Putcall Documentation

Release 0.2 [4 - Beta]

sonntagsgesicht, based on a fork of Deutsche Postbank [pbrisk

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Contents

CHAPTER 1

Introduction

1.1 Python library *putcall*

Collection of classical option pricing formulas.

1.2 Example Usage

1.3 Install

The latest stable version can always be installed or updated via pip:

```
$ pip install putcall
```

If the above fails, please try easy_install instead:

```
$ easy_install putcall
```

1.4 Development Version

The latest development version can be installed directly from GitHub:

```
$ pip install --upgrade git+https://github.com/pbrisk/putcall.git
```

1.5 Contributions

Issues and Pull Requests are always welcome.

1.6 License

CHAPTER 2

Tutorial

. . . will come soon.

CHAPTER 3

API Documentation

3.1 Option Pricing Formulas

3.1.1 Intrinsic Option Payoffs

putcall.formulas.option_payoffs.**option_payoff**(*forward_value*, *strike_value*, *is_call_bool*)

simple option payoff

@param strike_value: strike price @param forward_value: forward price of underlying @param is_call_bool: call -> True, put -> False @return: option payoff value

putcall.formulas.option_payoffs.**digital_option_payoff**(*forward_value*, *strike_value*, *is_call_bool*)

simple digital option payoff

@param strike_value: strike price @param forward_value: forward price of underlying @param is_call_bool: call -> True, put -> False @return: option payoff value

putcall.formulas.option_payoffs.**straddle_payoff**(*forward_value*, *strike_value*, *is_call_bool=True*)

simple straddle option payoff

@param strike_value: strike price @param forward_value: forward price of underlying @param is_call_bool: obsolete @return: option payoff value

3.1.2 Black Scholes

putcall.formulas.plain_vanilla_options.blackscholes.**black_scholes**(*spot_value*, *strike_value*, *vol_value*, *time_value*, *is_call_bool*, *rate=0.0*)

Black Scholes option pricing formula on log-normal spot value

Parameters

- **forward_value** (*real*) – forward price of underlying at exercise date

- **strike_value** (*real*) – strike of the option
- **vol_value** (*non-negative real*) – volatility of underlying price
- **time_value** (*non-negative real*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False
- **rate** (*real*) – risk free rate

Returns option price

Return type real

Returns

putcall.formulas.plain_vanilla_options.blackscholes.**black_scholes_digital**(*spot_value*, *strike_value*, *vol_value*, *time_value*, *is_call_bool*, *rate=0.0*)

Black Scholes digital option pricing formula on log-normal spot value

Parameters

- **spot_value** (*real*) – forward price of underlying at exercise date
- **strike_value** (*real*) – strike of the option
- **vol_value** (*non-negative real*) – volatility of underlying price
- **time_value** (*non-negative real*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False
- **rate** (*real*) – risk free rate

Returns option price

Return type real

Returns

putcall.formulas.plain_vanilla_options.blackscholes.**forward_black_scholes**(*forward_value*, *strike_value*, *vol_value*, *time_value*, *is_call_bool*, *rate=0.0*)

Black Scholes option pricing formula on log-normal forward value

Parameters

- **strike_value** (*real*) – strike of the option
- **forward_value** (*real*) – forward price of underlying at exercise date
- **vol_value** (*non-negative real*) – volatility of underlying price
- **time_value** (*non-negative real*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False
- **rate** (*real*) – risk free rate

Returns option price

Return type real

Returns

putcall.formulas.plain_vanilla_options.blackscholes.**forward_black_scholes_digital**(*forward_*
strike_va
vol_valu
time_val
is_call_b
rate=0.0

Black Scholes digital option pricing formula on log-normal forward value

Parameters

- **strike_value** (*real*) – strike of the option
- **forward_value** (*real*) – forward price of underlying at exercise date
- **vol_value** (*non-negative real*) – volatility of underlying price
- **time_value** (*non-negative real*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False
- **rate** (*real*) – risk free rate

Returns option price

Return type real

Returns

3.1.3 Interest Rate Options

putcall.formulas.interest_rate_options.bachelier.**bachelier**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Bachelier formula (Black formula for normal underlying distribution).

