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% Example 3.2 %

% Term Structure Interest Rates %

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% Data upload

Y=xlsread('Chap3termstr2014');

global para0;

% Set parameters

dt=1/250;

ratestart=mean(Y(end,1));

ttime=250;

nrow=ttime;

tau=[0.33,3,5,10];

ncol=size(tau,2);

Delta=[1,1,1,-1,ones(1,numel(tau))]';

%starting values

para0=[0.04,0.8,0.01,-0.002,1e-2\*rand(1,ncol).\*ones(1,ncol)];

nparam=size(para0,2);

para\_BFGS=log(para0./(Delta'-para0));

options = optimset('Display','off','MaxIter',1000,...

'MaxFunEvals',1e2,'TolX',1e-4,'TolFun',10^(-8),...

'HessUpdate', 'bfgs');

% Maximization procedure

% Functions LLoneCIR\_BFGS and LLoneCIR\_param\_BFGS are required

for imax=1:3

 x='';

 try

 [x]=fminunc(@LLoneCIR\_BFGS,para\_BFGS,...

 options,Y, tau, nrow, ncol, Delta,dt);

 catch exception

 end

 if ~isempty(x) || imax==3

 break;

 else

 % restart maximization with a new set of

 % starting values for initial estimates

 para1=para0+1e-4\*randn(1,length(para0));

 para\_BFGS=log(para1./(Delta'-para1));

 end

end

if imax==3;

 x=para\_BFGS;

end

[Theta]=LLoneCIR\_param\_BFGS(x,Y, tau,...

Delta, dt, nrow, ncol,nparam);