

Supplementary Material S1:

MATLAB source code for all numerical simulations presented in Sections 3 (Software: MATLAB 2017b version)

```
clc;clear;

% Step 1: Define the meaning of parameters
syms x y z C1 L1 C2 T1 P1 E21 E11 E12 LS T2 P21 P22 P31 P32 a b F1 F2 E22 L2 C3 T3 L3

% Step 2: Construct and run the function, and add it to the MATLAB search path. Here,
dydt(1) corresponds to Equation (10) in the text, dydt(2) corresponds to Equation (11) in the
text, and dydt(3) corresponds to Equation (12) in the text.  $y(1)$  is equivalent to  $x$ , and  $y(2)$  is
equivalent to  $y$ , and  $y(3)$  is equivalent to  $z$ .
function dydt=symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,L3)
dydt=zeros(3,1);
dydt(1)=-y(1)*(y(1)-1)*(T1+L1+C2-C1+y(3)*(F1+E12+(1-y(2))*(E22+b*E11)));
dydt(2)=-y(2)*(y(2)-1)*(y(3)*T2+E21*(b-a)-y(1)*P31-(1-y(1))*P32+y(3)*(b*E11+F2+L2+E22));
dydt(3)=-y(3)*(y(3)-1)*(T3-C3+L3+(1-y(1))*F1+(1-y(2))*F2);
end

% Step 3: Input parameter values for simulation evolution

%Figure 4(a)
clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
for i=0.1:0.1:0.9
    for j=0.1:0.1:0.8
        for k=0.1:0.1:0.9
            [t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 1],[i j k]);
            figure(1)
            grid on
            plot3(y(:,1),y(:,2),y(:,3));
            hold on
        end
    end
end
end
set(gca,'XTick',[0:0.2:1],'YTick',[0:0.2:1],'ZTick',[0:0.2:1]);
xlabel('x');
ylabel('y');
zlabel('z');
title('')
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%Figure 4(b)
clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;i=0.8;j=0.2;k=0.2;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 1],[i j k]);
figure(1)
grid on
plot3(y(:,1),y(:,2),y(:,3));
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;i=0.2;j=0.8;k=0.2;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 1],[i j k]);
figure(1)
grid on
plot3(y(:,1),y(:,2),y(:,3));
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;i=0.2;j=0.2;k=0.8;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 1],[i j k]);
figure(1)
grid on
plot3(y(:,1),y(:,2),y(:,3));
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;i=0.3;j=0.6;k=0.9;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 1],[i j k]);
figure(1)
grid on
plot3(y(:,1),y(:,2),y(:,3));
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;i=0.7;j=0.4;k=0.1;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 1],[i j k]);
figure(1)
grid on
plot3(y(:,1),y(:,2),y(:,3));
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;i=0.6;j=0.8;k=0.3;

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[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 1],[i j k]);
figure(1)
grid on
plot3(y(:,1),y(:,2),y(:,3));
hold on
set(gca,'XTick',[0:0.2:1],'YTick',[0:0.2:1],'ZTick',[0:0.2:1]);
xlabel('x');
ylabel('y');
zlabel('z');
title('')

```

%Figure 5

```

clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=40;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-','MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-','MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-','MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);

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maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-','MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-','MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-','MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:T3=5','Demanders:T3=5','Regulators:T3=5','Suppliers:T3=40','Demanders:T
3=40','Regulators:T3=40','Suppliers:T3=80','Demanders:T3=80','Regulators:T3=80');

```

%Figure 6

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clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=20;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-','MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-','MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-','MarkerIndices',maker_idx6);

```

```

hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=40;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-','MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-','MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-','MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:F1=5','Demanders:F1=5','Regulators:F1=5','Suppliers:F1=20','Demanders:F
1=20','Regulators:F1=20','Suppliers:F1=40','Demanders:F1=40','Regulators:F1=40');

```

%Figure 7

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clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5; E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;
P32=20; a=0.05; b=0.25; F1=20; F2=10;E22=10;L2=5;C3=50; T3=80; L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5; E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;
P32=20; a=0.05; b=0.25; F1=20; F2=25;E22=10;L2=5;C3=50; T3=80; L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-','MarkerIndices',maker_idx4);
hold on

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maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-', 'MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-', 'MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5; E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;
P32=20; a=0.05; b=0.25; F1=20; F2=40;E22=10;L2=5;C3=50; T3=80; L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-', 'MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-', 'MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-', 'MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:F2=10','Demanders:F2=10','Regulators:F2=10','Suppliers:F2=25','Demanders:F2=25','Regulators:F2=25','Suppliers:F2=40','Demanders:F2=40','Regulators:F2=40');

