%%

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Exercise 3.2 %

% CIR curve simulation %

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

clear all

ySimt=xlsread('Chap3ysimt');

nSim=1000;

ini=3;

len=12;

nrow=14;

ncol=7;

DRsim=zeros(len,nSim);

GDPsim=zeros(len,nSim);

URsim=zeros(len,nSim);

REsim=zeros(len,nSim);

ERsim=zeros(len,nSim);

EUR3Msim=zeros(len,nSim);

IRS10sim=zeros(len,nSim);

for j=1:nSim

DRsim(:,j) =ySimt(ini:end,ncol\*(j-1)+1);

GDPsim(:,j) =ySimt(ini:end,ncol\*(j-1)+2);

URsim(:,j) =ySimt(ini:end,ncol\*(j-1)+3);

REsim(:,j) =ySimt(ini:end,ncol\*(j-1)+4);

ERsim(:,j) =ySimt(ini:end,ncol\*(j-1)+5);

EUR3Msim(:,j)=ySimt(ini:end,ncol\*(j-1)+6);

IRS10sim(:,j)=ySimt(ini:end,ncol\*(j-1)+7);

end

IRshortvar=EUR3Msim(end,:);

IRlongvar=IRS10sim(end,:);

% Theta vector estimated in Example 3.5

Theta=[

0.0400

0.8001

0.0101

0.0019

0.0064

0.0009

0.0029

0.0056];

ratestart=0.01;

%%

% CIR curve simulation

nSim=1000;

kappa1=Theta(2);

sigma1=Theta(3);

lambda1=Theta(4);

last=10;

ttau=1:1:last;

A=zeros(last,nSim);

B=zeros(last,nSim);

CC2=zeros(last,nSim);

for i=1:last

 for j=1:nSim

 theta1(j)=max(0,IRlongvar(j));

 AffineG11=sqrt((kappa1+lambda1)^2+2\*sigma1^2);

 AffineG12=kappa1+lambda1+AffineG11;

 AffineG13=2\*kappa1\*theta1(j)/sigma1^2;

 AffineG14=2\*AffineG11+AffineG12\*(exp(AffineG11\*ttau(i))- 1);

 AffineA1=((2\*AffineG11\*exp(AffineG12\*ttau(i)/2))/AffineG14)^AffineG13;

 A1=-log(AffineA1)/ttau(i);

 AffineB1=2\*(exp(AffineG11\*ttau(i))-1)/AffineG14;

 B1=AffineB1/ttau(i);

 A(i,j)=A1;

 B(i,j)=B1;

 CC2(i,j)=A(i,j)+B(i,j)\*max(0,IRshortvar(j));

 end

end

figure;

spessore=15;

hold('on'); subplot(1,2,1); plot(ttau, CC2 , 'LineWidth', 2.5);

title('CIR One Factor Simulation','Fontsize',spessore);

xlabel('Year','Fontsize',spessore), ylabel('Interest Rate','Fontsize',spessore)

FontSizeAxes=spessore;

set(gca,'FontSize',FontSizeAxes)

subplot(1,2,2); boxplot(CC2');

title('Box-Plot','Fontsize',spessore);

xlabel('Year','Fontsize',spessore);

FontSizeAxes=spessore;

set(gca,'FontSize',FontSizeAxes)

set(gcf, 'PaperPositionMode', 'manual');

set(gcf, 'PaperUnits', 'centimeters');

set(gcf, 'PaperPosition', [0.5 0.5 28 20]); %left bottom width heigh

set(gcf, 'PaperOrientation', 'landscape');

%print -dpdf 'termstructureSim.pdf';