AssetsCash().

6.22.2.19 void MCEngine::RunEngineRevLookbackCall (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*)

Price Lokback Call.

Definition at line 263 of file MCEngine.cpp.

References GaussianProcess::BuildPath(), Random::GetGaussians(), LongNatural, m_DiscFactor, m_nPaths, m_price, and PayOff::RevLookbackCall().

Referenced by RunEngineGeneral().

6.22.2.20 void MCEngine::RunEngineRevLookbackPut (Random * *pRandom*, GaussianProcess * *pHazardRateProcess*, PayOff *thePayOff*, valarray< Real > *gaussianSample*, valarray< Real > *vHazardRatePath*)

Price Lokback Put.

Definition at line 274 of file MCEngine.cpp.

References GaussianProcess::BuildPath(), Random::GetGaussians(), LongNatural, m_DiscFactor, m_nPaths, m_price, and PayOff::RevLookbackPut().

Referenced by RunEngineGeneral().

6.22.3 Member Data Documentation

6.22.3.1 Real MCEngine::m_DiscFactor [private]

Definition at line 99 of file MCEngine.h.

Referenced by MCEngine(), RunEngineAsianCall(), RunEngineAsianPut(), RunEngineBarrierCall(), RunEngineBarrierPut(), RunEngineCall(), RunEngineCappedCliquet(), RunEngineFlooredCliquet(), RunEnginePut(), RunEngineRainbow2AssetsBasketMax(), RunEngineRainbow2SpreadOptionMax(), RunEngineRainbowBestOf2AssetsCash(), RunEngineRainbowMax2AssetsCall(), RunEngineRainbowMax2AssetsPut(), RunEngineRainbowMin2AssetsCall(), RunEngineRainbowMin2AssetsPut(), RunEngineRainbowWorstOf2AssetsCash(), RunEngineRevLookbackCall(), and RunEngineRevLookbackPut().

6.22.3.2 LongNatural MCEngine::m_nDates [private]

Definition at line 101 of file MCEngine.h.

6.22.3.3 LongNatural MCEngine::m_nPaths [private]

Definition at line 100 of file MCEngine.h.

Referenced by MCResult(), RunEngineAsianCall(), RunEngineAsianPut(), RunEngineBarrierCall(), RunEngineBarrierPut(), RunEngineCall(), RunEngineCappedCliquet(), RunEngineFlooredCliquet(), RunEnginePut(), RunEngineRainbow2AssetsBasketMax(), RunEngineRainbow2SpreadOptionMax(), RunEngineRainbowBestOf2AssetsCash(), RunEngineRainbowMax2AssetsCall(), RunEngineRainbowMax2AssetsPut(), RunEngineRainbowMin2AssetsCall(), RunEngineRainbowMin2AssetsPut(), RunEngineRainbowWorstOf2AssetsCash(), RunEngineRevLookbackCall(), and RunEngineRevLookbackPut().

6.22.3.4 Real MCEngine::m_price [private]

Definition at line 99 of file MCEngine.h.

Referenced by MCEngine(), MCResult(), RunEngineAsianCall(), RunEngineAsianPut(), RunEngineBarrierCall(), RunEngineBarrierPut(), RunEngineCall(), RunEngineCappedCliquet(), RunEngineFlooredCliquet(), RunEnginePut(), RunEngineRainbow2AssetsBasketMax(), RunEngineRainbow2SpreadOptionMax(), RunEngineRainbowBestOf2AssetsCash(), RunEngineRainbowMax2AssetsCall(), RunEngineRainbowMax2AssetsPut(), RunEngineRainbowMin2AssetsCall(), RunEngineRainbowMin2AssetsPut(), RunEngineRainbowWorstOf2AssetsCash(), RunEngineRevLookbackCall(), and RunEngineRevLookbackPut().

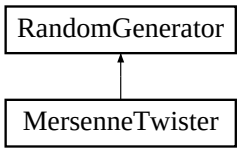
The documentation for this class was generated from the following files:

- **MCEngine.h**
- **MCEngine.cpp**

6.23 MersenneTwister Class Reference

`#include <MersenneTwister.h>`

Inheritance diagram for MersenneTwister::



Public Member Functions

- **MersenneTwister** (**LongNatural seed**=0)

  Default constructor : if the given seed is 0, a random seed will be chosen based on clock().

- **MersenneTwister** (const valarray< **LongNatural** > &seeds)
- ~**MersenneTwister** ()
- **Real getUniform** ()

  returns a sample with weight 1.0 containing a random number on (0.0, 1.0)

- **LongNatural GetOneRandomInteger** ()

  return a random number on [0,0xffffffff]-interval

- **VeryLongNatural Max** ()

  Return maximum number of random numbers.

- **LongNatural Min** ()

  Return minimum of numbers generated.

- void **SetSeed** (**LongNatural seed**)

  Set seed for generator.

Private Attributes

- **LongInteger seed**
- valarray< **LongNatural** > **mt**
- **LongNatural mti**

6.23.1 Constructor & Destructor Documentation

6.23.1.1 MersenneTwister::MersenneTwister (LongNatural *seed* = 0)

Default constructor : if the given seed is 0, a random seed will be chosen based on clock().

Definition at line 14 of file MersenneTwister.cpp.

References LongNatural, N, and SetSeed().

6.23.1.2 MersenneTwister::MersenneTwister (const valarray< LongNatural > & *seeds*)

Definition at line 42 of file MersenneTwister.cpp.

References LongNatural, mt, N, and SetSeed().

6.23.1.3 MersenneTwister::~MersenneTwister ()

Definition at line 20 of file MersenneTwister.cpp.

6.23.2 Member Function Documentation

6.23.2.1 LongNatural MersenneTwister::GetOneRandomInteger () [virtual]

return a random number on [0,0xffffffff]-interval

Implements **RandomGenerator** (p. 190).

Definition at line 65 of file MersenneTwister.cpp.

References LongNatural, LOWER_MASK, M, MATRIX_A, mt, mti, N, and UPPER_MASK.

Referenced by getUniform().

6.23.2.2 Real MersenneTwister::getUniform () [inline, virtual]

returns a sample with weight 1.0 containing a random number on (0.0, 1.0)

Implements **RandomGenerator** (p. 190).

Definition at line 21 of file MersenneTwister.h.

References GetOneRandomInteger(), and Real.

6.23.2.3 VeryLongNatural MersenneTwister::Max () [virtual]

Return maximum number of random numbers.

Implements **RandomGenerator** (p. 190).

Definition at line 24 of file MersenneTwister.cpp.

References VeryLongNatural.

6.23.2.4 LongNatural MersenneTwister::Min () [virtual]

Return minimum of numbers generated.

Implements **RandomGenerator** (p. 190).

Definition at line 28 of file MersenneTwister.cpp.

References LongNatural.

6.23.2.5 void MersenneTwister::SetSeed (LongNatural *seed*) [virtual]

Set seed for generator.

Reimplemented from **RandomGenerator** (p. 190).

Definition at line 33 of file MersenneTwister.cpp.

References LongNatural, mt, mti, and N.

Referenced by MersenneTwister().

6.23.3 Member Data Documentation

6.23.3.1 valarray<LongNatural> MersenneTwister::mt [private]

Definition at line 31 of file MersenneTwister.h.

Referenced by GetOneRandomInteger(), MersenneTwister(), and SetSeed().

6.23.3.2 LongNatural MersenneTwister::mti [private]

Definition at line 32 of file MersenneTwister.h.

Referenced by GetOneRandomInteger(), and SetSeed().

6.23.3.3 LongInteger MersenneTwister::seed [private]

Definition at line 30 of file MersenneTwister.h.

The documentation for this class was generated from the following files:

- **MersenneTwister.h**
- **MersenneTwister.cpp**

6.24 OptionStrategy Class Reference

`#include <OptionStrategy.h>`

Public Member Functions

- **OptionStrategy** ()

  Default constructor: initialize parameters.

- ~**OptionStrategy** ()
- void **addOneOptionToStrategy** (**Real** spot, **Real** vol, bool isVol, **Real r**, **Real** K, **Real** T, **TypeOptionBS** type, **Real** Quantity)

  Generic function to add Options to the Strategy.

- void **addOneBlackScholesObject** (**BlackScholes** *bs, **Real** Quantity)
- void **addLongCallSpread** (**Real** spot, **Real** volStrike1, bool isVol1, **Real** volStrike2, bool isVol2, **Real r**, **Real** K1, **Real** K2, **Real** T, **Real** Quantity)

  Create a long call spread in the portfolio.

- void **addLongStraddle** (**Real** spot, **Real** vol, bool isVol, **Real r**, **Real** K, **Real** T, **Real** Quantity)

  Create a long straddle in the portfolio.

- void **addLongStrangle** (**Real** spot, **Real** volStrike1, bool isVol1, **Real** volStrike2, bool isVol2, **Real r**, **Real** K1, **Real** K2, **Real** T, **Real** Quantity)

  Create a long strangle in the portfolio.

- void **addLongButterflySpread** (**Real** spot, **Real** volStrike1, bool isVol1, **Real** volStrike2, bool isVol2, **Real** volStrike3, bool isVol3, **Real r**, **Real** K1, **Real** K2, **Real** T, **Real** Quantity)

  There are two functions for butterfly if you want to specify or not K3=(K1+K2)/2 by default.

- void **addLongButterflySpread** (**Real** spot, **Real** volStrike1, bool isVol1, **Real** volStrike2, bool isVol2, **Real** volStrike3, bool isVol3, **Real r**, **Real** K1, **Real** K2, **Real** K3, **Real** T, **Real** Quantity)
- void **addLongRatioCallSpread** (**Real** spot, **Real** volStrike1, bool isVol1, **Real** volStrike2, bool isVol2, **Real r**, **Real** K1, **Real** K2, **Real** T, **Real** Quantity)

  Create a long ratio call spread in the portfolio.

- void **addLongPutSpread** (**Real** spot, **Real** volStrike1, bool isVol1, **Real** volStrike2, bool isVol2, **Real r**, **Real** K1, **Real** K2, **Real** T, **Real** Quantity)

  Create a long put spread in the portfolio.

- **Real getGlobalDelta** ()

  Get Greeks for global **Portfolio**(p. 158).

- **Real getGlobalGamma** ()
- **Real getGlobalVega** ()
- **Real getGlobalTheta** ()
- **Real getGlobalRho** ()

- **Real returnPrice** ()

  Return global price of the portfolio.

- **Real recalcPrice** ()

  Recalculate global price of the portfolio in case of change.

- **Natural returnNbOptions** () const

  Return number of options in the portfolio.

- **BlackScholes** * **returnOption** (**Natural** i) const

  Return pointer on blackscholes object inside, used for variance swaps.

- **Real returnOptionQuantity** (**Natural** i) const

  Return quantity on blackscholes object inside.

- void **changeRate** (**Real** addConstant=**defaultshiftRate**)

  Add constant rate to the inside rate of all **BlackScholes**(p. 26) *objects.*

- void **changeVol** (**Real** addConstant=**defaultshiftVol**)

  Add constant vol to the inside vol of all **BlackScholes**(p. 26) *objects.*

- void **changeMaturity** (**Real** addConstant=**defaultshiftMat**)

  Add constant maturity to the inside maturity of all **BlackScholes**(p. 26) *objects.*

- void **changeSpot** (**Real** addConstant=**defaultshiftSpot**)

  Add constant spot to the inside spot of all **BlackScholes**(p. 26) *objects.*

- void **changeStrike** (**Real** addConstant=**defaultshiftStrike**)

  Add constant strike to the inside strike of all **BlackScholes**(p. 26) *objects.*

Private Attributes

- **Real _price**
- **Natural _nbOptions**
- valarray< **BlackScholes** * > **_insideOptions**
- valarray< **Real** > **_insideQuantities**

Friends

- ostream & **operator**<< (ostream &os, const **OptionStrategy** &optionStrategy)

  display parameters of options in the optionstrategy object

- ostream & **operator**<< (ostream &os, const **OptionStrategy** *optionStrategy)

6.24.1 Constructor & Destructor Documentation

6.24.1.1 OptionStrategy::OptionStrategy ()

Default constructor: initialize parameters.

Definition at line 3 of file OptionStrategy.cpp.

References _insideOptions, _insideQuantities, and _nbOptions.

6.24.1.2 OptionStrategy::~OptionStrategy ()

Definition at line 10 of file OptionStrategy.cpp.

6.24.2 Member Function Documentation

6.24.2.1 void OptionStrategy::addLongButterflySpread (Real *spot*, Real *volStrike1*, bool *isVol1*, Real *volStrike2*, bool *isVol2*, Real *volStrike3*, bool *isVol3*, Real *r*, Real *K1*, Real *K2*, Real *K3*, Real *T*, Real *Quantity*)

Definition at line 78 of file OptionStrategy.cpp.

References addOneOptionToStrategy(), Call, r, and Real.

6.24.2.2 void OptionStrategy::addLongButterflySpread (Real *spot*, Real *volStrike1*, bool *isVol1*, Real *volStrike2*, bool *isVol2*, Real *volStrike3*, bool *isVol3*, Real *r*, Real *K1*, Real *K2*, Real *T*, Real *Quantity*)

There are two functions for butterfly if you want to specify or not K3=(K1+K2)/2 by default.

Definition at line 72 of file OptionStrategy.cpp.

References addOneOptionToStrategy(), Call, r, and Real.

Referenced by inputButterflySpread(), mainoptionstrategy(), and mainvarianceswap().

6.24.2.3 void OptionStrategy::addLongCallSpread (Real *spot*, Real *volStrike1*, bool *isVol1*, Real *volStrike2*, bool *isVol2*, Real *r*, Real *K1*, Real *K2*, Real *T*, Real *Quantity*)

Create a long call spread in the portfolio.

We search to be long the call with smallest strike and short the other

Definition at line 44 of file OptionStrategy.cpp.

References addOneOptionToStrategy(), Call, r, and Real.

Referenced by inputCallSpread().

6.24.2.4 void OptionStrategy::addLongPutSpread (Real *spot*, Real *volStrike1*, bool *isVol1*, Real *volStrike2*, bool *isVol2*, Real *r*, Real *K1*, Real *K2*, Real *T*, Real *Quantity*)

Create a long put spread in the portfolio.

Definition at line 95 of file OptionStrategy.cpp.

References addOneOptionToStrategy(), Put, r, and Real.

Referenced by inputPutSpread().

6.24.2.5 void OptionStrategy::addLongRatioCallSpread (Real *spot*, Real *volStrike1*, bool *isVol1*, Real *volStrike2*, bool *isVol2*, Real *r*, Real *K1*, Real *K2*, Real *T*, Real *Quantity*)

Create a long ratio call spread in the portfolio.

Definition at line 84 of file OptionStrategy.cpp.

References addOneOptionToStrategy(), Call, r, and Real.

Referenced by inputRatioCallSpread().

6.24.2.6 void OptionStrategy::addLongStraddle (Real *spot*, Real *vol*, bool *isVol*, Real *r*, Real *K*, Real *T*, Real *Quantity*)

Create a long straddle in the portfolio.

Definition at line 56 of file OptionStrategy.cpp.

References addOneOptionToStrategy(), Call, Put, r, and Real.

Referenced by inputStraddle().

6.24.2.7 void OptionStrategy::addLongStrangle (Real *spot*, Real *volStrike1*, bool *isVol1*, Real *volStrike2*, bool *isVol2*, Real *r*, Real *K1*, Real *K2*, Real *T*, Real *Quantity*)

Create a long strangle in the portfolio.

Definition at line 61 of file OptionStrategy.cpp.

References addOneOptionToStrategy(), Call, Put, r, and Real.

Referenced by inputStrangle().

6.24.2.8 void OptionStrategy::addOneBlackScholesObject (BlackScholes * *bs*, Real *Quantity*)

Definition at line 37 of file OptionStrategy.cpp.

References _insideOptions, _insideQuantities, _nbOptions, and Real.

Referenced by inputOptionStrategy(), and mainvarianceswap().

6.24.2.9 void OptionStrategy::addOneOptionToStrategy (Real *spot*, Real *vol*, bool *isVol*, Real *r*, Real *K*, Real *T*, TypeOptionBS *type*, Real *Quantity*)

Generic function to add Options to the Strategy.

Definition at line 29 of file OptionStrategy.cpp.

References _insideOptions, _insideQuantities, _nbOptions, r, and Real.

Referenced by addLongButterflySpread(), addLongCallSpread(), addLongPutSpread(), addLongRatioCallSpread(), addLongStraddle(), and addLongStrangle().

6.24.2.10 void OptionStrategy::changeMaturity (Real *addConstant* = defaultshiftMat)

Add constant maturity to the inside maturity of all **BlackScholes**(p. 26) objects.

Definition at line 175 of file OptionStrategy.cpp.

References _insideOptions, _nbOptions, BlackScholes::changeMaturity(), BlackScholes::getMaturity(), and Real.

Referenced by VarianceSwap::getTheta().

6.24.2.11 void OptionStrategy::changeRate (Real *addConstant* = defaultshiftRate)

Add constant rate to the inside rate of all **BlackScholes**(p. 26) objects.

Definition at line 161 of file OptionStrategy.cpp.

References _insideOptions, _nbOptions, BlackScholes::changeRate(), BlackScholes::getRate(), and Real.

Referenced by VarianceSwap::getRho().

6.24.2.12 void OptionStrategy::changeSpot (Real *addConstant* = defaultshiftSpot)

Add constant spot to the inside spot of all **BlackScholes**(p. 26) objects.

Definition at line 182 of file OptionStrategy.cpp.

References _insideOptions, _nbOptions, BlackScholes::changeSpot(), BlackScholes::getSpot(), and Real.

6.24.2.13 void OptionStrategy::changeStrike (Real *addConstant* = defaultshiftStrike)

Add constant strike to the inside strike of all **BlackScholes**(p. 26) objects.

Definition at line 189 of file OptionStrategy.cpp.

References _insideOptions, _nbOptions, BlackScholes::changeStrike(), BlackScholes::getStrike(), and Real.

6.24.2.14 void OptionStrategy::changeVol (Real *addConstant* = defaultshiftVol)

Add constant vol to the inside vol of all **BlackScholes**(p. 26) objects.

Definition at line 168 of file OptionStrategy.cpp.

References _insideOptions, _nbOptions, BlackScholes::changeVol(), BlackScholes::getVolatility(), and Real.

Referenced by VarianceSwap::getVega().

6.24.2.15 Real OptionStrategy::getGlobalDelta ()

Get Greeks for global **Portfolio**(p. 158).

Definition at line 106 of file OptionStrategy.cpp.

References _insideOptions, _insideQuantities, _nbOptions, and Real.

Referenced by inputOptionStrategy(), and mainoptionstrategy().

6.24.2.16 Real OptionStrategy::getGlobalGamma ()

Definition at line 114 of file OptionStrategy.cpp.

References _insideOptions, _insideQuantities, _nbOptions, and Real.

Referenced by inputOptionStrategy().

6.24.2.17 Real OptionStrategy::getGlobalRho ()

Definition at line 138 of file OptionStrategy.cpp.

References _insideOptions, _insideQuantities, _nbOptions, and Real.

Referenced by inputOptionStrategy(), and Portfolio::returnSensibilityToRate().

6.24.2.18 Real OptionStrategy::getGlobalTheta ()

Definition at line 130 of file OptionStrategy.cpp.

References _insideOptions, _insideQuantities, _nbOptions, and Real.

Referenced by inputOptionStrategy(), and Portfolio::returnSensibilityToTime().

6.24.2.19 Real OptionStrategy::getGlobalVega ()

Definition at line 122 of file OptionStrategy.cpp.

References _insideOptions, _insideQuantities, _nbOptions, and Real.

Referenced by inputOptionStrategy(), and Portfolio::returnSensibilityToVol().

6.24.2.20 Real OptionStrategy::recalcPrice ()

Recalculate global price of the portfolio in case of change.

Definition at line 19 of file OptionStrategy.cpp.

References _insideOptions, _insideQuantities, _nbOptions, and Real.

6.24.2.21 Natural OptionStrategy::returnNbOptions () const

Return number of options in the portfolio.

Definition at line 147 of file OptionStrategy.cpp.

References _nbOptions, and Natural.

Referenced by VarianceSwap::getPrice(), and operator<<().

6.24.2.22 BlackScholes * OptionStrategy::returnOption (Natural *i*) const

Return pointer on blackscholes object inside, used for variance swaps.

Definition at line 151 of file OptionStrategy.cpp.

References _insideOptions, and Natural.

Referenced by VarianceSwap::getPrice(), and operator<<().

6.24.2.23 Real OptionStrategy::returnOptionQuantity (Natural *i*) const

Return quantity on blackscholes object inside.

Definition at line 156 of file OptionStrategy.cpp.

References _insideOptions, _insideQuantities, Natural, and Real.

Referenced by operator<<().

6.24.2.24 Real OptionStrategy::returnPrice ()

Return global price of the portfolio.

Definition at line 14 of file OptionStrategy.cpp.

References Real.

Referenced by Portfolio::getPrice(), inputOptionStrategy(), and mainoptionstrategy().

6.24.3 Friends And Related Function Documentation

6.24.3.1 ostream& operator<< (ostream & *os*, const OptionStrategy * *optionStrategy*) [friend]

Definition at line 28 of file OptionStrategy.h.

6.24.3.2 ostream& operator<< (ostream & *os*, const OptionStrategy & *optionStrategy*) [friend]

display parameters of options in the optionstrategy object

Parameters:

os: the output stream to direct output to

optionStrategy: the option strategy to display

Returns:

output stream as is standard for operator<<

Definition at line 196 of file OptionStrategy.cpp.

6.24.4 Member Data Documentation

6.24.4.1 valarray<BlackScholes*> OptionStrategy::_insideOptions [private]

Definition at line 93 of file OptionStrategy.h.

Referenced by addOneBlackScholesObject(), addOneOptionToStrategy(), changeMaturity(), changeRate(), changeSpot(), changeStrike(), changeVol(), getGlobalDelta(), getGlobalGamma(), getGlobalRho(), getGlobalTheta(), getGlobalVega(), OptionStrategy(), recalcPrice(), returnOption(), and returnOptionQuantity().

6.24.4.2 valarray<Real> OptionStrategy::_insideQuantities [private]

Definition at line 94 of file OptionStrategy.h.

Referenced by addOneBlackScholesObject(), addOneOptionToStrategy(), getGlobalDelta(), getGlobalGamma(), getGlobalRho(), getGlobalTheta(), getGlobalVega(), OptionStrategy(), recalcPrice(), and returnOptionQuantity().

6.24.4.3 Natural OptionStrategy::_nbOptions [private]

Definition at line 92 of file OptionStrategy.h.

Referenced by addOneBlackScholesObject(), addOneOptionToStrategy(), changeMaturity(), changeRate(), changeSpot(), changeStrike(), changeVol(), getGlobalDelta(), getGlobalGamma(), getGlobalRho(), getGlobalTheta(), getGlobalVega(), OptionStrategy(), recalcPrice(), and returnNbOptions().

6.24.4.4 Real OptionStrategy::_price [private]

Definition at line 91 of file OptionStrategy.h.

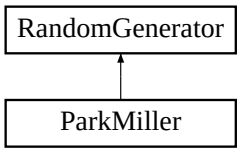
The documentation for this class was generated from the following files:

- **OptionStrategy.h**
- **OptionStrategy.cpp**

6.25 ParkMiller Class Reference

`#include <ParkMiller.h>`

Inheritance diagram for ParkMiller::



Public Member Functions

- **ParkMiller** (**LongNatural** Seed_=0)
  Default constructor: initialize variable.
- ~**ParkMiller** ()
- **LongNatural GetOneRandomInteger** ()
  Create one random integer.
- **Real getUniform** ()
  Creates one uniform number on (0.0,1.0).
- void **SetSeed** (**LongNatural Seed**)
  Set seed for generator.
- **VeryLongNatural Max** ()
  Return maximum number of random numbers.
- **LongNatural Min** ()
  Return minimum of numbers generated.

Private Attributes

- **LongNatural Seed**

6.25.1 Constructor & Destructor Documentation

6.25.1.1 ParkMiller::ParkMiller (LongNatural *Seed_* = 0)

Default constructor: initialize variable.

Definition at line 4 of file ParkMiller.cpp.

References LongNatural, and Seed.

6.25.1.2 ParkMiller::~ParkMiller ()

Definition at line 9 of file ParkMiller.cpp.

6.25.2 Member Function Documentation

6.25.2.1 LongNatural ParkMiller::GetOneRandomInteger () [virtual]

Create one random integer.

Implements **RandomGenerator** (p. 190).

Definition at line 28 of file ParkMiller.cpp.

References a, LongInteger, LongNatural, m, q, r, and Seed.

Referenced by getUniform().

6.25.2.2 Real ParkMiller::getUniform () [virtual]

Creates one uniform number on (0.0,1.0).

Implements **RandomGenerator** (p. 190).

Definition at line 42 of file ParkMiller.cpp.

References GetOneRandomInteger(), m, and Real.

6.25.2.3 VeryLongNatural ParkMiller::Max () [virtual]

Return maximum number of random numbers.

Implements **RandomGenerator** (p. 190).

Definition at line 20 of file ParkMiller.cpp.

References m, and VeryLongNatural.

6.25.2.4 LongNatural ParkMiller::Min () [virtual]

Return minimum of numbers generated.

Implements **RandomGenerator** (p. 190).

Definition at line 24 of file ParkMiller.cpp.

References LongNatural.

6.25.2.5 void ParkMiller::SetSeed (LongNatural *Seed*) [virtual]

Set seed for generator.

Reimplemented from **RandomGenerator** (p. 190).

Definition at line 46 of file ParkMiller.cpp.

References LongNatural, and Seed.

6.25.3 Member Data Documentation

6.25.3.1 LongNatural ParkMiller::Seed [private]

Reimplemented from **RandomGenerator** (p. 191).

Definition at line 36 of file ParkMiller.h.

Referenced by GetOneRandomInteger(), ParkMiller(), and SetSeed().

The documentation for this class was generated from the following files:

- **ParkMiller.h**
- **ParkMiller.cpp**

6.26 PayOff Class Reference

`#include <PayOff.h>`

Public Member Functions

- **PayOff** (**Real** Strike_)
  Default constructor: set Strike.
- **PayOff** (void)
  void constructor
- void **SetStrike** (**Real** Strike_)
- virtual **Real operator()** (**Real** Spot) const
  Nice operator for european call options only.
- virtual ~**PayOff** ()
- virtual **Real Call** (**Real** Fwd)
  Return the payoff of a call.
- virtual **Real Put** (**Real** Fwd)
  Return the payoff of a put.
- virtual **Real AsianCall** (valarray< **Real** > Path, **LongNatural** nDates)
  Return the payoff of an asian call.
- virtual **Real AsianPut** (valarray< **Real** > Path, **LongNatural** nDates)
  Return the payoff of an asian put.
- virtual **Real RevLookbackCall** (valarray< **Real** > Path, **LongNatural** nDates)
  Return the payoff of a look back call.
- virtual **Real RevLookbackPut** (valarray< **Real** > Path, **LongNatural** nDates)
  Return the payoff of a look back put.
- virtual **Real BarrierCall** (valarray< **Real** > Path, **LongNatural** nDates)
  Return the payoff of a barrier call.
- virtual **Real BarrierPut** (valarray< **Real** > Path, **LongNatural** nDates)
  Return the payoff of a barrier put.
- virtual **Real FlooredCliquet** (**Real** Spot, **Real** Fwd)
  Return the payoff of a floor.
- virtual **Real CappedCliquet** (**Real** Spot, **Real** Fwd)
  Return the payoff of a cap.
- virtual **Real Rainbow2SpreadOptionMax** (**Real** Fwd1, **Real** Fwd2, **Real** W1, **Real** W2, **Real** Mult)

- virtual **Real Rainbow2AssetsBasketMax** (**Real** Fwd1, **Real** Fwd2, **Real** W1, **Real** W2, **Real** Mult)
- virtual **Real RainbowBestOf2AssetsCash** (**Real** Fwd1, **Real** Fwd2, **Real** W1, **Real** W2)
- virtual **Real RainbowWorstOf2AssetsCash** (**Real** Fwd1, **Real** Fwd2, **Real** W1, **Real** W2)
- virtual **Real RainbowMax2AssetsCall** (**Real** Fwd1, **Real** Fwd2, **Real** W1, **Real** W2, **Real** Mult)
- virtual **Real RainbowMin2AssetsCall** (**Real** Fwd1, **Real** Fwd2, **Real** W1, **Real** W2, **Real** Mult)
- virtual **Real RainbowMax2AssetsPut** (**Real** Fwd1, **Real** Fwd2, **Real** W1, **Real** W2, **Real** Mult)
- virtual **Real RainbowMin2AssetsPut** (**Real** Fwd1, **Real** Fwd2, **Real** W1, **Real** W2, **Real** Mult)
- virtual **Real Convertible** (**Real** Fwd, **Real** ConversionRatio, **Real** BondPrice, **Real** Call-Price=TN_INFINITY, **Real** PutPrice=0)

Private Attributes

- **Real Strike**

6.26.1 Constructor & Destructor Documentation

6.26.1.1 PayOff::PayOff (Real *Strike_*)

Default constructor: set Strike.

Definition at line 5 of file PayOff.cpp.

References Real.

6.26.1.2 PayOff::PayOff (void)

void constructor

Author:
Yann

Definition at line 9 of file PayOff.cpp.

6.26.1.3 virtual PayOff::~PayOff () `[inline, virtual]`

Definition at line 24 of file PayOff.h.

6.26.2 Member Function Documentation

6.26.2.1 Real PayOff::AsianCall (valarray< Real > *Path*, LongNatural *nDates*) `[virtual]`

Return the payoff of an asian call.

Definition at line 34 of file PayOff.cpp.

References Average(), LongNatural, Real, and Strike.

Referenced by MCEngine::RunEngineAsianCall().

6.26.2.2 Real PayOff::AsianPut (valarray< Real > *Path*, LongNatural *nDates*) [virtual]

Return the payoff of an asian put.

Definition at line 39 of file PayOff.cpp.

References Average(), LongNatural, Real, and Strike.

Referenced by MCEngine::RunEngineAsianPut().

6.26.2.3 Real PayOff::BarrierCall (valarray< Real > *Path*, LongNatural *nDates*) [virtual]

Return the payoff of a barrier call.

Definition at line 54 of file PayOff.cpp.

References LongNatural, Real, and Strike.

Referenced by MCEngine::RunEngineBarrierCall().

6.26.2.4 Real PayOff::BarrierPut (valarray< Real > *Path*, LongNatural *nDates*) [virtual]

Return the payoff of a barrier put.

Definition at line 62 of file PayOff.cpp.

References LongNatural, Real, and Strike.

Referenced by MCEngine::RunEngineBarrierPut().

6.26.2.5 Real PayOff::Call (Real *Fwd*) [virtual]

Return the payoff of a call.

Definition at line 24 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineCall(), and binomialTree::runEngineCall().

6.26.2.6 Real PayOff::CappedCliquet (Real *Spot*, Real *Fwd*) [virtual]

Return the payoff of a cap.

Definition at line 77 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineCappedCliquet().

6.26.2.7 Real PayOff::Convertible (Real *Fwd*, Real *ConversionRatio*, Real *BondPrice*, Real *CallPrice* = TN_INFINITY, Real *PutPrice* = 0) [virtual]

Returns:
the payoff of a Convertible bond

If CallPrice and PutPrice are omitted they are set to infinity and zero respectively so that they don't factor into the calculation

Definition at line 124 of file PayOff.cpp.

References Real.

Referenced by binomialTree::runEngineConvertibleBond().

6.26.2.8 Real PayOff::FlooredCliquet (Real *Spot*, Real *Fwd*) [virtual]

Return the payoff of a floor.

Definition at line 70 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineFlooredCliquet().

6.26.2.9 Real PayOff::operator() (Real *Spot*) const [virtual]

Nice operator for european call options only.

Definition at line 19 of file PayOff.cpp.

References Real, and Strike.

6.26.2.10 Real PayOff::Put (Real *Fwd*) [virtual]

Return the payoff of a put.

Definition at line 29 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEnginePut().

6.26.2.11 Real PayOff::Rainbow2AssetsBasketMax (Real *Fwd1*, Real *Fwd2*, Real *W1*, Real *W2*, Real *Mult*) [virtual]

Returns:
the payoff of a basket option with 2 assets

Definition at line 89 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineRainbow2AssetsBasketMax().

6.26.2.12 Real PayOff::Rainbow2SpreadOptionMax (Real *Fwd1*, Real *Fwd2*, Real *W1*, Real *W2*, Real *Mult*) [virtual]

Returns:
the payoff of a Spread option with 2 assets

Definition at line 84 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineRainbow2SpreadOptionMax().

6.26.2.13 Real PayOff::RainbowBestOf2AssetsCash (Real *Fwd1*, Real *Fwd2*, Real *W1*, Real *W2*) [virtual]

Returns:
the payoff of a best of + cash option with 2 assets

Definition at line 94 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineRainbowBestOf2AssetsCash().

6.26.2.14 Real PayOff::RainbowMax2AssetsCall (Real *Fwd1*, Real *Fwd2*, Real *W1*, Real *W2*, Real *Mult*) [virtual]

Returns:
the payoff of a Max call option with 2 assets

Definition at line 104 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineRainbowMax2AssetsCall().

6.26.2.15 Real PayOff::RainbowMax2AssetsPut (Real *Fwd1*, Real *Fwd2*, Real *W1*, Real *W2*, Real *Mult*) [virtual]

Returns:
the payoff of a Max put option with 2 assets

Definition at line 114 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineRainbowMax2AssetsPut().