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_delta**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

delta sensitivity for Bachelier formula.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_gamma**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

gamma sensitivity for Bachelier formula.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_vega**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

vega sensitivity for Bachelier formula.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_digital**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Bachelier formula for digital option (Black formula for normal underlying distribution).

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_digital_delta**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

delta sensitivity for Bachelier formula for digital option.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_digital_gamma**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

gamma sensitivity for Bachelier formula for digital option.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_digital_vega**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

vega sensitivity for Bachelier formula for digital option.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_straddle**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Bachelier formula for straddle option on log-normal underlying distribution.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_straddle_delta**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Bachelier delta sensitivity for straddle payoff.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_straddle_gamma**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Bachelier gamma sensitivity for straddle payoff.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.bachelier.**bachelier_straddle_vega**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Bachelier vega sensitivity for straddle payoff.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Standard Black-76 formula for log-normal underlying distribution.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_delta**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Black-76 delta sensitivity.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_gamma**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Black-76 gamma sensitivity.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_vega**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Black-76 vega sensitivity.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_digital**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Standard Black-76 formula for digital option on log-normal underlying distribution.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_digital_delta**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Black-76 delta sensitivity for digital payoff.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date

- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_digital_gamma**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Black-76 gamma sensitivity for digital payoff.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_digital_vega**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Black-76 vega sensitivity for digital payoff.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_straddle**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Standard Black-76 formula for straddle option on log-normal underlying distribution.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_straddle_delta**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Black-76 delta sensitivity for straddle payoff.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_straddle_gamma**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Black-76 gamma sensitivity for straddle payoff.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.black76.**black_straddle_vega**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*)

Black-76 vega sensitivity for straddle payoff.

Parameters

- **forward_value** (*float*) – forward price of underlying at exercise date
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of underlying price
- **time_value** (*float*) – year fraction until exercise date
- **is_call_bool** (*boolean*) – call -> True, put -> False

Returns float

putcall.formulas.interest_rate_options.hullwhite.**hw_discount_bond_option**(*forward_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*, *time_to_bond_value*, *mean_reversion_value*, *maturity_discount_value*)

discount bond option pricing formula in the Hull White framework

Parameters

- **forward_value** (*float*) – forward price of underlying (discount bond) at bond maturity (D(t,Tau,r))
- **strike_value** (*float*) – strike price
- **implied_vol_value** (*float*) – volatility of the spot rate
- **time_value** (*float*) – year fraction until exercise date (option maturity date)
- **bool is_call_bool** (*float*) – call -> True, put -> False
- **time_to_bond_value** (*float*) – year fraction between option's maturity and bond's maturity
- **maturity_discount_value** (*float*) – forward price of underlying (discount bond) at option maturity date (D(t,T,r))
- **mean_reversion_value** (*float*) – mean reversion / alpha

Returns float

discount bond option pricing formula in the Hull White framework as described in A. Pelsser, *Efficient Methods for Valuing Interest Rate Derivatives*, 2000, pp. 50

putcall.formulas.interest_rate_options.hullwhite.**hw_cap_floor_let**(*forward_rate_value*, *strike_value*, *implied_vol_value*, *time_value*, *is_call_bool*, *year_fraction_value*, *mean_reversion_value*, *discount_value*)

pricing formula of a caplet/floorlet under the Hull White framework

Parameters

- **forward_rate_value** (*float*) – forward rate (LIBOR,EURIBOR...)
- **discount_value** (*float*) – zero bond price between pricing time and start of the caplet (D(t,T,r))
- **mean_reversion_value** (*float*) – mean reversion in the Hull White model
- **strike_value** (*float*) – strike of the option
- **implied_vol_value** (*float*) – volatility of the spot rate
- **year_fraction_value** (*float*) – year fraction between start and maturity = tenor of the rate

- **time_value** (*float*) – year_fraction between pricing date (e.g. start of the Cap) and start of the caplet Y(t,T)
- **is_call_bool** (*bool*) – call(caplet) -> True, put(floorlet) -> False

