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1 clear all
2 close all
3
4 % set parameters
5 sigma = 1; % inverse EIS
6 chi = 1; % inverse Frisch
7 beta = 0.99; % discount factor
8 phi = 0.75; % calvo parameters
9 zeta = ((1-phi)*(1-phi*beta))/phi; % slop coefficient in PC
10 psi = 0.2; % government spending share
11 rho = 0.9; % common AR
12 rhoa = rho; % AR productivity
13 rhog = rho; % AR government spending
14 phipi = 1.5; % taylor rule coefficient
15 gamma = (chi*(1-psi)+sigma)/(1-psi);
16
17 alpha = 4/5; % ZLB probability
18
19 % undetermined coefficients -- this requires rhoa=rhoga
20 theta1 = (1-alpha*beta*rho)*(1-psi)/(sigma*(1-alpha*beta*rho)*(1-alpha*rho) -
alpha*rho*zeta*gamma*(1-psi));
21 theta2 = zeta*gamma*(1-psi)/(sigma*(1-alpha*beta*rho)*(1-alpha*rho) -
alpha*rho*zeta*gamma*(1-psi));
22
23 % g shock
24 T = 20; % length of IRFs
25 g_irf = zeros(T,1);
26 for j = 1:T
27     g_irf(j,1) = rhog^(j-1);
28 end
29 rf_irf = -(sigma/(1-psi))*(psi*chi*(1-psi)/(chi*(1-psi)+sigma))*(rhog-1)*g_irf;
30
31 pi_irf = zeros(T,1);
32 x_irf = zeros(T,1);
33
34 for j = 1:T
35     pi_irf(j,1) = alpha^(j-1)*theta2*rf_irf(j,1);
36     x_irf(j,1) = alpha^(j-1)*theta1*rf_irf(j,1);
37 end
38
39 i_irf = zeros(T,1);
40 for j = 1:T
41     i_irf(j,1) = alpha^(j-1)*0 + (1-alpha^(j-1))*rf_irf(j,1);
42 end
43
44 yf_irf = (psi*sigma/(chi*(1-psi)+sigma))*g_irf;
45 y_irf = x_irf + yf_irf;
46
47 % plot optimal and ZLB irfs
48 t = 1:T;
49
50 figure
51 subplot(2,3,1)
52 plot(g_irf,'-k','Linewidth',2)
53 title('g')
54
55 subplot(2,3,2)
56 plot(t,x_irf,'k',t,zeros(T,1),'--b','Linewidth',2)
57 title('x')
58
59 subplot(2,3,3)
60 plot(t,pi_irf,'k',t,zeros(T,1),'--b','Linewidth',2)
61 title('\pi')
62
63 subplot(2,3,4)
64 plot(t,i_irf,'k',t,rf_irf,'--b','Linewidth',2)
65 title('i')
66
67 subplot(2,3,5)

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68 plot(t, (1/psi)*y_irf, 'k', t, (1/psi)*yf_irf, '--b', 'Linewidth', 2)
69 title('y')
70 legend('ZLB', 'No ZLB')
71
72 % a shock
73 a_irf = zeros(T,1);
74 for j = 1:T
75     a_irf(j,1) = rhoa^(j-1);
76 end
77 rf_irf2 = (sigma/(1-psi))* ( (1+chi)*(1-psi)/(chi*(1-psi)+sigma) )*(rhoa-1)*a_irf;
78
79 pi_irf2 = zeros(T,1);
80 x_irf2 = zeros(T,1);
81
82 for j = 1:T
83     pi_irf2(j,1) = alpha^(j-1)*theta2*rf_irf2(j,1);
84     x_irf2(j,1) = alpha^(j-1)*theta1*rf_irf2(j,1);
85 end
86
87 i_irf2 = zeros(T,1);
88 for j = 1:T
89     i_irf2(j,1) = alpha^(j-1)*0 + (1-alpha^(j-1))*rf_irf2(j,1);
90 end
91
92 yf_irf2 = (psi*sigma/(chi*(1-psi)+sigma))*a_irf;
93 y_irf2 = x_irf2 + yf_irf2;
94
95 figure
96 subplot(2,3,1)
97 plot(a_irf, '-k', 'Linewidth', 2)
98 title('a')
99
100 subplot(2,3,2)
101 plot(t, x_irf2, 'k', t, zeros(T,1), '--b', 'Linewidth', 2)
102 title('x')
103
104 subplot(2,3,3)
105 plot(t, pi_irf2, 'k', t, zeros(T,1), '--b', 'Linewidth', 2)
106 title('\pi')
107
108 subplot(2,3,4)
109 plot(t, i_irf2, 'k', t, rf_irf2, '--b', 'Linewidth', 2)
110 title('i')
111
112 subplot(2,3,5)
113 plot(t, y_irf2, 'k', t, yf_irf2, '--b', 'Linewidth', 2)
114 title('y')
115 legend('ZLB', 'No ZLB')
116

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