

QPM Model

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1: % =====
2: % Basic Quarterly Projection Model (QPM)
3: % =====
4:
5: !transition_variables
6: 'Real GDP (100*log)'          L_GDP
7: 'Trend in Real GDP (100*log)' L_GDP_BAR
8: 'Output Gap (in %)'          L_GDP_GAP
9: 'Quarterly Growth in Real GDP(in % pa)' DLA_GDP
10: 'Real GDP Growth YoY (in % pa)' D4L_GDP
11: 'Real GDP Trend Growth QoQ annualized (in % pa)' DLA_GDP_BAR
12: 'Real NON-MINING GDP (100*log)'          L_GDP_OTH
13: 'Trend in Real NON-MINING GDP (100*log)' L_GDP_OTH_BAR
14: 'NON-MINING Output Gap (in %)'          L_GDP_OTH_GAP
15: 'Quarterly Growth in Real NON-MINING GDP(in % pa)' DLA_GDP_OTH
16: 'Real NON-MINING GDP Growth YoY (in % pa)' D4L_GDP_OTH
17: 'Real NON-MINING GDP Trend Growth QoQ annualized (in % pa)' DLA_GDP_OTH_BAR
18: 'Real MINING GDP (100*log)'          L_GDP_MINE
19: 'Trend in Real MINING GDP (100*log)' L_GDP_MINE_BAR
20: 'MINING Output Gap (in %)'          L_GDP_MINE_GAP
21: 'Quarterly Growth in Real MINING GDP(in % pa)' DLA_GDP_MINE
22: 'Real MINING GDP Growth YoY (in % pa)' D4L_GDP_MINE
23: 'Real MINING GDP Trend Growth QoQ annualized (in % pa)' DLA_GDP_MINE_BAR
24:
25: 'Real YEARLY GDP (100*log)'    L_GDP_yearly
26: 'Real GDP Growth Yearly (in % pa)' DL_GDP_yearly
27: 'Real MINING YEARLY GDP (100*log)' L_GDP_MINE_yearly
28: 'Real MINING GDP Growth Yearly (in % pa)' DL_GDP_MINE_yearly
29: 'Real NON-MINING YEARLY GDP (100*log)' L_GDP_OTH_yearly
30: 'Real NON-MINING GDP Growth Yearly (in % pa)' DL_GDP_OTH_yearly
31:
32:
33: 'Real Monetary Condition Index (in % pa)' MCI
34:
35: 'CPI (level, 100*log)'          L_CPI
36: 'CPI Inflation QoQ annualized (in % pa)' DLA_CPI
37: 'Expected CPI Inflation QoQ annualized (in % pa)' E_DLA_CPI
38: 'Expected CPI Inflation YoQ (in % pa)' E_D4L_CPI