Returns float

pricing formula of a caplet/floorlet under the Hull White framework as described in A. Pelsser, *Efficient Methods for Valuing Interest Rate Derivatives*, 2000, pp. 57

putcall.formulas.interest_rate_options.sabr.**sabr_black_vol**(*strike_value*, *forward_value*, *alpha_value*, *beta_value*, *nu_value*, *rho_value*, *time_value*)

Parameters

- **strike_value** –
- **forward_value** –
- **alpha_value** –
- **beta_value** –
- **nu_value** –
- **rho_value** –
- **time_value** –

Returns

Return type

putcall.formulas.interest_rate_options.sabr.**sabr_atmadj_black_vol**(*strike_value*, *forward_value*, *atm_vol_value*, *beta_value*, *nu_value*, *rho_value*, *time_value*)

Parameters

- **strike_value** –
- **forward_value** –
- **atm_vol_value** –
- **beta_value** –
- **nu_value** –
- **rho_value** –
- **time_value** –

Returns

Return type

putcall.formulas.interest_rate_options.sabr.**sabr_alpha_from_atm**(*forward_value*, *atm_vol_value*, *beta_value*, *nu_value*, *rho_value*, *time_value*)

Parameters

- **forward_value** –
- **atm_vol_value** –
- **beta_value** –
- **nu_value** –
- **rho_value** –
- **time_value** –

Returns

Return type

3.2 Option Calibration

putcall.calibration.hw_calibration.**binary_vol_hw_calibration_cap_floor**(*price_dict*, *mean_reversion_start=0*, *mean_reversion_stop=0.*, *mean_reversion_step=0.*, *volatility_start=0.0001*, *volatility_stop=0.01*, *volatility_step=0.0001*)

Binary search based calibration of the Hull White model using caps and floors

Parameters

- **price_dict** (*dictionary*) – contains prices, time_values, year_fractions,forward values
- **mean_reversion_start** (*real*) – mean reversion error mean_reversion_start
- **mean_reversion_stop** (*real*) – mean reversion error mean_reversion_stop
- **mean_reversion_step** (*real*) – step for the mean reversion optimisation loop
- **volatility_start** (*real*) – volatility error mean_reversion_start
- **volatility_stop** (*real*) – volatility error mean_reversion_stop
- **volatility_step** (*real*) – step for the volatility optimisation loop

Returns optimal mean reversion, optimal volatility, vector of errors

Return type list(list())

remarks: price_dict is a dictionary s.t.: price_dict['time_value'] contains the year fractions between start date and maturity price_dict['year_fraction'] contains the year fractions between start and maturity price_dict['forward_values'] contains the rate forward values price_dict['price'] price of the lets price_dict['strike'] list of strikes price_dict['bool'] list of booleans (True if call False if put) threshold_vol mean_reversion_stop on the vola mean_reversion_stop is the mean_reversion_stop on the mean revertion

putcall.calibration.hw_calibration.**binary_mr_hw_calibration_cap_floor**(*price_dict*, *mean_reversion_start=0.0*, *mean_reversion_stop=0.0*, *mean_reversion_step=0.0*, *volatility_start=0.0001*, *volatility_stop=0.01*, *volatility_step=0.0001*)

Binary search based calibration of the Hull White model using caps and floors

Parameters

- **price_dict** (*dictionary*) – contains prices, time_values, year_fractions,forward values
- **mean_reversion_start** (*real*) – mean reversion error mean_reversion_start
- **mean_reversion_stop** (*real*) – mean reversion error mean_reversion_stop
- **mean_reversion_step** (*real*) – step for the mean reversion optimisation loop
- **volatility_start** (*real*) – volatility error mean_reversion_start
- **volatility_stop** (*real*) – volatility error mean_reversion_stop
- **volatility_step** (*real*) – step for the volatility optimisation loop

Returns optimal mean reversion, optimal volatility, vector of errors

Return type list(list())

remarks: price_dict is a dictionary s.t.: price_dict['time_value'] contains the year fractions between start date and maturity price_dict['year_fraction'] contains the year fractions between start and maturity price_dict['forward_values'] contains the rate forward values price_dict['price'] price of the lets price_dict['strike'] list of strikes price_dict['bool'] list of booleans (True if call False if put) threshold_vol mean_reversion_stop on the vola mean_reversion_stop is the mean_reversion_stop on the mean revertion

putcall.calibration.hw_calibration.**brute_hw_calibration_cap_floor**(*price_dict*, *mean_reversion_start=0.0*, *mean_reversion_stop=0.01*, *mean_reversion_step=0.0001*, *volatility_start=0.0001*, *volatility_stop=0.01*, *volatility_step=0.0001*, *error_func=None*)