6.26.2.16 Real PayOff::RainbowMin2AssetsCall (Real *Fwd1*, Real *Fwd2*, Real *W1*, Real *W2*, Real *Mult*) [virtual]

Returns:
the payoff of a Min call option with 2 assets

Definition at line 109 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineRainbowMin2AssetsCall().

6.26.2.17 Real PayOff::RainbowMin2AssetsPut (Real *Fwd1*, Real *Fwd2*, Real *W1*, Real *W2*, Real *Mult*) [virtual]

Returns:
the payoff of a Min put option with 2 assets

Definition at line 119 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineRainbowMin2AssetsPut().

6.26.2.18 Real PayOff::RainbowWorstOf2AssetsCash (Real *Fwd1*, Real *Fwd2*, Real *W1*, Real *W2*) [virtual]

Returns:
the payoff of a worst of + cash option with 2 assets

Definition at line 99 of file PayOff.cpp.

References Real, and Strike.

Referenced by MCEngine::RunEngineRainbowWorstOf2AssetsCash().

6.26.2.19 Real PayOff::RevLookbackCall (valarray< Real > *Path*, LongNatural *nDates*) [virtual]

Return the payoff of a look back call.

Definition at line 44 of file PayOff.cpp.

References LongNatural, Maximize(), Real, and Strike.

Referenced by MCEngine::RunEngineRevLookbackCall().

6.26.2.20 Real PayOff::RevLookbackPut (valarray< Real > *Path*, LongNatural *nDates*) [virtual]

Return the payoff of a look back put.

Definition at line 49 of file PayOff.cpp.

References LongNatural, Maximize(), Real, and Strike.

Referenced by MCEngine::RunEngineRevLookbackPut().

6.26.2.21 void PayOff::SetStrike (Real *Strike_*)

Definition at line 13 of file PayOff.cpp.

References Real, and Strike.

Referenced by RainbowOption::instanciateMCVariables(), and RainbowOption::RainbowOption().

6.26.3 Member Data Documentation

6.26.3.1 Real PayOff::Strike [private]

Definition at line 88 of file PayOff.h.

Referenced by AsianCall(), AsianPut(), BarrierCall(), BarrierPut(), Call(), CappedCliquet(), FlooredCliquet(), operator()(), Put(), Rainbow2AssetsBasketMax(), Rainbow2SpreadOptionMax(), RainbowBestOf2AssetsCash(), RainbowMax2AssetsCall(), RainbowMax2AssetsPut(), RainbowMin2AssetsCall(), RainbowMin2AssetsPut(), RainbowWorstOf2AssetsCash(), RevLookbackCall(), RevLookbackPut(), and SetStrike().

The documentation for this class was generated from the following files:

- **PayOff.h**
- **PayOff.cpp**

6.27 Portfolio Class Reference

`#include <PortFolio.h>`

Public Member Functions

- **Portfolio** (char *name, **Currency** currency)
  Default Constructor : just initialization of size.
- ~**Portfolio** (void)
- char * **getName** ()
  Return name of the portfolio.
- **Currency getCurrency** ()
  Return currency of the portfolio.
- char * **getCurrencyAsString** ()
  Return currency of the portfolio as a string.
- void **addOptionStrategy** (**OptionStrategy** *optionStrategy)
  Add one option to the Portfolio.
- void **addRainbowOption** (**RainbowOption** *rainbowOption, **Real** quantity)
  Add one rainbow option to the Portfolio.
- void **addExoticOption** (**Exotics** *exoticOption, **Real** quantity)
  Add one exotic option to the Portfolio.
- void **addVanillaSwap** (**VanillaSwap** *vanillaSwap, **Real** quantity)
  Add one vanilla swap to the Portfolio.
- void **addVarianceSwap** (**VarianceSwap** *varSwap, **Real** quantity)
  Add one variance swap to the Portfolio.
- void **addBond** (**bond** *oneBond, **Real** quantity)
  Add one bond to the Portfolio.
- void **addAsset** (**asset** *oneAsset, **Real** quantity)
  Add one asset to the Portfolio.
- **Real getPrice** ()
  Return Price of the whole Portfolio.
- **Real returnSensibilityToRate** ()
  Return sensibility to interest rate.
- **Real returnSensibilityToVol** ()
  Return sensibility to volatility.

- **Real returnSensibilityToTime** ()

  Return sensibility to time.

Private Attributes

- char * **_name**
- **Currency _currency**
- **OptionStrategy _optionStrategy**
- valarray< **RainbowOption** * > **_rainbowOptions**
- valarray< **Exotics** * > **_exoticsOptions**
- valarray< **VanillaSwap** * > **_vanSwaps**
- valarray< **VarianceSwap** * > **_varSwaps**
- valarray< **bond** * > **_bonds**
- valarray< **asset** * > **_assets**
- valarray< **Real** > **_quantityRainbowOptions**
- valarray< **Real** > **_quantityExoticsOptions**
- valarray< **Real** > **_quantityVanSwaps**
- valarray< **Real** > **_quantityVarSwaps**
- valarray< **Real** > **_quantityBonds**
- valarray< **Real** > **_quantityAssets**
- **Natural _nbRainbowOptions**
- **Natural _nbExoticsOptions**
- **Natural _nbVanSwaps**
- **Natural _nbVarSwaps**
- **Natural _nbBonds**
- **Natural _nbAssets**

6.27.1 Detailed Description

Author:
Simon

Definition at line 24 of file PortFolio.h.

6.27.2 Constructor & Destructor Documentation

6.27.2.1 Portfolio::Portfolio (char * *name*, Currency *currency*)

Default Constructor : just initialization of size.

Parameters:
name: Name of the portfolio

currency: Currency of the portfolio

Definition at line 3 of file PortFolio.cpp.

References _assets, _bonds, _nbAssets, _nbBonds, _nbRainbowOptions, _nbVanSwaps, _nbVarSwaps, _optionStrategy, _rainbowOptions, _vanSwaps, _varSwaps, MAX_SIZE, and MAX_SIZE_NAME.

6.27.2.2 Portfolio::~Portfolio (void)

Definition at line 21 of file PortFolio.cpp.

6.27.3 Member Function Documentation

6.27.3.1 void Portfolio::addAsset (asset * *oneAsset*, Real *quantity*)

Add one asset to the Portfolio.

Definition at line 85 of file PortFolio.cpp.

References _assets, _nbAssets, _quantityAssets, and Real.

6.27.3.2 void Portfolio::addBond (bond * *oneBond*, Real *quantity*)

Add one bond to the Portfolio.

Definition at line 79 of file PortFolio.cpp.

References _bonds, _nbBonds, _quantityBonds, and Real.

6.27.3.3 void Portfolio::addExoticOption (Exotics * *exoticOption*, Real *quantity*)

Add one exotic option to the Portfolio.

Definition at line 61 of file PortFolio.cpp.

References _exoticsOptions, _nbExoticsOptions, _quantityExoticsOptions, and Real.

6.27.3.4 void Portfolio::addOptionStrategy (OptionStrategy * *optionStrategy*)

Add one option to the Portfolio.

Definition at line 51 of file PortFolio.cpp.

References _optionStrategy.

6.27.3.5 void Portfolio::addRainbowOption (RainbowOption * *rainbowOption*, Real *quantity*)

Add one rainbow option to the Portfolio.

Definition at line 55 of file PortFolio.cpp.

References _nbRainbowOptions, _quantityRainbowOptions, _rainbowOptions, and Real.

6.27.3.6 void Portfolio::addVanillaSwap (VanillaSwap * *vanillaSwap*, Real *quantity*)

Add one vanilla swap to the Portfolio.

Definition at line 67 of file PortFolio.cpp.

References _nbVanSwaps, _quantityVanSwaps, _vanSwaps, and Real.

6.27.3.7 void Portfolio::addVarianceSwap (VarianceSwap * *varSwap*, Real *quantity*)

Add one variance swap to the Portfolio.

Definition at line 73 of file PortFolio.cpp.

References _nbVarSwaps, _quantityVarSwaps, _varSwaps, and Real.

6.27.3.8 Currency Portfolio::getCurrency ()

Return currency of the portfolio.

Definition at line 29 of file PortFolio.cpp.

References Currency.

6.27.3.9 char * Portfolio::getCurrencyAsString ()

Return currency of the portfolio as a string.

Definition at line 33 of file PortFolio.cpp.

References CAD, EUR, MAX_SIZE_NAME, and USD.

6.27.3.10 char * Portfolio::getName ()

Return name of the portfolio.

Definition at line 25 of file PortFolio.cpp.

6.27.3.11 Real Portfolio::getPrice ()

Return Price of the whole Portfolio.

Definition at line 91 of file PortFolio.cpp.

References _assets, _bonds, _exoticsOptions, _nbAssets, _nbBonds, _nbExoticsOptions, _nbRainbowOptions, _nbVanSwaps, _nbVarSwaps, _optionStrategy, _rainbowOptions, _vanSwaps, _varSwaps, Integer, Real, and OptionStrategy::returnPrice().

6.27.3.12 Real Portfolio::returnSensibilityToRate ()

Return sensibility to interest rate.

Definition at line 115 of file PortFolio.cpp.

References _assets, _bonds, _exoticsOptions, _nbAssets, _nbBonds, _nbExoticsOptions, _nbRainbowOptions, _nbVanSwaps, _nbVarSwaps, _optionStrategy, _rainbowOptions, _vanSwaps, _varSwaps, OptionStrategy::getGlobalRho(), Integer, and Real.

6.27.3.13 Real Portfolio::returnSensibilityToTime ()

Return sensibility to time.

Definition at line 154 of file PortFolio.cpp.

References _exoticsOptions, _nbExoticsOptions, _nbRainbowOptions, _nbVanSwaps, _nbVarSwaps, _optionStrategy, _rainbowOptions, _vanSwaps, _varSwaps, OptionStrategy::getGlobalTheta(), Integer, and Real.

6.27.3.14 Real Portfolio::returnSensibilityToVol ()

Return sensibility to volatility.

Definition at line 139 of file PortFolio.cpp.

References _exoticsOptions, _nbExoticsOptions, _nbRainbowOptions, _nbVarSwaps, _optionStrategy, _rainbowOptions, _varSwaps, OptionStrategy::getGlobalVega(), Integer, and Real.

6.27.4 Member Data Documentation

6.27.4.1 valarray<asset*> Portfolio::_assets [private]

Definition at line 88 of file PortFolio.h.

Referenced by addAsset(), getPrice(), Portfolio(), and returnSensibilityToRate().

6.27.4.2 valarray<bond*> Portfolio::_bonds [private]

Definition at line 87 of file PortFolio.h.

Referenced by addBond(), getPrice(), Portfolio(), and returnSensibilityToRate().

6.27.4.3 Currency Portfolio::_currency [private]

Definition at line 80 of file PortFolio.h.

6.27.4.4 valarray<Exotics*> Portfolio::_exoticsOptions [private]

Definition at line 84 of file PortFolio.h.

Referenced by addExoticOption(), getPrice(), returnSensibilityToRate(), returnSensibilityToTime(), and returnSensibilityToVol().

6.27.4.5 char* Portfolio::_name [private]

Definition at line 79 of file PortFolio.h.

6.27.4.6 Natural Portfolio::_nbAssets [private]

Definition at line 102 of file PortFolio.h.

Referenced by addAsset(), getPrice(), Portfolio(), and returnSensibilityToRate().

6.27.4.7 Natural Portfolio::_nbBonds [private]

Definition at line 101 of file PortFolio.h.

Referenced by addBond(), getPrice(), Portfolio(), and returnSensibilityToRate().

6.27.4.8 Natural Portfolio::_nbExoticsOptions [private]

Definition at line 98 of file PortFolio.h.

Referenced by addExoticOption(), getPrice(), returnSensibilityToRate(), returnSensibilityToTime(), and returnSensibilityToVol().

6.27.4.9 Natural Portfolio::_nbRainbowOptions [private]

Definition at line 97 of file PortFolio.h.

Referenced by addRainbowOption(), getPrice(), Portfolio(), returnSensibilityToRate(), returnSensibilityToTime(), and returnSensibilityToVol().

6.27.4.10 Natural Portfolio::_nbVanSwaps [private]

Definition at line 99 of file PortFolio.h.

Referenced by addVanillaSwap(), getPrice(), Portfolio(), returnSensibilityToRate(), and returnSensibilityToTime().

6.27.4.11 Natural Portfolio::_nbVarSwaps [private]

Definition at line 100 of file PortFolio.h.

Referenced by addVarianceSwap(), getPrice(), Portfolio(), returnSensibilityToRate(), returnSensibilityToTime(), and returnSensibilityToVol().

6.27.4.12 OptionStrategy Portfolio::_optionStrategy [private]

Definition at line 82 of file PortFolio.h.

Referenced by addOptionStrategy(), getPrice(), Portfolio(), returnSensibilityToRate(), returnSensibilityToTime(), and returnSensibilityToVol().

6.27.4.13 valarray<Real> Portfolio::_quantityAssets [private]

Definition at line 95 of file PortFolio.h.

Referenced by addAsset().

6.27.4.14 valarray<Real> Portfolio::_quantityBonds [private]

Definition at line 94 of file PortFolio.h.

Referenced by addBond().

6.27.4.15 valarray<Real> Portfolio::_quantityExoticsOptions [private]

Definition at line 91 of file PortFolio.h.

Referenced by addExoticOption().

6.27.4.16 valarray<Real> Portfolio::_quantityRainbowOptions [private]

Definition at line 90 of file PortFolio.h.

Referenced by addRainbowOption().

6.27.4.17 valarray<Real> Portfolio::_quantityVanSwaps [private]

Definition at line 92 of file PortFolio.h.

Referenced by addVanillaSwap().

6.27.4.18 valarray<Real> Portfolio::_quantityVarSwaps [private]

Definition at line 93 of file PortFolio.h.

Referenced by addVarianceSwap().

6.27.4.19 valarray<RainbowOption*> Portfolio::_rainbowOptions [private]

Definition at line 83 of file PortFolio.h.

Referenced by addRainbowOption(), getPrice(), Portfolio(), returnSensibilityToRate(), returnSensibilityToTime(), and returnSensibilityToVol().

6.27.4.20 valarray<VanillaSwap*> Portfolio::_vanSwaps [private]

Definition at line 85 of file PortFolio.h.

Referenced by addVanillaSwap(), getPrice(), Portfolio(), returnSensibilityToRate(), and returnSensibilityToTime().

6.27.4.21 valarray<VarianceSwap*> Portfolio::_varSwaps [private]

Definition at line 86 of file PortFolio.h.

Referenced by addVarianceSwap(), getPrice(), Portfolio(), returnSensibilityToRate(), returnSensibilityToTime(), and returnSensibilityToVol().

The documentation for this class was generated from the following files:

- **PortFolio.h**
- **PortFolio.cpp**

6.28 RainbowOption Class Reference

`#include <rainbowoption.h>`

Public Member Functions

- **RainbowOption** (void)

  The default constructor will instantiate a rainbow such with : - a non correlated basket - of RO_DEFAULT_NB_ASSETS assets, - equally weighted, and - with RO_DEFAULT_MULTIPLIER.

- **RainbowOption** (**rainbowType** type, **Date** startDate, **Real** expiry, **Real** Strike, **yieldCurve** yc, valarray< **volsurface** > vols, valarray< **Real** > spots=valarray< **Real** >(RO_DEFAULT_STRIKE, RO_DEFAULT_NB_ASSETS), **Real** Multiplier=RO_DEFAULT_MULTIPLIER, **Matrix** Correl=IdentityMatrix(RO_DEFAULT_NB_ASSETS), valarray< **Real** > weights=valarray< **Real** >(1/(**Real**) RO_DEFAULT_NB_ASSETS, RO_DEFAULT_NB_ASSETS), bool outputMsgs=false)

  Full general constructor with n assets.

- **RainbowOption** (**rainbowType** type, **Date** start, **Real** exp, **Real** Strike, **yieldCurve** yc, valarray< **volsurface** > vols, **Real** Spot1, **Real** Spot2, **Real** Mult=RO_DEFAULT_MULTIPLIER, **Real** Correl12=0, **Real** weight1=0.5, **Real** weight2=0.5, bool outputMsgs=false)

  For 2 assets.

- ~**RainbowOption** (void)
- **Real getPrice** (**priceType** priceMethod=ClosedForm, **LongNatural** nPaths=RO_NPATHS)
- **Real getPartialDelta** (**Natural** security, **priceType** priceMethod=ClosedForm)

  by convention, security 1 is the 0th spot in the array, so user "logical"

- **Real getPartialGamma** (**Natural** security, **priceType** priceMethod=ClosedForm)

  by convention, security 1 is the 0th spot in the array, so user "logical"

- **Real getPartialVega** (**Natural** security, **priceType** priceMethod=ClosedForm)

  by convention, security 1 is the 0th spot in the array, so user "logical"

- **Real getDelta** (**priceType** priceMethod=ClosedForm)
- **Real getGamma** (**priceType** priceMethod=ClosedForm)
- **Real getVega** (**priceType** priceMethod=ClosedForm)
- **Real getCorrelRisk** (**priceType** priceMethod=ClosedForm)

  Correl Risk.

- **Real getRho** (**priceType** priceMethod=ClosedForm)

  Rho risk.

- **Real getTheta** (**priceType** priceMethod=ClosedForm)

  Theata risk.

- **rainbowType getRainbowType** ()
- void **setRainbowType** (**rainbowType** newType)

Private Member Functions

- **Real PriceByMc_2SpreadOptionMax** (**LongNatural** nPaths=RO_NPATHS)
- **Real PriceByMc_2AssetsBasketMax** (**LongNatural** nPaths=RO_NPATHS)
- **Real PriceByMc_BestOf2AssetsCash** (**LongNatural** nPaths=RO_NPATHS)
- **Real PriceByMc_WorstOf2AssetsCash** (**LongNatural** nPaths=RO_NPATHS)
- **Real PriceByMc_BetterOf2Assets** (**LongNatural** nPaths=RO_NPATHS)
- **Real PriceByMc_WorseOf2Assets** (**LongNatural** nPaths=RO_NPATHS)
- **Real PriceByMc_Max2AssetsCall** (**LongNatural** nPaths=RO_NPATHS)
- **Real PriceByMc_Min2AssetsCall** (**LongNatural** nPaths=RO_NPATHS)
- **Real PriceByMc_Max2AssetsPut** (**LongNatural** nPaths=RO_NPATHS)
- **Real PriceByMc_Min2AssetsPut** (**LongNatural** nPaths=RO_NPATHS)
- **Real PriceByClosedForm_BestOf2_plusCash** ()
- **Real PriceByClosedForm_BetterOf2** ()
- **Real PriceByClosedForm_WorseOf2** ()
- **Real PriceByClosedForm_MaxOf2_call** ()
- **Real PriceByClosedForm_MinOf2_call** ()
- **Real PriceByClosedForm_MaxOf2_put** ()
- **Real PriceByClosedForm_MinOf2_put** ()
- void **reassignVolsAtThemoney** ()
- void **reassignVolsAtThestrike** ()
- void **instanciateMCVariables** ()
- void **compute_sigmaA** ()
- void **compute_rho1** ()
- void **compute_rho2** ()
- void **compute_d1** ()
- void **compute_d2** ()
- void **compute_d3** ()
- void **compute_d4** ()
- void **compute_A** ()
- void **compute_B** ()
- void **compute_C** ()
- void **compute_ClosedFormsParameters** ()

Private Attributes

- bool **_outputMsgs**
- **Date _startDate**
- **Real _expiryInYears**
- **Natural _NumberOfAssets**
- **Real _Strike**
- valarray< **Real** > **_spots**
- **Real _Multiplier**
- valarray< **Real** > **_weights**
- **Matrix _CorrelationMatrix**
- valarray< **Real** > **_volatilities**
- valarray< **volsurface** > **_volatilitiesSurfaces**
- **yieldCurve _yc**
- **rainbowType _type**
- **PayOff _thePayOff**

- **Real _DFTomaturity**
- valarray< **Drift** > **_Drifts**
- **Random** * **_pRandom**
- **MCEngine _MCEngine**
- **Real _gaussianSample**
- valarray< **Real** > **_TerminalPoints**
- valarray< **GaussianProcess** > **_pHazardRateProcesses**
- **LongNatural _seed**
- **Real sigmaA**
- **Real rho1**
- **Real rho2**
- **Real d1**
- **Real d2**
- **Real d3**
- **Real d4**
- **Real A**
- **Real B**
- **Real C**
- bool **haveClosedFormVariablesBeenComputed**

6.28.1 Constructor & Destructor Documentation

6.28.1.1 RainbowOption::RainbowOption (void)

The default constructor will instantiate a rainbow such with : - a non correlated basket - of RO_DEFAULT_NB_ASSETS assets, - equally weighted, and - with RO_DEFAULT_MULTIPLIER.

Definition at line 3 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _expiryInYears, _Multiplier, _NumberOfAssets, _outputMsgs, _pRandom, _seed, _spots, _startDate, _Strike, _volatilities, _volatilitiesSurfaces, _weights, BestOf2AssetsCash, yieldCurve::discountFactor(), haveClosedFormVariablesBeenComputed, IdentityMatrix(), LongNatural, Real, RO_DEFAULT_MATURITY, RO_DEFAULT_NB_ASSETS, RO_DEFAULT_RATE, RO_DEFAULT_STRIKE, RO_DEFAULT_VOL, RO_SEED, and Date::setDateToToday().

6.28.1.2 RainbowOption::RainbowOption (rainbowType *type*, Date *startDate*, Real *expiry*, Real *Strike*, yieldCurve *yc*, valarray< volsurface > *vols*, valarray< Real > *spots* = valarray< Real >(RO_DEFAULT_STRIKE, RO_DEFAULT_NB_ASSETS), Real *Multiplier* = RO_DEFAULT_MULTIPLIER, Matrix *Correl* = IdentityMatrix(RO_DEFAULT_NB_ASSETS), valarray< Real > *weights* = valarray< Real >(1/(Real) RO_DEFAULT_NB_ASSETS, RO_DEFAULT_NB_ASSETS), bool *outputMsgs* = false)

Full general constructor with n assets.

Definition at line 29 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _expiryInYears, _NumberOfAssets, _pRandom, _seed, _Strike, _thePayOff, yieldCurve::discountFactor(), Matrix::GetRows(), haveClosedFormVariablesBeenComputed, LongNatural, Real, reassignVolsAtThestrike(), RO_SEED, and PayOff::SetStrike().

6.28.1.3 RainbowOption::RainbowOption (rainbowType *type*, Date *start*, Real *exp*, Real *Strike*, yieldCurve *yc*, valarray< volsurface > *vols*, Real *Spot1*, Real *Spot2*, Real *Mult* = RO_DEFAULT_MULTIPLIER, Real *Correl12* = 0, Real *weight1* = 0.5, Real *weight2* = 0.5, bool *outputMsgs* = false)

For 2 assets.

Parameters:

Real Correl: the correlation between 1 and 2 - default is 0

Definition at line 52 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _expiryInYears, _NumberOfAssets, _pRandom, _seed, _spots, _volatilities, _weights, yieldCurve::discountFactor(), haveClosedFormVariablesBeenComputed, IdentityMatrix(), LongNatural, Real, reassignVolsAtThestrike(), RO_SEED, and Matrix::SetValue().

6.28.1.4 RainbowOption::~RainbowOption (void)

Definition at line 679 of file rainbowoption.cpp.

6.28.2 Member Function Documentation

6.28.2.1 void RainbowOption::compute_A () [private]

Definition at line 541 of file rainbowoption.cpp.

References _spots, A, CumulativeBivariateNormal(), CumulativeNormal(), d3, Real, and rho1.

Referenced by compute_ClosedFormsParameters().

6.28.2.2 void RainbowOption::compute_B () [private]

Definition at line 547 of file rainbowoption.cpp.

References _spots, B, CumulativeBivariateNormal(), CumulativeNormal(), d4, Real, and rho2.

Referenced by compute_ClosedFormsParameters().

6.28.2.3 void RainbowOption::compute_C () [private]

Definition at line 553 of file rainbowoption.cpp.

References _CorrelationMatrix, _expiryInYears, _Strike, _volatilities, a, C, CumulativeBivariateNormal(), Real, and yieldCurve::spotRate().

Referenced by compute_ClosedFormsParameters().

6.28.2.4 void RainbowOption::compute_ClosedFormsParameters () [private]

Definition at line 564 of file rainbowoption.cpp.

References compute_A(), compute_B(), compute_C(), compute_d1(), compute_d2(), compute_d3(), compute_d4(), compute_rho1(), compute_rho2(), and compute_sigmaA().

Referenced by PriceByClosedForm_BestOf2_plusCash(), PriceByClosedForm_BetterOf2(), PriceByClosedForm_MaxOf2_call(), and PriceByClosedForm_MaxOf2_put().

6.28.2.5 void RainbowOption::compute_d1 () [private]

Definition at line 507 of file rainbowoption.cpp.

References _expiryInYears, _spots, _Strike, _volatilities, Real, and yieldCurve::spotRate().

Referenced by compute_ClosedFormsParameters().

6.28.2.6 void RainbowOption::compute_d2 () [private]

Definition at line 516 of file rainbowoption.cpp.

References _expiryInYears, _spots, _Strike, _volatilities, Real, and yieldCurve::spotRate().

Referenced by compute_ClosedFormsParameters().

6.28.2.7 void RainbowOption::compute_d3 () [private]

Definition at line 525 of file rainbowoption.cpp.

References _expiryInYears, _spots, d3, Real, and sigmaA.

Referenced by compute_ClosedFormsParameters().

6.28.2.8 void RainbowOption::compute_d4 () [private]

Definition at line 533 of file rainbowoption.cpp.

References _expiryInYears, _spots, d4, Real, and sigmaA.

Referenced by compute_ClosedFormsParameters().

6.28.2.9 void RainbowOption::compute_rho1 () [private]

Definition at line 491 of file rainbowoption.cpp.

References _CorrelationMatrix, _volatilities, Real, rho1, and sigmaA.

Referenced by compute_ClosedFormsParameters().

6.28.2.10 void RainbowOption::compute_rho2 () [private]

Definition at line 499 of file rainbowoption.cpp.

References _CorrelationMatrix, _volatilities, Real, rho2, and sigmaA.

Referenced by compute_ClosedFormsParameters().

6.28.2.11 void RainbowOption::compute_sigmaA () [private]

Definition at line 483 of file rainbowoption.cpp.

References _CorrelationMatrix, _volatilities, Real, and sigmaA.

Referenced by compute_ClosedFormsParameters().

6.28.2.12 Real RainbowOption::getCorrelRisk (priceType *priceMethod* = ClosedForm)

Correl Risk.

Definition at line 264 of file rainbowoption.cpp.

References _CorrelationMatrix, _outputMsgs, getPrice(), Matrix::GetRows(), GREEKAPPROX, haveClosedFormVariablesBeenComputed, Natural, Real, and Matrix::SetValue().

Referenced by inputRainbowOption(), and mainrainbowoptions().

6.28.2.13 Real RainbowOption::getDelta (priceType *priceMethod* = ClosedForm)

Returns:
overall delta (if all the market shifts : sum of deltas)

Definition at line 240 of file rainbowoption.cpp.

References _NumberOfAssets, getPartialDelta(), Natural, Real, Matrix::SetValue(), and Matrix::SumColumn().

6.28.2.14 Real RainbowOption::getGamma (priceType *priceMethod* = ClosedForm)

Returns:
overall gamma (if all the market shifts : sum of gamma)

Definition at line 248 of file rainbowoption.cpp.

References _NumberOfAssets, getPartialGamma(), Natural, Real, Matrix::SetValue(), and Matrix::SumColumn().

6.28.2.15 Real RainbowOption::getPartialDelta (Natural *security*, priceType *priceMethod* = ClosedForm)

by convention, security 1 is the 0th spot in the array, so user "logical"

Definition at line 177 of file rainbowoption.cpp.

References _NumberOfAssets, _outputMsgs, _spots, getPrice(), GREEKAPPROX, haveClosedFormVariablesBeenComputed, Natural, and Real.

Referenced by getDelta(), getPartialGamma(), inputRainbowOption(), and mainrainbowoptions().

6.28.2.16 Real RainbowOption::getPartialGamma (Natural *security*, priceType *priceMethod* = ClosedForm)

by convention, security 1 is the 0th spot in the array, so user "logical"

Definition at line 198 of file rainbowoption.cpp.

References _NumberOfAssets, _outputMsgs, _spots, getPartialDelta(), GREEKAPPROX, haveClosedFormVariablesBeenComputed, Natural, and Real.

Referenced by getGamma(), inputRainbowOption(), and mainrainbowoptions().

6.28.2.17 Real RainbowOption::getPartialVega (Natural *security*, priceType *priceMethod* = ClosedForm)

by convention, security 1 is the 0th spot in the array, so user "logical"

Definition at line 219 of file rainbowoption.cpp.

References _NumberOfAssets, _outputMsgs, _volatilities, getPrice(), GREEKAPPROX, haveClosedFormVariablesBeenComputed, Natural, and Real.

Referenced by getVega(), inputRainbowOption(), and mainrainbowoptions().

6.28.2.18 Real RainbowOption::getPrice (priceType *priceMethod* = ClosedForm, LongNatural *nPaths* = RO_NPATHS)

Parameters:

price type : MC (default as for this one we have all prices) - or CF

nPaths - only be used for MC, so default

Definition at line 85 of file rainbowoption.cpp.

References _outputMsgs, AssetsBasketMax, BestOf2AssetsCash, BetterOf2Assets, ClosedForm, LongNatural, Max2AssetsCall, Max2AssetsPut, Min2AssetsCall, Min2AssetsPut, MonteCarlo, PriceByClosedForm_BestOf2_plusCash(), PriceByClosedForm_BetterOf2(), PriceByClosedForm_MaxOf2_call(), PriceByClosedForm_MaxOf2_put(), PriceByClosedForm_MinOf2_call(), PriceByClosedForm_MinOf2_put(), PriceByClosedForm_WorseOf2(), PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_BetterOf2Assets(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), PriceByMc_WorseOf2Assets(), PriceByMc_WorstOf2AssetsCash(), Real, SpreadOptionMax, WorseOf2Assets, and WorstOf2AssetsCash.

Referenced by getCorrelRisk(), getPartialDelta(), getPartialVega(), getRho(), getTheta(), inputRainbowOption(), and mainrainbowoptions().

6.28.2.19 rainbowType RainbowOption::getRainbowType () [inline]

Definition at line 116 of file rainbowoption.h.

References rainbowType.

6.28.2.20 Real RainbowOption::getRho (priceType *priceMethod* = ClosedForm)

Rho risk.

Definition at line 310 of file rainbowoption.cpp.

References _outputMsgs, getPrice(), GREEKAPPROX, haveClosedFormVariablesBeenComputed, Real, and yieldCurve::shiftZCBRateCurve().

Referenced by inputRainbowOption(), and mainrainbowoptions().

6.28.2.21 Real RainbowOption::getTheta (priceType *priceMethod* = ClosedForm)

Theata risk.

Definition at line 331 of file rainbowoption.cpp.

References _expiryInYears, _outputMsgs, getPrice(), haveClosedFormVariablesBeenComputed, and Real.

6.28.2.22 Real RainbowOption::getVega (priceType *priceMethod* = ClosedForm)

Returns:
overall vega (if all the market shifts : sum of Vega)

Definition at line 256 of file rainbowoption.cpp.

References _NumberOfAssets, getPartialVega(), Natural, Real, Matrix::SetValue(), and Matrix::SumColumn().

6.28.2.23 void RainbowOption::instanciateMCVariables () [private]

Definition at line 354 of file rainbowoption.cpp.

References _Drifts, _expiryInYears, _gaussianSample, _NumberOfAssets, _pHazardRateProcesses, _pRandom, _spots, _startDate, _Strike, _TerminalPoints, _thePayOff, _volatilities, Natural, RO_SEED, Random::SetSeed(), PayOff::SetStrike(), and yieldCurve::spotRate().

Referenced by PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_BetterOf2Assets(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), PriceByMc_WorseOf2Assets(), and PriceByMc_WorstOf2AssetsCash().

6.28.2.24 Real RainbowOption::PriceByClosedForm_BestOf2_plusCash () [private]

Definition at line 577 of file rainbowoption.cpp.

References _outputMsgs, A, B, C, compute_ClosedFormsParameters(), haveClosedFormVariablesBeenComputed, and Real.

Referenced by getPrice().

6.28.2.25 Real RainbowOption::PriceByClosedForm_BetterOf2 () [private]

Definition at line 587 of file rainbowoption.cpp.

References _outputMsgs, _Strike, A, B, C, compute_ClosedFormsParameters(), EPSILON, haveClosedFormVariablesBeenComputed, and Real.

Referenced by getPrice(), PriceByClosedForm_MaxOf2_put(), and PriceByClosedForm_WorseOf2().

6.28.2.26 Real RainbowOption::PriceByClosedForm_MaxOf2_call () [private]

Definition at line 620 of file rainbowoption.cpp.

References _expiryInYears, _outputMsgs, _Strike, A, B, C, compute_ClosedFormsParameters(), haveClosedFormVariablesBeenComputed, Real, and yieldCurve::spotRate().

Referenced by getPrice(), PriceByClosedForm_MaxOf2_put(), and PriceByClosedForm_MinOf2_call().

6.28.2.27 Real RainbowOption::PriceByClosedForm_MaxOf2_put () [private]

Definition at line 651 of file rainbowoption.cpp.

References _expiryInYears, _outputMsgs, _Strike, compute_ClosedFormsParameters(), haveClosedFormVariablesBeenComputed, PriceByClosedForm_BetterOf2(), PriceByClosedForm_MaxOf2_call(), Real, and yieldCurve::spotRate().

Referenced by getPrice(), and PriceByClosedForm_MinOf2_put().