```

%Figure 8

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clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5; E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;
P32=20; a=0.05; b=0.25; F1=20; F2=40;E22=10;L2=5;C3=50; T3=80; L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-', 'MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-', 'MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5; E12=5;LS=5;T2=5;P21=50;P22=20;P31=60;
P32=20; a=0.05; b=0.25; F1=20; F2=40;E22=10;L2=5;C3=50; T3=80; L3=5;

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```

[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-', 'MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-', 'MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-', 'MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5; E12=5;LS=5;T2=5;P21=50;P22=20;P31=70;
P32=20; a=0.05; b=0.25; F1=20; F2=40;E22=10;L2=5;C3=50; T3=80; L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-', 'MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-', 'MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-', 'MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:P31=50','Demanders:P31=50','Regulators:P31=50','Suppliers:P31=60','De
manders:P31=60','Regulators:P31=60','Suppliers:P31=70','Demanders:P31=70','Regulators:P
31=70');

```

%Figure 9

```

clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5; E12=5;LS=5;T2=5;P21=50;P22=20;P31=70;
P32=20; a=0.05; b=0.25; F1=20; F2=40;E22=10;L2=5;C3=50; T3=80; L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-', 'MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-', 'MarkerIndices',maker_idx2);

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hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-', 'MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5; E12=5;LS=5;T2=5;P21=50;P22=20;P31=70;
P32=20; a=0.05; b=0.25; F1=20; F2=50;E22=10;L2=5;C3=50; T3=80; L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-', 'MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-', 'MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-', 'MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5; E12=5;LS=5;T2=5;P21=50;P22=20;P31=70;
P32=20; a=0.05; b=0.25; F1=20; F2=60;E22=10;L2=5;C3=50; T3=80; L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-', 'MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-', 'MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-', 'MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10], 'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:F2=40','Demanders:F2=40','Regulators:F2=40','Suppliers:F2=50','Demande
rs:F2=50','Regulators:F2=50','Suppliers:F2=60','Demanders:F2=60','Regulators:F2=60');

```

%Figure 10(a)

```

clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);

```

```

maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-', 'MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-', 'MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-', 'MarkerIndices',maker_idx3);
hold on
C1=30;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-', 'MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-', 'MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-', 'MarkerIndices',maker_idx6);
hold on
C1=20;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-', 'MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-', 'MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-', 'MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10], 'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:C1=40','Demanders:C1=40','Regulators:C1=40','Suppliers:C1=30','Demand
ers:C1=30','Regulators:C1=30','Suppliers:C1=20','Demanders:C1=20','Regulators:C1=20');

%Figure 10(b)

```

```

clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=20;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-','MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-','MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-','MarkerIndices',maker_idx6);
hold on
C1=40;L1=30;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-','MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-','MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-','MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);

```

```

title('')
legend('Suppliers:L1=10','Demanders:L1=10','Regulators:L1=10','Suppliers:L1=20','Demander
s:L1=20','Regulators:L1=20','Suppliers:L1=30','Demanders:L1=30','Regulators:L1=30');

%Figure 10(c)
clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=15;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P
32=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-','MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-','MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-','MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=25;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P
32=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-','MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-','MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-','MarkerIndices',maker_idx9);

```

```

hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:C2=5','Demanders:C2=5','Regulators:C2=5','Suppliers:C2=15','Demanders:C2=15','Regulators:C2=15','Suppliers:C2=25','Demanders:C2=25','Regulators:C2=25');

%Figure 10(d)
clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P32=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=5;T1=15;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P32=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-','MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-','MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-','MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=5;T1=25;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P32=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-','MarkerIndices',maker_idx7);
hold on

```

```

maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-', 'MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-', 'MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10], 'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:T1=5','Demanders:T1=5','Regulators:T1=5','Suppliers:T1=15','Demanders:T1=15','Regulators:T1=15','Suppliers:T1=25','Demanders:T1=25','Regulators:T1=25');

```

%Figure 11(a)

```

clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P32=20;a=0.05;b=0.25;F1=20;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-', 'MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-', 'MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=20;P21=50;P22=20;P31=50;P32=20;a=0.05;b=0.25;F1=20;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-', 'MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-', 'MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-', 'MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=45;P21=50;P22=20;P31=50;P32=20;a=0.05;b=0.25;F1=20;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;

```

```

[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-','MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-','MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-','MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:T2=5','Demanders:T2=5','Regulators:T2=5','Suppliers:T2=25','Demanders:T
2=25','Regulators:T2=25','Suppliers:T2=45','Demanders:T2=45','Regulators:T2=45');

```

%Figure 11(b)

```

clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=20;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=20;F2=5;E22=10;L2=20;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-','MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-','MarkerIndices',maker_idx5);
hold on

```

```

maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-', 'MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=20;F2=5;E22=10;L2=45;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-', 'MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-', 'MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-', 'MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:L2=5','Demanders:L2=5','Regulators:L2=5','Suppliers:L2=25','Demanders:L
2=25','Regulators:L2=25','Suppliers:L2=45','Demanders:L2=45','Regulators:L2=45');

```

%Figure 12