Brute force based calibration of the Hull White model using caps and floors

Parameters

- **price_dict** (*dictionary*) – contains prices as a price_dict
- **mean_reversion_start** (*float*) – mean reversion starting point
- **mean_reversion_stop** (*float*) – mean reversion threshold
- **mean_reversion_step** (*float*) – mean reversion step
- **volatility_start** (*float*) – volatility starting point
- **volatility_stop** (*float*) – volatility reversion threshold

- **volatility_step** (*float*) – volatility reversion step
- **error_func** (*function*) – function to aggregate errors

Returns optimal mean reversion, optimal volatility, corresponding error

calculates the error for different choices of mean rev and volatility which will make it possible for the user to pick the values for which the error is minimal

remarks: price_dict is a dictionary s.t.: price_dict['time_value'] contains the year fractions between start date and maturity price_dict['year_fraction'] contains the year fractions between start and maturity price_dict['forward_values'] contains the rate forward values price_dict['price'] price of the lets price_dict['strike'] list of strikes price_dict['bool'] list of booleans (True if call False if put) threshold_vol threshold on the vola threshold is the threshold on the mean reversion

class putcall.calibration.implied_volatility.**OptionValueByVolatility**(*option_value_function*, *forward*, *strike*, *time*, *option_type*, *discount_factor=1.0*)

Bases: object

option_value(*vol*)

class putcall.calibration.implied_volatility.**ImpliedVolCalculator**

Bases: object

VOL_CALIB_TOL = 1e-09

MAX_VOL_FOR_IMPLIED_VOL = 10.0

implied_vol(*price*, *option_value_function_by_volatility*, *upper_bound=1.0*, *initial_value=0.05*)

class ImpliedVolErrorFunction(*price*, *option_value_function_by_volatility*)

Bases: object

3.3 Option Valuators

class putcall.optionvaluator.**OptionType**

Bases: object

CALL = 0

PUT = 1

DIGITAL_CALL = 2

DIGITAL_PUT = 3

STRADDLE = 4

class putcall.optionvaluator.**OptionValuator**(*delta=None*, *vega=None*)

Bases: object

option_value(*forward*, *strike*, *time*, *volatility*, *option_type*, *discount_factor=1.0*)

implied_vol(*forward*, *strike*, *time*, *price*, *option_type*, *discount_factor=1.0*)

delta(*forward*, *strike*, *time*, *volatility*, *option_type*, *discount_factor=1.0*)

gamma(*forward*, *strike*, *time*, *volatility*, *option_type*, *discount_factor=1.0*)

vega(*forward*, *strike*, *time*, *volatility*, *option_type*, *discount_factor=1.0*)

class putcall.optionvaluator.**OptionValuatorIntrinsic**(*delta=None*, *vega=None*)
Bases: *putcall.optionvaluator.OptionValuator*

implied_vol(*forward*, *strike*, *time*, *price*, *option_type*, *discount_factor=1.0*)

class putcall.optionvaluator.**OptionValuatorN**(*delta=None*, *vega=None*)
Bases: *putcall.optionvaluator.OptionValuator*

class putcall.optionvaluator.**OptionValuatorLN**(*delta=None*, *vega=None*)
Bases: *putcall.optionvaluator.OptionValuator*

class putcall.optionvaluator.**OptionValuatorSLN**(*displacement=0.03*, *delta=None*, *vega=None*)
Bases: *putcall.optionvaluator.OptionValuator*

implied_vol(*forward*, *strike*, *time*, *price*, *optionType*, *discount_factor=1.0*)

CHAPTER 4

Releases

These changes are listed in decreasing version number order.

4.1 Release 0.2

Release date was Wednesday, 18 September 2019

4.2 Release 0.1

Release date was July 7th, 2017

CHAPTER 5

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