6.28.2.28 Real RainbowOption::PriceByClosedForm_MinOf2_call () [private]

Definition at line 632 of file rainbowoption.cpp.

References _expiryInYears, _outputMsgs, _spots, _Strike, _volatilities, Call, BlackScholes::getPrice(), PriceByClosedForm_MaxOf2_call(), Real, and yieldCurve::spotRate().

Referenced by getPrice().

6.28.2.29 Real RainbowOption::PriceByClosedForm_MinOf2_put () [private]

Definition at line 662 of file rainbowoption.cpp.

References _expiryInYears, _outputMsgs, _spots, _Strike, _volatilities, BlackScholes::getPrice(), PriceByClosedForm_MaxOf2_put(), Put, Real, and yieldCurve::spotRate().

Referenced by getPrice().

6.28.2.30 Real RainbowOption::PriceByClosedForm_WorseOf2 () [private]

Definition at line 601 of file rainbowoption.cpp.

References _expiryInYears, _outputMsgs, _spots, _volatilities, Call, EPSILON, BlackScholes::getPrice(), PriceByClosedForm_BetterOf2(), Real, and yieldCurve::spotRate().

Referenced by getPrice().

6.28.2.31 Real RainbowOption::PriceByMc_2AssetsBasketMax (LongNatural *nPaths* = RO_NPATHS) [private]

Definition at line 395 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _gaussianSample, _MCEngine, _Multiplier, _pHazardRateProcesses, _pRandom, _TerminalPoints, _thePayOff, _weights, instanciateMCVariables(), LongNatural, MCEngine::MCResult(), Real, and MCEngine::RunEngineRainbow2AssetsBasketMax().

Referenced by getPrice().

6.28.2.32 Real RainbowOption::PriceByMc_2SpreadOptionMax (LongNatural *nPaths* = RO_NPATHS) [private]

Definition at line 383 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _gaussianSample, _MCEngine, _Multiplier, _pHazardRateProcesses, _pRandom, _TerminalPoints, _thePayOff, _weights, instanciateMCVariables(), LongNatural, MCEngine::MCResult(), Real, and MCEngine::RunEngineRainbow2SpreadOptionMax().

Referenced by getPrice().

6.28.2.33 Real RainbowOption::PriceByMc_BestOf2AssetsCash (LongNatural *nPaths* = RO_NPATHS) [private]

Definition at line 404 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _gaussianSample, _MCEngine, _pHazardRateProcesses, _pRandom, _TerminalPoints, _thePayOff, _weights, instanciateMCVariables(), LongNatural, MCEngine::MCResult(), Real, and MCEngine::RunEngineRainbowBestOf2AssetsCash().

Referenced by getPrice().

6.28.2.34 Real RainbowOption::PriceByMc_BetterOf2Assets (LongNatural *nPaths* = RO_NPATHS) [private]

Definition at line 422 of file rainbowoption.cpp.

References _Strike, EPSILON, instanciateMCVariables(), LongNatural, PriceByMc_Max2AssetsCall(), and Real.

Referenced by getPrice().

6.28.2.35 Real RainbowOption::PriceByMc_Max2AssetsCall (LongNatural *nPaths* = RO_NPATHS) [private]

Definition at line 447 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _gaussianSample, _MCEngine, _Multiplier, _pHazardRateProcesses, _pRandom, _TerminalPoints, _thePayOff, _weights, instanciateMCVariables(), LongNatural, MCEngine::MCResult(), Real, and MCEngine::RunEngineRainbowMax2AssetsCall().

Referenced by getPrice(), and PriceByMc_BetterOf2Assets().

6.28.2.36 Real RainbowOption::PriceByMc_Max2AssetsPut (LongNatural *nPaths* = RO_NPATHS) [private]

Definition at line 465 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _gaussianSample, _MCEngine, _Multiplier, _pHazardRateProcesses, _pRandom, _TerminalPoints, _thePayOff, _weights, instanciateMCVariables(), LongNatural, MCEngine::MCResult(), Real, and MCEngine::RunEngineRainbowMax2AssetsPut().

Referenced by getPrice().

6.28.2.37 Real RainbowOption::PriceByMc_Min2AssetsCall (LongNatural *nPaths* = RO_NPATHS) [private]

Definition at line 456 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _gaussianSample, _MCEngine, _Multiplier, _pHazardRateProcesses, _pRandom, _TerminalPoints, _thePayOff, _weights, instanciateMCVariables(), LongNatural, MCEngine::MCResult(), Real, and MCEngine::RunEngineRainbowMin2AssetsCall().

Referenced by getPrice(), and PriceByMc_WorseOf2Assets().

6.28.2.38 Real RainbowOption::PriceByMc_Min2AssetsPut (LongNatural *nPaths* = RO_NPATHS) [private]

Definition at line 474 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _gaussianSample, _MCEngine, _Multiplier, _pHazardRateProcesses, _pRandom, _TerminalPoints, _thePayOff, _weights, instanciateMCVariables(), LongNatural, MCEngine::MCResult(), Real, and MCEngine::RunEngineRainbowMin2AssetsPut().

Referenced by getPrice().

6.28.2.39 Real RainbowOption::PriceByMc_WorseOf2Assets (LongNatural *nPaths* = RO_NPATHS) [private]

Definition at line 435 of file rainbowoption.cpp.

References _Strike, EPSILON, instanciateMCVariables(), LongNatural, PriceByMc_Min2AssetsCall(), and Real.

Referenced by getPrice().

6.28.2.40 Real RainbowOption::PriceByMc_WorstOf2AssetsCash (LongNatural *nPaths* = RO_NPATHS) [private]

Definition at line 413 of file rainbowoption.cpp.

References _CorrelationMatrix, _DFTomaturity, _gaussianSample, _MCEngine, _pHazardRateProcesses, _pRandom, _TerminalPoints, _thePayOff, _weights, instanciateMCVariables(), LongNatural, MCEngine::MCResult(), Real, and MCEngine::RunEngineRainbowWorstOf2AssetsCash().

Referenced by getPrice().

6.28.2.41 void RainbowOption::reassignVolsAtThemoney () [private]

Definition at line 378 of file rainbowoption.cpp.

References _expiryInYears, _NumberOfAssets, _spots, _startDate, _volatilities, _volatilitiesSurfaces, Natural, and Date::plusDays().

6.28.2.42 void RainbowOption::reassignVolsAtThestrike () [private]

Definition at line 372 of file rainbowoption.cpp.

References _expiryInYears, _NumberOfAssets, _startDate, _Strike, _volatilities, _volatilitiesSurfaces, Natural, and Date::plusDays().

Referenced by RainbowOption().

6.28.2.43 void RainbowOption::setRainbowType (rainbowType *newType*) [inline]

Definition at line 117 of file rainbowoption.h.

Referenced by mainrainbowoptions().

6.28.3 Member Data Documentation

6.28.3.1 Matrix RainbowOption::_CorrelationMatrix [private]

Definition at line 158 of file rainbowoption.h.

Referenced by compute_C(), compute_rho1(), compute_rho2(), compute_sigmaA(), getCorrelRisk(), PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), PriceByMc_WorstOf2AssetsCash(), and RainbowOption().

6.28.3.2 Real RainbowOption::_DFTomaturity [private]

Definition at line 171 of file rainbowoption.h.

Referenced by PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), PriceByMc_WorstOf2AssetsCash(), and RainbowOption().

6.28.3.3 valarray<Drift> RainbowOption::_Drifts [private]

Definition at line 172 of file rainbowoption.h.

Referenced by instanciateMCVariables().

6.28.3.4 Real RainbowOption::_expiryInYears [private]

Definition at line 152 of file rainbowoption.h.

Referenced by compute_C(), compute_d1(), compute_d2(), compute_d3(), compute_d4(), getTheta(), instanciateMCVariables(), PriceByClosedForm_MaxOf2_call(), PriceByClosedForm_MaxOf2_put(), PriceByClosedForm_MinOf2_call(), PriceByClosedForm_MinOf2_put(), PriceByClosedForm_WorseOf2(), RainbowOption(), reassignVolsAtThemoney(), and reassignVolsAtThestrike().

6.28.3.5 Real RainbowOption::_gaussianSample [private]

Definition at line 175 of file rainbowoption.h.

Referenced by instanciateMCVariables(), PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), and PriceByMc_WorstOf2AssetsCash().

6.28.3.6 MCEngine RainbowOption::_MCEngine [private]

Definition at line 174 of file rainbowoption.h.

Referenced by PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), and PriceByMc_WorstOf2AssetsCash().

6.28.3.7 Real RainbowOption::_Multiplier [private]

Definition at line 156 of file rainbowoption.h.

Referenced by PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), and RainbowOption().

6.28.3.8 Natural RainbowOption::_NumberOfAssets [private]

Definition at line 153 of file rainbowoption.h.

Referenced by getDelta(), getGamma(), getPartialDelta(), getPartialGamma(), getPartialVega(), getVega(), instanciateMCVariables(), RainbowOption(), reassignVolsAtThemoney(), and reassignVolsAtThestrike().

6.28.3.9 bool RainbowOption::_outputMsgs [private]

Definition at line 148 of file rainbowoption.h.

Referenced by getCorrelRisk(), getPartialDelta(), getPartialGamma(), getPartialVega(), getPrice(), getRho(), getTheta(), PriceByClosedForm_BestOf2_plusCash(), PriceByClosedForm_BetterOf2(), PriceByClosedForm_MaxOf2_call(), PriceByClosedForm_MaxOf2_put(), PriceByClosedForm_MinOf2_call(), PriceByClosedForm_MinOf2_put(), PriceByClosedForm_WorseOf2(), and RainbowOption().

6.28.3.10 valarray<GaussianProcess> RainbowOption::_pHazardRateProcesses [private]

Definition at line 177 of file rainbowoption.h.

Referenced by instanciateMCVariables(), PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), and PriceByMc_WorstOf2AssetsCash().

6.28.3.11 Random* RainbowOption::_pRandom [private]

Definition at line 173 of file rainbowoption.h.

Referenced by instanciateMCVariables(), PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), PriceByMc_WorstOf2AssetsCash(), and RainbowOption().

6.28.3.12 LongNatural RainbowOption::_seed [private]

Definition at line 180 of file rainbowoption.h.

Referenced by RainbowOption().

6.28.3.13 valarray<Real> RainbowOption::_spots [private]

Definition at line 155 of file rainbowoption.h.

Referenced by compute_A(), compute_B(), compute_d1(), compute_d2(), compute_d3(), compute_d4(), getPartialDelta(), getPartialGamma(), instanciateMCVariables(), PriceByClosedForm_MinOf2_call(), PriceByClosedForm_MinOf2_put(), PriceByClosedForm_WorseOf2(), RainbowOption(), and reassignVolsAtThemoney().

6.28.3.14 Date RainbowOption::_startDate [private]

Definition at line 151 of file rainbowoption.h.

Referenced by instanciateMCVariables(), RainbowOption(), reassignVolsAtThemoney(), and reassignVolsAtThestrike().

6.28.3.15 Real RainbowOption::_Strike [private]

Definition at line 154 of file rainbowoption.h.

Referenced by compute_C(), compute_d1(), compute_d2(), instanciateMCVariables(), PriceByClosedForm_BetterOf2(), PriceByClosedForm_MaxOf2_call(), PriceByClosedForm_MaxOf2_put(), PriceByClosedForm_MinOf2_call(), PriceByClosedForm_MinOf2_put(), PriceByMc_BetterOf2Assets(), PriceByMc_WorseOf2Assets(), RainbowOption(), and reassignVolsAtThestrike().

6.28.3.16 valarray<Real> RainbowOption::_TerminalPoints [private]

Definition at line 176 of file rainbowoption.h.

Referenced by instanciateMCVariables(), PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), and PriceByMc_WorstOf2AssetsCash().

6.28.3.17 PayOff RainbowOption::_thePayOff [private]

Definition at line 170 of file rainbowoption.h.

Referenced by instanciateMCVariables(), PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), PriceByMc_WorstOf2AssetsCash(), and RainbowOption().

6.28.3.18 rainbowType RainbowOption::_type [private]

Definition at line 163 of file rainbowoption.h.

6.28.3.19 valarray<Real> RainbowOption::_volatilities [private]

Definition at line 159 of file rainbowoption.h.

Referenced by compute_C(), compute_d1(), compute_d2(), compute_rho1(), compute_rho2(), compute_sigmaA(), getPartialVega(), instanciateMCVariables(), PriceByClosedForm_MinOf2_call(), PriceByClosedForm_MinOf2_put(), PriceByClosedForm_WorseOf2(), RainbowOption(), reassignVolsAtThemoney(), and reassignVolsAtThestrike().

6.28.3.20 valarray<volsurface> RainbowOption::_volatilitiesSurfaces [private]

Definition at line 160 of file rainbowoption.h.

Referenced by RainbowOption(), reassignVolsAtThemoney(), and reassignVolsAtThestrike().

6.28.3.21 valarray<Real> RainbowOption::_weights [private]

Definition at line 157 of file rainbowoption.h.

Referenced by PriceByMc_2AssetsBasketMax(), PriceByMc_2SpreadOptionMax(), PriceByMc_BestOf2AssetsCash(), PriceByMc_Max2AssetsCall(), PriceByMc_Max2AssetsPut(), PriceByMc_Min2AssetsCall(), PriceByMc_Min2AssetsPut(), PriceByMc_WorstOf2AssetsCash(), and RainbowOption().

6.28.3.22 yieldCurve RainbowOption::_yc [private]

Definition at line 161 of file rainbowoption.h.

6.28.3.23 Real RainbowOption::A [private]

Definition at line 197 of file rainbowoption.h.

Referenced by compute_A(), PriceByClosedForm_BestOf2_plusCash(), PriceByClosedForm_BetterOf2(), and PriceByClosedForm_MaxOf2_call().

6.28.3.24 Real RainbowOption::B [private]

Definition at line 199 of file rainbowoption.h.

Referenced by compute_B(), PriceByClosedForm_BestOf2_plusCash(), PriceByClosedForm_BetterOf2(), and PriceByClosedForm_MaxOf2_call().

6.28.3.25 Real RainbowOption::C [private]

Definition at line 201 of file rainbowoption.h.

Referenced by compute_C(), PriceByClosedForm_BestOf2_plusCash(), PriceByClosedForm_BetterOf2(), and PriceByClosedForm_MaxOf2_call().

6.28.3.26 Real RainbowOption::d1 [private]

Definition at line 189 of file rainbowoption.h.

6.28.3.27 Real RainbowOption::d2 [private]

Definition at line 191 of file rainbowoption.h.

6.28.3.28 Real RainbowOption::d3 [private]

Definition at line 193 of file rainbowoption.h.

Referenced by compute_A(), and compute_d3().

6.28.3.29 Real RainbowOption::d4 [private]

Definition at line 195 of file rainbowoption.h.

Referenced by compute_B(), and compute_d4().

6.28.3.30 bool RainbowOption::haveClosedFormVariablesBeenComputed [private]

Definition at line 204 of file rainbowoption.h.

Referenced by getCorrelRisk(), getPartialDelta(), getPartialGamma(), getPartialVega(), getRho(), getTheta(), PriceByClosedForm_BestOf2_plusCash(), PriceByClosedForm_BetterOf2(), PriceByClosedForm_MaxOf2_call(), PriceByClosedForm_MaxOf2_put(), and RainbowOption().

6.28.3.31 Real RainbowOption::rho1 [private]

Definition at line 185 of file rainbowoption.h.

Referenced by compute_A(), and compute_rho1().

6.28.3.32 Real RainbowOption::rho2 [private]

Definition at line 187 of file rainbowoption.h.

Referenced by compute_B(), and compute_rho2().

6.28.3.33 Real RainbowOption::sigmaA [private]

Definition at line 183 of file rainbowoption.h.

Referenced by compute_d3(), compute_d4(), compute_rho1(), compute_rho2(), and compute_-sigmaA().

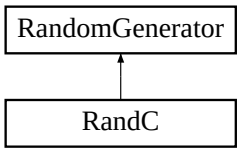
The documentation for this class was generated from the following files:

- **rainbowoption.h**
- **rainbowoption.cpp**

6.29 RandC Class Reference

`#include <RandC.h>`

Inheritance diagram for RandC::



Public Member Functions

- **RandC** (**LongNatural** Seed_=0)
  Default constructor: initialize variable.
- ~**RandC** (void)
- **LongNatural GetOneRandomInteger** ()
  Create one random integer.
- **Real getUniform** ()
  Creates one uniform number on (0.0,1.0).
- void **SetSeed** (**LongNatural Seed**)
  Set seed for generator.
- **VeryLongNatural Max** ()
  Return maximum number of random numbers.
- **LongNatural Min** ()
  Return minimum of numbers generated.

Private Attributes

- **LongNatural Seed**

6.29.1 Constructor & Destructor Documentation

6.29.1.1 RandC::RandC (LongNatural *Seed_* = 0)

Default constructor: initialize variable.

Definition at line 8 of file RandC.cpp.

References LongNatural.

6.29.1.2 RandC::~RandC (void)

Definition at line 14 of file RandC.cpp.

6.29.2 Member Function Documentation

6.29.2.1 LongNatural RandC::GetOneRandomInteger () [virtual]

Create one random integer.

Implements **RandomGenerator** (p. 190).

Definition at line 26 of file RandC.cpp.

References LongNatural, and Maxim.

Referenced by getUniform().

6.29.2.2 Real RandC::getUniform () [virtual]

Creates one uniform number on (0.0,1.0).

Implements **RandomGenerator** (p. 190).

Definition at line 30 of file RandC.cpp.

References GetOneRandomInteger(), Max(), and Real.

6.29.2.3 VeryLongNatural RandC::Max () [virtual]

Return maximum number of random numbers.

Implements **RandomGenerator** (p. 190).

Definition at line 18 of file RandC.cpp.

References Maxim, and VeryLongNatural.

Referenced by getUniform().

6.29.2.4 LongNatural RandC::Min () [virtual]

Return minimum of numbers generated.

Implements **RandomGenerator** (p. 190).

Definition at line 22 of file RandC.cpp.

References LongNatural.

6.29.2.5 void RandC::SetSeed (LongNatural *Seed*) [virtual]

Set seed for generator.

Reimplemented from **RandomGenerator** (p. 190).

Definition at line 34 of file RandC.cpp.

References LongNatural.

6.29.3 Member Data Documentation

6.29.3.1 LongNatural RandC::Seed [private]

Reimplemented from **RandomGenerator** (p. 191).

Definition at line 28 of file RandC.h.

The documentation for this class was generated from the following files:

- **RandC.h**
- **RandC.cpp**

6.30 Random Class Reference

`#include <Random.h>`

Public Member Functions

- **Random** (**LongNatural Dimensionality**, **RandomGenerator** *rndGen)

  Default constructor: set dimension.

- **Random** (**RandomGenerator** *rndGen)
- **LongNatural GetDimensionality** () const

  Return dimension.

- **Random** * **clone** () const

  Clone function.

- void **GetUniforms** (valarray< **Real** > &variates)

  Get uniforms Real.

- void **GetUniform** (**Real** &variate)
- void **Skip** (**LongNatural** numberOfPaths)
- void **SetSeed** (**LongNatural** Seed)
- void **Reset** ()
- void **GetGaussians** (valarray< **Real** > &variates)

  Get gaussian random numbers.

- void **GetGaussian** (**Real** &variate)
- void **ResetDimensionality** (**LongNatural** NewDimensionality)

Private Attributes

- **RandomGenerator** * **InnerGenerator**
- **LongNatural Dimensionality**
- **LongNatural InitialSeed**
- **Real Reciprocal**

6.30.1 Constructor & Destructor Documentation

6.30.1.1 Random::Random (LongNatural *Dimensionality*, RandomGenerator * *rndGen*)

Default constructor: set dimension.

Definition at line 3 of file Random.cpp.

References InnerGenerator, and LongNatural.

Referenced by clone().

6.30.1.2 Random::Random (RandomGenerator * *rndGen*)

Author:
Yann if dimension 1 - ne need to specifty dimensionality

Definition at line 10 of file Random.cpp.

References Dimensionality, and InnerGenerator.

6.30.2 Member Function Documentation

6.30.2.1 Random * Random::clone () const

Clone function.

Definition at line 15 of file Random.cpp.

References Random().

6.30.2.2 LongNatural Random::GetDimensionality () const [inline]

Return dimension.

Definition at line 50 of file Random.h.

References Dimensionality, and LongNatural.

Referenced by GetUniforms(), and Skip().

6.30.2.3 void Random::GetGaussian (Real & *variate*) [inline]

Author:
Yann - Get gaussian random number in a Real to avoid array

Definition at line 66 of file Random.h.

References GetUniform(), InverseCumulativeNormal(), and Real.

Referenced by MCEngine::RunEngineRainbow2AssetsBasketMax(), MCEngine::RunEngineRainbow2SpreadOptionMax(), MCEngine::RunEngineRainbowBestOf2AssetsCash(), MCEngine::RunEngineRainbowMax2AssetsCall(), MCEngine::RunEngineRainbowMax2AssetsPut(), MCEngine::RunEngineRainbowMin2AssetsCall(), MCEngine::RunEngineRainbowMin2AssetsPut(), and MCEngine::RunEngineRainbowWorstOf2AssetsCash().

6.30.2.4 void Random::GetGaussians (valarray< Real > & *variates*) [inline]

Get gaussian random numbers.

Definition at line 55 of file Random.h.

References Dimensionality, GetUniforms(), InverseCumulativeNormal(), LongNatural, and Real.

Referenced by MCEngine::RunEngineAsianCall(), MCEngine::RunEngineAsianPut(), MCEngine::RunEngineBarrierCall(), MCEngine::RunEngineBarrierPut(), MCEngine::RunEngineCall(), MCEngine::RunEngineCappedCliquet(), MCEngine::RunEngineFlooredCliquet(), MCEngine::RunEnginePut(), MCEngine::RunEngineRevLookbackCall(), and MCEngine::RunEngineRevLookbackPut().

6.30.2.5 void Random::GetUniform (Real & *variate*)

Author:
Yann - Get uniform in a Real to avoid arrays

Definition at line 26 of file Random.cpp.

References RandomGenerator::getUniform(), InnerGenerator, and Real.

Referenced by GetGaussian().

6.30.2.6 void Random::GetUniforms (valarray< Real > & *variates*) [inline]

Get uniforms Real.

Definition at line 20 of file Random.cpp.

References GetDimensionality(), RandomGenerator::getUniform(), InnerGenerator, and LongNatural.

Referenced by GetGaussians(), and Skip().

6.30.2.7 void Random::Reset ()

Definition at line 44 of file Random.cpp.

References InitialSeed, InnerGenerator, and RandomGenerator::SetSeed().

6.30.2.8 void Random::ResetDimensionality (LongNatural *NewDimensionality*)

Definition at line 50 of file Random.cpp.

References Dimensionality, InitialSeed, InnerGenerator, LongNatural, and RandomGenerator::SetSeed().

6.30.2.9 void Random::SetSeed (LongNatural *Seed*)

Definition at line 38 of file Random.cpp.

References InitialSeed, InnerGenerator, LongNatural, and RandomGenerator::SetSeed().

Referenced by RainbowOption::instanciateMCVariables(), and mainmc().

6.30.2.10 void Random::Skip (LongNatural *numberOfPaths*)

Definition at line 31 of file Random.cpp.

References GetDimensionality(), GetUniforms(), and LongNatural.

6.30.3 Member Data Documentation

6.30.3.1 LongNatural Random::Dimensionality [private]

Definition at line 45 of file Random.h.

Referenced by GetDimensionality(), GetGaussians(), Random(), and ResetDimensionality().

6.30.3.2 LongNatural Random::InitialSeed [private]

Definition at line 46 of file Random.h.

Referenced by Reset(), ResetDimensionality(), and SetSeed().

6.30.3.3 RandomGenerator* Random::InnerGenerator [private]

Definition at line 44 of file Random.h.

Referenced by GetUniform(), GetUniforms(), Random(), Reset(), ResetDimensionality(), and SetSeed().

6.30.3.4 Real Random::Reciprocal [private]

Definition at line 47 of file Random.h.

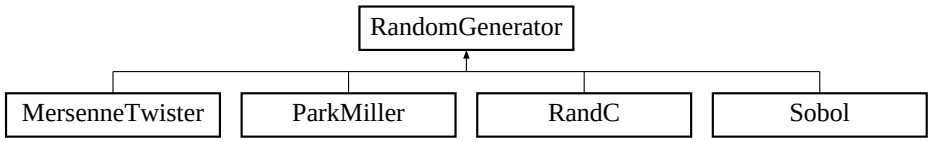
The documentation for this class was generated from the following files:

- **Random.h**
- **Random.cpp**

6.31 RandomGenerator Class Reference

`#include <RandomGenerator.h>`

Inheritance diagram for RandomGenerator::



Public Member Functions

- **RandomGenerator** (**LongNatural** Seed_=0)
  Default constructor: initialize variable.
- virtual ~**RandomGenerator** (void)
- virtual **LongNatural GetOneRandomInteger** ()=0
  Create one random integer.
- virtual **Real getUniform** ()=0
  Creates one uniform number on (0.0,1.0).
- virtual void **SetSeed** (**LongNatural Seed**)
  Set seed for generator.
- virtual **VeryLongNatural Max** ()=0
  Return maximum number of random numbers.
- virtual **LongNatural Min** ()=0
  Return minimum of numbers generated.

Private Attributes

- **LongNatural Seed**

6.31.1 Constructor & Destructor Documentation

6.31.1.1 RandomGenerator::RandomGenerator (LongNatural *Seed_* = 0)

Default constructor: initialize variable.

Definition at line 3 of file RandomGenerator.cpp.

References LongNatural, and SetSeed().

6.31.1.2 RandomGenerator::~RandomGenerator (void) [virtual]

Definition at line 8 of file RandomGenerator.cpp.

6.31.2 Member Function Documentation

6.31.2.1 virtual LongNatural RandomGenerator::GetOneRandomInteger () [pure virtual]

Create one random integer.

Implemented in **MersenneTwister** (p. 138), **ParkMiller** (p. 149), **RandC** (p. 183), and **Sobol** (p. 196).

Referenced by getUniform().

6.31.2.2 Real RandomGenerator::getUniform () [pure virtual]

Creates one uniform number on (0.0,1.0).

Implemented in **MersenneTwister** (p. 138), **ParkMiller** (p. 149), **RandC** (p. 183), and **Sobol** (p. 196).

Definition at line 19 of file RandomGenerator.cpp.

References GetOneRandomInteger(), Max(), and Real.

Referenced by Random::GetUniform(), and Random::GetUniforms().

6.31.2.3 virtual VeryLongNatural RandomGenerator::Max () [pure virtual]

Return maximum number of random numbers.

Implemented in **MersenneTwister** (p. 138), **ParkMiller** (p. 149), **RandC** (p. 183), and **Sobol** (p. 196).

Referenced by getUniform().

6.31.2.4 virtual LongNatural RandomGenerator::Min () [pure virtual]

Return minimum of numbers generated.

Implemented in **MersenneTwister** (p. 138), **ParkMiller** (p. 149), **RandC** (p. 183), and **Sobol** (p. 196).

6.31.2.5 void RandomGenerator::SetSeed (LongNatural *Seed*) [virtual]

Set seed for generator.

Reimplemented in **MersenneTwister** (p. 139), **ParkMiller** (p. 149), **RandC** (p. 183), and **Sobol** (p. 196).

Definition at line 12 of file RandomGenerator.cpp.

References LongNatural.

Referenced by RandomGenerator(), Random::Reset(), Random::ResetDimensionality(), and Random::SetSeed().

6.31.3 Member Data Documentation

6.31.3.1 LongNatural RandomGenerator::Seed [private]

Reimplemented in **ParkMiller** (p. 149), **RandC** (p. 184), and **Sobol** (p. 197).

Definition at line 30 of file RandomGenerator.h.

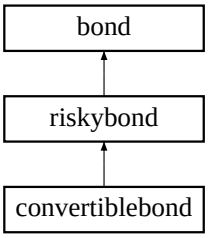
The documentation for this class was generated from the following files:

- **RandomGenerator.h**
- **RandomGenerator.cpp**

6.32 riskybond Class Reference

`#include <bond.h>`

Inheritance diagram for riskybond::



Public Member Functions

- **riskybond** (**Date** issue, **Date** maturity, **Date** firstcoupondate, **Real** coupon, **Frequency** freq, **Real** faceamount, **DayCountConvention** daycount, **yieldCurve** yc, **creditCurve** cc)

  Constructor.

- **riskybond** (**Date** issue, **Date** maturity, **Real** faceamount, **DayCountConvention** daycount, **yieldCurve** yc, **creditCurve** cc)

  Constructor : ZCbond.

- ~**riskybond** (void)

  Destructor.

- virtual **Real quotedPrice** (**Date** today)
- virtual **riskybond shiftedbond** (**Real** shift)

  bond with same parameters and a shifted **yieldCurve**(p. 220)

- virtual **Real rho** (**Date** today)

  return the derivative of the bond price with respect to interest rates

- virtual **Real rho** ()

Private Attributes

- **creditCurve _cc**

6.32.1 Constructor & Destructor Documentation

6.32.1.1 riskybond::riskybond (Date *issue*, Date *maturity*, Date *firstcoupondate*, Real *coupon*, Frequency *freq*, Real *faceamount*, DayCountConvention *daycount*, yieldCurve *yc*, creditCurve *cc*)

Constructor.

Parameters:

issue: date of issue of the bond

maturity: maturity of the bond

firstcoupondate: date of the first coupon

coupon: coupon of the bond, express as a percentqge of the faceamount

freq: frequency of the coupon

faceamount: par value

daycount: daycount convention

yc: yieldcurve

cc: creditcurve

Definition at line 336 of file bond.cpp.

References Real.

6.32.1.2 riskybond::riskybond (Date *issue*, Date *maturity*, Real *faceamount*, DayCountConvention *daycount*, yieldCurve *yc*, creditCurve *cc*)

Constructor : ZCbond.

Definition at line 342 of file bond.cpp.

References Once, and Real.

6.32.1.3 riskybond::~riskybond (void) [inline]

Destructor.

Definition at line 135 of file bond.h.

6.32.2 Member Function Documentation

6.32.2.1 Real riskybond::quotedPrice (Date *today*) [virtual]

Reimplemented from **bond** (p. 36).

Definition at line 348 of file bond.cpp.

References Date::dayCount(), bond::getCashflow(), cashflow::getCashflows(), cashflow::getDates(), Natural, Real, and creditCurve::riskyDiscountFactor().

6.32.2.2 virtual Real riskybond::rho () [inline, virtual]

Reimplemented in **convertiblebond** (p. 48).

Definition at line 144 of file bond.h.

References Real.

6.32.2.3 Real riskybond::rho (Date *today*) [virtual]

return the derivative of the bond price with respect to interest rates

Reimplemented in **convertiblebond** (p. 48).

Definition at line 380 of file bond.cpp.

References bond::fairvalue(), Real, and shiftedbond().

6.32.2.4 riskybond riskybond::shiftedbond (Real *shift*) [virtual]

bond with same parameters and a shifted **yieldCurve**(p. 220)

Definition at line 374 of file bond.cpp.

References Real, and yieldCurve::shiftZCBRateCurve().

Referenced by rho(), and convertiblebond::shiftedcbond().

6.32.3 Member Data Documentation

6.32.3.1 creditCurve riskybond::_cc [private]

Definition at line 114 of file bond.h.

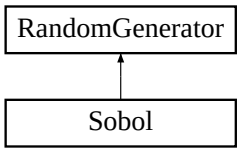
The documentation for this class was generated from the following files:

- **bond.h**
- **bond.cpp**

6.33 Sobol Class Reference

`#include <Sobol.h>`

Inheritance diagram for Sobol::



Public Member Functions

- **Sobol** (**LongNatural** Seed_=0)

  Default constructor.

- ~**Sobol** ()
- void **sobseq** (**Integer** *n, **Real** x[ ])
- **LongNatural GetOneRandomInteger** ()

  Create one random integer.

- **Real getUniform** ()

  Creates one uniform number on (0.0,1.0).

- void **SetSeed** (**LongNatural Seed**)

  Set seed for generator.

- **VeryLongNatural Max** ()

  Return maximum number of random numbers.

- **LongNatural Min** ()

  Return minimum of numbers generated.

Private Attributes

- **LongNatural Seed**
- **Integer n_**
- **Real x_** [MAXDIM+1]

6.33.1 Constructor & Destructor Documentation

6.33.1.1 Sobol::Sobol (LongNatural *Seed_* = 0)

Default constructor.

Definition at line 4 of file Sobol.cpp.

References LongNatural, n_, sobseq(), and x_.

6.33.1.2 Sobol::~Sobol ()

Definition at line 12 of file Sobol.cpp.

6.33.2 Member Function Documentation

6.33.2.1 LongNatural Sobol::GetOneRandomInteger () [virtual]

Create one random integer.

Implements **RandomGenerator** (p. 190).

Definition at line 79 of file Sobol.cpp.

References LongNatural.

6.33.2.2 Real Sobol::getUniform () [virtual]

Creates one uniform number on (0.0,1.0).

Implements **RandomGenerator** (p. 190).

Definition at line 84 of file Sobol.cpp.

References n_, Real, sobseq(), and x_.

6.33.2.3 VeryLongNatural Sobol::Max () [virtual]

Return maximum number of random numbers.

Implements **RandomGenerator** (p. 190).

Definition at line 71 of file Sobol.cpp.

References VeryLongNatural.

6.33.2.4 LongNatural Sobol::Min () [virtual]

Return minimum of numbers generated.

Implements **RandomGenerator** (p. 190).

Definition at line 75 of file Sobol.cpp.

References LongNatural.