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39: 'CPI Inflation YoY (in % pa)'	D4L_CPI
40: 'Inflation Target (in % pa)'	D4L_CPI_TAR
41:	
42: 'Real Marginal Cost (in %)'	RMC
43:	
44: 'Nominal Exchange Rate (LCY/FCY, 100*log)'	L_S
45: 'Nominal Exch. Rate Depreciation QoQ annualized (in % pa)'	DLA_S
46: 'Nominal Exch. Rate Depreciation YoY (in % pa)'	D4L_S
47: 'Country Risk Premium (in % pa)'	PREM
48:	
49: 'Nominal Policy Interest Rate (in % pa)'	RS
50: 'Real Interest Rate (in % pa)'	RR
51: 'Trend Real Interest Rate (in % pa)'	RR_BAR
52: 'Real Interest Rate Gap (in %)'	RR_GAP
53: 'Nominal Policy Neutral Interest Rate (in % pa)'	RSNEUTRAL
54:	
55: 'Real Exchange Rate (level, 100*log)'	L_Z
56: 'Trend Real Exchange Rate (level, 100*log)'	L_Z_BAR
57: 'Real Exchange Rate Gap (in %)'	L_Z_GAP
58: 'Real Exchange Rate Depreciation QoQ annualized (in % pa)'	DLA_Z
59: 'Trend Real Exchange Rate Depreciation QoQ annualized(in % pa)'	DLA_Z_BAR
60:	
61: 'Foreign Output Gap (in %)'	L_GDP_RW_GAP
62: 'Foreign Nominal Interest Rate (in % pa)'	RS_RW
63: 'Foreign Real Interest Rate (in % pa)'	RR_RW
64: 'Foreign Real Interest Rate Trend (in % pa)'	RR_RW_BAR
65: 'Foreign Real Interest Rate Gap (in %)'	RR_RW_GAP
66: 'Foreign CPI (level, 100*log)'	L_CPI_RW
67: 'Foreign Inflation QoQ annualized (in % pa)'	DLA_CPI_RW
68:	
69: %% TUNES	
70: TUNE_L_GDP_GAP	
71: TUNE_L_GDP_OTH_GAP	
72: TUNE_L_GDP_MINE_GAP	
73:	
74:	
75: % ----- %	
76: !transition_shocks	
77: %%'Shock: Output gap (demand)'	SHK_L_GDP_GAP
78: 'Shock: Output gap (demand)'	SHK_L_GDP_MINE_GAP< $\sigma=2$ >
79: 'Shock: Output gap (demand)'	SHK_L_GDP_OTH_GAP< $\sigma=2$ >

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80: 'Shock: CPI inflation (cost-push)'          SHK_DLA_CPI< $\sigma=0.75$ >
81: 'Shock: Exchange rate (UIP)'              SHK_L_S< $\sigma=1.6$ >
82: 'Shock: Interest rate (monetary policy)'    SHK_RS< $\sigma=1$ >
83: 'Shock: Inflation target'                  SHK_D4L_CPI_TAR< $\sigma=2$ >
84:
85: 'Shock: Real interest rate'                SHK_RR_BAR< $\sigma=0.5$ >
86: 'Shock: Real exchange rate depreciation'    SHK_DLA_Z_BAR< $\sigma=0.4$ >
87: %'Shock: Potential GDP growth'             SHK_DLA_GDP_BAR
88: SHK_L_GDP_GAP< $\sigma=0.01$ >
89: 'Shock: Potential GDP growth'              SHK_DLA_GDP_MINE_BAR< $\sigma=0.5$ >
90: 'Shock: Potential GDP growth'              SHK_DLA_GDP_OTH_BAR< $\sigma=0.5$ >
91:
92: 'Shock: Foreign output gap'                SHK_L_GDP_RW_GAP< $\sigma=1$ >
93: 'Shock: Foreign nominal interest rate'      SHK_RS_RW< $\sigma=1$ >
94: 'Shock: Foreign inflation'                 SHK_DLA_CPI_RW< $\sigma=2$ >
95: 'Shock: Foreign real interest rate'         SHK_RR_RW_BAR< $\sigma=0.5$ >
96:
97: % ----- %
98: !parameters
99: %%b1 b2 b3 b4
100: b1_mine<0.7> b3_mine<0.5>
101: b1_oth<0.7> b2_oth<0.2> b3_oth<0>
102: w_mine<0.15>
103: b4<0.4>
104: a1<0.6> a2<0.3> a3<0.5>
105: e1<0.4>
106: g1<0.8> g2<1> g3<0.1>
107:
108: rho_D4L_CPI_TAR<0.8>
109: rho_DLA_Z_BAR<0.8>
110: rho_RR_BAR<0.8>
111: rho_DLA_GDP_BAR<0.8>
112: rho_DLA_GDP_MINE_BAR<0.8>
113: rho_DLA_GDP_OTH_BAR<0.8>
114:
115: rho_L_GDP_RW_GAP<0.8>
116: rho_RS_RW<0.8>
117: rho_DLA_CPI_RW<0.8>
118: rho_RR_RW_BAR<0.8>
119:
120: ss_D4L_CPI_TAR<6>

