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1  var Y C I G L Ld Ih Yw K u w wr mrs Pi Pirpk pw f1 f2 x1 x2 vp vw Q QB RF
2  RB Rd Rre Rtr M1 M2 mu Lam fw f b re d n lambda phi Omega fcb bcb bG A theta
3  logY logC logI logLd logPi logRd exr logQ;
4  warning off;
5  varexo eA er et eB eG ef eb et2;
6
7  parameters beta kappa spF spB psi epsip epsiw alpha delta0 g bb bcs bcbGs
8  by levs sigma Rds RFs RBs Qs QBs M1s M2s pws Ks Ys Is ws delta1 Cs mus mrss
9  chi fws res bcbs fcbs fs bGs bs ns ds Delta phis thetas X Omegas lams phip
10 phiw psik delta2 eta rhor phipi phiy sr rhof rhob sf sb rhoA sA rhot st
11 rhoG sG rhoB sB;
12
13 load param_sw;
14 set_param_value('alpha',alpha);
15 set_param_value('beta',beta);
16 set_param_value('delta0',delta0);
17 set_param_value('delta1',delta1);
18 set_param_value('delta2',delta2);
19 set_param_value('eta',eta);
20 set_param_value('kappa',kappa);
21 set_param_value('spF',spF);
22 set_param_value('spB',spB);
23 set_param_value('psi',psi);
24 set_param_value('epsip',epsip);
25 set_param_value('epsiw',epsiw);
26 set_param_value('g',g);
27 set_param_value('bb',bb);
28 set_param_value('bcs',bcs);
29 set_param_value('bcbGs',bcbGs);
30 set_param_value('by',by);
31 set_param_value('levs',levs);
32 set_param_value('sigma',sigma);
33 set_param_value('Rds',Rds);
34 set_param_value('RFs',RFs);
35 set_param_value('RBs',RBs);
36 set_param_value('Qs',Qs);
37 set_param_value('QBs',QBs);
38 set_param_value('M1s',M1s);
39 set_param_value('M2s',M2s);
40 set_param_value('pws',pws);
41 set_param_value('Ks',Ks);
42 set_param_value('Ys',Ys);
43 set_param_value('Is',Is);
44 set_param_value('ws',ws);
45 set_param_value('Cs',Cs);
46 set_param_value('mus',mus);
47 set_param_value('mrss',mrss);
48 set_param_value('chi',chi);
49 set_param_value('fws',fws);
50 set_param_value('res',res);
51 set_param_value('bcbs',bcbs);
52 set_param_value('fcbs',fcbs);
53 set_param_value('fs',fs);
54 set_param_value('bGs',bGs);
55 set_param_value('bs',bs);
56 set_param_value('ns',ns);
57 set_param_value('ds',ds);
58 set_param_value('Delta',Delta);
59 set_param_value('phis',phis);
60 set_param_value('thetas',thetas);
61 set_param_value('X',X);
62 set_param_value('Omegas',Omegas);
63 set_param_value('lams',lams);
64 set_param_value('hip',hip);
65 set_param_value('phiw',phiw);
66 set_param_value('psik',psik);
67 set_param_value('eta',eta);
68 set_param_value('rhor',rhor);
69 set_param_value('hipi',hipi);

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70 set_param_value('phiy', phiy);
71 set_param_value('sr', sr);
72 set_param_value('rhof', rhof);
73 set_param_value('rhob', rhob);
74 set_param_value('sf', sf);
75 set_param_value('sb', sb);
76 set_param_value('rhoA', rhoA);
77 set_param_value('sA', sA);
78 set_param_value('rhot', rhot);
79 set_param_value('st', st);
80 set_param_value('rhoG', rhoG);
81 set_param_value('sG', sG);
82 set_param_value('rhoB', rhoB);
83 set_param_value('sB', sB);
84
85 model;
86 %%%%%%
87 % Household
88 %%%%%%
89
90 % (1) SDF
91 Lam = beta*mu/mu(-1);
92
93 % (2) mu
94 mu = (C - bb*C(-1))^( -1) - beta*bb*(C(+1) - bb*C)^( -1);
95
96 % (3) Labor supply
97 chi*L^(eta) = mrs*mu;
98
99 % (4) Bonds
100 1 = Rd*Lam(+1)*Pi(+1)^( -1);
101
102 % (5) Wage-setting
103 wr = (epsiw/(epsiw-1))*f1/f2;
104
105 % (6) f1
106 f1 = mrs*w^(epsiw)*Ld + phiw*Lam(+1)*Pi(+1)^(epsiw)*f1(+1);
107
108 % (7) f2
109 f2 = w^(epsiw)*Ld + phiw*Lam(+1)*Pi(+1)^(epsiw-1)*f2(+1);
110
111 %%%%%%
112 % Investment firm
113 %%%%%%
114
115 % (8) Ihat
116 Ih = (1 - (psik/2)*(I/I(-1) - 1)^2)*I;
117
118 % (9) FOC I
119 1 = pk*(1 - (psik/2)*(I/I(-1) - 1)^2 - psik*(I/I(-1) - 1)*(I/I(-1))) +
Lam(+1)*pk(+1)*psik*(I(+1)/I - 1)*(I(+1)/I)^2;
120
121
122 %%%%%%
123 % Retail firm
124 %%%%%%
125
126 % (10) Reset inflation
127 Pir = (epsip/(epsip - 1))*x1/x2;
128
129 % (11) x1
130 x1 = pw*Y + phip*Lam(+1)*Pi(+1)^(epsip)*x1(+1);
131
132 % (12) x2
133 x2 = Y + phip*Lam(+1)*Pi(+1)^(epsip-1)*x2(+1);
134
135 %%%%%%%
136 % Wholesale firm
137 %%%%%%%%%%