6.33.2.5 void Sobol::SetSeed (LongNatural *Seed*) [virtual]

Set seed for generator.

Reimplemented from **RandomGenerator** (p. 190).

Definition at line 16 of file Sobol.cpp.

References LongNatural, n_, sobseq(), and x_.

6.33.2.6 void Sobol::sobseq (Integer * n, Real x[])

Definition at line 23 of file Sobol.cpp.

References Integer, LongInteger, LongNatural, MAXBIT, Natural, and Real.

Referenced by getUniform(), SetSeed(), and Sobol().

6.33.3 Member Data Documentation

6.33.3.1 Integer Sobol::n_ [private]

Definition at line 38 of file Sobol.h.

Referenced by getUniform(), SetSeed(), and Sobol().

6.33.3.2 LongNatural Sobol::Seed [private]

Reimplemented from **RandomGenerator** (p. 191).

Definition at line 37 of file Sobol.h.

6.33.3.3 Real Sobol::x_[MAXDIM+1] [private]

Definition at line 39 of file Sobol.h.

Referenced by getUniform(), SetSeed(), and Sobol().

The documentation for this class was generated from the following files:

- **Sobol.h**
- **Sobol.cpp**

6.34 StringTokenizer Class Reference

`#include <StringTokenizer.h>`

Public Member Functions

- **StringTokenizer** (const std::string &_str, const std::string &_delim)
- ~**StringTokenizer** ()
- int **countTokens** ()
- bool **hasMoreTokens** ()
- std::string **nextToken** ()
- int **nextIntToken** ()
- double **nextFloatToken** ()
- std::string **nextToken** (const std::string &**delim**)
- std::string **remainingString** ()
- std::string **filterNextToken** (const std::string &filterStr)

Private Attributes

- std::string **token_str**
- std::string **delim**

6.34.1 Constructor & Destructor Documentation

6.34.1.1 StringTokenizer::StringTokenizer (const std::string & *_str*, const std::string & *_delim*)

Definition at line 3 of file StringTokenizer.cpp.

References delim, and token_str.

6.34.1.2 StringTokenizer::~StringTokenizer () `[inline]`

Definition at line 34 of file StringTokenizer.h.

6.34.2 Member Function Documentation

6.34.2.1 int StringTokenizer::countTokens ()

Definition at line 52 of file StringTokenizer.cpp.

References delim, and token_str.

6.34.2.2 std::string StringTokenizer::filterNextToken (const std::string & *filterStr*)

Definition at line 155 of file StringTokenizer.cpp.

References nextToken().

6.34.2.3 bool StringTokenizer::hasMoreTokens ()

Definition at line 84 of file StringTokenizer.cpp.

References token_str.

6.34.2.4 double StringTokenizer::nextFloatToken ()

Definition at line 120 of file StringTokenizer.cpp.

References nextToken().

6.34.2.5 int StringTokenizer::nextIntToken ()

Definition at line 114 of file StringTokenizer.cpp.

References nextToken().

Referenced by CSVParser::operator>>().

6.34.2.6 std::string StringTokenizer::nextToken (const std::string & *delim*)

Definition at line 126 of file StringTokenizer.cpp.

References token_str.

6.34.2.7 std::string StringTokenizer::nextToken ()

Definition at line 90 of file StringTokenizer.cpp.

References delim, and token_str.

Referenced by filterNextToken(), nextFloatToken(), and nextIntToken().

6.34.2.8 std::string StringTokenizer::remainingString ()

Definition at line 149 of file StringTokenizer.cpp.

References token_str.

6.34.3 Member Data Documentation

6.34.3.1 std::string StringTokenizer::delim [private]

Definition at line 48 of file StringTokenizer.h.

Referenced by countTokens(), nextToken(), and StringTokenizer().

6.34.3.2 std::string StringTokenizer::token_str [private]

Definition at line 47 of file StringTokenizer.h.

Referenced by countTokens(), hasMoreTokens(), nextToken(), remainingString(), and StringTokenizer().

The documentation for this class was generated from the following files:

- **StringTokenizer.h**
- **StringTokenizer.cpp**

6.35 SwapLeg Class Reference

`#include <SwapLeg.h>`

Public Member Functions

- **SwapLeg** (**Date** startDate, **Real Frequency**, **Date** endDate, **Real** Notional, **Real** AmortizingConstant, **BusinessDayConvention** convention)

  Constructor that takes a notional and the constant value of which the notional should be decreasing every time.

- **SwapLeg** (valarray< **Date** > dates, valarray< **Real** > Notionals)

  For more general swaps : takes a valarray of notionals for every period and a valarray of dates.

- **LongInteger returnSize** ()

  Return size of valarray.

- valarray< **Date** > **returnDates** ()

  Return dates valarray.

- valarray< **Real** > **returnAmounts** ()

  Return dates valarray.

- ~**SwapLeg** (void)

Private Attributes

- valarray< **Date** > **_dateSchedule**
- valarray< **Real** > **_flowSchedule**

6.35.1 Constructor & Destructor Documentation

6.35.1.1 SwapLeg::SwapLeg (Date *startDate*, Real *Frequency*, Date *endDate*, Real *Notional*, Real *AmortizingConstant*, BusinessDayConvention *convention*)

Constructor that takes a notional and the constant value of which the notional should be decreasing every time.

If endDate!=startDate + multiple of frequency then endDate is reduced until it satisfies the condition

Definition at line 3 of file SwapLeg.cpp.

References _dateSchedule, _flowSchedule, Date::applyConvention(), Frequency, Integer, LongInteger, Natural, Real, and Date::serialNumber().

6.35.1.2 SwapLeg::SwapLeg (valarray< Date > *dates*, valarray< Real > *Notionals*)

For more general swaps : takes a valarray of notionals for every period and a valarray of dates.

Definition at line 27 of file SwapLeg.cpp.

References _dateSchedule, and _flowSchedule.

6.35.1.3 SwapLeg::~SwapLeg (void)

Definition at line 50 of file SwapLeg.cpp.

6.35.2 Member Function Documentation

6.35.2.1 valarray< Real > SwapLeg::returnAmounts ()

Return dates valarray.

Definition at line 45 of file SwapLeg.cpp.

References _flowSchedule.

Referenced by CashFlow::CashFlow().

6.35.2.2 valarray< Date > SwapLeg::returnDates ()

Return dates valarray.

Definition at line 40 of file SwapLeg.cpp.

References _dateSchedule.

Referenced by CashFlow::CashFlow().

6.35.2.3 LongInteger SwapLeg::returnSize ()

Return size of valarray.

Definition at line 35 of file SwapLeg.cpp.

References _dateSchedule, and LongInteger.

6.35.3 Member Data Documentation

6.35.3.1 valarray<Date> SwapLeg::_dateSchedule [private]

Definition at line 36 of file SwapLeg.h.

Referenced by returnDates(), returnSize(), and SwapLeg().

6.35.3.2 valarray<Real> SwapLeg::_flowSchedule [private]

Definition at line 37 of file SwapLeg.h.

Referenced by returnAmounts(), and SwapLeg().

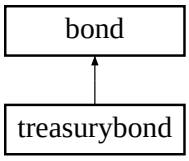
The documentation for this class was generated from the following files:

- **SwapLeg.h**
- **SwapLeg.cpp**

6.36 treasurybond Class Reference

`#include <bond.h>`

Inheritance diagram for treasurybond::



Public Member Functions

- **treasurybond** (**Date** issue, **Date** maturity, **Date** firstcoupondate, **Real** coupon, **Frequency** freq, **Real** faceamount, **DayCountConvention** daycount, **yieldCurve** yc)

  Constructor.

- **treasurybond** (**Date** issue, **Date** maturity, **Date** firstcoupondate, **Real** coupon, **yieldCurve** yc)

  Constructor : bond whose freq is semiannual, faceamount=100 and daycount is actual/360.

- **treasurybond** (**Date** issue, **Date** maturity, **Real** faceamount, **DayCountConvention** daycount, **yieldCurve** yc)

  Constructor : ZCbond.

- ~**treasurybond** (void)

  Destructor.

- **treasurybond shiftedbond** (**Real** shift)

  bond with same parameters and a shifted yield curve

- **Real rho** (**Date** today)

  return the derivative of the bond price with respect to interest rates

- **Real rho** ()

6.36.1 Constructor & Destructor Documentation

6.36.1.1 treasurybond::treasurybond (Date *issue*, Date *maturity*, Date *firstcoupondate*, Real *coupon*, Frequency *freq*, Real *faceamount*, DayCountConvention *daycount*, yieldCurve *yc*)

Constructor.

Parameters:

issue: date of issue of the bond

maturity: maturity of the bond

firstcoupondate: date of the first coupon

coupon: coupon of the bond, express as a percentqge of the faceamount

freq: frequency of the coupon

faceamount: par value

daycount: daycount convention

yc: yieldcurve

Definition at line 307 of file bond.cpp.

References Real.

6.36.1.2 treasurybond::treasurybond (Date *issue*, Date *maturity*, Date *firstcoupondate*, Real *coupon*, yieldCurve *yc*)

Constructor : bond whose freq is semiannual, faceamount=100 and daycount is actual/360.

Definition at line 312 of file bond.cpp.

References ACT_360, Real, and Semiannual.

6.36.1.3 treasurybond::treasurybond (Date *issue*, Date *maturity*, Real *faceamount*, DayCountConvention *daycount*, yieldCurve *yc*)

Constructor : ZCbond.

Definition at line 317 of file bond.cpp.

References Once, and Real.

6.36.1.4 treasurybond::~treasurybond (void) [inline]

Destructor.

Definition at line 101 of file bond.h.

6.36.2 Member Function Documentation

6.36.2.1 Real treasurybond::rho () [inline]

Definition at line 108 of file bond.h.

References Real.

6.36.2.2 Real treasurybond::rho (Date *today*)

return the derivative of the bond price with respect to interest rates

Definition at line 328 of file bond.cpp.

References bond::fairvalue(), Real, and shiftedbond().

6.36.2.3 treasurybond treasurybond::shiftedbond (Real *shift*)

bond with same parameters and a shifted yield curve

Definition at line 322 of file bond.cpp.

References Real, and yieldCurve::shiftZCBRateCurve().

Referenced by rho().

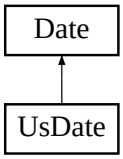
The documentation for this class was generated from the following files:

- **bond.h**
- **bond.cpp**

6.37 UsDate Class Reference

`#include <UsDate.h>`

Inheritance diagram for UsDate::



Public Member Functions

- bool **isBusinessDay** ()

  Apply Conventions (use for UsDate for example).

6.37.1 Detailed Description

Author:
Simon

Definition at line 8 of file UsDate.h.

6.37.2 Member Function Documentation

6.37.2.1 bool UsDate::isBusinessDay ()

Apply Conventions (use for UsDate for example).

Reimplemented from **Date** (p. 75).

Definition at line 4 of file UsDate.cpp.

References Day, Date::dayOfMonth(), December, February, Friday, January, July, m, May, Monday, Date::month(), Month, November, October, Saturday, September, Sunday, Thursday, Date::weekday(), and Weekday.

The documentation for this class was generated from the following files:

- **UsDate.h**
- **UsDate.cpp**

6.38 VanillaSwap Class Reference

`#include <VanillaSwap.h>`

Public Member Functions

- **VanillaSwap** (**CashFlow** cashflowReceived1, **CashFlow** cashflowPaid2, char *name1, char *name2, **yieldCurve** *curve)

  Default constructor : create a vanilla swap with two legs.

- ~**VanillaSwap** (void)
- **Real getFairValue1** ()

  Return fair value of first leg.

- **Real getFairValue2** ()

  Return fair value of second leg.

- **Real returnPrice** ()

  Return price of the swap.

- **Real getRho** ()

  Return sensitivity to the interest rate.

- **Real getTheta** ()

  Return sensitivity to the time.

Private Attributes

- **yieldCurve** * **_curve**
- **CashFlow** **_leg1**
- **CashFlow** **_leg2**
- char * **_name1**
- char * **_name2**

6.38.1 Constructor & Destructor Documentation

6.38.1.1 VanillaSwap::VanillaSwap (CashFlow *cashflowReceived1*, CashFlow *cashflowPaid2*, char * *name1*, char * *name2*, yieldCurve * *curve*)

Default constructor : create a vanilla swap with two legs.

Definition at line 3 of file VanillaSwap.cpp.

References _name1, _name2, and ShortNatural.

6.38.1.2 VanillaSwap::~VanillaSwap (void)

Definition at line 16 of file VanillaSwap.cpp.

6.38.2 Member Function Documentation

6.38.2.1 Real VanillaSwap::getFairValue1 ()

Return fair value of first leg.

Definition at line 20 of file VanillaSwap.cpp.

References _curve, _leg1, CashFlow::getFairValue(), and Real.

Referenced by inputVanillaSwap(), and returnPrice().

6.38.2.2 Real VanillaSwap::getFairValue2 ()

Return fair value of second leg.

Definition at line 24 of file VanillaSwap.cpp.

References _curve, _leg2, CashFlow::getFairValue(), and Real.

Referenced by inputVanillaSwap(), and returnPrice().

6.38.2.3 Real VanillaSwap::getRho ()

Return sensitivity to the interest rate.

Definition at line 34 of file VanillaSwap.cpp.

References _curve, Real, returnPrice(), and yieldCurve::shiftZCBRateCurve().

Referenced by inputVanillaSwap().

6.38.2.4 Real VanillaSwap::getTheta ()

Return sensitivity to the time.

Definition at line 42 of file VanillaSwap.cpp.

References _curve, yieldCurve::forwardZCBCurve(), Real, and returnPrice().

Referenced by inputVanillaSwap().

6.38.2.5 Real VanillaSwap::returnPrice ()

Return price of the swap.

Definition at line 28 of file VanillaSwap.cpp.

References getFairValue1(), getFairValue2(), and Real.

Referenced by getRho(), getTheta(), inputVanillaSwap(), and mainIRVanillaSwap().

6.38.3 Member Data Documentation

6.38.3.1 yieldCurve* VanillaSwap::_curve [private]

Definition at line 31 of file VanillaSwap.h.

Referenced by getFairValue1(), getFairValue2(), getRho(), and getTheta().

6.38.3.2 CashFlow VanillaSwap::_leg1 [private]

Definition at line 32 of file VanillaSwap.h.

Referenced by getFairValue1().

6.38.3.3 CashFlow VanillaSwap::_leg2 [private]

Definition at line 33 of file VanillaSwap.h.

Referenced by getFairValue2().

6.38.3.4 char* VanillaSwap::_name1 [private]

Definition at line 34 of file VanillaSwap.h.

Referenced by VanillaSwap().

6.38.3.5 char* VanillaSwap::_name2 [private]

Definition at line 35 of file VanillaSwap.h.

Referenced by VanillaSwap().

The documentation for this class was generated from the following files:

- **VanillaSwap.h**
- **VanillaSwap.cpp**

6.39 VarianceSwap Class Reference

`#include <VarianceSwap.h>`

Public Member Functions

- **VarianceSwap** (**OptionStrategy** *options, **Real** maturity, **Real** forwardprice)
  Default Constructor.
- ~**VarianceSwap** (void)
- **Real getPrice** ()
  Return price.
- **Real getRho** (**Real** shiftCurve=**defaultshiftRate**)
  Return sensitivity to a move in rates.
- **Real getVega** (**Real** shiftVol=**defaultshiftVol**)
  Return sensitivity to a move in volatility.
- **Real getTheta** (**Real** shiftMat=**defaultshiftMat**)
  Return sensitivity to a move in time.

Private Attributes

- **OptionStrategy** * **_options**
- **Real _maturity**
- **Real _forward**

6.39.1 Detailed Description

Author:
Simon

Definition at line 12 of file VarianceSwap.h.

6.39.2 Constructor & Destructor Documentation

6.39.2.1 VarianceSwap::VarianceSwap (OptionStrategy * *options*, Real *maturity*, Real *forwardprice*)

Default Constructor.

Parameters:
options: pointer to a basket of options to price the swap
maturity: maturity of the swap
forwardprice: forward value of the underlying = S0*exp(r*T)

Definition at line 3 of file VarianceSwap.cpp.

References Real.

6.39.2.2 VarianceSwap::~VarianceSwap (void)

Definition at line 10 of file VarianceSwap.cpp.

6.39.3 Member Function Documentation

6.39.3.1 Real VarianceSwap::getPrice ()

Return price.

Definition at line 14 of file VarianceSwap.cpp.

References _forward, _options, BlackScholes::getPrice(), BlackScholes::getStrike(), Integer, BlackScholes::isCall(), Natural, Real, OptionStrategy::returnNbOptions(), and OptionStrategy::returnOption().

Referenced by getRho(), getTheta(), getVega(), and mainvarianceswap().

6.39.3.2 Real VarianceSwap::getRho (Real *shiftCurve* = defaultshiftRate)

Return sensitivity to a move in rates.

Definition at line 72 of file VarianceSwap.cpp.

References _options, OptionStrategy::changeRate(), getPrice(), and Real.

6.39.3.3 Real VarianceSwap::getTheta (Real *shiftMat* = defaultshiftMat)

Return sensitivity to a move in time.

Definition at line 86 of file VarianceSwap.cpp.

References _options, OptionStrategy::changeMaturity(), getPrice(), and Real.

6.39.3.4 Real VarianceSwap::getVega (Real *shiftVol* = defaultshiftVol)

Return sensitivity to a move in volatility.

Definition at line 79 of file VarianceSwap.cpp.

References _options, OptionStrategy::changeVol(), getPrice(), and Real.

6.39.4 Member Data Documentation

6.39.4.1 Real VarianceSwap::_forward [private]

Definition at line 33 of file VarianceSwap.h.

Referenced by getPrice().

6.39.4.2 Real VarianceSwap::_maturity [private]

Definition at line 33 of file VarianceSwap.h.

6.39.4.3 OptionStrategy* VarianceSwap::_options [private]

Definition at line 32 of file VarianceSwap.h.

Referenced by getPrice(), getRho(), getTheta(), and getVega().

The documentation for this class was generated from the following files:

- **VarianceSwap.h**
- **VarianceSwap.cpp**

6.40 volsurface Class Reference

`#include <volsurface.h>`

Public Member Functions

- **volsurface** (**Real** stockPrice, **Date** today, valarray< **Real** > strikes, valarray< **Date** > maturities, **yieldCurve** yCurve, valarray< valarray< **Real** > > callputprices, valarray< valarray< bool > > iscallputprices)

  Constructor.

- **volsurface** (**Real** stockPrice, **Date** today, **yieldCurve** yCurve, **volsurfaceparams** &params)

  Constructor.

- **volsurface** (valarray< valarray< **Real** > > volsurf)

  Constructor.

- **volsurface** (**Real** constantvol)

  Default Constructor.

- **volsurface** (void)

  Default Constructor.

- ~**volsurface** (void)

  Destructor.

- **Real invertBSformula** (**Real r**, **Real** maturity, **Real** stockPrice, **Real** strike, **Real** callputPrice, bool isacall)
- **Real volatility** (**Real** K, **Date** T)
- **Real variance** (**Real** K, **Date** T)
- **Real forwardVolatility** (**Real** K, **Date** t, **Date** T)
- void **setvolsurface** ()
- valarray< valarray< **Real** > > **getvolsurface** ()
- **volsurface forwardvolsurface** (**Date** t)

  Implied volatility surface seen at time t.

- **volsurface shiftedYCvolsurface** (**Real** shift)

  Implied volatility surface when the yield curve is shifted.

- **volsurface shiftedvolsurface** (**Real** shift)

  Shift the implied volatility surface.

Private Attributes

- **Real _stockPrice**
- **Date _today**
- valarray< **Real** > **_strikes**

- valarray< **Date** > **_maturities**
- **yieldCurve _yieldCurve**
- valarray< valarray< **Real** > > **_callputprices**
- valarray< valarray< bool > > **_iscallputprices**
- valarray< valarray< **Real** > > **_impliedvolsurface**
- **interpolator _interpolvolsurf**
- bool **_volsurfconst**
- **Real _constantvol**

6.40.1 Constructor & Destructor Documentation

6.40.1.1 volsurface::volsurface (Real *stockPrice*, Date *today*, valarray< Real > *strikes*, valarray< Date > *maturities*, yieldCurve *yCurve*, valarray< valarray< Real > > *callputprices*, valarray< valarray< bool > > *iscallputprices*)

Constructor.

Parameters:

stockPrice: Current stock price

today: date of today

strikes: vectror of strikes

maturities: vector of maturities

yCurve: the yield curve

callputprices: matrix of option prices

iscallputprices: matrix indicating if we have call or put prices

Definition at line 7 of file volsurface.cpp.

References Real.

6.40.1.2 volsurface::volsurface (Real *stockPrice*, Date *today*, yieldCurve *yCurve*, volsurfaceparams & *params*)

Constructor.

Parameters:

stockPrice: Current stock price

today: date of today

yCurve: the yield curve

params: strikes, maturities, prices, etc.

Definition at line 19 of file volsurface.cpp.

References Real.

6.40.1.3 volsurface::volsurface (valarray< valarray< Real > > *volsurf*)

Constructor.

Parameters:
volsurf: volsurface

Definition at line 44 of file volsurface.cpp.

6.40.1.4 volsurface::volsurface (Real *constantvol*)

Default Constructor.

Definition at line 32 of file volsurface.cpp.

References Real.

6.40.1.5 volsurface::volsurface (void)

Default Constructor.

Definition at line 38 of file volsurface.cpp.

6.40.1.6 volsurface::~volsurface (void)

Destructor.

Definition at line 50 of file volsurface.cpp.

6.40.2 Member Function Documentation

6.40.2.1 Real volsurface::forwardVolatility (Real *K*, Date *t*, Date *T*)

Definition at line 139 of file volsurface.cpp.

References _today, Date::dayCount(), Real, and variance().

Referenced by Drift::Drift(), and forwardvolsurface().

6.40.2.2 volsurface volsurface::forwardvolsurface (Date *t*)

Implied volatility surface seen at time t.

Definition at line 148 of file volsurface.cpp.

References _impliedvolsurface, _maturities, _strikes, forwardVolatility(), Integer, M, and N.

Referenced by Exotics::getTheta().

6.40.2.3 valarray< valarray< Real > > volsurface::getvolsurface ()

Definition at line 118 of file volsurface.cpp.

References _impliedvolsurface.

6.40.2.4 Real volsurface::invertBSformula (Real *r*, Real *maturity*, Real *stockPrice*, Real *strike*, Real *callputPrice*, bool *isacall*)

Definition at line 55 of file volsurface.cpp.

References Call, BlackScholes::getVolatility(), Put, r, and Real.

Referenced by setvolsurface().

6.40.2.5 void volsurface::setvolsurface ()

Definition at line 68 of file volsurface.cpp.

References _callputprices, _constantvol, _impliedvolsurface, _interpolvolsurf, _iscallputprices, _maturities, _stockPrice, _strikes, _today, _volsurfconst, _yieldCurve, Date::dayCount(), invertBSformula(), N, r, Real, and yieldCurve::spotRate().

Referenced by importData::importVolSurface(), mainvolsurface(), and shiftedYCvolsurface().

6.40.2.6 volsurface volsurface::shiftedvolsurface (Real *shift*)

Shift the implied volatility surface.

Definition at line 194 of file volsurface.cpp.

References _impliedvolsurface, _maturities, _strikes, Integer, M, N, and Real.

Referenced by Exotics::getVega().

6.40.2.7 volsurface volsurface::shiftedYCvolsurface (Real *shift*)

Implied volatility surface when the yield curve is shifted.

Definition at line 185 of file volsurface.cpp.

References _callputprices, _iscallputprices, _maturities, _stockPrice, _strikes, _today, _yieldCurve, Real, setvolsurface(), and yieldCurve::shiftZCBRateCurve().

6.40.2.8 Real volsurface::variance (Real *K*, Date *T*)

Definition at line 131 of file volsurface.cpp.

References _constantvol, _volsurfconst, Real, and volatility().

Referenced by forwardVolatility().

6.40.2.9 Real volsurface::volatility (Real *K*, Date *T*)

Definition at line 122 of file volsurface.cpp.

References _constantvol, _interpolvolsurf, _today, _volsurfconst, Date::dayCount(), interpolator::interpolate(), and Real.

Referenced by GaussianProcess::BuildPath(), inputBSOption(), inputButterflySpread(), inputCallSpread(), inputPutSpread(), inputRatioCallSpread(), inputStraddle(), inputStrangle(), mainvolsurface(), and variance().

6.40.3 Member Data Documentation

6.40.3.1 valarray<valarray<Real> > volsurface::_callputprices [private]

Definition at line 35 of file volsurface.h.

Referenced by setvolsurface(), and shiftedYCvolsurface().

6.40.3.2 Real volsurface::_constantvol [private]

Definition at line 40 of file volsurface.h.

Referenced by setvolsurface(), variance(), and volatility().

6.40.3.3 valarray<valarray<Real> > volsurface::_impliedvolsurface [private]

Definition at line 37 of file volsurface.h.

Referenced by forwardvolsurface(), getvolsurface(), setvolsurface(), and shiftedvolsurface().

6.40.3.4 interpolator volsurface::_interpolvolsurf [private]

Definition at line 38 of file volsurface.h.

Referenced by setvolsurface(), and volatility().

6.40.3.5 valarray<valarray<bool> > volsurface::_iscallputprices [private]

Definition at line 36 of file volsurface.h.

Referenced by setvolsurface(), and shiftedYCvolsurface().

6.40.3.6 valarray<Date> volsurface::_maturities [private]

Definition at line 33 of file volsurface.h.

Referenced by forwardvolsurface(), setvolsurface(), shiftedvolsurface(), and shiftedYCvolsurface().

6.40.3.7 Real volsurface::_stockPrice [private]

Definition at line 30 of file volsurface.h.

Referenced by setvolsurface(), and shiftedYCvolsurface().

6.40.3.8 valarray<Real> volsurface::_strikes [private]

Definition at line 32 of file volsurface.h.

Referenced by forwardvolsurface(), setvolsurface(), shiftedvolsurface(), and shiftedYCvolsurface().

6.40.3.9 Date volsurface::_today [private]

Definition at line 31 of file volsurface.h.

Referenced by forwardVolatility(), setvolsurface(), shiftedYCvolsurface(), and volatility().

6.40.3.10 bool volsurface::_volsurfconst [private]

Definition at line 39 of file volsurface.h.

Referenced by setvolsurface(), variance(), and volatility().

6.40.3.11 yieldCurve volsurface::_yieldCurve [private]

Definition at line 34 of file volsurface.h.

Referenced by setvolsurface(), and shiftedYCvolsurface().

The documentation for this class was generated from the following files:

- **volsurface.h**
- **volsurface.cpp**

6.41 volsurfaceparams Class Reference

`#include <volsurface.h>`

Public Attributes

- valarray< **Real** > **strikes**
- valarray< **Date** > **maturities**
- valarray< valarray< **Real** > > **callputprices**
- valarray< valarray< bool > > **iscallputprices**

6.41.1 Member Data Documentation

6.41.1.1 valarray<valarray<Real> > volsurfaceparams::callputprices

Definition at line 23 of file volsurface.h.

Referenced by FileReader::buildVolSurfaceParams().

6.41.1.2 valarray<valarray<bool> > volsurfaceparams::iscallputprices

Definition at line 24 of file volsurface.h.

Referenced by FileReader::buildVolSurfaceParams().

6.41.1.3 valarray<Date> volsurfaceparams::maturities

Definition at line 22 of file volsurface.h.

Referenced by FileReader::buildVolSurfaceParams().

6.41.1.4 valarray<Real> volsurfaceparams::strikes

Definition at line 21 of file volsurface.h.

Referenced by FileReader::buildVolSurfaceParams().

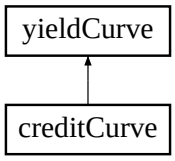
The documentation for this class was generated from the following file:

- **volsurface.h**

6.42 yieldCurve Class Reference

`#include <yieldCurve.h>`

Inheritance diagram for yieldCurve::



Public Member Functions

- **yieldCurve** (void)

  Default void constructor.

- **yieldCurve** (**Real** flatRate)

  FlatCurve.

- void **assignFlatRate** (**Real r**=0.0)

  For flat rate curves, set the flat rate value.

- void **assignZCBrateAtIndex** (**Real** rate, **Natural** i)

  sets an EXISTING rate at a certain level

- **yieldCurve shiftZCBRateCurve** (**Real** shift=**defaultshiftfactorForShortRate**)

  for risk mngmt purposes, shifts the yc

- **yieldCurve rotateZCBRateCurve** (**Real** moveInShortestRate=**defaultshiftfactorForShortRate**, **Real** maturityOfRotation=7)

  for risk mngmt purposes, rotates the yc with a ref to how you move the shortest rate, around which rate

- **yieldCurve** (valarray< **yieldPoint** > yieldPoints, char *name="unnamed")

  Constructor.

- ~**yieldCurve** (void)
- virtual **Real spotRate** (**Real** maturity) const

  Calculates the spot ZCB rate.

- virtual valarray< **Real** > **getMaturitiesInTheMarketCurve** () const

  Return the maturities present in the market curve, both from the Cash and Swap Pointsvalarray<Real>.

- virtual valarray< **Real** > **getMaturitiesInTheZCBCurve** () const

  Return the maturities present in the market curve, both from the Cash and Swap Pointsvalarray<Real>.

- virtual **Real spotRate** (**Date** maturityDate) const

Calculates the spot ZCB rate.

- virtual **Real discountFactor** (**Real** maturity, **interestComposition** composition=Continuous)

  Calculates the discountFactor.

- virtual **Real discountFactor** (**Date** maturityDate, **interestComposition** composition=Continuous)

  Calculates the discountFactor.

- virtual **Real forwardDiscountFactor** (**Real** forwardstart, **Real** lengthofcontractafterstart, **interestComposition** composition=Continuous)

  Calculates the discountFactor.

- virtual **Real forwardRate** (**Real** forwardStart, **Real** effectiveLengthOfTheContractAfterStart, **interestComposition** composition=Continuous)

  Calculates the fwd rate.

- virtual **Real forwardRate** (**Date** forwardStart, **Date** forwardEnd, **interestComposition** composition=Continuous)

  Calculates the fwd rate.

- virtual **yieldCurve forwardZCBCurve** (**Real** forwardStart)

  Forward curve.

- char * **getName** ()
- virtual bool **operator==** (const **yieldCurve** &yours)

  compares two y curves.

- virtual bool **operator!=** (const **yieldCurve** &yours)

Private Member Functions

- **yieldPoint getPointAtMaturity** (**Real** maturity)

  for know maturities, we can return the market Point as it is

- void **sortMarketRatesByMaturity** ()

  Sorting rates by maturity, just in case ...

- void **sortCashSwap** ()

  Routine to make sure the short term rates (cash) are before the mid/long term (swap).

- valarray< **yieldPoint** > **getSwapRates** ()

  needed in the bootstrap method to be able to back the ZC

- valarray< **yieldPoint** > **getSequentSwapRates** ()

  1Y difference in swaps -> ZC's easily backed up The method assumes that rates are sorted by ascending maturity The mkt curve is 1Y by 1Y - we should fill in the gaps by linear interpolation

- void **computeZCBRatesBootstrap** ()

Go from the swap rates to the ZC - matrix inversion to be done Swap rates can be annual or semi annual in their most common quotes on the market.

- valarray< **Real** > **SequentDiscountFactorsByInvertSwapMatrix** ()

  *Discount Factors corresponding to annual swaps quoted on sequent yrs : X-1 * (1...1)' where X is as follows: - diag = +1 swap (i) - inferior triang (i,j) = swap (i) - superior diag (i,j) =0.*

Private Attributes

- valarray< **yieldPoint** > **_marketRates**
- valarray< **yieldPoint** > **_zcbRates**
- char **_name** [YC_NAME_STRLEN]

Friends

- ostream & **operator**<< (ostream &os, const **yieldCurve** &c)

  display maturities and spotrates in the curve.

- ostream & **operator**<< (ostream &os, const **yieldCurve** *c)

6.42.1 Constructor & Destructor Documentation

6.42.1.1 yieldCurve::yieldCurve (void)

Default void constructor.

clean ?

Definition at line 42 of file yieldCurve.cpp.

References _name, assignFlatRate(), computeZCBRatesBootstrap(), and YC_MAX_NUMBER_POINTS.

Referenced by creditCurve::combineUnderlyingAndSpreads(), creditCurve::copyObj(), creditCurve::createSpreadCurve(), creditCurve::creditCurve(), forwardZCBCurve(), rotateZCBRateCurve(), and shiftZCBRateCurve().

6.42.1.2 yieldCurve::yieldCurve (Real *flatRate*)

FlatCurve.

Parameters:

flatRate : Real is the flat rate - by default, it will simulate a flat ZCB curve with 15 Points by default

clean ?

Definition at line 64 of file yieldCurve.cpp.

References _name, assignFlatRate(), computeZCBRatesBootstrap(), Real, and YC_MAX_NUMBER_POINTS.

6.42.1.3 yieldCurve::yieldCurve (valarray< yieldPoint > *yieldPoints*, char * *name* = "unnamed")

Constructor.

Parameters:

yieldPoints the array of yieldPoints

name the name we give it

clean ?

Definition at line 74 of file yieldCurve.cpp.

References _name, computeZCBRatesBootstrap(), sortCashSwap(), and sortMarketRatesByMaturity().

6.42.1.4 yieldCurve::~yieldCurve (void)

Definition at line 85 of file yieldCurve.cpp.

6.42.2 Member Function Documentation

6.42.2.1 void yieldCurve::assignFlatRate (Real *r* = 0.0)

For flat rate curves, set the flat rate value.

Definition at line 53 of file yieldCurve.cpp.

