ภาคผนวก ข.

โปรแกรม MATLAB ในเพื่อให้กำหนดค่าพารามิเตอร์ในตัวแบบจำลอง Vector STAR

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%This progarm use calculate parametes in Vector LSTAR and Test Hypothesis%
clear;
clc;
tic
%---load data---%
data  = xlsread('ex_iy1999_2004');  %Change i for change maturity
n = 1300
n1 = 3900;
k1 = 1;
n3  = 1300;
k3  = 4;
one = ones(n3,1);
%rearrange date for system ; exre_iy~difslope~exset%
y1     = data(2:end,2);   %---exre_iy---%
y2     = data(2:end,3);   %---difslope----%
y3     = data(2:end,4);   %---exset-----%
y      = [y1;y2;y3;];     %3900x1%
% rearrange date x1%  @ y = exre_iy @
x11    = data(1:end-1,2);  %---lag exre_iy---%
x12    = data(1:end-1,3);  %---difslope---%
x13    = data(1:end-1,4);  %---exset---%
x1     = horzcat(one,x11,x12,x13);                    %1300x4%
x2     = x1;
x3     = x1;
s      = [x11;x11;x11;];                              %Transition Variable
x_11   = vertcat(x1,zeros((2*n3),k3));                %3900x4%
x_1    =[x_11 x_11];                                  %3900x8%
x_22   = vertcat(zeros(n3,k3),x2,zeros(n3,k3));       %3900x4%
x_2    =[x_22 x_22];                                  %3900x8%
x_33   = vertcat(zeros((2*n3),k3),x3);                %3900x4%
x_3    =[x_33 x_33];                                  %3900x8%
x      = horzcat(x_1,x_2,x_3);                        %3900x24%
%---calculate parameters---%
bin=[-.001;.3;-14;-.0007;1.5;-5;-7;.1;-.000002;.0001;.3;.000002;-.002;.01;-2;-.0002;-
.02;137;.05;.03;-.3;-140;.07;.05;38;-.003];
options =optimset('GradObj','off','Hessian','off','Display','iter');
[b,FVAL,EXITFLAG,OUTPUT,GRAD,HESSIAN] = fminunc(@slstarll,bin,options,y,x,s);
var       = inv(HESSIAN);
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tstat       = b./sqrt(diag(var));
pvb         = 1-(tcdf(abs(tstat(1:26)),(n3-18)));
bb          = [bin b tstat pvb];
[q]         = slstar(s,b(6*k3+1),b(6*k3+2));
save output111_6 bin b bb tstat pvb HESSIAN var q EXITFLAG
%----------statistic of first equation-----------------%
yhat1       = ((x1*b(1:4)).*(1-q(1:1300)))+((x1*b(5:8)).*(q(1:1300)));
error1      = y1-yhat1;
abserror1   = abs(errorl);
sumerror1   = error1.'*error1;
MAEl        = mean(abserrorl);
RMSEl       = mean(sumerrorl);
total1      = [y1 yhat1 error1];
%----------statistic of second equation-----------------%
yhat2       = ((x2*b(9:12)).*(1-q(1:1300)))+((x2*b(13:16)).*(q(1:1300)));
error2      = y2-yhat2;
abserror2   = abs(error2);
sumerror2   = error2.'*error2;
MAE2        = mean(abserror2);
RMSE2       = mean(sumerror2);
total2      = [y2 yhat2 error2];
%----------statistic of third equation-----------------%
yhat3       = ((x3*b(17:20)).*(1-q(1:1300)))+((x3*b(21:24)).*(q(1:1300)));
error3      = y3-yhat3;
abserror3   = abs(error3);
sumerror3   = error3.'*error3;
MAE3        = mean(abserror3);
RMSE3       = mean(sumerror3);
total3      = [y3 yhat3 error3];
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%Test exists STAR Model
%1. Ho: ai = bi  ; i = 1:4
%2. Ho: c1 = 0
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%Test Ho(1); ai = bi  ; i = 1:4
% Wald Test = f(b)'*inv((G(b)*(s'*(inv(x'*x)))*inv(G(b))))*f(b)==>x2(4)
% when  f(b) = RB-q = 0
% G(b) = df(b)/db' = R
% s'*(inv(x'*x))   = Var-Covariance of b
R1      = [eye(4),zeros(4);zeros(4),-eye(4)];
B1      = b(1:8);
fb1     = R1*B1';
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var_cov1 = var(1:8,1:8);
W1      = fb1'*(inv(R1*var_cov1*R1'))*fb1;
pvW1    = 1-(chi2cdf(W1,4));
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%Test Ho(2) use T-Test
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%--display parameters--%
disp('Initial value MLE:Parameters  t-stat p-value grad');
disp(bb);
disp('Wald Test Ho_1; ai = bi  ; i = 1:3   p-value');
disp ([W1 pvW1]);
disp('T-Test Ho_2; c1 = 0  p-value');
