
Group homework 3

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Ivan Prskalo, Sohaib Syed Used PricingAsianOptions.m and changed option parameters

Problem 3a

Changed parameters from original file to match homework parameters

```
function BarrierUpInCall = Math565Group6HW3 %make it a function to avoid
    variable conflicts
gail.InitializeDisplay %initialize the workspace and the display parameters
inp.timeDim.timeVector = 1/52:1/52:24/52; %weekly monitoring for 24 weeks
inp.assetParam.initPrice = 100; %initial stock price
inp.assetParam.interest = 0.00; %risk-free interest rate
inp.assetParam.volatility = 0.4; %volatility
inp.payoffParam.strike = 130; %strike price
inp.priceParam.absTol = 0.1; %absolute tolerance of a dime
inp.priceParam.relTol = 0; %zero relative tolerance
EuroCall = optPrice(inp); %construct an optPrice object

%Lookback Call
LookCall = optPrice(EuroCall); %make a copy
LookCall.payoffParam.optType = {'look'}; %lookback
[LookCallPrice,out] = genOptPrice(LookCall); %uses meanMC_g to compute the
    price
LookCall
disp(['The price of this lookback call option is $' ...
    num2str(LookCallPrice) ...
    ' +/- $' num2str(max(LookCall.priceParam.absTol, ...
    LookCall.priceParam.relTol*LookCallPrice)) ])
disp(['    and it took ' num2str(out.time) ' seconds and ' ...
    num2str(out.nPaths) ' paths to compute']) %display results nicely

%Lookback Put
LookPut = optPrice(LookCall); %make a copy
LookPut.payoffParam.putCallType = {'put'}; % change to put type
[LookPutPrice,out] = genOptPrice(LookPut); %uses meanMC_g to compute the price
LookPut
disp(['The price of this lookback put option is $' ...
    num2str(LookPutPrice) ...
    ' +/- $' num2str(max(LookPut.priceParam.absTol, ...
    LookPut.priceParam.relTol*LookPutPrice)) ])
disp(['    and it took ' num2str(out.time) ' seconds and ' ...
    num2str(out.nPaths) ' paths to compute']) %display results nicely

LookCall =
```

optPrice with properties:

```
        inputType: 'n'
timeDim_timeVector: [0.0192 0.0385 0.0577 0.0769 0.0962 0.1154 ... ]
timeDim_startTime: 0.0192
timeDim_endTime: 0.4615
timeDim_initTime: 0
timeDim_initValue: 100
timeDim_dim: 1
wnParam_sampleKind: 'IID'
wnParam_distribName: {'Gaussian'}
wnParam_xDistrib: 'Gaussian'
bmParam_assembleType: 'diff'
bmParam_whBM: 1
assetParam_pathType: 'GBM'
assetParam_initPrice: 100
assetParam_interest: 0
assetParam_meanShift: 0
assetParam_volatility: 0.4000
assetParam_nAsset: 1
payoffParam_optType: {'look'}
payoffParam_putCallType: {'call'}
payoffParam_strike: 130
exactPrice: NaN
priceParam_cubMethod: 'IID_MC'
priceParam_absTol: 0.1000
priceParam_relTol: 0
priceParam_alpha: 0.0100
```

The price of this lookback call option is \$17.5337 +/- \$0.1
and it took 0.58702 seconds and 546213 paths to compute

LookPut =

optPrice with properties:

```
        inputType: 'n'
timeDim_timeVector: [0.0192 0.0385 0.0577 0.0769 0.0962 0.1154 ... ]
timeDim_startTime: 0.0192
timeDim_endTime: 0.4615
timeDim_initTime: 0
timeDim_initValue: 100
timeDim_dim: 1
wnParam_sampleKind: 'IID'
wnParam_distribName: {'Gaussian'}
wnParam_xDistrib: 'Gaussian'
bmParam_assembleType: 'diff'
bmParam_whBM: 1
assetParam_pathType: 'GBM'
assetParam_initPrice: 100
assetParam_interest: 0
assetParam_meanShift: 0
assetParam_volatility: 0.4000
assetParam_nAsset: 1
payoffParam_optType: {'look'}
payoffParam_putCallType: {'put'}
payoffParam_strike: 130
```

```
exactPrice: NaN
priceParam_cubMethod: 'IID_MC'
priceParam_absTol: 0.1000
priceParam_relTol: 0
priceParam_alpha: 0.0100
```

*The price of this lookback put option is \$19.912 +/- \$0.1
and it took 0.39866 seconds and 377969 paths to compute*

Problem 3b

The put has the higher price. The intuitive reason that I think causes this is that the 'put' definition to calculate price uses a 'max' function before subtracting the price at maturity. The initial price can play a role since in lookback options the initial price is considered to be in the price path. the max may be greater than initial price for a put option but for a call option the min might be the initial price, so by maturity time the call option doesn't increase as much.

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