References _marketRates, ACT_360, Cash, Natural, r, and Real.

Referenced by yieldCurve().

6.42.2.2 void yieldCurve::assignZCBrateAtIndex (Real *rate*, Natural *i*)

sets an EXISTING rate at a certain level

Definition at line 377 of file yieldCurve.cpp.

References _zcbRates, Natural, and Real.

Referenced by rotateZCBRateCurve(), and shiftZCBRateCurve().

6.42.2.3 void yieldCurve::computeZCBRatesBootstrap () [private]

Go from the swap rates to the ZC - matrix inversion to be done Swap rates can be annual or semi annual in their most common quotes on the market.

Having semi annual swaps with annual maturities makes life hard as to bootstrap the ZC's as we would not be able to back out the semi annual ZC's to move to the next step without market bond prices, etc: it would really be cumbersome On the quote screen provided by Prof Laud, swaps are quoted annualy from 2 to 10 -> easy calculation [cf latex Code] as for the 15 - 20 and 30 with frequency annual, we need to find a way to find mid Points 11-14, 16-19 21-29.

Definition at line 354 of file yieldCurve.cpp.

References _marketRates, _zcbRates, Cash, Natural, Real, and SequentDiscountFactorsByInvertSwapMatrix().

Referenced by yieldCurve().

6.42.2.4 Real yieldCurve::discountFactor (Date *maturityDate*, interestComposition *composition* = Continuous) [virtual]

Calculates the discountFactor.

Parameters:
maturity : just after ZCBrates are computed, it it very easy [done at trhe constructor level]

Reimplemented in **creditCurve** (p. 57).

Definition at line 247 of file yieldCurve.cpp.

References Day30_360, Date::dayCount(), discountFactor(), Real, and Date::setDateToToday().

6.42.2.5 Real yieldCurve::discountFactor (Real *maturity*, interestComposition *composition* = Continuous) [virtual]

Calculates the discountFactor.

Parameters:
maturity : just after ZCBrates are computed, it it very easy [done at trhe constructor level]

Reimplemented in **creditCurve** (p. 57).

Definition at line 235 of file yieldCurve.cpp.

References Continuous, Discrete, Real, and spotRate().

Referenced by creditCurve::defaultProbability(), discountFactor(), creditCurve::discountFactor(), asset::forwardPrice(), forwardRate(), CashFlow::getFairValue(), mainmc(), bond::quotedPrice(), RainbowOption::RainbowOption(), creditCurve::riskyDiscountFactor(), and creditCurve::swapFees().

6.42.2.6 Real yieldCurve::forwardDiscountFactor (Real *forwardstart*, Real *lengthofcontractafterstart*, interestComposition *composition* = Continuous) [virtual]

Calculates the discountFactor.

Parameters:
maturity : just after ZCBrates are computed, it it very easy [done at trhe constructor level]

Definition at line 253 of file yieldCurve.cpp.

References Continuous, Discrete, forwardRate(), and Real.

Referenced by binomialTree::setClaimVariables().

6.42.2.7 Real yieldCurve::forwardRate (Date *forwardStart*, Date *forwardEnd*, interestComposition *composition* = Continuous) [virtual]

Calculates the fwd rate.

Parameters:

forwardStart start of the rate

maturityAfterForward maturity after the start

Reimplemented in **creditCurve** (p. 58).

Definition at line 298 of file yieldCurve.cpp.

References Day30_360, Date::dayCount(), forwardRate(), Real, and Date::setDateToToday().

6.42.2.8 Real yieldCurve::forwardRate (Real *forwardStart*, Real *effectiveLengthOfTheContractAfterStart*, interestComposition *composition* = Continuous) [virtual]

Calculates the fwd rate.

Parameters:

forwardStart start of the rate

maturityAfterForward maturity after the start

Reimplemented in **creditCurve** (p. 58).

Definition at line 264 of file yieldCurve.cpp.

References Continuous, discountFactor(), Discrete, Real, and spotRate().

Referenced by CashFlow::CashFlow(), Drift::Drift(), forwardDiscountFactor(), forwardRate(), creditCurve::forwardRate(), and forwardZCBCurve().

6.42.2.9 yieldCurve yieldCurve::forwardZCBCurve (Real *forwardStart*) [virtual]

Forward curve.

Definition at line 279 of file yieldCurve.cpp.

References _zcbRates, forwardRate(), Natural, Real, and yieldCurve().

Referenced by VanillaSwap::getTheta(), and Exotics::getTheta().

6.42.2.10 valarray< Real > yieldCurve::getMaturitiesInTheMarketCurve () const [virtual]

Return the maturities present in the market curve, both from the Cash and Swap Pointsvalarray<Real>.

Definition at line 333 of file yieldCurve.cpp.

References _marketRates, and Natural.

6.42.2.11 valarray< Real > yieldCurve::getMaturitiesInTheZCBCurve () const [virtual]

Return the maturities present in the market curve, both from the Cash and Swap Pointsvalarray<Real>.

Reimplemented in **creditCurve** (p. 59).

Definition at line 343 of file yieldCurve.cpp.

References _zcbRates, and Natural.

Referenced by creditCurve::combineUnderlyingAndSpreads(), creditCurve::getMaturitiesInTheZCBCurve(), mainyieldcurve(), operator<<(), and operator==().

6.42.2.12 char* yieldCurve::getName () [inline]

Reimplemented in **creditCurve** (p. 59).

Definition at line 192 of file yieldCurve.h.

References _name.

Referenced by creditCurve::getName().

6.42.2.13 yieldPoint yieldCurve::getPointAtMaturity (Real *maturity*) [private]

for know maturities, we can return the market Point as it is

Parameters:

maturity : Be careful with this method as if it does not know the maturity it will give a blank Point

Definition at line 89 of file yieldCurve.cpp.

References _marketRates, Natural, and Real.

Referenced by sortMarketRatesByMaturity().

6.42.2.14 valarray< yieldPoint > yieldCurve::getSequentSwapRates () [private]

1Y difference in swaps -> ZC's easily backed up The method assumes that rates are sorted by ascending maturity The mkt curve is 1Y by 1Y - we should fill in the gaps by linear interpolation

Swaps are quoted per year sequent then gaps : we need to fill in the gaps with a linear interpolation

we know that the first one is in 1Y swap rate (assigned at 1Y cash rate), as for the rest we ahve to Check for 1y sequent swap rates first

Definition at line 172 of file yieldCurve.cpp.

References getSwapRates(), Natural, Real, and Swap.

Referenced by SequentDiscountFactorsByInvertSwapMatrix().

6.42.2.15 valarray< yieldPoint > yieldCurve::getSwapRates () [private]

needed in the bootstrap method to be able to back the ZC

Definition at line 155 of file yieldCurve.cpp.

References _marketRates, Cash, Natural, spotRate(), Swap, and YC_MAX_NUMBER_POINTS.

Referenced by getSequentSwapRates().

6.42.2.16 bool yieldCurve::operator!= (const yieldCurve & *yours*) [virtual]

Definition at line 452 of file yieldCurve.cpp.

References operator==().

6.42.2.17 bool yieldCurve::operator== (const yieldCurve & *yours*) [virtual]

compares two y curves.

Two y curves are equal if they give identical spotrates for all ZCB maturities in each curve

Parameters:
param - the creditcurve to compare to

Returns:
true if all spotrates match, otherwise false

Definition at line 423 of file yieldCurve.cpp.

References getMaturitiesInTheZCBCurve(), m, mergeunique(), Natural, Real, and spotRate().

Referenced by operator!=().

6.42.2.18 yieldCurve yieldCurve::rotateZCBRateCurve (Real *moveInShortestRate* = defaultshiftfactorForShortRate, Real *maturityOfRotation* = 7)

for risk mngmt purposes, rotates the yc with a ref to how you move the shortest rate, around which rate

Definition at line 399 of file yieldCurve.cpp.

References _zcbRates, assignZCBrateAtIndex(), Natural, Real, and yieldCurve().

Referenced by mainyieldcurve().

6.42.2.19 valarray< Real > yieldCurve::SequentDiscountFactorsByInvertSwapMatrix () [private]

Discount Factors corresponding to annual swaps quoted on sequent yrs : X-1 $*$ (1...1)' where X is as follows: - diag = +1 swap (i) - inferior triang (i,j) = swap (i) - superior diag (i,j) =0.

Definition at line 305 of file yieldCurve.cpp.

References getSequentSwapRates(), M, and Natural.

Referenced by computeZCBRatesBootstrap().

6.42.2.20 yieldCurve yieldCurve::shiftZCBRateCurve (Real *shift* = defaultshiftfactorForShortRate)

for risk mngmt purposes, shifts the yc

Definition at line 382 of file yieldCurve.cpp.

References _zcbRates, assignZCBrateAtIndex(), Natural, Real, and yieldCurve().

Referenced by VanillaSwap::getRho(), RainbowOption::getRho(), Exotics::getRho(), asset::getRho(), mainyieldcurve(), riskybond::shiftedbond(), treasurybond::shiftedbond(), and volsurface::shiftedYCvolsurface().

6.42.2.21 void yieldCurve::sortCashSwap () [private]

Routine to make sure the short term rates (cash) are before the mid/long term (swap).

Definition at line 134 of file yieldCurve.cpp.

References _marketRates, Cash, Natural, and Swap.

Referenced by yieldCurve().

6.42.2.22 void yieldCurve::sortMarketRatesByMaturity () [private]

Sorting rates by maturity, just in case ...

Definition at line 112 of file yieldCurve.cpp.

References _marketRates, getPointAtMaturity(), Natural, Real, and YC_MAX_NUMBER_POINTS.

Referenced by yieldCurve().

6.42.2.23 Real yieldCurve::spotRate (Date *maturityDate*) const [virtual]

Calculates the spot ZCB rate.

Parameters:

maturityDate : maturityDate of the ZCB

Reimplemented in **creditCurve** (p. 61).

Definition at line 229 of file yieldCurve.cpp.

References Day30_360, Date::dayCount(), Real, Date::setDateToToday(), and spotRate().

6.42.2.24 Real yieldCurve::spotRate (Real *maturity*) const [virtual]

Calculates the spot ZCB rate.

Parameters:

maturity : if it is exact it just gives the result from a Point, else an interpolated one based on interpolator

Reimplemented in **creditCurve** (p. 62).

Definition at line 207 of file yieldCurve.cpp.

References _zcbRates, Natural, and Real.

Referenced by creditCurve::combineUnderlyingAndSpreads(), RainbowOption::compute_C(), RainbowOption::compute_d1(), RainbowOption::compute_d2(), creditCurve::createSpreadCurve(), creditCurve::creditSpread(), discountFactor(), forwardRate(), getSwapRates(), inputBSOption(), inputButterflySpread(), inputCallSpread(), inputPutSpread(),

inputRatioCallSpread(), inputStraddle(), inputStrangle(), RainbowOption::instanciateMCVariables(), mainyieldcurve(), operator<<(), operator==(), RainbowOption::PriceByClosedForm_MaxOf2_call(), RainbowOption::PriceByClosedForm_MaxOf2_put(), RainbowOption::PriceByClosedForm_MinOf2_call(), RainbowOption::PriceByClosedForm_MinOf2_put(), RainbowOption::PriceByClosedForm_WorseOf2(), creditCurve::resampleSpread(), volsurface::setvolsurface(), spotRate(), and creditCurve::spotRate().

6.42.3 Friends And Related Function Documentation

6.42.3.1 ostream& operator<< (ostream & *os*, const yieldCurve * *c*) [friend]

Definition at line 100 of file yieldCurve.h.

6.42.3.2 ostream& operator<< (ostream & *os*, const yieldCurve & *c*) [friend]

display maturities and spotrates in the curve.

Parameters:

os - the output stream to direct output to

c - the curve to display

Returns:

output stream as is standard for operator<<

Definition at line 457 of file yieldCurve.cpp.

6.42.4 Member Data Documentation

6.42.4.1 valarray<yieldPoint> yieldCurve::_marketRates [private]

Definition at line 199 of file yieldCurve.h.

Referenced by assignFlatRate(), computeZCBRatesBootstrap(), getMaturitiesInTheMarketCurve(), getPointAtMaturity(), getSwapRates(), sortCashSwap(), and sortMarketRatesByMaturity().

6.42.4.2 char yieldCurve::_name[YC_NAME_STRLEN] [private]

Definition at line 201 of file yieldCurve.h.

Referenced by getName(), and yieldCurve().

6.42.4.3 valarray<yieldPoint> yieldCurve::_zcbRates [private]

Definition at line 200 of file yieldCurve.h.

Referenced by assignZCBrateAtIndex(), computeZCBRatesBootstrap(), forwardZCBCurve(), getMaturitiesInTheZCBCurve(), rotateZCBRateCurve(), shiftZCBRateCurve(), and spotRate().

The documentation for this class was generated from the following files:

- **yieldCurve.h**
- **yieldCurve.cpp**

6.43 yieldPoint Class Reference

`#include <yieldCurve.h>`

Public Member Functions

- **yieldPoint** (void)

  Default constructor.

- **yieldPoint** (**Real r**, **Real** T, **TypeOfRate** type=Cash, **DayCountConvention** dayCount=ACT_360)

  Constructor.

- ~**yieldPoint** (void)

  Standard Destructor.

- **Real getRate** ()

  Returns the rate associated to the Point.

- **Real getMaturity** ()

  Returns the maturity associated to the Point.

- **TypeOfRate getType** ()

  Returns the type associated to the Point.

- **DayCountConvention getDayCount** ()

  Returns the dayCount associated to the Point.

- void **setRate** (**Real r**)

  Set the rate associated to the Point.

- void **setMaturity** (**Real m**)

  Set the maturity associated to the Point.

- void **setType** (**TypeOfRate** t)

  Set the type associated to the Point.

- void **setDayCount** (**DayCountConvention** d)

  Set the dayCount associated to the Point.

Static Public Member Functions

- char * **TypeAsString** (**TypeOfRate** t)

Private Attributes

- **Real _rate**
- **Real _maturity**
- **TypeOfRate _type**
- **DayCountConvention _dayCount**

6.43.1 Constructor & Destructor Documentation

6.43.1.1 yieldPoint::yieldPoint (void)

Default constructor.

Definition at line 7 of file yieldCurve.cpp.

References _dayCount, _maturity, _rate, ACT_360, and Cash.

6.43.1.2 yieldPoint::yieldPoint (Real *r*, Real *T*, TypeOfRate *type* = Cash, DayCountConvention *dayCount* = ACT_360)

Constructor.

Parameters:

r: Real rate associated to the Point - on an annual basis

T: Real maturity of the rate

Type: Type of the market Point Type : either cash or swap. Default will be the case where the short term is always cash, long is swap.

Definition at line 14 of file yieldCurve.cpp.

References _dayCount, _maturity, _rate, r, and Real.

6.43.1.3 yieldPoint::~yieldPoint (void)

Standard Destructor.

Definition at line 35 of file yieldCurve.cpp.

6.43.2 Member Function Documentation

6.43.2.1 DayCountConvention yieldPoint::getDayCount () [inline]

Returns the dayCount associated to the Point.

Definition at line 65 of file yieldCurve.h.

References _dayCount, and DayCountConvention.

6.43.2.2 Real yieldPoint::getMaturity () [inline]

Returns the maturity associated to the Point.

Definition at line 59 of file yieldCurve.h.

References _maturity, and Real.

6.43.2.3 Real yieldPoint::getRate () [inline]

Returns the rate associated to the Point.

Definition at line 56 of file yieldCurve.h.

References _rate, and Real.

6.43.2.4 TypeOfRate yieldPoint::getType () [inline]

Returns the type associated to the Point.

Definition at line 62 of file yieldCurve.h.

References TypeOfRate.

6.43.2.5 void yieldPoint::setDayCount (DayCountConvention *d*) [inline]

Set the dayCount associated to the Point.

Definition at line 77 of file yieldCurve.h.

References _dayCount.

6.43.2.6 void yieldPoint::setMaturity (Real *m*) [inline]

Set the maturity associated to the Point.

Definition at line 71 of file yieldCurve.h.

References _maturity, m, and Real.

6.43.2.7 void yieldPoint::setRate (Real *r*) [inline]

Set the rate associated to the Point.

Definition at line 68 of file yieldCurve.h.

References _rate, r, and Real.

6.43.2.8 void yieldPoint::setType (TypeOfRate *t*) [inline]

Set the type associated to the Point.

Definition at line 74 of file yieldCurve.h.

6.43.2.9 char * yieldPoint::TypeAsString (TypeOfRate *t*) [static]

Definition at line 23 of file yieldCurve.cpp.

References Cash, and Swap.

Referenced by CSVParser::operator>>().

6.43.3 Member Data Documentation

6.43.3.1 DayCountConvention yieldPoint::_dayCount [private]

Definition at line 86 of file yieldCurve.h.

Referenced by getDayCount(), setDayCount(), and yieldPoint().

6.43.3.2 Real yieldPoint::_maturity [private]

Definition at line 84 of file yieldCurve.h.

Referenced by getMaturity(), setMaturity(), and yieldPoint().

6.43.3.3 Real yieldPoint::_rate [private]

Definition at line 83 of file yieldCurve.h.

Referenced by getRate(), setRate(), and yieldPoint().

6.43.3.4 TypeOfRate yieldPoint::_type [private]

Definition at line 85 of file yieldCurve.h.

The documentation for this class was generated from the following files:

- **yieldCurve.h**
- **yieldCurve.cpp**

Chapter 7

terreneuve File Documentation

7.1 asset.cpp File Reference

```
#include ".\asset.h"
```

7.2 asset.h File Reference

```
#include "../common/types.h"
#include "../common/date.h"
#include "../PartB/yieldCurve.h"
```

Classes

- class **flowSchedule**
- class **asset**

Defines

- #define **ASSET_DEFAULT_VOL** 0.20

7.2.1 Define Documentation

7.2.1.1 #define ASSET_DEFAULT_VOL 0.20

Definition at line 9 of file asset.h.

Referenced by asset::asset().

7.3 binomialTree.cpp File Reference

```
#include ".\binomialTree.h"
```

Functions

- ostream & **operator**<< (ostream &os, const **binomialTree** &bt)

7.3.1 Function Documentation

7.3.1.1 ostream& operator<< (ostream & *os*, const binomialTree & *bt*)

Definition at line 162 of file binomialTree.cpp.

References binomialTree::_claimProcess, binomialTree::_d, binomialTree::_discountFactor, binomialTree::_n, binomialTree::_q, binomialTree::_stockProcess, binomialTree::_u, binomialTree::getMaturity(), binomialTree::getSigma(), binomialTree::getSo(), binomialTree::getSteps(), Natural, and valarrayRealToString().

7.4 binomialTree.h File Reference

```
#include "../common/types.h"
#include "../PartA/MonteCarlo1/PayOff.h"
#include "../PartB/yieldCurve.h"
#include "../PartC/asset.h"
#include "../common/utils.h"
#include <iostream>
#include <valarray>
```

Classes

- class **binomialTree**

Defines

- #define **BT_DEFAULT_SO** 100
- #define **BT_DEFAULT_RATE** 0.05
- #define **BT_DEFAULT_SIGMA** 0.30
- #define **BT_DEFAULT_MATURITY** 1
- #define **BT_DEFAULT_STEPS** 10

7.4.1 Define Documentation

7.4.1.1 #define BT_DEFAULT_MATURITY 1

Definition at line 17 of file binomialTree.h.

Referenced by binomialTree::binomialTree().

7.4.1.2 #define BT_DEFAULT_RATE 0.05

Definition at line 15 of file binomialTree.h.

Referenced by binomialTree::binomialTree().

7.4.1.3 #define BT_DEFAULT_SIGMA 0.30

Definition at line 16 of file binomialTree.h.

Referenced by binomialTree::binomialTree().

7.4.1.4 #define BT_DEFAULT_SO 100

Definition at line 14 of file binomialTree.h.

Referenced by binomialTree::binomialTree().

7.4.1.5 #define BT_DEFAULT_STEPS 10

Definition at line 18 of file binomialTree.h.

Referenced by binomialTree::binomialTree().

7.5 BlackScholes.cpp File Reference

```
#include "BlackScholes.h"
```

Functions

- **Real absolute** (**Real** x)

7.5.1 Function Documentation

7.5.1.1 Real absolute (Real *x*)

Definition at line 3 of file BlackScholes.cpp.

References Real.

Referenced by BlackScholes::BlackScholes().

7.6 BlackScholes.h File Reference

```
#include "../../common/types.h"
#include "../../common/Normals.h"
#include <cmath>
```

Classes

- class **BlackScholes**

Enumerations

- enum **TypeOptionBS** { **Call**, **Put** }

7.6.1 Enumeration Type Documentation

7.6.1.1 enum TypeOptionBS

Enumeration values:

Call

Put

Definition at line 8 of file BlackScholes.h.

Referenced by inputBSOption().

7.7 bond.cpp File Reference

```
#include ".\bond.h"
```

7.8 bond.h File Reference

```
#include "../common/types.h"
#include "../common/date.h"
#include <valarray>
#include "../PartB/yieldCurve.h"
#include "../PartF/creditCurve.h"
```

Classes

- class **cashflow**
- class **bond**
- class **treasurybond**
- class **riskybond**

7.9 CashFlow.cpp File Reference

```
#include "./cashflow.h"
```

7.10 CashFlow.h File Reference

```
#include "./../PartB/yieldCurve.h"
#include "./SwapLeg.h"
#include "./../Common/types.h"
#include <iostream>
```

Classes

- class **CashFlow**

7.11 convertiblebond.cpp File Reference

```
#include ".\convertiblebond.h"
#include ".\binomialTree.h"
#include "../PartA/MonteCarlo1/PayOff.h"
```

Functions

- ostream & **operator**<< (ostream &os, **convertiblebond** &cb)

7.11.1 Function Documentation

7.11.1.1 ostream& operator<< (ostream & *os*, convertiblebond & *cb*)

Definition at line 156 of file convertiblebond.cpp.

References convertiblebond::_bt, convertiblebond::_btCached, convertiblebond::_callPrice, convertiblebond::_conversionRatio, bond::_faceamount, bond::_issue, bond::_maturity, convertiblebond::_n, convertiblebond::_putPrice, convertiblebond::_stock, CB_DEFAULT_CALLPRICE, CB_DEFAULT_PUTPRICE, convertiblebond::delta(), convertiblebond::fairvalue(), convertiblebond::gamma(), asset::getPrice(), asset::GetVolatility(), convertiblebond::interestRateDelta(), convertiblebond::parityDelta(), convertiblebond::parityGamma(), and Date::toString().

7.12 convertiblebond.h File Reference

```
#include "../common/types.h"
#include "../PartH/bond.h"
#include "../PartC/asset.h"
#include "./binomialTree.h"
#include <iostream>
#include <valarray>
```

Classes

- class **convertiblebond**

Defines

- #define **CB_DEFAULT_FACEAMOUNT** 100
- #define **CB_DEFAULT_MATURITY** 1
- #define **CB_DEFAULT_DAYCOUNT** ACT_360
- #define **CB_DEFAULT_RATE** 0.05
- #define **CB_DEFAULT_SPREAD** 0.02
- #define **CB_DEFAULT_SO** 100
- #define **CB_DEFAULT_SIGMA** 0.30
- #define **CB_DEFAULT_STEPS** 4
- #define **CB_DEFAULT_RATIO** 10
- #define **CB_DEFAULT_CALLPRICE** TN_INFINITY
- #define **CB_DEFAULT_PUTPRICE** 0

7.12.1 Define Documentation

7.12.1.1 #define CB_DEFAULT_CALLPRICE TN_INFINITY

Definition at line 29 of file convertiblebond.h.

Referenced by operator<<().

7.12.1.2 #define CB_DEFAULT_DAYCOUNT ACT_360

Definition at line 16 of file convertiblebond.h.

7.12.1.3 #define CB_DEFAULT_FACEAMOUNT 100

Definition at line 14 of file convertiblebond.h.

7.12.1.4 #define CB_DEFAULT_MATURITY 1

Definition at line 15 of file convertiblebond.h.

7.12.1.5 #define CB_DEFAULT_PUTPRICE 0

Definition at line 30 of file convertiblebond.h.

Referenced by operator<<().

7.12.1.6 #define CB_DEFAULT_RATE 0.05

Definition at line 17 of file convertiblebond.h.

7.12.1.7 #define CB_DEFAULT_RATIO 10

Definition at line 28 of file convertiblebond.h.

7.12.1.8 #define CB_DEFAULT_SIGMA 0.30

Definition at line 22 of file convertiblebond.h.

7.12.1.9 #define CB_DEFAULT_SO 100

Definition at line 21 of file convertiblebond.h.

7.12.1.10 #define CB_DEFAULT_SPREAD 0.02

Definition at line 18 of file convertiblebond.h.

7.12.1.11 #define CB_DEFAULT_STEPS 4

Definition at line 25 of file convertiblebond.h.

7.13 creditCurve.cpp File Reference

```
#include ".\creditCurve.h"
#include "..\common\utils.h"
#include <cmath>
```

Functions

- ostream & **operator**<< (ostream &os, const **creditCurve** &c)

7.13.1 Function Documentation

7.13.1.1 ostream& operator<< (ostream & *os*, const creditCurve & *c*)

Definition at line 423 of file creditCurve.cpp.

References creditCurve::_combined.

7.14 creditCurve.h File Reference

```
#include "../common/types.h"
#include "../common/date.h"
#include "../PartB/yieldCurve.h"
#include <string.h>
#include <math.h>
#include <valarray>
```

Classes

- class **CreditSpreadPoint**
  used to encapsulate a spread at a given maturity
- class **creditCurve**

Defines

- #define **CC_MAX_NUM_SPREADS** 30
- #define **CC_DEFAULT_RECOVERY_RATE** 0.40
- #define **CC_DEFAULT_FREQUENCY** Annual
- #define **CC_DEFAULT_CURRENCY** USD
- #define **CC_DEFAULT_NAME** "creditCurve"

Enumerations

- enum **CreditSpreadType** { **Absolute**, **Relative** }

7.14.1 Define Documentation

7.14.1.1 #define CC_DEFAULT_CURRENCY USD

Definition at line 19 of file creditCurve.h.

7.14.1.2 #define CC_DEFAULT_FREQUENCY Annual

Definition at line 18 of file creditCurve.h.

7.14.1.3 #define CC_DEFAULT_NAME "creditCurve"

Definition at line 20 of file creditCurve.h.

7.14.1.4 #define CC_DEFAULT_RECOVERY_RATE 0.40

Definition at line 17 of file creditCurve.h.

7.14.1.5 #define CC_MAX_NUM_SPREADS 30

Definition at line 14 of file creditCurve.h.

Referenced by FileReader::buildCreditSpreadPointArray(), and creditCurve::creditCurve().

7.14.2 Enumeration Type Documentation

7.14.2.1 enum CreditSpreadType

Enumeration values:

Absolute

Relative

Definition at line 22 of file creditCurve.h.

Referenced by FileReader::buildCreditSpreadPointArray(), and CreditSpreadPoint::getSpreadType().

7.15 credits.cpp File Reference

```
#include "main.h"
```

Functions

- void **credits** ()

7.15.1 Function Documentation

7.15.1.1 void credits ()

Definition at line 3 of file credits.cpp.

Referenced by main().

7.16 csvparser.cpp File Reference

```
#include <iostream>
#include <cstdlib>
#include "csvparser.h"
#include "../PartB/yieldCurve.h"
#include "../PartF/creditCurve.h"
#include "StringTokenizer.h"
```

Namespaces

- namespace **std**

7.17 csvparser.h File Reference

```
#include <string>
#include "../PartB/yieldCurve.h"
#include "../PartF/creditCurve.h"
```

Classes

- class **CSVParser**

7.18 date.cpp File Reference

```
#include ".\date.h"
#include <time.h>
```

7.19 date.h File Reference

```
#include ".\types.h"
#include <stdio.h>
```

Classes

- class **Date**

Typedefs

- typedef **ShortNatural Day**
- typedef **ShortNatural Year**

Enumerations

- enum **Weekday** {
  Sunday = 1, **Monday** = 2, **Tuesday** = 3, **Wednesday** = 4,
  Thursday = 5, **Friday** = 6, **Saturday** = 7 }
- enum **Month** {
  January = 1, **February** = 2, **March** = 3, **April** = 4,
  May = 5, **June** = 6, **July** = 7, **August** = 8,
  September = 9, **October** = 10, **November** = 11, **December** = 12 }
- enum **TimeUnit** { **Days**, **Weeks**, **Months**, **Years** }
- enum **Frequency** {
  NoFrequency = -1, **Once** = 0, **Annual** = 1, **Semiannual** = 2,
  EveryFourthMonth = 3, **Quarterly** = 4, **Bimonthly** = 6, **Monthly** = 12 }
- enum **BusinessDayConvention** {
  Unadjusted, **Preceding**, **ModifiedPreceding**, **Following**,
  ModifiedFollowing, **MonthEndReference** }
- enum **DayCountConvention** { **ACT_365**, **ACT_360**, **Day30_365**, **Day30_360** }

7.19.1 Typedef Documentation

7.19.1.1 typedef ShortNatural Day

Author:
Simon

Definition at line 12 of file date.h.

Referenced by Date::advance(), Date::Date(), Date::dayOfMonth(), Date::dayOfYear(), UsDate::isBusinessDay(), Date::lastDayOfMonth(), Date::month(), CSVParser::operator>>(), and Date::setDateToToday().

7.19.1.2 typedef ShortNatural Year

Definition at line 13 of file date.h.

Referenced by Date::advance(), Date::Date(), Date::endOfMonth(), Date::isLeap(), Date::nthWeekday(), CSVParser::operator>>(), Date::year(), and Date::yearOffset().

7.19.2 Enumeration Type Documentation

7.19.2.1 enum BusinessDayConvention

Enumeration values:

Unadjusted
Preceding
ModifiedPreceding
Following
ModifiedFollowing
MonthEndReference

Definition at line 54 of file date.h.

Referenced by flowSchedule::getBusDayConv().

7.19.2.2 enum DayCountConvention

Enumeration values:

ACT_365
ACT_360
Day30_365
Day30_360

Definition at line 74 of file date.h.

Referenced by yieldPoint::getDayCount(), inputBond(), and mainbond().

7.19.2.3 enum Frequency

Enumeration values:

NoFrequency
Once
Annual
Semiannual
EveryFourthMonth
Quarterly
Bimonthly
Monthly

Definition at line 44 of file date.h.

Referenced by creditCurve::getFrequency(), inputBond(), mainbond(), and SwapLeg::SwapLeg().

7.19.2.4 enum Month

Enumeration values:

January

February

March

April

May

June

July

August

September

October

November

December

Definition at line 24 of file date.h.

Referenced by Date::advance(), Date::endOfMonth(), UsDate::isBusinessDay(), mainyieldcurve(), Date::month(), CSVParser::operator>>(), and Date::setDateToToday().

7.19.2.5 enum TimeUnit

Enumeration values:

Days

Weeks

Months

Years

Definition at line 38 of file date.h.

7.19.2.6 enum Weekday

Enumeration values:

Sunday

Monday

Tuesday

Wednesday

Thursday

Friday

Saturday

Definition at line 15 of file date.h.

Referenced by UsDate::isBusinessDay(), Date::nextWeekday(), Date::nthWeekday(), and Date::weekday().

7.20 Drift.cpp File Reference

```
#include "../../common\types.h"
#include "./drift.h"
#include <math.h>
```

7.21 Drift.h File Reference

```
#include "../../PartB/yieldCurve.h"
#include "../../PartE/volsurface.h"
#include "../../common/date.h"
```

Classes

- class **Drift**

7.22 Exotics.cpp File Reference

```
#include "./Exotics.h"
```

7.23 Exotics.h File Reference

```
#include "./../PartB/yieldCurve.h"
#include "./../PartE/volsurface.h"
#include <valarray>
```

Classes

- class **Exotics**

Enumerations

- enum **exoticsType** {
  AsianCall, **AsianPut**, **RevLookbackCall**, **RevLookbackPut**,
  FlooredCliquet, **CappedCliquet**, **CollaredCliquet**, **BarrierCall**,
  BarrierPut }

Functions

- **Real mainmc** (**Real** Expiry, **Real** Strike, **Real** Spot, **volsurface** *pvolsurface, **yieldCurve** *pyieldCurve, **LongNatural** nPaths, **LongNatural** nDates, **Integer** PrdName)

Variables

- const **Real defaultShiftVolSurface** = 0.01
- const **Real defaultAdvDays** = 1.

7.23.1 Enumeration Type Documentation

7.23.1.1 enum exoticsType

Enumeration values:

AsianCall

AsianPut

RevLookbackCall

RevLookbackPut

FlooredCliquet

CappedCliquet

CollaredCliquet

BarrierCall

BarrierPut

Definition at line 22 of file Exotics.h.

Referenced by choiceToType(), and inputExoticOptionOnSingleAsset().

7.23.2 Function Documentation

7.23.2.1 Real mainmc (Real *Expiry*, Real *Strike*, Real *Spot*, volsurface * *pvolsurface*, yieldCurve * *pyieldCurve*, LongNatural *nPaths*, LongNatural *nDates*, Integer *PrdName*)

Definition at line 40 of file mainmontecarlo.cpp.

References yieldCurve::discountFactor(), GaussianProcess::GetStepIncrements(), Drift::GetvDates(), Drift::GetvDrift(), Integer, LongNatural, MCEngine::MCResult(), r, Real, MCEngine::RunEngineGeneral(), Date::setDateToToday(), and Random::SetSeed().

Referenced by Exotics::getPrice(), mainbinomialtree(), and mainmontecarlo().

7.23.3 Variable Documentation

7.23.3.1 const Real defaultAdvDays = 1. [static]

Definition at line 17 of file Exotics.h.