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138
139 % (13) Labor demand
140 w = (1-alpha)*pw*A*(u*K(-1))^(alpha)*Ld^(-alpha);
141
142 % (14) Utilization
143 pk*M2*(delta1 + delta2*(u - 1)) = alpha*pw*A*(u*K(-1))^(alpha-1)*Ld^(1-alpha);
144
145 % (15) Capital
146 pk*M2 = Lam(+1)*(alpha*pw(+1)*A(+1)*(u(+1)*K)^(alpha-1)*u(+1)*Ld(+1)^(1-alpha) +
147 (1-delta0-delta1*(u(+1) - 1)-(delta2/2)*(u(+1) - 1)^2)*pk(+1)*M2(+1));
148
149 % (16) Bonds
150 Q*M1 = Lam(+1)*Pi(+1)^(-1)*(1+kappa*Q(+1)*M1(+1));
151
152 % (17) M1 and M2
153 (M1-1)/(M2-1) = 1/psi;
154
155 % (18) Production
156 Yw = A*(u*K(-1))^(alpha)*Ld^(1-alpha);
157
158 % (19) Capital acumulation
159 K = Ih + (1-delta0-delta1*(u-1)-(delta2/2)*(u-1)^2)*K(-1);
160
161 % (20) Loan in advance
162 psi*pk*Ih = Q*(fw - kappa*Pi^(-1)*fw(-1));
163
164 % Financial Intermediaries
165 %%%%%%%%%%%
166
167 % (21) FOC private
168 Lam(+1)*(RF(+1) - Rd)*Pi(+1)^(-1)*Omega(+1) = theta*lambda/(1+lambda);
169
170 % (22) FOC government
171 Lam(+1)*(RB(+1) - Rd)*Pi(+1)^(-1)*Omega(+1) = Delta*theta*lambda/(1+lambda);
172
173 % (23) FOC reserves
174 Lam(+1)*(Rre - Rd)*Pi(+1)^(-1)*Omega(+1) = 0;
175
176 % (24) Omega
177 Omega = 1- sigma + sigma*phi*theta;
178
179 % (25) phi
180 phi = (Lam(+1)*Pi(+1)^(-1)*Omega(+1)*Rd)/(theta - Lam(+1)*Omega(+1)*Pi(+1)^(-1)*(RF(+1)
181 - Rd));
182
183 % (26) Balance sheet
184 Q*f + QB*b + re = d + n;
185
186 % (27) Modified leverage constraint
187 phi = (Q*f + Delta*QB*b)/n;
188
189 % (28) Net worth evolution
190 n = sigma*Pi^(-1)*((RF - Rd(-1))*Q(-1)*f(-1) + (RB - Rd(-1))*QB(-1)*b(-1) + (Rre(-1) -
191 Rd(-1))*re(-1) + Rd(-1)*n(-1)) + X;
192
193 %%%%%%%%%%
194 %% Central Bank
195 %%%%%%%%%%
196
197 % (29) Taylor rule
198 log(Rtr) = (1-rhor)*log(Rds) + rhor*log(Rtr(-1)) + (1-rhor)*(phipi*log(Pi) +
199 phiy*(log(Y) - log(Y(-1)))) + sr*er;
200
201 Rre = 1;
202
203 % (31) Private holdings