```

clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-', 'MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-', 'MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=25;E11=20;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P
32=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);

```

```

plot(t,y(:,1),'r>-','MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-','MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-','MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=45;E11=40;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P
32=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-','MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-','MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-','MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:E11=5,E21=10','Demanders:E11=5,E21=10','Regulators:E11=5,E21=10','Su
ppliers:E11=20,E21=25','Demanders:E11=20,E21=25','Regulators:E11=20,E21=25','Suppliers:
E11=40,E21=45','Demanders:E11=40,E21=45','Regulators:E11=40,E21=45');

```

%Figure 13

```

clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);

```

```

hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=25;LS=5;T2=5;P21=50;P22=20;P31=50;P
32=20;a=0.05;b=0.25;F1=5;F2=5;E22=30;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>','MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-','MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-','MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=45;LS=5;T2=5;P21=50;P22=20;P31=50;P
32=20;a=0.05;b=0.25;F1=5;F2=5;E22=50;L2=5;C3=50;T3=80;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-','MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-','MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-','MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:E12=5,E22=10','Demanders:E12=5,E22=10','Regulators:E12=5,E22=10','Su
ppliers:E12=25,E22=30','Demanders:E12=25,E22=30','Regulators:E12=25,E22=30','Suppliers:
E12=45,E22=50','Demanders:E12=45,E22=50','Regulators:E12=45,E22=50');

%Figure 14
clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);

```

```

hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-', 'MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=40;F2=40;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx4 = 1:5:length(t);
plot(t,y(:,1),'r>-','MarkerIndices',maker_idx4);
hold on
maker_idx5 = 1:5:length(t);
plot(t,y(:,2),'bs-', 'MarkerIndices',maker_idx5);
hold on
maker_idx6 = 1:5:length(t);
plot(t,y(:,3),'gh-', 'MarkerIndices',maker_idx6);
hold on
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=80;F2=80;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)symmetry(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx7 = 1:5:length(t);
plot(t,y(:,1),'ro-', 'MarkerIndices',maker_idx7);
hold on
maker_idx8 = 1:5:length(t);
plot(t,y(:,2),'bx-', 'MarkerIndices',maker_idx8);
hold on
maker_idx9 = 1:5:length(t);
plot(t,y(:,3),'gv-', 'MarkerIndices',maker_idx9);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:F1=5,F2=5','Demanders:F1=5,F2=5','Regulators:F1=5,F2=5','Suppliers:F1=4
0,F2=40','Demanders:F1=40,F2=40','Regulators:F1=40,F2=40','Suppliers:F1=80,F2=80','Dema
nders:F1=80,F2=80','Regulators:F1=80,F2=80');

%Figure 15(a)
clc;clear;

```

```

C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=40;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)Alchangshi(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:F1=5,F2=40','Demanders:F1=5,F2=40','Regulators:F1=5,F2=40');

```

%Figure 15(b)

```

clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=40;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)Alchangshi(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:F1=40,F2=5','Demanders:F1=40,F2=5','Regulators:F1=40,F2=5');

```

%Figure 15(c)

```

clc;clear;

```

```

C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=5;F2=80;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)Alchangshi(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:F1=5,F2=80','Demanders:F1=5,F2=80','Regulators:F1=5,F2=80');

```

%Figure 15(d)

```

clc;clear;
C1=40;L1=10;C2=5;T1=5;P1=80;E21=10;E11=5;E12=5;LS=5;T2=5;P21=50;P22=20;P31=50;P3
2=20;a=0.05;b=0.25;F1=80;F2=5;E22=10;L2=5;C3=50;T3=5;L3=5;
[t,y]=ode45(@(t,y)Alchangshi(t,y,C1,L1,C2,T1,E21,E11,E12,T2,P31,P32,a,b,F1,F2,E22,L2,C3,T3,
L3),[0 10],[0.5 0.5 0.5]);
maker_idx1 = 1:5:length(t);
plot(t,y(:,1),'rp-','MarkerIndices',maker_idx1);
hold on
maker_idx2 = 1:5:length(t);
plot(t,y(:,2),'bd-','MarkerIndices',maker_idx2);
hold on
maker_idx3 = 1:5:length(t);
plot(t,y(:,3),'g*-','MarkerIndices',maker_idx3);
hold on
set(gca,'XTick',[0:1:10],'YTick',[0:0.1:1]);
axis([0 10 0 1]);
xlabel('time','interpreter','latex','rotation',360);
ylabel('proportion','interpreter','latex','rotation',90);
title('')
legend('Suppliers:F1=80,F2=5','Demanders:F1=80,F2=5','Regulators:F1=80,F2=5');

```