7.23.3.2 const Real defaultShiftVolSurface = 0.01 [static]

Author:
Simon

Definition at line 16 of file Exotics.h.

7.24 filereader.cpp File Reference

```
#include <fstream>
#include "filereader.h"
#include "csvparser.h"
```

7.25 filereader.h File Reference

```
#include <string>
#include "..\PartB\yieldCurve.h"
#include "..\PartF\creditCurve.h"
#include "..\PartE\volsurface.h"
```

Classes

- class **FileReader**

7.26 GaussianProcess.cpp File Reference

```
#include "GaussianProcess.h"
#include <math.h>
#include <cmath>
#include <valarray>
```

7.27 GaussianProcess.h File Reference

```
#include "../../common/Date.h"
#include "../../common/types.h"
#include "../../PartE/volsurface.h"
#include <valarray>
```

Classes

- class **GaussianProcess**

Defines

- #define **GAUSSIANPROCESS_H**

7.27.1 Define Documentation

7.27.1.1 #define GAUSSIANPROCESS_H

Definition at line 3 of file GaussianProcess.h.

7.28 importData.cpp File Reference

```
#include ".\importData.h"
```

7.29 importData.h File Reference

```
#include <iostream>
#include <string>
#include "..\PartF\creditCurve.h"
#include "..\common\filereader.h"
#include "..\common\date.h"
#include "..\PartB\yieldCurve.h"
#include "..\PartE\volsurface.h"
```

Classes

- struct **marketData**
- class **importData**

Variables

- const string **YCNAME** = "yieldcurve.csv"
- const string **VSNAME** = "volsurface.csv"
- const string **CSNAME** = "creditspreads.csv"

7.29.1 Variable Documentation

7.29.1.1 const string CSNAME = "creditspreads.csv" [static]

Definition at line 20 of file importData.h.

7.29.1.2 const string VSNAME = "volsurface.csv" [static]

Definition at line 19 of file importData.h.

7.29.1.3 const string YCNAME = "yieldcurve.csv" [static]

Author:
Yann

Definition at line 18 of file importData.h.

7.30 interpolator.cpp File Reference

```
#include "./interpolator.h"
```

Functions

- **Integer interpolatormain** ()

7.30.1 Function Documentation

7.30.1.1 Integer interpolatormain ()

Definition at line 198 of file interpolator.cpp.

References Integer, interpolator::interpolate(), and Real.

7.31 interpolator.h File Reference

```
#include <iostream>
#include <valarray>
#include <fstream>
#include <istream>
#include <ostream>
#include "./types.h"
```

Classes

- class **interpolator**

7.32 main.cpp File Reference

```
#include "main.h"
```

Functions

- **Natural main** (**Natural** argc, char **argv)

7.32.1 Function Documentation

7.32.1.1 Natural main (Natural *argc*, char ** *argv*)

Definition at line 4 of file main.cpp.

References credits(), maintests(), Natural, and productsCreationMenu().

7.33 main.h File Reference

```
#include <string.h>
#include "testObjects.h"
#include "productscreation.h"
#include "importData.h"
```

Functions

- **Natural maintests** (**Natural** argc, char **argv)
- void **credits** ()

7.33.1 Function Documentation

7.33.1.1 void credits ()

Definition at line 3 of file credits.cpp.

Referenced by main().

7.33.1.2 Natural maintests (Natural *argc*, char ** *argv*)

Definition at line 7 of file testObjects.cpp.

References mainasset(), mainbinomialtree(), mainbond(), mainconvertiblebond(), maincreditcurve(), maindate(), mainfilereader(), maininterpolator(), mainIRVanillaSwap(), mainmatrix(), mainmontecarlo(), mainoption(), mainoptionstrategy(), mainrainbowoptions(), mainvarianceswap(), mainvolsurface(), mainyieldcurve(), Natural, FileReader::setdatadir(), and ShortNatural.

Referenced by main().

7.34 mainbinomialtree.cpp File Reference

```
#include "..\PartA\BlackScholes\BlackScholes.h"
#include "../Interface/main.h"
#include "..\PartJ\binomialTree.h"
#include "..\common\utils.h"
```

Functions

- bool **mainbinomialtree** (void)
  test of the binomial tree object

7.34.1 Function Documentation

7.34.1.1 bool mainbinomialtree (void)

test of the binomial tree object

Returns:
true if pass, otherwise fail

Definition at line 7 of file mainbinomialtree.cpp.

References Call, BlackScholes::getPrice(), binomialTree::getPrice(), binomialTree::getStockProcess(), LongNatural, mainmc(), Natural, r, Real, realsEqual(), and binomialTree::runEngineCall().

Referenced by maintests().

7.35 mainbond.cpp File Reference

```
#include "..\PartB\yieldCurve.h"
#include "..\PartF\creditCurve.h"
#include "..\PartH\bond.h"
#include "..\common\filereader.h"
#include <iostream>
#include <valarray>
```

Functions

- bool **mainbond** (void)
  test the bond functionality

7.35.1 Function Documentation

7.35.1.1 bool mainbond (void)

test the bond functionality

Returns:
true if pass, otherwise fail

Definition at line 12 of file mainbond.cpp.

References ACT_365, bond::convexity(), DayCountConvention, bond::duration(), bond::fairvalue(), Frequency, May, November, Real, Semiannual, and bond::yieldToMaturity().

Referenced by maintests().

7.36 mainconvertiblebond.cpp File Reference

```
#include "..\PartJ\convertiblebond.h"
#include "..\common\utils.h"
```

Functions

- bool **mainconvertiblebond** (void)
  test of the convertible bond object

7.36.1 Function Documentation

7.36.1.1 bool mainconvertiblebond (void)

test of the convertible bond object

Returns:
true if pass, otherwise fail

Definition at line 5 of file mainconvertiblebond.cpp.

References ACT_365, Days, convertiblebond::fairvalue(), Months, Natural, convertiblebond::parityDelta(), convertiblebond::parityGamma(), Date::plus(), Real, realsEqual(), convertiblebond::rho(), Date::setDateToToday(), and asset::setPrice().

Referenced by maintests().

7.37 maincreditcurves.cpp File Reference

```
#include "..\PartF\creditCurve.h"
#include "..\common\filereader.h"
#include <iostream>
#include <valarray>
#include <time.h>
```

Functions

- bool **maincreditcurve** (void)
  test of the credit curve object

7.37.1 Function Documentation

7.37.1.1 bool maincreditcurve (void)

test of the credit curve object

Returns:
true if pass, otherwise fail

Definition at line 9 of file maincreditcurves.cpp.

References FileReader::buildCreditSpreadPointArray(), FileReader::buildYieldPointArray(), creditCurve::creditSpread(), creditCurve::cumulativeDefaultProbability(), creditCurve::default-Probability(), FileReader::getdatadirasstring(), creditCurve::hazardRate(), Natural, Real, creditCurve::riskyDiscountFactor(), and creditCurve::survivalProbability().

Referenced by maintests().

7.38 maindate.cpp File Reference

```
#include "../Interface/main.h"
#include "../common/date.h"
#include <iostream>
```

Functions

- bool **maindate** (void)
  test the date class

7.38.1 Function Documentation

7.38.1.1 bool maindate (void)

test the date class

Returns:
true if pass, otherwise fail

Definition at line 7 of file maindate.cpp.

References Date::lastDayOfMonth(), Date::setDateToToday(), and Date::toString().

Referenced by maintests().

7.39 mainfilereader.cpp File Reference

```
#include <iostream>
#include <fstream>
#include <string>
#include "../Interface/main.h"
#include "../common/csvparser.h"
#include "../common/filereader.h"
#include "../PartB/yieldCurve.h"
```

Functions

- bool **mainfilereader** (void)
  test the file reader functionality
- bool **fr_basic** (void)
  file reader basic test

7.39.1 Function Documentation

7.39.1.1 bool fr_basic (void)

file reader basic test

Returns:
true if pass, otherwise fail

Definition at line 53 of file mainfilereader.cpp.

References FileReader::fileexists(), and FileReader::getdatadirasstring().

Referenced by mainfilereader().

7.39.1.2 bool mainfilereader (void)

test the file reader functionality

Returns:
true if pass, otherwise fail

Definition at line 45 of file mainfilereader.cpp.

References fr_basic().

Referenced by maintests().

7.40 maininterpolator.cpp File Reference

```
#include "..\common\date.h"
#include "..\common\interpolator.h"
#include <valarray>
```

Functions

- bool **maininterpolator** (void)
  test the 2d/3d interpolator functionality

7.40.1 Function Documentation

7.40.1.1 bool maininterpolator (void)

test the 2d/3d interpolator functionality

Returns:
true if pass, otherwise fail

Definition at line 5 of file maininterpolator.cpp.

References Integer, interpolator::interpolate(), and Real.

Referenced by maintests().

7.41 mainIRVanillaSwap.cpp File Reference

```
#include "../Interface/main.h"
#include "../PartD/VanillaSwap.h"
#include <iostream>
```

Functions

- bool **mainIRVanillaSwap** (void)
  Test of the Vanilla Swap - Yann.

7.41.1 Function Documentation

7.41.1.1 bool mainIRVanillaSwap (void)

Test of the Vanilla Swap - Yann.

Author:
Yann

Definition at line 9 of file mainIRVanillaSwap.cpp.

References FileReader::buildYieldPointArray(), FileReader::getdatadirasstring(), CashFlow::getFairValue(), Date::plusMonths(), Date::plusYears(), Real, VanillaSwap::returnPrice(), and Date::setDateToToday().

Referenced by maintests().

7.42 mainmatrix.cpp File Reference

```
#include "..\common\matrix.h"
#include "..\common\types.h"
#include "..\common\utils.h"
#include <iostream>
#include <stdlib.h>
#include <math.h>
#include <valarray>
```

Functions

- bool **mainmatrix** (void)
  test the matrix functions

7.42.1 Function Documentation

7.42.1.1 bool mainmatrix (void)

test the matrix functions

Author:
Yann

Definition at line 16 of file mainmatrix.cpp.

References Matrix::CholeskyDecomposition(), Matrix::GetTransposed(), Natural, Matrix::SetValue(), transform1DvalarrayToColumnMatrix(), transform2DvalarrayToMatrix(), transformColumnMatrixTo1Dvalarray(), and transformMatrixTo2Dvalarray().

Referenced by maintests().

7.43 mainmontecarlo.cpp File Reference

```
#include "../Interface/main.h"
#include "../PartA/MonteCarlo1/ParkMiller.h"
#include "../PartA/MonteCarlo1/MersenneTwister.h"
#include "../PartA/MonteCarlo1/RandC.h"
#include "../PartA/MonteCarlo1/Sobol.h"
#include "../PartA/MonteCarlo1/GaussianProcess.h"
#include "../common/Normals.h"
#include "../PartA/MonteCarlo1/PayOff.h"
#include "../PartA/MonteCarlo1/Random.h"
#include "../PartB/YieldCurve.h"
#include "../PartA/MonteCarlo1/Drift.h"
#include "../PartA/MonteCarlo1/MCEngine.h"
#include "time.h"
#include <iostream>
#include <valarray>
```

Functions

- bool **mainmontecarlo** (void)
  test the montecarlo option pricer functionality
- **Real mainmc** (**Real** Expiry, **Real** Strike, **Real** Spot, **volsurface** *pvolsurface, **yieldCurve** *pyieldCurve, **LongNatural** nPaths, **LongNatural** nDates, **Integer** PrdName)

7.43.1 Function Documentation

7.43.1.1 Real mainmc (Real *Expiry*, Real *Strike*, Real *Spot*, volsurface * *pvolsurface*, yieldCurve * *pyieldCurve*, LongNatural *nPaths*, LongNatural *nDates*, Integer *PrdName*)

Definition at line 40 of file mainmontecarlo.cpp.

References yieldCurve::discountFactor(), GaussianProcess::GetStepIncrements(), Drift::GetvDates(), Drift::GetvDrift(), Integer, LongNatural, MCEngine::MCResult(), r, Real, MCEngine::RunEngineGeneral(), Date::setDateToToday(), and Random::SetSeed().

Referenced by Exotics::getPrice(), mainbinomialtree(), and mainmontecarlo().

7.43.1.2 bool mainmontecarlo (void)

test the montecarlo option pricer functionality

Returns:
true if pass, otherwise fail

Definition at line 19 of file mainmontecarlo.cpp.

References LongNatural, mainmc(), and Real.

Referenced by maintests().

7.44 mainoptionstrategy.cpp File Reference

```
#include "../PartA/BlackScholes/OptionStrategy.h"
#include "../PartA/BlackScholes/BlackScholes.h"
#include <iostream>
```

Functions

- bool **mainoption** (void)
  test the BS option pricing functionality
- bool **mainoptionstrategy** (void)
  test the option strategy functionality

7.44.1 Function Documentation

7.44.1.1 bool mainoption (void)

test the BS option pricing functionality

Returns:
true if pass, otherwise fail

Definition at line 5 of file mainoptionstrategy.cpp.

References Call, BlackScholes::getDelta(), BlackScholes::getGamma(), BlackScholes::getPrice(), BlackScholes::getRho(), BlackScholes::getTheta(), BlackScholes::getVega(), BlackScholes::getVolatility(), and LongNatural.

Referenced by maintests().

7.44.1.2 bool mainoptionstrategy (void)

test the option strategy functionality

Returns:
true if pass, otherwise fail

Definition at line 26 of file mainoptionstrategy.cpp.

References OptionStrategy::addLongButterflySpread(), OptionStrategy::getGlobalDelta(), and OptionStrategy::returnPrice().

Referenced by maintests().

7.45 mainrainbowoptions.cpp File Reference

```
#include "../Interface/main.h"
#include "../PartI/rainbowoption.h"
#include "../PartB/YieldCurve.h"
#include <iostream>
#include <valarray>
```

Functions

- bool **mainrainbowoptions** (void)
  test of the credit curve object

7.45.1 Function Documentation

7.45.1.1 bool mainrainbowoptions (void)

test of the credit curve object

Author:
Yann

* Types (MonteCarlo, ClosedForm)

Definition at line 13 of file mainrainbowoptions.cpp.

References AssetsBasketMax, BestOf2AssetsCash, BetterOf2Assets, ClosedForm, RainbowOption::getCorrelRisk(), RainbowOption::getPartialDelta(), RainbowOption::getPartialGamma(), RainbowOption::getPartialVega(), RainbowOption::getPrice(), RainbowOption::getRho(), Max2AssetsCall, Max2AssetsPut, Min2AssetsCall, Min2AssetsPut, MonteCarlo, Real, Date::setDateToToday(), RainbowOption::setRainbowType(), SpreadOptionMax, WorseOf2Assets, and WorstOf2AssetsCash.

Referenced by maintests().

7.46 maintestasset.cpp File Reference

```
#include "..\PartC\asset.h"
#include "../common/filereader.h"
#include <iostream>
#include <valarray>
#include <time.h>
```

Functions

- bool **mainasset** (void)

  test the asset functionality

7.46.1 Function Documentation

7.46.1.1 bool mainasset (void)

test the asset functionality

Author:
Yann

Definition at line 14 of file maintestasset.cpp.

References a, FileReader::buildYieldPointArray(), EUR, asset::forwardPrice(), FileReader::getdatadirasstring(), Natural, Date::plusDays(), Date::plusMonths(), Date::plusYears(), Real, Date::setDateToToday(), and Date::toString().

Referenced by maintests().

7.47 mainvarianceswap.cpp File Reference

```
#include "../PartA/BlackScholes/OptionStrategy.h"
#include "../PartK/VarianceSwap.h"
#include <iostream>
#include <valarray>
```

Functions

- bool **mainvarianceswap** (void)

  test of the variance swaps object

7.47.1 Function Documentation

7.47.1.1 bool mainvarianceswap (void)

test of the variance swaps object

Returns:
true if pass, otherwise fail

Definition at line 9 of file mainvarianceswap.cpp.

References OptionStrategy::addLongButterflySpread(), OptionStrategy::addOneBlackScholesObject(), Call, VarianceSwap::getPrice(), Natural, Put, and Real.

Referenced by maintests().

7.48 mainvolsurface.cpp File Reference

```
#include "..\PartB\yieldCurve.h"
#include "..\PartE\volsurface.h"
#include "..\common\filereader.h"
#include <iostream>
#include <fstream>
#include <valarray>
```

Functions

- bool **mainvolsurface** (void)
  test the volsurface functionality

7.48.1 Function Documentation

7.48.1.1 bool mainvolsurface (void)

test the volsurface functionality

Returns:
true if pass, otherwise fail

Definition at line 12 of file mainvolsurface.cpp.

References FileReader::buildVolSurfaceParams(), December, July, March, Real, September, volsurface::setvolsurface(), Date::toString(), and volsurface::volatility().

Referenced by maintests().

7.49 mainyieldcurves.cpp File Reference

```
#include "..\PartB\yieldCurve.h"
#include "../common/filereader.h"
#include <iostream>
#include <valarray>
#include <time.h>
```

Functions

- bool **mainyieldcurve** (void)
  test the yield curve functionality

7.49.1 Function Documentation

7.49.1.1 bool mainyieldcurve (void)

test the yield curve functionality

Author:
Yann

Definition at line 13 of file mainyieldcurves.cpp.

References FileReader::buildYieldPointArray(), Continuous, Discrete, FileReader::getdatadirasstring(), yieldCurve::getMaturitiesInTheZCBCurve(), Month, Natural, Date::plusMonths(), Real, yieldCurve::rotateZCBRateCurve(), Date::setDateToToday(), yieldCurve::shiftZCBRateCurve(), and yieldCurve::spotRate().

Referenced by maintests().

7.50 matrix.cpp File Reference

```
#include <iostream>
#include <fstream>
#include <cmath>
#include "matrix.h"
#include "utils.h"
```

Functions

- **Matrix** & **IdentityMatrix** (int Diagonal)
- ostream & **operator**<< (ostream &ostr, const **Matrix** &obj)

7.50.1 Function Documentation

7.50.1.1 Matrix& IdentityMatrix (int *Diagonal*)

Definition at line 1465 of file matrix.cpp.

References Matrix::IdentityMatrix().

Referenced by RainbowOption::RainbowOption().

7.50.1.2 ostream& operator<< (ostream & *ostr*, const Matrix & *obj*)

Definition at line 1472 of file matrix.cpp.

7.51 matrix.h File Reference

```
#include <iostream>
#include <fstream>
#include "..\common\types.h"
```

Classes

- class **Matrix**

Functions

- **Matrix** & **IdentityMatrix** (int Diagonal)
- ostream & **operator**<< (ostream &ostr, const **Matrix** &obj)

7.51.1 Function Documentation

7.51.1.1 Matrix& IdentityMatrix (int *Diagonal*)

Definition at line 1465 of file matrix.cpp.

References Matrix::IdentityMatrix().

Referenced by RainbowOption::RainbowOption().

7.51.1.2 ostream& operator<< (ostream & *ostr*, const Matrix & *obj*)

Definition at line 1472 of file matrix.cpp.

References Matrix::GetColumns(), and Matrix::GetRows().

7.52 MCEngine.cpp File Reference

```
#include ".\mcengine.h"
```

7.53 MCEngine.h File Reference

```
#include "Random.h"
#include "GaussianProcess.h"
#include "PayOff.h"
#include "../../common/Normals.h"
#include "../../common/matrix.h"
```

Classes

- class **MCEngine**

7.54 MersenneTwister.cpp File Reference

```
#include "./MersenneTwister.h"

#include "time.h"
```

Variables

- const **LongNatural N** = 624
- const **LongNatural M** = 397
- const **LongNatural MATRIX_A** = 0x9908b0dfUL
- const **LongNatural UPPER_MASK** = 0x80000000UL
- const **LongNatural LOWER_MASK** = 0x7fffffffUL

7.54.1 Variable Documentation

7.54.1.1 const LongNatural LOWER_MASK = 0x7fffffffUL

Definition at line 12 of file MersenneTwister.cpp.

Referenced by MersenneTwister::GetOneRandomInteger().

7.54.1.2 const LongNatural M = 397

Definition at line 6 of file MersenneTwister.cpp.

Referenced by volsurface::forwardvolsurface(), MersenneTwister::GetOneRandomInteger(), interpolator::interpolate(), yieldCurve::SequentDiscountFactorsByInvertSwapMatrix(), volsurface::shiftedvolsurface(), transformColumnMatrixTo1Dvalarray(), and transformMatrixTo2Dvalarray().

7.54.1.3 const LongNatural MATRIX_A = 0x9908b0dfUL

Definition at line 8 of file MersenneTwister.cpp.

Referenced by MersenneTwister::GetOneRandomInteger().

7.54.1.4 const LongNatural N = 624

Definition at line 5 of file MersenneTwister.cpp.

Referenced by volsurface::forwardvolsurface(), MersenneTwister::GetOneRandomInteger(), interpolator::interpolate(), MersenneTwister::MersenneTwister(), MersenneTwister::SetSeed(), volsurface::setvolsurface(), and volsurface::shiftedvolsurface().

7.54.1.5 const LongNatural UPPER_MASK = 0x80000000UL

Definition at line 10 of file MersenneTwister.cpp.

Referenced by MersenneTwister::GetOneRandomInteger().

7.55 MersenneTwister.h File Reference

```
#include "./RandomGenerator.h"
#include "../../Common/types.h"
#include <valarray>
```

Classes

- class **MersenneTwister**

7.56 Normals.cpp File Reference

```
#include ".\normals.h"
#include <cmath>
```

Functions

- **Real NormalDensity** (**Real** x)
- **Real InverseCumulativeNormal** (**Real** u)
- **Real CumulativeNormal** (**Real** x)
- **Real Average** (valarray< **Real** > Ptr, **LongNatural** dim)
- **Real Maximize** (valarray< **Real** > Ptr, **LongNatural** dim)
- **Real CumulativeBivariateNormal** (**Real a**, **Real** b, **Real** rho)

  Bivariate normal distribution - from Hull's book.

- **Real SubFunctionForBivariateNormal** (**Real** X, **Real** y, **Real** ap, **Real** bp, **Real** rho)

Variables

- const **Real OneOverRootTwoPi** = 0.398942280401433

7.56.1 Function Documentation

7.56.1.1 Real Average (valarray< Real > *Ptr*, LongNatural *dim*)

Definition at line 116 of file Normals.cpp.

References LongNatural, and Real.

Referenced by PayOff::AsianCall(), and PayOff::AsianPut().

7.56.1.2 Real CumulativeBivariateNormal (Real *a*, Real *b*, Real *rho*)

Bivariate normal distribution - from Hull's book.

Author:
Yann

Definition at line 144 of file Normals.cpp.

References a, CumulativeNormal(), Natural, Real, sign(), and SubFunctionForBivariateNormal().

Referenced by RainbowOption::compute_A(), RainbowOption::compute_B(), and RainbowOption::compute_C().

7.56.1.3 Real CumulativeNormal (Real *x*)

Definition at line 82 of file Normals.cpp.

References a, NormalDensity(), and Real.

Referenced by RainbowOption::compute_A(), RainbowOption::compute_B(), CumulativeBivariateNormal(), BlackScholes::getDelta(), BlackScholes::getPrice(), BlackScholes::getRho(), and BlackScholes::getTheta().

7.56.1.4 Real InverseCumulativeNormal (Real *u*)

Definition at line 23 of file Normals.cpp.

References a, r, and Real.

Referenced by Random::GetGaussian(), and Random::GetGaussians().

7.56.1.5 Real Maximize (valarray< Real > *Ptr*, LongNatural *dim*)

Definition at line 130 of file Normals.cpp.

References LongNatural, and Real.

Referenced by PayOff::RevLookbackCall(), and PayOff::RevLookbackPut().

7.56.1.6 Real NormalDensity (Real *x*)

Definition at line 17 of file Normals.cpp.

References OneOverRootTwoPi, and Real.

Referenced by CumulativeNormal(), BlackScholes::getGamma(), BlackScholes::getTheta(), and BlackScholes::getVega().

7.56.1.7 Real SubFunctionForBivariateNormal (Real *X*, Real *y*, Real *ap*, Real *bp*, Real *rho*)

Definition at line 189 of file Normals.cpp.

References r, and Real.

Referenced by CumulativeBivariateNormal().

7.56.2 Variable Documentation

7.56.2.1 const Real OneOverRootTwoPi = 0.398942280401433

Definition at line 14 of file Normals.cpp.

Referenced by NormalDensity().

7.57 Normals.h File Reference

```
#include <valarray>
#include "./types.h"
#include "./utils.h"
```

Functions

- **Real NormalDensity** (**Real** x)
- **Real CumulativeNormal** (**Real** x)
- **Real InverseCumulativeNormal** (**Real** x)
- **Real Average** (valarray< **Real** > Ptr, **LongNatural** dim)
- **Real Maximize** (valarray< **Real** > Ptr, **LongNatural** dim)
- **Real CumulativeBivariateNormal** (**Real a**, **Real** b, **Real** rho)

  Bivariate normal distribution - from Hull's book.

- **Real SubFunctionForBivariateNormal** (**Real** X, **Real** y, **Real** ap, **Real** bp, **Real** rho)

7.57.1 Function Documentation

7.57.1.1 Real Average (valarray< Real > *Ptr*, LongNatural *dim*)

Definition at line 116 of file Normals.cpp.

References LongNatural, and Real.

Referenced by PayOff::AsianCall(), and PayOff::AsianPut().

7.57.1.2 Real CumulativeBivariateNormal (Real *a*, Real *b*, Real *rho*)

Bivariate normal distribution - from Hull's book.

Author:
Yann

Definition at line 144 of file Normals.cpp.

References a, CumulativeNormal(), Natural, Real, sign(), and SubFunctionForBivariateNormal().

Referenced by RainbowOption::compute_A(), RainbowOption::compute_B(), and RainbowOption::compute_C().

7.57.1.3 Real CumulativeNormal (Real *x*)

Definition at line 82 of file Normals.cpp.

References a, NormalDensity(), and Real.

Referenced by RainbowOption::compute_A(), RainbowOption::compute_B(), CumulativeBivariateNormal(), BlackScholes::getDelta(), BlackScholes::getPrice(), BlackScholes::getRho(), and BlackScholes::getTheta().

7.57.1.4 Real InverseCumulativeNormal (Real *x*)

Definition at line 23 of file Normals.cpp.

References a, r, and Real.

Referenced by Random::GetGaussian(), and Random::GetGaussians().

7.57.1.5 Real Maximize (valarray< Real > *Ptr*, LongNatural *dim*)

Definition at line 130 of file Normals.cpp.

References LongNatural, and Real.

Referenced by PayOff::RevLookbackCall(), and PayOff::RevLookbackPut().

7.57.1.6 Real NormalDensity (Real *x*)

Definition at line 17 of file Normals.cpp.

References OneOverRootTwoPi, and Real.

Referenced by CumulativeNormal(), BlackScholes::getGamma(), BlackScholes::getTheta(), and BlackScholes::getVega().

7.57.1.7 Real SubFunctionForBivariateNormal (Real *X*, Real *y*, Real *ap*, Real *bp*, Real *rho*)

Definition at line 189 of file Normals.cpp.

References r, and Real.

Referenced by CumulativeBivariateNormal().

7.58 OptionStrategy.cpp File Reference

```
#include ".\optionstrategy.h"
```

Functions

- ostream & **operator**<< (ostream &os, const **OptionStrategy** &optionStrategy)

7.58.1 Function Documentation

7.58.1.1 ostream& operator<< (ostream & *os*, const OptionStrategy & *optionStrategy*)

Parameters:

os: the output stream to direct output to

optionStrategy: the option strategy to display

Returns:

output stream as is standard for operator<<

Definition at line 196 of file OptionStrategy.cpp.

References BlackScholes::getMaturity(), BlackScholes::getRate(), BlackScholes::getSpot(), BlackScholes::getStrike(), BlackScholes::getVolatility(), BlackScholes::isCall(), Natural, OptionStrategy::returnNbOptions(), OptionStrategy::returnOption(), and OptionStrategy::returnOptionQuantity().

7.59 OptionStrategy.h File Reference

```
#include "BlackScholes.h"
#include "../../common/types.h"
#include <valarray>
```

Classes

- class **OptionStrategy**

Variables

- const **Natural maxNbOptions** = 500
- const **Real defaultshiftRate** = 0.0001
- const **Real defaultshiftVol** = 0.0001
- const **Real defaultshiftMat** = 0.01
- const **Real defaultshiftSpot** = 0.0001
- const **Real defaultshiftStrike** = 0.0001

7.59.1 Variable Documentation

7.59.1.1 const Real defaultshiftMat = 0.01 [static]

Definition at line 16 of file OptionStrategy.h.

7.59.1.2 const Real defaultshiftRate = 0.0001 [static]

Definition at line 14 of file OptionStrategy.h.

7.59.1.3 const Real defaultshiftSpot = 0.0001 [static]

Definition at line 17 of file OptionStrategy.h.

7.59.1.4 const Real defaultshiftStrike = 0.0001 [static]

Definition at line 18 of file OptionStrategy.h.

7.59.1.5 const Real defaultshiftVol = 0.0001 [static]

Definition at line 15 of file OptionStrategy.h.

7.59.1.6 const Natural maxNbOptions = 500 [static]

Definition at line 13 of file OptionStrategy.h.

7.60 ParkMiller.cpp File Reference

```
#include ".\parkmiller.h"
#include "time.h"
```

7.61 ParkMiller.h File Reference

```
#include "../../common/types.h"
#include "RandomGenerator.h"
```

Classes

- class **ParkMiller**

Variables

- const **LongInteger a** = 16807
- const **LongInteger m** = 2147483647
- const **LongInteger q** = 127773
- const **LongInteger r** = 2836

7.61.1 Variable Documentation

7.61.1.1 const LongInteger a = 16807

Definition at line 8 of file ParkMiller.h.

Referenced by RainbowOption::compute_C(), CumulativeBivariateNormal(), CumulativeNormal(), ParkMiller::GetOneRandomInteger(), InverseCumulativeNormal(), and mainasset().

7.61.1.2 const LongInteger m = 2147483647

Definition at line 9 of file ParkMiller.h.

Referenced by Date::advance(), Date::Date(), Date::endOfMonth(), ParkMiller::GetOneRandomInteger(), ParkMiller::getUniform(), UsDate::isBusinessDay(), ParkMiller::Max(), Date::month(), Date::monthLength(), Date::monthOffset(), Date::nthWeekday(), yieldCurve::operator==(), CSVParser::operator>>(), yieldPoint::setMaturity(), and CreditSpreadPoint::setMaturity().

7.61.1.3 const LongInteger q = 127773

Definition at line 10 of file ParkMiller.h.

Referenced by Matrix::Determinant(), ParkMiller::GetOneRandomInteger(), Matrix::IdentityMatrix(), Matrix::operator *(), Matrix::RightAppendIdentity(), and binomialTree::setClaimVariables().

7.61.1.4 const LongInteger r = 2836

Definition at line 11 of file ParkMiller.h.

Referenced by OptionStrategy::addLongButterflySpread(), OptionStrategy::addLongCallSpread(), OptionStrategy::addLongPutSpread(), OptionStrategy::addLongRatioCallSpread(), OptionStrategy::addLongStraddle(), OptionStrategy::addLongStrangle(), OptionStrategy::addOneOptionToStrategy(), yieldCurve::assignFlatRate(), creditCurve::assignFlatSpread(),

binomialTree::binomialTree(), BlackScholes::BlackScholes(), CreditSpreadPoint::CreditSpreadPoint(), ParkMiller::GetOneRandomInteger(), InverseCumulativeNormal(), volsurface::invertBSformula(), mainbinomialtree(), mainmc(), yieldPoint::setRate(), CreditSpreadPoint::setRate(), volsurface::setvolsurface(), SubFunctionForBivariateNormal(), and yieldPoint::yieldPoint().

7.62 PayOff.cpp File Reference

```
#include "./payoff.h"
#include "../../common/Normals.h"
#include <minmax.h>
```

7.63 PayOff.h File Reference

```
#include "../../common/types.h"
#include <valarray>
```

Classes

- class **PayOff**

7.64 PortFolio.cpp File Reference

```
#include "./PortFolio.h"
```

7.65 PortFolio.h File Reference

```
#include "./../PartA/BlackScholes/OptionStrategy.h"
#include "./../PartK/VarianceSwap.h"
#include "./../PartD/VanillaSwap.h"
#include "./../PartI/rainbowoption.h"
#include "./../PartH/bond.h"
#include "./../PartC/asset.h"
#include "./../PartL/Exotics.h"
#include <valarray>
```

Classes

- class **Portfolio**

Variables

- const **Natural MAX_SIZE** = 100
- const **Natural MAX_SIZE_NAME** = 50

7.65.1 Variable Documentation

7.65.1.1 const Natural MAX_SIZE = 100

Definition at line 17 of file PortFolio.h.

Referenced by Portfolio::Portfolio().

7.65.1.2 const Natural MAX_SIZE_NAME = 50

Definition at line 18 of file PortFolio.h.

Referenced by Portfolio::getCurrencyAsString(), and Portfolio::Portfolio().

7.66 productsCreation.cpp File Reference

```
#include ".\productscreation.h"
```

Functions

- bool **productsCreationMenu** (**marketData** data)

  Menu for this category.

- **BlackScholes** * **inputBSOption** (**marketData** data)

  User interface to input and store a BS option.

- string **outputCallPut** (char c)

  Transform the input c/C/p/P into "Call" or "Put".

- **OptionStrategy inputOptionStrategy** (**marketData** data)

  User interface to input and store an option strategy and options in it.

