Lookback Options

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Generate *lookback* options for a market with no interest rate ($r = 0$).

Lookback Options are a particular type of options that are characterized by the fact they define their strike price by their past asset history price (*asset path*). Because they use the maximum or minimum value of the asset path, their payoff satisfies $\text{payoff} \geq 0$.

Code

The code is fairly simple because it makes use of the `GAIL` library. It can be describe as a three-step process:

1. Create an *option price* object, tuning the correct features.

2. Generate paths for that object, and compute the price for each path.

3. Compute the mean price.

The last two steps are encapsulated in the `genOptPrice` function.

On a side note, note the `payoffParam.optType` is set to `{'look'}`; this specifies the lookback option.

```
inp.timeDim.timeVector = 1/52:1/52:6/13; % weekly monitoring for 24
 weeks
inp.assetParam.initPrice = 100;          % initial stock price
inp.assetParam.interest = 0;             % risk-free interest rate
inp.assetParam.volatility = 0.4;         % volatility
inp.priceParam.absTol = 0.1;             % absolute tolerance of a
 dime
inp.priceParam.relTol = 0;               % zero relative tolerance
inp.payoffParam.optType = {'look'};      %lookback

lb_call = optPrice(inp);                 %construct an optPrice object
[cprice,out] = genOptPrice(lb_call); % uses meanMC_g to compute the
 price
```

Output

```
disp(['The price of this lookback call option is $' ...
   num2str(cprice) ...
   ' +/- $' num2str(max(lb_call.priceParam.absTol, ...
   lb_call.priceParam.relTol*cprice)) ])
disp(['   and it took ' num2str(out.time) ' seconds and ' ...
```

```
   num2str(out.nPaths) ' paths to compute']) %display results nicely

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

```
The price of this lookback call option is $17.5294 +/- $0.1
   and it took 0.80242 seconds and 530997 paths to compute
The price of this lookback put option is $19.9238 +/- $0.1
   and it took 0.52399 seconds and 378930 paths to compute
```

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