disp ([tstat(9,1) pvb(9,1)]);
toc
save output111 bin b bb tstat pvb HESSIAN var q EXITFLAG
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
function [l,g,h]=slstarll(b,y,x,s);
n1 = 3900;
k1 = 1;
n3  = 1300;
k3  = 4;
data   = xlsread('ex_iy1999_2004'); %date~exre_iy~dif_slope~exre_set%    %Change i
for change maturity
y1     = data(2:end,2);          %---exre_iy---%
y2     = data(2:end,3);          %---dif_slope--%
y3     = data(2:end,4);          %---exre_set---%
%----------------------------%
%for sys_2yl%
x11     = data(1:end-1,2);
s      = [x11;x11;x11;];
%----------------------------%
[q1] = slstar(s,b(6*k3+1),b(6*k3+2));
% ik=ones(1,1);
% matq1 = kron(ik',q1);                 %1300x4%
q     = q1(1:1300);
%-----------e1-----------%
dux11     =  x(1:1300,1:4);             %1300x4%
dux12     =  x(1:1300,5:8);             %1300x4%
yhat11    = (dux11*b(1:4)).*(1-q);     %1300x1%
yhat12    = (dux12*b(5:8)).*(q);        %1300x1%
yhat1     =  yhat11 + yhat12;           %1300x1%
e1        =  y1-yhat1;                  %1300x1%
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%----------e2----------%
dux21    = x(1301:2600,9:12);      %1300x4%
dux22    = x(1301:2600,13:16);     %1300x4%
yhat21   = (dux21*b(9:12)).*(1-q); %1300x1%
yhat22   = (dux22*b(13:16)).*(q);  %1300x1%
yhat2    = yhat21 + yhat22;        %1300x1%
e2       = y2- yhat2;              %1300x1%
%----------e3----------%
dux31    = x(2601:3900,17:20);     %1300x4%
dux32    = x(2601:3900,21:24);     %1300x4%
yhat31   = (dux31*b(17:20)).*(1-q); %1300x1%
yhat32   = (dux32*b(21:24)).*(q);  %1300x1%
yhat3    = yhat21 + yhat22;        %1300x1%
e3       = y3- yhat3;              %1300x1%
e        = [e1;e2;e3];             %3900x1%
%%%%%%%%%%%%%%%%%%%%%%
merror   = horzcat(e1,e2,e3);      %1300x3%
sigm     = cov(merror);
dsigm    = det(sigm);
isigm    = inv(sigm);
iksigm   = kron(eye(n3),isigm);
l  = (3*n3/2)*log(2*pi) + (3*n3/2)*log(dsigm) + 0.5*(e'*iksigm* e);
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%for Losgitic Function%
function [f,g,h]=slstar(x,c1,c2);
std_st =  std(x);
e    =  exp((-c1*(x-c2))/std_st);
f    =  1./(1+e);
%for Quadratice Logsitic Function%
function [f,g,h]=slstar(x,c1,c2,c3);
std_st =  std(x);
e    =  exp((-c1*(x-c2)*(x-c3))/std_st);
f    =  1./(1+e);
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
function [l,g,h] = sestarll(b,y,x,s);     % Can change for calculate Vector LSTAR
n1 = 3900;
k1 = 1;
n3  = 1300;
k3  = 4;
data   = xlsread('ex_i 0y1999_2004'); %date~exre_2y~dif_slope~exre_set%
y1     = data(2:end,2);   %---exre_iy---%
y2     = data(2:end,3);   %---exf11----%
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```
y3     = data(2:end,4);    %---exre_set-----%
%---------------------------%
%for sys_2yl%
x11    = data(1:end-1,2);
s      = [x11;x11;x11;];
%---------------------------%
[q1] = sestar(s,b(6*k3+1),b(6*k3+2),b(6*k3+3));
q    = q1(1:1300);
%----------e1-----------%
dux11     =  x(1:1300,1:4); %3900x4%
dux12     =  x(1:1300,5:8);
yhat11    = (dux11*b(1:4)).*(1-q);
yhat12    = (dux12*b(5:8)).*(q);
yhat1     =  yhat11 + yhat12; %
e1        =  y1-yhat1;
%----------e2-----------%
dux21     =  x(1301:2600,9:12); %3900x4%
dux22     =  x(1301:2600,13:16);
yhat21    = (dux21*b(9:12)).*(1-q);
yhat22    = (dux22*b(13:16)).*(q);
yhat2     =  yhat21 + yhat22; %
e2        =  y2- yhat2;
%----------e3-----------%
dux31     =  x(2601:3900,17:20); %3900x4%
dux32     =  x(2601:3900,21:24);
yhat31    = (dux31*b(17:20)).*(1-q);
yhat32    = (dux32*b(21:24)).*(q);
yhat3     = yhat21 + yhat22; %
e3        = y3- yhat3;
e         = [e1;e2;e3]
%%%%%%%%%%%%%%%%%%%%%%
merror    =  horzcat(e1,e2,e3);
sigm      =  cov(merror);
dsigm     =  det(sigm);
isigm     =  inv(sigm);
iksigm    =  kron(eye(n3),isigm);
l         =  (3*n3/2)*log(2*pi) + (3*n3/2)*log(dsigm) + 0.5*(e'*iksigm* e);
```