- void **inputSpecificOptionStrategy** (**marketData** data, **OptionStrategy** &strategy)

  add something else to the strategy than a Call/Put

- void **inputButterflySpread** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a butterfly spread to the strategy

- void **inputCallSpread** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a call spread to the strategy

- void **inputPutSpread** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a put spread to the strategy

- void **inputRatioCallSpread** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a ratio call spread to the strategy

- void **inputStraddle** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a Straddle to the strategy

- void **inputStrangle** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a strangle to the strategy

- **Exotics** * **inputExoticOptionOnSingleAsset** (**marketData** &data)

  User interface to input and store an Exotic Option with a single underlying (MC Price).

- **convertiblebond** * **inputConvertibleBond** (**marketData** &data)

  User interface to input a convertible bond.

- **bond** * **inputBond** (**marketData** &data)

  User interface to input a bond.

- **exoticsType choiceToType** (**Natural** choice)

  converts the 1 to 9 choice in a **Exotics**(p. 86) *Type*

- **VanillaSwap** * **inputVanillaSwap** (**marketData** data)

  User interface to input an interest rate vanilla swap.

- **rainbowType chooseRainbowType** ()
- **priceType choosePricingType** ()
- **RainbowOption** * **inputRainbowOption** (**marketData** data)

  To input a Rainbow Option.

7.66.1 Function Documentation

7.66.1.1 exoticsType choiceToType (Natural *choice*)

converts the 1 to 9 choice in a **Exotics**(p. 86) Type

Definition at line 832 of file productsCreation.cpp.

References AsianCall, AsianPut, BarrierCall, BarrierPut, CappedCliquet, CollaredCliquet, exoticsType, FlooredCliquet, Natural, RevLookbackCall, and RevLookbackPut.

Referenced by inputExoticOptionOnSingleAsset().

7.66.1.2 priceType choosePricingType ()

Definition at line 1014 of file productsCreation.cpp.

References ClosedForm, MonteCarlo, Natural, and priceType.

Referenced by inputRainbowOption().

7.66.1.3 rainbowType chooseRainbowType ()

Definition at line 957 of file productsCreation.cpp.

References AssetsBasketMax, BestOf2AssetsCash, BetterOf2Assets, Max2AssetsCall, Max2AssetsPut, Min2AssetsCall, Min2AssetsPut, Natural, rainbowType, SpreadOptionMax, WorseOf2Assets, and WorstOf2AssetsCash.

Referenced by inputRainbowOption().

7.66.1.4 bond* inputBond (marketData & *data*)

User interface to input a bond.

Definition at line 639 of file productsCreation.cpp.

References ACT_360, ACT_365, Annual, Bimonthly, bond::convexity(), marketData::creditcurve, Day30_360, Day30_365, DayCountConvention, bond::duration(), EveryFourthMonth, bond::fairvalue(), Frequency, Integer, Monthly, Natural, NoFrequency, Once, Date::plusDays(), Quarterly, Real, Semiannual, Date::setDateToToday(), marketData::yieldcurve, and bond::yieldToMaturity().

Referenced by productsCreationMenu().

7.66.1.5 BlackScholes* inputBSOption (marketData *data*)

User interface to input and store a BS option.

Definition at line 52 of file productsCreation.cpp.

References Call, BlackScholes::getDelta(), BlackScholes::getGamma(), BlackScholes::getPrice(), BlackScholes::getRho(), BlackScholes::getTheta(), BlackScholes::getVega(), Integer, Natural, outputCallPut(), Date::plusDays(), Put, Real, Date::setDateToToday(), yieldCurve::spotRate(), TypeOptionBS, volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputOptionStrategy(), and productsCreationMenu().

7.66.1.6 void inputButterflySpread (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a butterfly spread to the strategy

Definition at line 214 of file productsCreation.cpp.

References OptionStrategy::addLongButterflySpread(), Integer, Natural, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.66.1.7 void inputCallSpread (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a call spread to the strategy

Definition at line 263 of file productsCreation.cpp.

References OptionStrategy::addLongCallSpread(), Integer, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.66.1.8 convertiblebond* inputConvertibleBond (marketData & *data*)

User interface to input a convertible bond.

Definition at line 533 of file productsCreation.cpp.

References ACT_365, marketData::creditcurve, Integer, Natural, Date::plusDays(), Real, Date::setDateToToday(), and marketData::yieldcurve.

Referenced by productsCreationMenu().

7.66.1.9 Exotics* inputExoticOptionOnSingleAsset (marketData & *data*)

User interface to input and store an Exotic Option with a single underlying (MC Price).

Definition at line 424 of file productsCreation.cpp.

References choiceToType(), CollaredCliquet, exoticsType, importData::getData(), Exotics::getDelta(), Exotics::getPrice(), Exotics::getRho(), Exotics::getTheta(), Exotics::getVega(), LongNatural, Natural, Real, importData::runUserDefinedInterface(), marketData::vols, and marketData::yieldcurve.

Referenced by productsCreationMenu().

7.66.1.10 OptionStrategy inputOptionStrategy (marketData *data*)

User interface to input and store an option strategy and options in it.

Definition at line 119 of file productsCreation.cpp.

References OptionStrategy::addOneBlackScholesObject(), OptionStrategy::getGlobalDelta(), OptionStrategy::getGlobalGamma(), OptionStrategy::getGlobalRho(), OptionStrategy::getGlobalTheta(), OptionStrategy::getGlobalVega(), inputBSOption(), inputSpecificOptionStrategy(), Natural, Real, and OptionStrategy::returnPrice().

Referenced by productsCreationMenu().

7.66.1.11 void inputPutSpread (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a put spread to the strategy

Definition at line 296 of file productsCreation.cpp.

References OptionStrategy::addLongPutSpread(), Integer, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.66.1.12 RainbowOption* inputRainbowOption (marketData *data*)

To input a Rainbow Option.

Definition at line 1039 of file productsCreation.cpp.

References choosePricingType(), chooseRainbowType(), RainbowOption::getCorrelRisk(), RainbowOption::getPartialDelta(), RainbowOption::getPartialGamma(), RainbowOption::getPartialVega(), RainbowOption::getPrice(), RainbowOption::getRho(), Natural, priceType, rainbowType, Real, Date::setDateToToday(), marketData::vols, and marketData::yieldcurve.

Referenced by productsCreationMenu().

7.66.1.13 void inputRatioCallSpread (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a ratio call spread to the strategy

Definition at line 329 of file productsCreation.cpp.

References OptionStrategy::addLongRatioCallSpread(), Integer, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.66.1.14 void inputSpecificOptionStrategy (marketData *data*, OptionStrategy & *strategy*)

add something else to the strategy than a Call/Put

Definition at line 169 of file productsCreation.cpp.

References inputButterflySpread(), inputCallSpread(), inputPutSpread(), inputRatioCallSpread(), inputStraddle(), inputStrangle(), and Natural.

Referenced by inputOptionStrategy().

7.66.1.15 void inputStraddle (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a Straddle to the strategy

Definition at line 362 of file productsCreation.cpp.

References OptionStrategy::addLongStraddle(), Integer, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.66.1.16 void inputStrangle (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a strangle to the strategy

Definition at line 390 of file productsCreation.cpp.

References OptionStrategy::addLongStrangle(), Integer, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.66.1.17 VanillaSwap* inputVanillaSwap (marketData *data*)

User interface to input an interest rate vanilla swap.

Definition at line 866 of file productsCreation.cpp.

References Following, VanillaSwap::getFairValue1(), VanillaSwap::getFairValue2(), VanillaSwap::getRho(), VanillaSwap::getTheta(), Integer, Natural, Date::plusDays(), Real, VanillaSwap::returnPrice(), Date::setDateToToday(), and marketData::yieldcurve.

Referenced by productsCreationMenu().

7.66.1.18 string outputCallPut (char *c*)

Transform the input c/C/p/P into "Call" or "Put".

Definition at line 108 of file productsCreation.cpp.

Referenced by inputBSOption().

7.66.1.19 bool productsCreationMenu (marketData *data*)

Menu for this category.

Definition at line 4 of file productsCreation.cpp.

References inputBond(), inputBSOption(), inputConvertibleBond(), inputExoticOptionOnSingle-Asset(), inputOptionStrategy(), inputRainbowOption(), inputVanillaSwap(), and Natural.

Referenced by main().

7.67 productsCreation.h File Reference

```
#include "../PartB/yieldCurve.h"
#include "../PartE/volsurface.h"
#include "../PartA/BlackScholes/BlackScholes.h"
#include "../PartA/BlackScholes/OptionStrategy.h"
#include "../PartL/Exotics.h"
#include "../PartH/bond.h"
#include "../PartD/VanillaSwap.h"
#include "../PartI/rainbowoption.h"
#include "../PartJ/convertiblebond.h"
#include "./importData.h"
#include <minmax.h>
```

Functions

- bool **productsCreationMenu** (**marketData** data)

  Menu for this category.

- **BlackScholes** * **inputBSOption** (**marketData** data)

  User interface to input and store a BS option.

- string **outputCallPut** (char c)

  Transform the input c/C/p/P into "Call" or "Put".

- **OptionStrategy inputOptionStrategy** (**marketData** data)

  User interface to input and store an option strategy and options in it.

- void **inputSpecificOptionStrategy** (**marketData** data, **OptionStrategy** &strategy)

  add something else to the strategy than a Call/Put

- void **inputButterflySpread** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a butterfly spread to the strategy

- void **inputCallSpread** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a call spread to the strategy

- void **inputPutSpread** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a put spread to the strategy

- void **inputRatioCallSpread** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a ratio call spread to the strategy

- void **inputStraddle** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a Straddle to the strategy

- void **inputStrangle** (**marketData** data, **OptionStrategy** &strategy, bool useMarketData)

  add a strangle to the strategy

- **Exotics** * **inputExoticOptionOnSingleAsset** (**marketData** &data)

  User interface to input and store an Exotic Option with a single underlying (MC Price).

- **exoticsType choiceToType** (**Natural** choice)

  converts the 1 to 9 choice in a **Exotics**(p. 86) *Type*

- **bond** * **inputBond** (**marketData** &data)

  User interface to input a bond.

- **convertiblebond** * **inputConvertibleBond** (**marketData** &data)

  User interface to input a convertible bond.

- **VanillaSwap** * **inputVanillaSwap** (**marketData** data)

  User interface to input an interest rate vanilla swap.

- **priceType choosePricingType** (**Natural** choice)

  For Rainbow options, converts the input into a priceType.

- **rainbowType chooseRainbowType** (**Natural** choice)

  For Rainbow options, converts the input into a rainbowType.

- **RainbowOption** * **inputRainbowOption** (**marketData** data)

  To input a Rainbow Option.

7.67.1 Function Documentation

7.67.1.1 exoticsType choiceToType (Natural *choice*)

converts the 1 to 9 choice in a **Exotics**(p. 86) Type

Definition at line 832 of file productsCreation.cpp.

References AsianCall, AsianPut, BarrierCall, BarrierPut, CappedCliquet, CollaredCliquet, exoticsType, FlooredCliquet, Natural, RevLookbackCall, and RevLookbackPut.

Referenced by inputExoticOptionOnSingleAsset().

7.67.1.2 priceType choosePricingType (Natural *choice*)

For Rainbow options, converts the input into a priceType.

7.67.1.3 rainbowType chooseRainbowType (Natural *choice*)

For Rainbow options, converts the input into a rainbowType.

7.67.1.4 bond* inputBond (marketData & *data*)

User interface to input a bond.

Definition at line 639 of file productsCreation.cpp.

References ACT_360, ACT_365, Annual, Bimonthly, bond::convexity(), marketData::creditcurve, Day30_360, Day30_365, DayCountConvention, bond::duration(), EveryFourthMonth, bond::fairvalue(), Frequency, Integer, Monthly, Natural, NoFrequency, Once, Date::plusDays(), Quarterly, Real, Semiannual, Date::setDateToToday(), marketData::yieldcurve, and bond::yieldToMaturity().

Referenced by productsCreationMenu().

7.67.1.5 BlackScholes* inputBSOption (marketData *data*)

User interface to input and store a BS option.

Definition at line 52 of file productsCreation.cpp.

References Call, BlackScholes::getDelta(), BlackScholes::getGamma(), BlackScholes::getPrice(), BlackScholes::getRho(), BlackScholes::getTheta(), BlackScholes::getVega(), Integer, Natural, outputCallPut(), Date::plusDays(), Put, Real, Date::setDateToToday(), yieldCurve::spotRate(), TypeOptionBS, volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputOptionStrategy(), and productsCreationMenu().

7.67.1.6 void inputButterflySpread (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a butterfly spread to the strategy

Definition at line 214 of file productsCreation.cpp.

References OptionStrategy::addLongButterflySpread(), Integer, Natural, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.67.1.7 void inputCallSpread (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a call spread to the strategy

Definition at line 263 of file productsCreation.cpp.

References OptionStrategy::addLongCallSpread(), Integer, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.67.1.8 convertiblebond* inputConvertibleBond (marketData & *data*)

User interface to input a convertible bond.

Definition at line 533 of file productsCreation.cpp.

References ACT_365, marketData::creditcurve, Integer, Natural, Date::plusDays(), Real, Date::setDateToToday(), and marketData::yieldcurve.

Referenced by productsCreationMenu().

7.67.1.9 Exotics* inputExoticOptionOnSingleAsset (marketData & *data*)

User interface to input and store an Exotic Option with a single underlying (MC Price).

Definition at line 424 of file productsCreation.cpp.

References choiceToType(), CollaredCliquet, exoticsType, importData::getData(), Exotics::getDelta(), Exotics::getPrice(), Exotics::getRho(), Exotics::getTheta(), Exotics::getVega(), LongNatural, Natural, Real, importData::runUserDefinedInterface(), marketData::vols, and marketData::yieldcurve.

Referenced by productsCreationMenu().

7.67.1.10 OptionStrategy inputOptionStrategy (marketData *data*)

User interface to input and store an option strategy and options in it.

Definition at line 119 of file productsCreation.cpp.

References OptionStrategy::addOneBlackScholesObject(), OptionStrategy::getGlobalDelta(), OptionStrategy::getGlobalGamma(), OptionStrategy::getGlobalRho(), OptionStrategy::getGlobalTheta(), OptionStrategy::getGlobalVega(), inputBSOption(), inputSpecificOptionStrategy(), Natural, Real, and OptionStrategy::returnPrice().

Referenced by productsCreationMenu().

7.67.1.11 void inputPutSpread (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a put spread to the strategy

Definition at line 296 of file productsCreation.cpp.

References OptionStrategy::addLongPutSpread(), Integer, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.67.1.12 RainbowOption* inputRainbowOption (marketData *data*)

To input a Rainbow Option.

Definition at line 1039 of file productsCreation.cpp.

References choosePricingType(), chooseRainbowType(), RainbowOption::getCorrelRisk(), RainbowOption::getPartialDelta(), RainbowOption::getPartialGamma(), RainbowOption::get-

PartialVega(), RainbowOption::getPrice(), RainbowOption::getRho(), Natural, priceType, rainbowType, Real, Date::setDateToToday(), marketData::vols, and marketData::yieldcurve.

Referenced by productsCreationMenu().

7.67.1.13 void inputRatioCallSpread (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a ratio call spread to the strategy

Definition at line 329 of file productsCreation.cpp.

References OptionStrategy::addLongRatioCallSpread(), Integer, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.67.1.14 void inputSpecificOptionStrategy (marketData *data*, OptionStrategy & *strategy*)

add something else to the strategy than a Call/Put

Definition at line 169 of file productsCreation.cpp.

References inputButterflySpread(), inputCallSpread(), inputPutSpread(), inputRatioCallSpread(), inputStraddle(), inputStrangle(), and Natural.

Referenced by inputOptionStrategy().

7.67.1.15 void inputStraddle (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a Straddle to the strategy

Definition at line 362 of file productsCreation.cpp.

References OptionStrategy::addLongStraddle(), Integer, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.67.1.16 void inputStrangle (marketData *data*, OptionStrategy & *strategy*, bool *useMarketData*)

add a strangle to the strategy

Definition at line 390 of file productsCreation.cpp.

References OptionStrategy::addLongStrangle(), Integer, Date::plusDays(), Real, Date::setDateToToday(), yieldCurve::spotRate(), volsurface::volatility(), marketData::vols, and marketData::yieldcurve.

Referenced by inputSpecificOptionStrategy().

7.67.1.17 VanillaSwap* inputVanillaSwap (marketData *data*)

User interface to input an interest rate vanilla swap.

Definition at line 866 of file productsCreation.cpp.

References Following, VanillaSwap::getFairValue1(), VanillaSwap::getFairValue2(), VanillaSwap::getRho(), VanillaSwap::getTheta(), Integer, Natural, Date::plusDays(), Real, VanillaSwap::returnPrice(), Date::setDateToToday(), and marketData::yieldcurve.

Referenced by productsCreationMenu().

7.67.1.18 string outputCallPut (char *c*)

Transform the input c/C/p/P into "Call" or "Put".

Definition at line 108 of file productsCreation.cpp.

Referenced by inputBSOption().

7.67.1.19 bool productsCreationMenu (marketData *data*)

Menu for this category.

Definition at line 4 of file productsCreation.cpp.

References inputBond(), inputBSOption(), inputConvertibleBond(), inputExoticOptionOnSingleAsset(), inputOptionStrategy(), inputRainbowOption(), inputVanillaSwap(), and Natural.

Referenced by main().

7.68 rainbowoption.cpp File Reference

```
#include ".\rainbowoption.h"
```

7.69 rainbowoption.h File Reference

```
#include "../common/types.h"
#include "../common/matrix.h"
#include "../common/date.h"
#include "..\PartB\yieldCurve.h"
#include "..\PartE\volsurface.h"
#include <valarray>
#include "../PartA/MonteCarlo1/MersenneTwister.h"
#include "../PartA/MonteCarlo1/GaussianProcess.h"
#include "../PartA/MonteCarlo1/PayOff.h"
#include "../PartA/MonteCarlo1/Random.h"
#include "../PartA/MonteCarlo1/Drift.h"
#include "../PartA/MonteCarlo1/MCEngine.h"
#include "../PartA/BlackScholes/BlackScholes.h"
```

Classes

- class **RainbowOption**

Defines

- #define **RO_DEFAULT_STRIKE** 100
- #define **RO_DEFAULT_VOL** 0.15
- #define **RO_DEFAULT_RATE** 0.02
- #define **RO_DEFAULT_MATURITY** 1
- #define **RO_DEFAULT_NB_ASSETS** 2
- #define **RO_DEFAULT_MULTIPLIER** 1
- #define **RO_NPATHS** 100000
- #define **RO_SEED** 100000000
- #define **EPSILON** 0.00000001
- #define **GREEKAPPROX** 0.01

Enumerations

- enum **priceType** { **MonteCarlo**, **ClosedForm** }
- enum **rainbowType** {

  SpreadOptionMax, **AssetsBasketMax**, **BestOf2AssetsCash**, **WorstOf2Assets-Cash**,

  BetterOf2Assets, **WorseOf2Assets**, **Max2AssetsCall**, **Min2AssetsCall**,

  Max2AssetsPut, **Min2AssetsPut** }

7.69.1 Define Documentation

7.69.1.1 #define EPSILON 0.00000001

Definition at line 32 of file rainbowoption.h.

Referenced by RainbowOption::PriceByClosedForm_BetterOf2(), RainbowOption::PriceByClosedForm_WorseOf2(), RainbowOption::PriceByMc_BetterOf2Assets(), and RainbowOption::PriceByMc_WorseOf2Assets().

7.69.1.2 #define GREEKAPPROX 0.01

Definition at line 33 of file rainbowoption.h.

Referenced by RainbowOption::getCorrelRisk(), RainbowOption::getPartialDelta(), RainbowOption::getPartialGamma(), RainbowOption::getPartialVega(), and RainbowOption::getRho().

7.69.1.3 #define RO_DEFAULT_MATURITY 1

Definition at line 25 of file rainbowoption.h.

Referenced by RainbowOption::RainbowOption().

7.69.1.4 #define RO_DEFAULT_MULTIPLIER 1

Definition at line 27 of file rainbowoption.h.

7.69.1.5 #define RO_DEFAULT_NB_ASSETS 2

Definition at line 26 of file rainbowoption.h.

Referenced by RainbowOption::RainbowOption().

7.69.1.6 #define RO_DEFAULT_RATE 0.02

Definition at line 24 of file rainbowoption.h.

Referenced by RainbowOption::RainbowOption().

7.69.1.7 #define RO_DEFAULT_STRIKE 100

Definition at line 22 of file rainbowoption.h.

Referenced by RainbowOption::RainbowOption().

7.69.1.8 #define RO_DEFAULT_VOL 0.15

Definition at line 23 of file rainbowoption.h.

Referenced by RainbowOption::RainbowOption().

7.69.1.9 #define RO_NPATHS 100000

Definition at line 29 of file rainbowoption.h.

7.69.1.10 #define RO_SEED 100000000

Definition at line 30 of file rainbowoption.h.

Referenced by RainbowOption::instanciateMCVariables(), and RainbowOption::RainbowOption().

7.69.2 Enumeration Type Documentation

7.69.2.1 enum priceType

Author:
Yann to simplify, only non path dependant Rainbows, and no quanto

Enumeration values:
MonteCarlo

ClosedForm

Definition at line 41 of file rainbowoption.h.

Referenced by choosePricingType(), and inputRainbowOption().

7.69.2.2 enum rainbowType

Enumeration values:
SpreadOptionMax

AssetsBasketMax

BestOf2AssetsCash

WorstOf2AssetsCash

BetterOf2Assets

WorseOf2Assets

Max2AssetsCall

Min2AssetsCall

Max2AssetsPut

Min2AssetsPut

Definition at line 46 of file rainbowoption.h.

Referenced by chooseRainbowType(), RainbowOption::getRainbowType(), and inputRainbowOption().

7.70 RandC.cpp File Reference

```
#include "./randc.h"
#include "../../common/types.h"
#include <stdlib.h>
#include <time.h>
```

Variables

- const **Natural Maxim** = 32767

7.70.1 Variable Documentation

7.70.1.1 const Natural Maxim = 32767

Definition at line 6 of file RandC.cpp.

Referenced by RandC::GetOneRandomInteger(), and RandC::Max().

7.71 RandC.h File Reference

```
#include "./RandomGenerator.h"
```

Classes

- class **RandC**

7.72 Random.cpp File Reference

```
#include ".\random.h"
```

7.73 Random.h File Reference

```
#include "../../common/normals.h"
#include "../../common/types.h"
#include "RandomGenerator.h"
#include <valarray>
```

Classes

- class **Random**

7.74 RandomGenerator.cpp File Reference

```
#include ".\randomgenerator.h"
```

7.75 RandomGenerator.h File Reference

```
#include "../../Common/types.h"
```

Classes

- class **RandomGenerator**

7.76 Sobol.cpp File Reference

```
#include ".\sobol.h"
#include <minmax.h>
```

7.77 Sobol.h File Reference

```
#include "./RandomGenerator.h"
#include "../../common/types.h"
#include <valarray>
```

Classes

- class **Sobol**

Variables

- const **Natural MAXBIT** = 30MAXDIM=6

7.77.1 Variable Documentation

7.77.1.1 const Natural MAXBIT = 30MAXDIM=6

Definition at line 10 of file Sobol.h.

Referenced by Sobol::sobseq().

7.78 StringTokenizer.cpp File Reference

```
#include "StringTokenizer.h"
```

7.79 StringTokenizer.h File Reference

```
#include <stdio.h>
#include <stdlib.h>
#include <iostream>
#include <string>
```

Classes

- class **StringTokenizer**

7.80 SwapLeg.cpp File Reference

```
#include ".\swapleg.h"
```

7.81 SwapLeg.h File Reference

```
#include "./../Common/Date.h"
#include "./../Common/types.h"
#include <valarray>
```

Classes

- class **SwapLeg**

7.82 testObjects.cpp File Reference

```
#include <iostream>
#include <string>
#include "testObjects.h"
#include "../common/filereader.h"
```

Functions

- **Natural maintests** (**Natural** argc, char **argv)

7.82.1 Function Documentation

7.82.1.1 Natural maintests (Natural *argc*, char ** *argv*)

Definition at line 7 of file testObjects.cpp.

References mainasset(), mainbinomialtree(), mainbond(), mainconvertiblebond(), maincreditcurve(), maindate(), mainfilereader(), maininterpolator(), mainIRVanillaSwap(), mainmatrix(), mainmontecarlo(), mainoption(), mainoptionstrategy(), mainrainbowoptions(), mainvarianceswap(), mainvolsurface(), mainyieldcurve(), Natural, FileReader::setdatadir(), and ShortNatural.

Referenced by main().

7.83 testObjects.h File Reference

```
#include <string>
#include "../PartB/yieldCurve.h"
#include "../PartE/volsurface.h"
```

Functions

- bool **maindate** (void)
  test the date class
- bool **mainmontecarlo** (void)
  test the montecarlo option pricer functionality
- double **mainmc** (double Expiry, double Strike, double Spot, **volsurface** *Vol, **yieldCurve** *r, unsigned long nPaths, unsigned long nDates, int PrdName)
  main routine which runs the montecarlo pricer
- bool **mainoption** (void)
  test the BS option pricing functionality
- bool **mainoptionstrategy** (void)
  test the option strategy functionality
- bool **mainmatrix** (void)
  test the matrix functions
- bool **maininterpolator** (void)
  test the 2d/3d interpolator functionality
- bool **mainyieldcurve** (void)
  test the yield curve functionality
- bool **mainasset** (void)
  test the asset functionality
- bool **mainfilereader** (void)
  test the file reader functionality
- bool **fr_basic** (void)
  file reader basic test
- bool **mainvolsurface** (void)
  test the volsurface functionality
- bool **maincreditcurve** (void)
  test of the credit curve object
- bool **mainrainbowoptions** (void)

test of the credit curve object

- bool **mainbond** (void)

  test the bond functionality

- bool **mainvarianceswap** (void)

  test of the variance swaps object

- bool **mainbinomialtree** (void)

  test of the binomial tree object

- bool **mainconvertiblebond** (void)

  test of the convertible bond object

- bool **mainIRVanillaSwap** (void)

  Test of the Vanilla Swap - Yann.

7.83.1 Function Documentation

7.83.1.1 bool fr_basic (void)

file reader basic test

Returns:
true if pass, otherwise fail

Definition at line 53 of file mainfilereader.cpp.

References FileReader::fileexists(), and FileReader::getdatadirasstring().

Referenced by mainfilereader().

7.83.1.2 bool mainasset (void)

test the asset functionality

Author:
Yann

Definition at line 14 of file maintestasset.cpp.

References a, FileReader::buildYieldPointArray(), EUR, asset::forwardPrice(), FileReader::getdatadirasstring(), Natural, Date::plusDays(), Date::plusMonths(), Date::plusYears(), Real, Date::setDateToToday(), and Date::toString().

Referenced by maintests().

7.83.1.3 bool mainbinomialtree (void)

test of the binomial tree object

Returns:
true if pass, otherwise fail

Definition at line 7 of file mainbinomialtree.cpp.

References Call, binomialTree::getPrice(), BlackScholes::getPrice(), binomialTree::getStockProcess(), LongNatural, mainmc(), Natural, r, Real, realsEqual(), and binomialTree::runEngineCall().

Referenced by maintests().

7.83.1.4 bool mainbond (void)

test the bond functionality

Returns:
true if pass, otherwise fail

Definition at line 12 of file mainbond.cpp.

References ACT_365, bond::convexity(), DayCountConvention, bond::duration(), bond::fairvalue(), Frequency, May, November, Real, Semiannual, and bond::yieldToMaturity().

Referenced by maintests().

7.83.1.5 bool mainconvertiblebond (void)

test of the convertible bond object

Returns:
true if pass, otherwise fail

Definition at line 5 of file mainconvertiblebond.cpp.

References ACT_365, Days, convertiblebond::fairvalue(), Months, Natural, convertiblebond::parityDelta(), convertiblebond::parityGamma(), Date::plus(), Real, realsEqual(), convertiblebond::rho(), Date::setDateToToday(), and asset::setPrice().

Referenced by maintests().

7.83.1.6 bool maincreditcurve (void)

test of the credit curve object

Returns:
true if pass, otherwise fail

Definition at line 9 of file maincreditcurves.cpp.

References FileReader::buildCreditSpreadPointArray(), FileReader::buildYieldPointArray(), creditCurve::creditSpread(), creditCurve::cumulativeDefaultProbability(), creditCurve::defaultProbability(), FileReader::getdatadirasstring(), creditCurve::hazardRate(), Natural, Real, creditCurve::riskyDiscountFactor(), and creditCurve::survivalProbability().

Referenced by maintests().

7.83.1.7 bool maindate (void)

test the date class

Returns:
true if pass, otherwise fail

Definition at line 7 of file maindate.cpp.

References Date::lastDayOfMonth(), Date::setDateToToday(), and Date::toString().

Referenced by maintests().

7.83.1.8 bool mainfilereader (void)

test the file reader functionality

Returns:
true if pass, otherwise fail

Definition at line 45 of file mainfilereader.cpp.

References fr_basic().

Referenced by maintests().

7.83.1.9 bool maininterpolator (void)

test the 2d/3d interpolator functionality

Returns:
true if pass, otherwise fail

Definition at line 5 of file maininterpolator.cpp.

References Integer, interpolator::interpolate(), and Real.

Referenced by maintests().

7.83.1.10 bool mainIRVanillaSwap (void)

Test of the Vanilla Swap - Yann.

Author:
Yann

Definition at line 9 of file mainIRVanillaSwap.cpp.

References FileReader::buildYieldPointArray(), FileReader::getdatadirasstring(), CashFlow::getFairValue(), Date::plusMonths(), Date::plusYears(), Real, VanillaSwap::returnPrice(), and Date::setDateToToday().

Referenced by maintests().

7.83.1.11 bool mainmatrix (void)

test the matrix functions

Author:
Yann

Definition at line 16 of file mainmatrix.cpp.

References Matrix::CholeskyDecomposition(), Matrix::GetTransposed(), Natural, Matrix::SetValue(), transform1DvalarrayToColumnMatrix(), transform2DvalarrayToMatrix(), transformColumnMatrixTo1Dvalarray(), and transformMatrixTo2Dvalarray().

Referenced by maintests().

7.83.1.12 double mainmc (double *Expiry*, double *Strike*, double *Spot*, volsurface * *Vol*, yieldCurve * *r*, unsigned long *nPaths*, unsigned long *nDates*, int *PrdName*)

main routine which runs the montecarlo pricer

7.83.1.13 bool mainmontecarlo (void)

test the montecarlo option pricer functionality

Returns:
true if pass, otherwise fail

Definition at line 19 of file mainmontecarlo.cpp.

References LongNatural, mainmc(), and Real.

Referenced by maintests().

7.83.1.14 bool mainoption (void)

test the BS option pricing functionality

Returns:
true if pass, otherwise fail

Definition at line 5 of file mainoptionstrategy.cpp.

References Call, BlackScholes::getDelta(), BlackScholes::getGamma(), BlackScholes::getPrice(), BlackScholes::getRho(), BlackScholes::getTheta(), BlackScholes::getVega(), BlackScholes::getVolatility(), and LongNatural.

Referenced by maintests().

7.83.1.15 bool mainoptionstrategy (void)

test the option strategy functionality

Returns:
true if pass, otherwise fail

Definition at line 26 of file mainoptionstrategy.cpp.

References OptionStrategy::addLongButterflySpread(), OptionStrategy::getGlobalDelta(), and OptionStrategy::returnPrice().

Referenced by maintests().

7.83.1.16 bool mainrainbowoptions (void)

test of the credit curve object

Author:
Yann

* Types (MonteCarlo, ClosedForm)

Definition at line 13 of file mainrainbowoptions.cpp.

References AssetsBasketMax, BestOf2AssetsCash, BetterOf2Assets, ClosedForm, RainbowOption::getCorrelRisk(), RainbowOption::getPartialDelta(), RainbowOption::getPartialGamma(), RainbowOption::getPartialVega(), RainbowOption::getPrice(), RainbowOption::getRho(), Max2AssetsCall, Max2AssetsPut, Min2AssetsCall, Min2AssetsPut, MonteCarlo, Real, Date::setDateToToday(), RainbowOption::setRainbowType(), SpreadOptionMax, WorseOf2Assets, and WorstOf2AssetsCash.

Referenced by maintests().

7.83.1.17 bool mainvarianceswap (void)

test of the variance swaps object

Returns:
true if pass, otherwise fail

Definition at line 9 of file mainvarianceswap.cpp.

References OptionStrategy::addLongButterflySpread(), OptionStrategy::addOneBlackScholesObject(), Call, VarianceSwap::getPrice(), Natural, Put, and Real.

Referenced by maintests().

7.83.1.18 bool mainvolsurface (void)

test the volsurface functionality

Returns:
true if pass, otherwise fail

Definition at line 12 of file mainvolsurface.cpp.

References FileReader::buildVolSurfaceParams(), December, July, March, Real, September, volsurface::setvolsurface(), Date::toString(), and volsurface::volatility().

Referenced by maintests().

7.83.1.19 bool mainyieldcurve (void)

test the yield curve functionality

Author:
Yann

Definition at line 13 of file mainyieldcurves.cpp.

References FileReader::buildYieldPointArray(), Continuous, Discrete, FileReader::getdatadirasstring(), yieldCurve::getMaturitiesInTheZCBCurve(), Month, Natural, Date::plusMonths(), Real, yieldCurve::rotateZCBRateCurve(), Date::setDateToToday(), yieldCurve::shiftZCBRateCurve(), and yieldCurve::spotRate().

Referenced by maintests().