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121: ss_DLA_Z_BAR(3)
122: ss_RR_BAR(3)
123: ss_DLA_GDP_BAR(5.6)
124: ss_DLA_GDP_MINE_BAR(0)
125: ss_DLA_GDP_OTH_BAR(4)
126:
127: ss_DLA_CPI_RW(3)
128: ss_RR_RW_BAR(1.35)
129:
130: %% ----- %
131: !transition_equations
132: %% == Aggregate demand (the IS curve) ==
133: %%L_GDP_GAP = b1*L_GDP_GAP{-1} - b2*MCI + b3*L_GDP_RW_GAP + SHK_L_GDP_GAP;
134: L_GDP_MINE_GAP = b1_mine(0.7)*L_GDP_MINE_GAP{-1} + b3_mine(0.5)*L_GDP_RW_GAP + SHK_L_GDP_MINE_GAP(σ=2);
135: L_GDP_OTH_GAP = b1_oth(0.7)*L_GDP_OTH_GAP{-1} - b2_oth(0.2)*MCI + b3_oth(0)*L_GDP_RW_GAP + SHK_L_GDP_OTH_GAP(σ=2);
136: L_GDP_GAP = w_mine(0.15)*L_GDP_MINE_GAP + (1-w_mine(0.15))*L_GDP_OTH_GAP + SHK_L_GDP_GAP(σ=0.01);
137:
138: %%-- Real monetary conditions index
139: MCI = b4(0.4)*RR_GAP + (1-b4(0.4))*(- L_Z_GAP);
140:
141: %% == Inflation (the Phillips curve) ==
142: DLA_CPI = a1(0.6)*DLA_CPI{-1} + (1-a1(0.6))*DLA_CPI{+1} + a2(0.3)*RMC + SHK_DLA_CPI(σ=0.75);
143:
144: %%-- Real marginal cost
145: RMC = a3(0.5)*L_GDP_GAP + (1-a3(0.5))*L_Z_GAP;
146:
147: %- expected inflation
148: E_DLA_CPI = DLA_CPI{+1};
149: E_D4L_CPI = D4L_CPI{+4};
150:
151: %% == Monetary policy reaction function (a forward-looking Taylor-type Rule) ==
152: RS = g1(0.8)*RS{-1} + (1-g1(0.8))*(RSNEUTRAL + g2(1)*(D4L_CPI{+4} - D4L_CPI_TAR{+4}) + g3(0.1)*L_GDP_GAP) + SHK_RS(σ=1);
153:
154: %- Neutral nominal policy interest rate
155: RSNEUTRAL = RR_BAR + D4L_CPI{+1};
156:
157: %% == Modified Uncovered Interest Rate Parity (UIP) condition ==
158: L_S = (1-e1(0.4))*L_S{+1} + e1(0.4)*(L_S{-1} + 2/4*(D4L_CPI_TAR - ss_DLA_CPI_RW(3) + DLA_Z_BAR)) + (- RS + RS_RW + PREM)/4 + SHK_L_S(σ
159:
160: %% == Definitions ==
161:

