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% Example 3.1 %

% Interest Rate Elasticity %

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% 1. Load data

rawData = xlsread('Chap3rates.xlsx');

DeltaR = rawData(2:end,1) - rawData(1:end-1,1);

Loans = rawData(2:end,2);

DepositAccounts = rawData(2:end,3);

% 2. Define the Problem

k = 3;

% The number of lag terms / betas is k+1

whichCoupon = 'Loans';

% 3. Set up the predictors and responses

if strcmp(whichCoupon, 'Loans')

 C = Loans;

else

 C = DepositAccounts;

end

Y = C(2:end) - C(1:end-1);

% And trim to accommodate k more lag terms:

Y = Y(1+k:end);

X = zeros(size(Y,1), k+1);

for iLag = 1:k+1

 X(:,iLag) = DeltaR(k-iLag+3:end - iLag +1);

end

obj = @(params) objectiveFcn(params, X, Y);

% 4. Run the optimization

param0 = [ones(k+1,1) / (k+1); 0];

% Constraint 1: All the betas sum to 1

Aeq = [ones(1, k+1), 0];

beq = 1;

% Constraints 2 and 3: betas lie between 0 and 1,

%and abs(theta) <= 1

lb = [zeros(k+1,1); -1];

ub = ones(k+2,1);

[paramEst,fval,exitflag] =...

 fmincon(obj, param0, [], [], Aeq, beq, lb, ub);

eta = paramEst(1:end-1);

vartheta = paramEst(end);

% 5. Estimates

% eta =

% 0.5042

% 0.4875

% 0.0059

% 0.0024

% vartheta =

% 0.6525

% Graph

Yhat=vartheta\*(eta'\*X'); %tt=1:1:size(Yhat,2);

FDates=datenum({'30?Jun?2005' '30?Sep?2005' '31?Dec?2005' '31?Mar?2006' '30?Jun?2006' '30?Sep?2006' '31?Dec?2006' '31?Mar?2007' '30?Jun?2007' '30?Sep?2007' '31?Dec?2007' '31?Mar?2008' '30?Jun?2008' '30?Sep?2008' '31?Dec?2008' '31?Mar?2009' '30?Jun?2009' '30?Sep?2009' '31?Dec?2009' '31?Mar?2010' '30?Jun?2010' '30?Sep?2010' '31?Dec?2010' '31?Mar?2011' '30?Jun?2011' '30?Sep?2011' '31?Dec?2011' '31?Mar?2012' '30?Jun?2012' '30?Sep?2012' '31?Dec?2012' '31?Mar?2013' '30?Jun?2013' '30?Sep?2013' '31?Dec?2013' '31?Mar?2014' '30?Jun?2014' '30?Sep?2014' '31?Dec?2014'});

figure; spessore=15;

hold('on');

plot(FDates, Y, 'b\*-',FDates, Yhat, 'r-','LineWidth', 2.5); datetick('x');

title('Sensitivity Analysis','Fontsize',spessore);

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

legend('IA Actual','IA Fitted','Location', 'southwest' ); 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');