7.84 types.h File Reference

Classes

- struct **cachedval**

Defines

- #define **TN_INTEGER** int
- #define **TN_LONG_INTEGER** long
- #define **TN_REAL** double
- #define **TN_INFINITY** 9999

Typedefs

- typedef short TN_INTEGER **ShortInteger**
- typedef unsigned short TN_INTEGER **ShortNatural**
- typedef TN_INTEGER **Integer**
- typedef unsigned TN_INTEGER **Natural**
- typedef TN_LONG_INTEGER **LongInteger**
- typedef unsigned TN_LONG_INTEGER **LongNatural**
- typedef TN_REAL **Real**
- typedef long long **VeryLongInteger**
- typedef unsigned long long **VeryLongNatural**

Enumerations

- enum **Currency** { **USD** = 1, **EUR** = 2, **CAD** = 3 }

7.84.1 Define Documentation

7.84.1.1 #define TN_INFINITY 9999

Definition at line 9 of file types.h.

Referenced by mergeunique().

7.84.1.2 #define TN_INTEGER int

Definition at line 6 of file types.h.

7.84.1.3 #define TN_LONG_INTEGER long

Definition at line 7 of file types.h.

7.84.1.4 #define TN_REAL double

Definition at line 8 of file types.h.

Referenced by Date::dayCount(), and bond::fairvalue().

7.84.2 Typedef Documentation

7.84.2.1 typedef TN_INTEGER Integer

Definition at line 14 of file types.h.

Referenced by Date::advance(), volsurface::forwardvolsurface(), bond::getCashflow(), interpolator::getInterpolation(), interpolator::getPlace(), interpolator::getPlaceOnXi(), VarianceSwap::getPrice(), Portfolio::getPrice(), Exotics::getTheta(), inputBond(), inputBSOption(), inputButterflySpread(), inputCallSpread(), inputConvertibleBond(), inputPutSpread(), inputRatioCallSpread(), inputStraddle(), inputStrangle(), inputVanillaSwap(), interpolator::interpolate(), interpolatormain(), maininterpolator(), mainmc(), Date::month(), Date::monthLength(), Date::monthOffset(), Date::plus(), Date::plusDays(), Date::plusMonths(), Date::plusWeeks(), Date::plusYears(), Portfolio::returnSensibilityToRate(), Portfolio::returnSensibilityToTime(), Portfolio::returnSensibilityToVol(), binomialTree::runEngineCall(), binomialTree::runEngineConvertibleBond(), volsurface::shiftedvolsurface(), Sobol::sobseq(), SwapLeg::SwapLeg(), and Date::weekday().

7.84.2.2 typedef TN_LONG_INTEGER LongInteger

Definition at line 16 of file types.h.

Referenced by Date::applyConvention(), Date::Date(), ParkMiller::GetOneRandomInteger(), Drift::GetTimeBtwDates(), Date::maximumSerialNumber(), Date::minimumSerialNumber(), Date::operator+(), Date::operator++(), Date::operator+=(), Date::operator-(), Date::operator–(), Date::operator-=(), SwapLeg::returnSize(), Date::serialNumber(), Sobol::sobseq(), SwapLeg::SwapLeg(), and Date::yearOffset().

7.84.2.3 typedef unsigned TN_LONG_INTEGER LongNatural

Definition at line 17 of file types.h.

Referenced by PayOff::AsianCall(), PayOff::AsianPut(), Average(), PayOff::BarrierCall(), PayOff::BarrierPut(), GaussianProcess::BuildPath(), Drift::Drift(), Exotics::Exotics(), GaussianProcess::GaussianProcess(), Random::GetDimensionality(), Drift::GetDriftattimei(), Random::GetGaussians(), Sobol::GetOneRandomInteger(), RandC::GetOneRandomInteger(), ParkMiller::GetOneRandomInteger(), MersenneTwister::GetOneRandomInteger(), RainbowOption::getPrice(), GaussianProcess::GetStepIncrements(), Drift::GetTimeBtwDates(), Random::GetUniforms(), inputExoticOptionOnSingleAsset(), mainbinomialtree(), mainmc(), mainmontecarlo(), mainoption(), Maximize(), MCEngine::MCEngine(), MersenneTwister::MersenneTwister(), Sobol::Min(), RandC::Min(), ParkMiller::Min(), MersenneTwister::Min(), ParkMiller::ParkMiller(), RainbowOption::PriceByMc_2AssetsBasketMax(), RainbowOption::PriceByMc_2SpreadOptionMax(), RainbowOption::PriceByMc_BestOf2AssetsCash(), RainbowOption::PriceByMc_BetterOf2Assets(), RainbowOption::PriceByMc_Max2AssetsCall(), RainbowOption::PriceByMc_Max2AssetsPut(), RainbowOption::PriceByMc_Min2AssetsCall(), RainbowOption::PriceByMc_Min2AssetsPut(), RainbowOption::PriceByMc_WorseOf2Assets(), RainbowOption::PriceByMc_WorstOf2AssetsCash(), RainbowOption::RainbowOption(), RandC::RandC(), Random::Random(), RandomGenerator::RandomGenerator(), Random::ResetDimensionality(), PayOff::RevLookbackCall(), PayOff::RevLookbackPut(), MCEngine::RunEngineAsianCall(), MCEngine::RunEngineAsianPut(), MCEngine::RunEngineBarrierCall(), MCEngine::RunEngineBarrierPut(), MCEngine::RunEngineCall(), MCEngine::RunEngineCappedCliquet(), MCEngine::RunEngineFlooredCliquet(), MCEngine::RunEnginePut(), MCEngine::RunEngineRainbow2AssetsBasketMax(), MCEngine::RunEngineRainbow2SpreadOptionMax(), MCEngine::RunEngineRainbow-

BestOf2AssetsCash(), MCEngine::RunEngineRainbowMax2AssetsCall(), MCEngine::RunEngineRainbowMax2AssetsPut(), MCEngine::RunEngineRainbowMin2AssetsCall(), MCEngine::RunEngineRainbowMin2AssetsPut(), MCEngine::RunEngineRainbowWorstOf2AssetsCash(), MCEngine::RunEngineRevLookbackCall(), MCEngine::RunEngineRevLookbackPut(), Sobol::SetSeed(), RandomGenerator::SetSeed(), Random::SetSeed(), RandC::SetSeed(), ParkMiller::SetSeed(), MersenneTwister::SetSeed(), Random::Skip(), Sobol::Sobol(), and Sobol::sobseq().

7.84.2.4 typedef unsigned TN_INTEGER Natural

Definition at line 15 of file types.h.

Referenced by yieldCurve::assignFlatRate(), creditCurve::assignFlatSpread(), yieldCurve::assignZCBrateAtIndex(), binomialTree::binomialTree(), FileReader::buildCreditSpreadPointArray(), FileReader::buildVolSurfaceParams(), FileReader::buildYieldPointArray(), CashFlow::CashFlow(), choiceToType(), choosePricingType(), chooseRainbowType(), creditCurve::combineUnderlyingAndSpreads(), yieldCurve::computeZCBRatesBootstrap(), binomialTree::constructStockProcess(), convertiblebond::convertiblebond(), bond::convexity(), creditCurve::createSpreadCurve(), CumulativeBivariateNormal(), creditCurve::defaultProbability(), importData::displayFileFormatsMenu(), Drift::Drift(), bond::duration(), bond::fairvalue(), asset::forwardPrice(), yieldCurve::forwardZCBCurve(), GaussianProcess::GaussianProcess(), bond::getCashflow(), binomialTree::getClaimProcess(), RainbowOption::getCorrelRisk(), RainbowOption::getDelta(), CashFlow::getFairValue(), RainbowOption::getGamma(), yieldCurve::getMaturitiesInTheMarketCurve(), yieldCurve::getMaturitiesInTheZCBCurve(), RainbowOption::getPartialDelta(), RainbowOption::getPartialGamma(), RainbowOption::getPartialVega(), yieldCurve::getPointAtMaturity(), VarianceSwap::getPrice(), binomialTree::getRate(), yieldCurve::getSequentSwapRates(), convertiblebond::getSteps(), binomialTree::getSteps(), binomialTree::getStockProcess(), yieldCurve::getSwapRates(), Drift::GetvDates(), Drift::GetvDrift(), RainbowOption::getVega(), creditCurve::indexOfCurrentSpread(), creditCurve::indexOfPreviousSpread(), inputBond(), inputBSOption(), inputButterflySpread(), inputConvertibleBond(), inputExoticOptionOnSingleAsset(), inputOptionStrategy(), inputRainbowOption(), inputSpecificOptionStrategy(), inputVanillaSwap(), RainbowOption::instanciateMCVariables(), main(), mainasset(), mainbinomialtree(), mainconvertiblebond(), maincreditcurve(), mainmatrix(), maintests(), mainvarianceswap(), mainyieldcurve(), mergeunique(), operator<<(), yieldCurve::operator==(), CSVParser::operator>>(), productsCreationMenu(), riskybond::quotedPrice(), bond::quotedPrice(), RainbowOption::reassignVolsAtThemoney(), RainbowOption::reassignVolsAtThestrike(), creditCurve::resampleSpread(), OptionStrategy::returnNbOptions(), OptionStrategy::returnOption(), OptionStrategy::returnOptionQuantity(), yieldCurve::rotateZCBRateCurve(), binomialTree::runEngineCall(), binomialTree::runEngineConvertibleBond(), MCEngine::RunEngineGeneral(), MCEngine::RunEngineRainbow2AssetsBasketMax(), MCEngine::RunEngineRainbow2SpreadOptionMax(), MCEngine::RunEngineRainbowBestOf2AssetsCash(), MCEngine::RunEngineRainbowMax2AssetsCall(), MCEngine::RunEngineRainbowMax2AssetsPut(), MCEngine::RunEngineRainbowMin2AssetsCall(), MCEngine::RunEngineRainbowMin2AssetsPut(), MCEngine::RunEngineRainbowWorstOf2AssetsCash(), importData::runInterface(), yieldCurve::SequentDiscountFactorsByInvertSwapMatrix(), binomialTree::setClaimVariables(), yieldCurve::shiftZCBRateCurve(), Sobol::sobseq(), yieldCurve::sortCashSwap(), yieldCurve::sortMarketRatesByMaturity(), yieldCurve::spotRate(), creditCurve::survivalProbability(), creditCurve::swapFees(), SwapLeg::SwapLeg(), transform1DvalarrayToColumnMatrix(), transform2DvalarrayToMatrix(), transformColumnMatrixTo1Dvalarray(), transformMatrixTo2Dvalarray(), valarrayRealToString(), and bond::yieldToMaturity().

7.84.2.5 typedef TN_REAL Real

Definition at line 18 of file types.h.

Referenced by absolute(), Portfolio::addAsset(), Portfolio::addBond(), Portfolio::addExoticOption(), OptionStrategy::addLongButterflySpread(), OptionStrategy::addLongCallSpread(), OptionStrategy::addLongPutSpread(), OptionStrategy::addLongRatioCallSpread(), OptionStrategy::addLongStraddle(), OptionStrategy::addLongStrangle(), OptionStrategy::addOneBlackScholesObject(), OptionStrategy::addOneOptionToStrategy(), Portfolio::addRainbowOption(), Portfolio::addVanillaSwap(), Portfolio::addVarianceSwap(), convertiblebond::adjustedConversionRatio(), PayOff::AsianCall(), PayOff::AsianPut(), asset::asset(), yieldCurve::assignFlatRate(), creditCurve::assignFlatSpread(), yieldCurve::assignZCBrateAtIndex(), Average(), PayOff::BarrierCall(), PayOff::BarrierPut(), binomialTree::binomialTree(), BlackScholes::BlackScholes(), bond::bond(), GaussianProcess::BuildPath(), GaussianProcess::BuildTerminalPoint(), PayOff::Call(), PayOff::CappedCliquet(), CashFlow::CashFlow(), OptionStrategy::changeMaturity(), BlackScholes::changeMaturity(), OptionStrategy::changeRate(), BlackScholes::changeRate(), OptionStrategy::changeSpot(), BlackScholes::changeSpot(), OptionStrategy::changeStrike(), BlackScholes::changeStrike(), OptionStrategy::changeVol(), BlackScholes::changeVol(), Matrix::CholeskyDecomposition(), RainbowOption::compute_A(), RainbowOption::compute_B(), RainbowOption::compute_C(), RainbowOption::compute_d1(), RainbowOption::compute_d2(), RainbowOption::compute_d3(), RainbowOption::compute_d4(), RainbowOption::compute_rho1(), RainbowOption::compute_rho2(), RainbowOption::compute_sigmaA(), yieldCurve::computeZCBRatesBootstrap(), PayOff::Convertible(), convertiblebond::convertiblebond(), bond::convexity(), creditCurve::creditCurve(), creditCurve::creditSpread(), CreditSpreadPoint::CreditSpreadPoint(), CumulativeBivariateNormal(), creditCurve::cumulativeDefaultProbability(), CumulativeNormal(), Date::dayCount(), creditCurve::defaultProbability(), convertiblebond::delta(), yieldCurve::discountFactor(), creditCurve::discountFactor(), Drift::Drift(), bond::duration(), Exotics::Exotics(), convertiblebond::fairvalue(), bond::fairvalue(), PayOff::FlooredCliquet(), flowSchedule::flowSchedule(), yieldCurve::forwardDiscountFactor(), asset::forwardPrice(), yieldCurve::forwardRate(), creditCurve::forwardRate(), volsurface::forwardVolatility(), yieldCurve::forwardZCBCurve(), convertiblebond::gamma(), GaussianProcess::GaussianProcess(), flowSchedule::getAmount(), bond::getCashflow(), RainbowOption::getCorrelRisk(), RainbowOption::getDelta(), Exotics::getDelta(), BlackScholes::getDelta(), asset::getDelta(), Drift::GetDriftattimei(), bond::getFaceAmount(), CashFlow::getFairValue(), VanillaSwap::getFairValue1(), VanillaSwap::getFairValue2(), RainbowOption::getGamma(), BlackScholes::getGamma(), Random::GetGaussian(), Random::GetGaussians(), OptionStrategy::getGlobalDelta(), OptionStrategy::getGlobalGamma(), OptionStrategy::getGlobalRho(), OptionStrategy::getGlobalTheta(), OptionStrategy::getGlobalVega(), interpolator::getInterpolation(), yieldPoint::getMaturity(), CreditSpreadPoint::getMaturity(), BlackScholes::getMaturity(), binomialTree::getMaturity(), bond::getMaturityInYears(), RainbowOption::getPartialDelta(), RainbowOption::getPartialGamma(), RainbowOption::getPartialVega(), interpolator::getPlace(), interpolator::getPlaceOnXi(), yieldCurve::getPointAtMaturity(), VarianceSwap::getPrice(), RainbowOption::getPrice(), Portfolio::getPrice(), Exotics::getPrice(), BlackScholes::getPrice(), asset::getPrice(), yieldPoint::getRate(), CreditSpreadPoint::getRate(), BlackScholes::getRate(), binomialTree::getRate(), asset::getRate(), creditCurve::getRecoveryRate(), VarianceSwap::getRho(), VanillaSwap::getRho(), RainbowOption::getRho(), Exotics::getRho(), BlackScholes::getRho(), asset::getRho(), yieldCurve::getSequentSwapRates(), binomialTree::getSigma(), binomialTree::getSo(), BlackScholes::getSpot(), BlackScholes::getStrike(), VarianceSwap::getTheta(), VanillaSwap::getTheta(), RainbowOption::getTheta(), Exotics::getTheta(), BlackScholes::getTheta(), Sobol::getUniform(), RandomGenerator::getUniform(), Random::GetUniform(), RandC::getUniform(), ParkMiller::getUniform(), MersenneTwister::getUniform(), VarianceSwap::getVega(), RainbowOption::getVega(), Exotics::getVega(), BlackScholes::getVega(), BlackScholes::getVolatility(), asset::GetVolatility(), creditCurve::hazardRate(), importData::importVolSurface(), creditCurve::indexOfCurrentSpread(),

creditCurve::indexOfPreviousSpread(), inputBond(), inputBSOption(), inputButterflySpread(), inputCallSpread(), inputConvertibleBond(), inputExoticOptionOnSingleAsset(), inputOptionStrategy(), inputPutSpread(), inputRainbowOption(), inputRatioCallSpread(), inputStraddle(), inputStrangle(), inputVanillaSwap(), convertiblebond::interestRateDelta(), interpolator::interpolate(), interpolatormain(), InverseCumulativeNormal(), volsurface::invertBSformula(), mainasset(), mainbinomialtree(), mainbond(), mainconvertiblebond(), maincreditcurve(), maininterpolator(), mainIRVanillaSwap(), mainmc(), mainmontecarlo(), mainrainbowoptions(), mainvarianceswap(), mainvolsurface(), mainyieldcurve(), Maximize(), MCEngine::MCEngine(), MCEngine::MCResult(), mergeunique(), NormalDensity(), PayOff::operator()(), yieldCurve::operator==(), convertiblebond::parity(), convertiblebond::parityDelta(), convertiblebond::parityGamma(), PayOff::PayOff(), asset::Price(), RainbowOption::PriceByClosedForm_BestOf2_plusCash(), RainbowOption::PriceByClosedForm_BetterOf2(), RainbowOption::PriceByClosedForm_MaxOf2_call(), RainbowOption::PriceByClosedForm_MaxOf2_put(), RainbowOption::PriceByClosedForm_MinOf2_call(), RainbowOption::PriceByClosedForm_MinOf2_put(), RainbowOption::PriceByClosedForm_WorseOf2(), RainbowOption::PriceByMc_2AssetsBasketMax(), RainbowOption::PriceByMc_2SpreadOptionMax(), RainbowOption::PriceByMc_BestOf2AssetsCash(), RainbowOption::PriceByMc_BetterOf2Assets(), RainbowOption::PriceByMc_Max2AssetsCall(), RainbowOption::PriceByMc_Max2AssetsPut(), RainbowOption::PriceByMc_Min2AssetsCall(), RainbowOption::PriceByMc_Min2AssetsPut(), RainbowOption::PriceByMc_WorseOf2Assets(), RainbowOption::PriceByMc_WorstOf2AssetsCash(), PayOff::Put(), riskybond::quotedPrice(), bond::quotedPrice(), PayOff::Rainbow2AssetsBasketMax(), PayOff::Rainbow2SpreadOptionMax(), PayOff::RainbowBestOf2AssetsCash(), PayOff::RainbowMax2AssetsCall(), PayOff::RainbowMax2AssetsPut(), PayOff::RainbowMin2AssetsCall(), PayOff::RainbowMin2AssetsPut(), RainbowOption::RainbowOption(), PayOff::RainbowWorstOf2AssetsCash(), realsEqual(), OptionStrategy::recalcPrice(), OptionStrategy::returnOptionQuantity(), VanillaSwap::returnPrice(), OptionStrategy::returnPrice(), Portfolio::returnSensibilityToRate(), Portfolio::returnSensibilityToTime(), Portfolio::returnSensibilityToVol(), PayOff::RevLookbackCall(), PayOff::RevLookbackPut(), convertiblebond::rho(), riskybond::rho(), treasurybond::rho(), riskybond::riskybond(), creditCurve::riskyDiscountFactor(), yieldCurve::rotateZCBRateCurve(), binomialTree::runEngineConvertibleBond(), MCEngine::RunEngineRainbow2AssetsBasketMax(), MCEngine::RunEngineRainbow2SpreadOptionMax(), MCEngine::RunEngineRainbowBestOf2AssetsCash(), MCEngine::RunEngineRainbowMax2AssetsCall(), MCEngine::RunEngineRainbowMax2AssetsPut(), MCEngine::RunEngineRainbowMin2AssetsCall(), MCEngine::RunEngineRainbowMin2AssetsPut(), MCEngine::RunEngineRainbowWorstOf2AssetsCash(), importData::runUserDefinedInterface(), flowSchedule::setAmount(), binomialTree::setClaimVariables(), asset::setDivAsRate(), yieldPoint::setMaturity(), CreditSpreadPoint::setMaturity(), asset::setPrice(), yieldPoint::setRate(), CreditSpreadPoint::setRate(), PayOff::SetStrike(), asset::setVolatility(), volsurface::setvolsurface(), riskybond::shiftedbond(), treasurybond::shiftedbond(), convertiblebond::shiftedcbond(), volsurface::shiftedvolsurface(), volsurface::shiftedYCvolsurface(), yieldCurve::shiftZCBRateCurve(), sign(), Sobol::sobseq(), yieldCurve::sortMarketRatesByMaturity(), yieldCurve::spotRate(), creditCurve::spotRate(), SubFunctionForBivariateNormal(), creditCurve::survivalProbability(), creditCurve::swapFees(), SwapLeg::SwapLeg(), creditCurve::timeOfCurrentSpread(), creditCurve::timeOfPreviousSpread(), treasurybond::treasurybond(), volsurface::variance(), VarianceSwap::VarianceSwap(), volsurface::volatility(), volsurface::volsurface(), yieldCurve::yieldCurve(), yieldPoint::yieldPoint(), and bond::yieldToMaturity().

7.84.2.6 typedef short TN_INTEGER ShortInteger

Definition at line 12 of file types.h.

Referenced by Date::nthWeekday().

7.84.2.7 typedef unsigned short TN_INTEGER ShortNatural

Definition at line 13 of file types.h.

Referenced by Date::Date(), maintests(), and VanillaSwap::VanillaSwap().

7.84.2.8 typedef long long VeryLongInteger

Definition at line 19 of file types.h.

7.84.2.9 typedef unsigned long long VeryLongNatural

Definition at line 20 of file types.h.

Referenced by Sobol::Max(), RandC::Max(), ParkMiller::Max(), and MersenneTwister::Max().

7.84.3 Enumeration Type Documentation

7.84.3.1 enum Currency

Enumeration values:

USD

EUR

CAD

Definition at line 22 of file types.h.

Referenced by Portfolio::getCurrency(), creditCurve::getCurrency(), and asset::GetCurrency-Format().

7.85 UsDate.cpp File Reference

```
#include ".\usdate.h"
```

7.86 UsDate.h File Reference

```
#include "date.h"
```

Classes

- class **UsDate**

7.87 utils.cpp File Reference

```
#include "utils.h"
```

Functions

- valarray< **Real** > **mergeunique** (valarray< **Real** > a1, valarray< **Real** > a2)

  helper function to merge two valarrays of reals sorted in ascending order and remove duplicates.

- short int **sign** (**Real** x)

  sign of a Real

- void **ErrorMsg** (string str, bool mustexit)
- **Matrix transform1DvalarrayToColumnMatrix** (valarray< **Real** > array)

  Transforms a 1D array into a column vector - easier to handle our structures and do operations on them.

- **Matrix transform2DvalarrayToMatrix** (valarray< valarray< **Real** > > array)

  Transforms a 2D array into a matrix.

- valarray< **Real** > **transformColumnMatrixTo1Dvalarray** (**Matrix M**)

  Transforms a column matrix to a 1D array.

- valarray< valarray< **Real** > > **transformMatrixTo2Dvalarray** (**Matrix M**)

  Transforms a normal matrix to a 2D array.

- int **getint** (istream &istr)
- bool **realsEqual** (**Real** realOne, **Real** realTwo, **Real** precision)
- string **valarrayRealToString** (const valarray< **Real** > &theArray)

7.87.1 Function Documentation

7.87.1.1 void ErrorMsg (string *str*, bool *mustexit*)

Definition at line 74 of file utils.cpp.

Referenced by Matrix::CMAC(), Matrix::CMAR(), Matrix::Determinant(), Matrix::DivideColumn(), Matrix::DivideRow(), Matrix::GetInverse(), Matrix::operator *(), Matrix::operator()(), Matrix::operator+(), Matrix::operator-(), Matrix::operator/(), and Matrix::operator[]().

7.87.1.2 int getint (istream & *istr*)

Definition at line 143 of file utils.cpp.

Referenced by Matrix::Input().

7.87.1.3 valarray<Real> mergeunique (valarray< Real > *a1*, valarray< Real > *a2*)

helper function to merge two valarrays of reals sorted in ascending order and remove duplicates.

a1 - first array to merge a2 - second array to merge

Returns:
the merged array

Definition at line 12 of file utils.cpp.

References Natural, Real, and TN_INFINITY.

Referenced by creditCurve::combineUnderlyingAndSpreads(), and yieldCurve::operator==().

7.87.1.4 bool realsEqual (Real *realOne*, Real *realTwo*, Real *precision*)

Definition at line 157 of file utils.cpp.

References Real.

Referenced by mainbinomialtree(), and mainconvertiblebond().

7.87.1.5 short int sign (Real *x*)

sign of a Real

Author:
Yann

Definition at line 62 of file utils.cpp.

References Real.

Referenced by CumulativeBivariateNormal().

7.87.1.6 Matrix transform1DvalarrayToColumnMatrix (valarray< Real > *array*)

Transforms a 1D array into a column vector - easier to handle our structures and do operations on them.

Definition at line 96 of file utils.cpp.

References Natural, and Matrix::SetValue().

Referenced by mainmatrix().

7.87.1.7 Matrix transform2DvalarrayToMatrix (valarray< valarray< Real > > *array*)

Transforms a 2D array into a matrix.

Definition at line 107 of file utils.cpp.

References Natural, and Matrix::SetValue().

Referenced by mainmatrix().

7.87.1.8 valarray<Real> transformColumnMatrixTo1Dvalarray (Matrix *M*)

Transforms a column matrix to a 1D array.

Definition at line 119 of file utils.cpp.

References M, and Natural.

Referenced by mainmatrix().

7.87.1.9 valarray<valarray<Real> > transformMatrixTo2Dvalarray (Matrix *M*)

Transforms a normal matrix to a 2D array.

Definition at line 128 of file utils.cpp.

References M, and Natural.

Referenced by mainmatrix().

7.87.1.10 string valarrayRealToString (const valarray< Real > & *theArray*)

Definition at line 162 of file utils.cpp.

References Natural.

Referenced by operator<<().

7.88 utils.h File Reference

```
#include "types.h"
#include "matrix.h"
#include <valarray>
#include <iostream>
#include <string>
```

Defines

- #define **DEFAULT_PRECISION** 0.00001

Functions

- short int **sign** (**Real** x)

  sign of a Real

- **Matrix transform1DvalarrayToColumnMatrix** (valarray< **Real** > array)

  Transforms a 1D array into a column vector - easier to handle our structures and do operations on them.

- **Matrix transform2DvalarrayToMatrix** (valarray< valarray< **Real** > > array)

  Transforms a 2D array into a matrix.

- valarray< **Real** > **transformColumnMatrixTo1Dvalarray** (**Matrix M**)

  Transforms a column matrix to a 1D array.

- valarray< valarray< **Real** > > **transformMatrixTo2Dvalarray** (**Matrix M**)

  Transforms a normal matrix to a 2D array.

- valarray< **Real** > **mergeunique** (valarray< **Real** > a1, valarray< **Real** > a2)

  helper function to merge two valarrays of reals sorted in ascending order and remove duplicates.

- void **ErrorMsg** (string str, bool mustexit=false)
- int **getint** (istream &istr)
- bool **realsEqual** (**Real** realOne, **Real** realTwo, **Real** precision=0.00001)
- string **valarrayRealToString** (const valarray< **Real** > &theArray)

7.88.1 Define Documentation

7.88.1.1 #define DEFAULT_PRECISION 0.00001

Definition at line 11 of file utils.h.

7.88.2 Function Documentation

7.88.2.1 void ErrorMsg (string *str*, bool *mustexit* = false)

Definition at line 74 of file utils.cpp.

Referenced by Matrix::CMAC(), Matrix::CMAR(), Matrix::Determinant(), Matrix::DivideColumn(), Matrix::DivideRow(), Matrix::GetInverse(), Matrix::operator *(), Matrix::operator()(), Matrix::operator+(), Matrix::operator-(), Matrix::operator/(), and Matrix::operator[]().

7.88.2.2 int getint (istream & *istr*)

Definition at line 143 of file utils.cpp.

Referenced by Matrix::Input().

7.88.2.3 valarray<Real> mergeunique (valarray< Real > *a1*, valarray< Real > *a2*)

helper function to merge two valarrays of reals sorted in ascending order and remove duplicates.

a1 - first array to merge a2 - second array to merge

Returns:
the merged array

Definition at line 12 of file utils.cpp.

References Natural, Real, and TN_INFINITY.

Referenced by creditCurve::combineUnderlyingAndSpreads(), and yieldCurve::operator==().

7.88.2.4 bool realsEqual (Real *realOne*, Real *realTwo*, Real *precision* = 0.00001)

Definition at line 157 of file utils.cpp.

References Real.

Referenced by mainbinomialtree(), and mainconvertiblebond().

7.88.2.5 short int sign (Real *x*)

sign of a Real

Author:
Yann

Definition at line 62 of file utils.cpp.

References Real.

Referenced by CumulativeBivariateNormal().

7.88.2.6 Matrix transform1DvalarrayToColumnMatrix (valarray< Real > *array*)

Transforms a 1D array into a column vector - easier to handle our structures and do operations on them.

Definition at line 96 of file utils.cpp.

References Natural, and Matrix::SetValue().

Referenced by mainmatrix().

7.88.2.7 Matrix transform2DvalarrayToMatrix (valarray< valarray< Real > > *array*)

Transforms a 2D array into a matrix.

Definition at line 107 of file utils.cpp.

References Natural, and Matrix::SetValue().

Referenced by mainmatrix().

7.88.2.8 valarray<Real> transformColumnMatrixTo1Dvalarray (Matrix *M*)

Transforms a column matrix to a 1D array.

Definition at line 119 of file utils.cpp.

References M, and Natural.

Referenced by mainmatrix().

7.88.2.9 valarray<valarray<Real> > transformMatrixTo2Dvalarray (Matrix *M*)

Transforms a normal matrix to a 2D array.

Definition at line 128 of file utils.cpp.

References M, and Natural.

Referenced by mainmatrix().

7.88.2.10 string valarrayRealToString (const valarray< Real > & *theArray*)

Definition at line 162 of file utils.cpp.

References Natural.

Referenced by operator<<().

7.89 VanillaSwap.cpp File Reference

```
#include ".\VanillaSwap.h"
```

7.90 VanillaSwap.h File Reference

```
#include "./CashFlow.h"
```

Classes

- class **VanillaSwap**

Variables

- const **ShortNatural MAX_LETTERS** = 30
- const **Real defaultprecisionInPrice** = 1.

7.90.1 Variable Documentation

7.90.1.1 const Real defaultprecisionInPrice = 1. [static]

Definition at line 6 of file VanillaSwap.h.

7.90.1.2 const ShortNatural MAX_LETTERS = 30 [static]

Definition at line 5 of file VanillaSwap.h.

7.91 VarianceSwap.cpp File Reference

```
#include "./VarianceSwap.h"
```

7.92 VarianceSwap.h File Reference

```
#include "../PartA/BlackScholes/OptionStrategy.h"
```

Classes

- class **VarianceSwap**

7.93 volsurface.cpp File Reference

```
#include ".\volsurface.h"
```

7.94 volsurface.h File Reference

```
#include "../common/types.h"
#include "../common/date.h"
#include "../common/interpolator.h"
#include <valarray>
#include <cmath>
#include "../PartB/yieldCurve.h"
#include "../PartA/BlackScholes/BlackScholes.h"
```

Classes

- class **volsurfaceparams**
- class **volsurface**

Defines

- #define **PI** 3.14159265358979323846264 3

7.94.1 Define Documentation

7.94.1.1 #define PI 3.14159265358979323846264 3

Definition at line 14 of file volsurface.h.

7.95 yieldCurve.cpp File Reference

```
#include ".\yieldCurve.h"
```

Functions

- ostream & **operator**<< (ostream &os, const **yieldCurve** &c)

7.95.1 Function Documentation

7.95.1.1 ostream& operator<< (ostream & *os*, const yieldCurve & *c*)

Parameters:

os - the output stream to direct output to

c - the curve to display

Returns:

output stream as is standard for operator<<

Definition at line 457 of file yieldCurve.cpp.

References yieldCurve::getMaturitiesInTheZCBCurve(), Natural, and yieldCurve::spotRate().

7.96 yieldCurve.h File Reference

```
#include "../common/types.h"
#include "../common/date.h"
#include "../common/interpolator.h"
#include "../common/matrix.h"
#include "..\common\utils.h"
#include <string>
#include <math.h>
#include <algorithm>
#include <time.h>
```

Classes

- class **yieldPoint**
- class **yieldCurve**

Defines

- #define **YC_NAME_STRLEN** 128
- #define **YC_DEFAULT_NUMER_POINTS** 15
- #define **YC_MAX_NUMBER_POINTS** 50

Enumerations

- enum **interestComposition** { **Discrete**, **Continuous** }
- enum **TypeOfRate** { **Cash**, **Swap** }

Variables

- const **Real defaultshiftfactorForShortRate** = 0.0001

7.96.1 Define Documentation

7.96.1.1 #define YC_DEFAULT_NUMER_POINTS 15

Definition at line 18 of file yieldCurve.h.

7.96.1.2 #define YC_MAX_NUMBER_POINTS 50

Definition at line 19 of file yieldCurve.h.

Referenced by FileReader::buildYieldPointArray(), yieldCurve::getSwapRates(), yieldCurve::sortMarketRatesByMaturity(), and yieldCurve::yieldCurve().

7.96.1.3 #define YC_NAME_STRLEN 128

Definition at line 17 of file yieldCurve.h.

7.96.2 Enumeration Type Documentation

7.96.2.1 enum interestComposition

Author:
Yann

Enumeration values:
Discrete
Continuous

Definition at line 24 of file yieldCurve.h.

7.96.2.2 enum TypeOfRate

Enumeration values:
Cash
Swap

Definition at line 29 of file yieldCurve.h.

Referenced by FileReader::buildYieldPointArray(), and yieldPoint::getType().

7.96.3 Variable Documentation

7.96.3.1 const Real defaultshiftfactorForShortRate = 0.0001 [static]

Definition at line 90 of file yieldCurve.h.

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