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203 fcb = (1-rhof)*fcbs + rhof*fcb(-1) -47*(1-rhof)*(phipi*log(Pi) +
    phiy*(log(Y)-log(Y(-1)))) + sf*ef;
204
205 % (32) Government holdings
206 bcb = (1-rhob)*bcbs + rhob*bcb(-1) + sb*eb;
207
208 % (33) Balance sheet
209 Q*fcb + QB*bcb = re;
210
211 %%%%%%%%%%%
212 % Aggregate conditions
213 %%%%%%%%%%%
214
215 % (34) Price evolution
216 1 = (1-hiph)*Pir^(1-epsip) + phip*Pi^(epsip-1);
217
218 % (35) Wage evolution
219 w^(1-epsiw) = (1-phiw)*wr^(1-epsiw) + phiw*Pi^(epsiw-1)*w(-1)^(1-epsiw);
220
221 % (36) Aggregate output
222 Yw = Y*vp;
223
224 % (37) Price dispersion
225 vp = (1-hiph)*Pir^(-epsip) + phip*Pi^(epsip)*vp(-1);
226
227 % (38) Labor supply / demand
228 L = Ld*vw;
229
230 % (39) Wage dispersion
231 vw = (1-phiw)*(wr/w)^(-epsiw) + phiw*(w/w(-1))^(epsiw)*Pi^(epsiw)*vw(-1);
232
233 % (40) Market-clearing private bonds
234 fw = f + fcb;
235
236 % (41) Market-clearing government bonds
237 bG = b + bcb;
238
239 % (42) Aggregate resource constraint
240 Y = C + I + G;
241
242 % (43) Return private bonds
243 RF = (1+kappa*Q)/Q(-1);
244
245 % (44) Return government bonds
246 RB = (1+kappa*QB)/QB(-1);
247
248 % (45) Productivity shock
249 log(A) = rhoA*log(A(-1)) + sA*eA;
250
251 % (46) Credit shock
252 log(theta) = (1-rhot)*log(thetas) + rhot*log(theta(-1)) + st*et + st*et2;
253
254 % (47) Government spending shock
255 log(G) = (1-rhoG)*log(g*Ys) + rhoG*log(G(-1)) + sG*eG;
256
257 % (48) Government debt shock
258 log(bG) = (1-rhoB)*log(bGs) + rhoB*log(bG(-1)) + sB*eB;
259
260
261
262 % other stuff
263
264 % (49) excess return
265 exr = 400*(log(RF(+1)) - log(Rd));
266
267 % (50) log output
268 logY = log(Y);
269
270 % (51) log consumption

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```

271 logC = log(C);
272
273 % (52) log investment
274 logI = log(I);
275
276 % (53) Log Labor
277 logLd = log(Ld);
278
279 % (54) Net inflation
280 logPi = 400*log(Pi);
281
282 % (55) Net deposit rate
283 logRd = 400*log(Rd);
284
285 % (56) Log Q
286 logQ = log(Q);
287
288 end;
289 options_.noprint=1;
290
291 initval;
292 Y = Ys;
293 Yw = Ys;
294 L = 1;
295 Ld = 1;
296 vp = 1;
297 vw = 1;
298 G = g*Ys;
299 I = Is;
300 C = Cs;
301 Ih = Is;
302 K = Ks;
303 u = 1;
304 w = ws;
305 wr = ws;
306 mrs = mrss;
307 Pi = 1;
308 Pir = 1;
309 pk = 1;
310 pw = pws;
311 f1 = (mrss*ws^(epsiw))/(1-phiw*beta);
312 f2 = (ws^(epsiw)/(1-phiw*beta));
313 x1 = (pws*Ys)/(1-hip*beta);
314 x2 = Ys/(1-hip*beta);
315 Q = Qs;
316 QB = QBs;
317 RF = RFs;
318 RB = RBs;
319 Rd = Rds;
320 Rre = Rds;
321 Rtr = Rds;
322 M1 = M1s;
323 M2 = M2s;
324 mu = mus;
325 Lam = beta;
326 fw = fws;
327 f = fs;
328 b = bs;
329 re = res;
330 d = ds;
331 n = ns;
332 lambda = lams;
333 phi = phis;
334 Omega = Omegas;
335 fcb = fcbs;
336 bcb = bcbs;
337 bG = bGs;
338 A = 1;
339 theta = thetas;

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```
340   exr = 400*(log(RFs) - log(Rds));
341   logY = log(Ys);
342   logI = log(Is);
343   logC = log(Cs);
344   logLd = 0;
345   logPi = 0;
346   logRd = 400*log(Rds);
347   logQ = log(Qs);
348   end;
349   % C I G L Ld Ih Yw K u w wr mrs Pi Pir pk pw f1 f2 x1 x2 vp vw Q QB RF
350   %RB Rd Rre Rtr M1 M2 mu Lam fw f b re d n lambda phi Omega fcb bcb bG A theta
351
352   steady;
353
354   shocks;
355   var eA = 1;
356   var eG = 1;
357   var er = 1;
358   var et = 1;
359   var eB = 1;
360   var eb = 1;
361   var ef = 1;
362   var et2 = 1;
363   end;
364
365   stoch_simul(order=1,irf=20,nograph,ar=1,qz_zero_threshold=1e-8);
366
367
368
```