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162: %- Fisher equation (RIR)
163: RR = RS - D4L_CPI{+1};
164:
165: %- Real exchange rate (RER)
166: L_Z = L_S + L_CPI_RW - L_CPI;
167:
168: %- Long-term version of UIP (consistency of trends)
169: DLA_Z_BAR{+1} = RR_BAR - RR_RW_BAR - PREM;
170:
171: %% === Identities ===
172: L_GDP_yearly      = (L_GDP + L_GDP{-1} + L_GDP{-2} + L_GDP{-3})/4;
173: L_GDP_MINE_yearly = (L_GDP_MINE + L_GDP_MINE{-1} + L_GDP_MINE{-2} + L_GDP_MINE{-3})/4;
174: L_GDP_OTH_yearly  = (L_GDP_OTH + L_GDP_OTH{-1} + L_GDP_OTH{-2} + L_GDP_OTH{-3})/4;
175:
176: DL_GDP_yearly      = L_GDP_yearly - L_GDP_yearly{-4};
177: DL_GDP_MINE_yearly = L_GDP_MINE_yearly - L_GDP_MINE_yearly{-4};
178: DL_GDP_OTH_yearly  = L_GDP_OTH_yearly - L_GDP_OTH_yearly{-4};
179:
180:
181: DLA_GDP_BAR = 4*(L_GDP_BAR - L_GDP_BAR{-1});
182: DLA_GDP_MINE_BAR = 4*(L_GDP_MINE_BAR - L_GDP_MINE_BAR{-1});
183: DLA_GDP_OTH_BAR = 4*(L_GDP_OTH_BAR - L_GDP_OTH_BAR{-1});
184: DLA_Z_BAR      = 4*(L_Z_BAR - L_Z_BAR{-1});
185: DLA_Z           = 4*(L_Z - L_Z{-1});
186: DLA_GDP         = 4*(L_GDP - L_GDP{-1});
187: DLA_GDP_MINE    = 4*(L_GDP_MINE - L_GDP_MINE{-1});
188: DLA_GDP_OTH     = 4*(L_GDP_OTH - L_GDP_OTH{-1});
189: DLA_CPI         = 4*(L_CPI - L_CPI{-1});
190: DLA_S           = 4*(L_S - L_S{-1});
191:
192: D4L_GDP      = L_GDP - L_GDP{-4};
193: D4L_GDP_MINE = L_GDP_MINE - L_GDP_MINE{-4};
194: D4L_GDP_OTH  = L_GDP_OTH - L_GDP_OTH{-4};
195: D4L_CPI      = L_CPI - L_CPI{-4};
196: D4L_S        = L_S - L_S{-4};
197:
198: %% === Gaps ===
199: RR_GAP = RR - RR_BAR;
200: L_Z_GAP = L_Z - L_Z_BAR;
201: L_GDP_GAP = L_GDP - L_GDP_BAR;
202: L_GDP_MINE_GAP = L_GDP_MINE - L_GDP_MINE_BAR;

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203: L_GDP_OTH_GAP = L_GDP_OTH - L_GDP_OTH_BAR;
204:
205:
206: %% === Trends ===
207: D4L_CPI_TAR = rho_D4L_CPI_TAR<0.8>*D4L_CPI_TAR{-1} + (1-rho_D4L_CPI_TAR<0.8>)*ss_D4L_CPI_TAR<6> + SHK_D4L_CPI_TAR<sigma=2>;
208: DLA_Z_BAR = rho_DLA_Z_BAR<0.8>*DLA_Z_BAR{-1} + (1-rho_DLA_Z_BAR<0.8>)*ss_DLA_Z_BAR<3> + SHK_DLA_Z_BAR<sigma=0.4>;
209: RR_BAR = rho_RR_BAR<0.8>*RR_BAR{-1} + (1-rho_RR_BAR<0.8>)*ss_RR_BAR<3> + SHK_RR_BAR<sigma=0.5>;
210: % DLA_GDP_BAR = rho_DLA_GDP_BAR*DLA_GDP_BAR{-1} + (1-rho_DLA_GDP_BAR)*ss_DLA_GDP_BAR + SHK_DLA_GDP_BAR;
211: DLA_GDP_BAR = w_mine<0.15>*DLA_GDP_MINE_BAR + (1-w_mine<0.15>)*DLA_GDP_OTH_BAR;
212: DLA_GDP_MINE_BAR = rho_DLA_GDP_MINE_BAR<0.8>*DLA_GDP_MINE_BAR{-1} + (1-rho_DLA_GDP_MINE_BAR<0.8>)*ss_DLA_GDP_MINE_BAR<0> + SHK_DLA_GDP
213: DLA_GDP_OTH_BAR = rho_DLA_GDP_OTH_BAR<0.8>*DLA_GDP_OTH_BAR{-1} + (1-rho_DLA_GDP_OTH_BAR<0.8>)*ss_DLA_GDP_OTH_BAR<4> + SHK_DLA_GDP_OTH_
214:
215: %% === Foreign Sector Equations ===
216: L_GDP_RW_GAP = rho_L_GDP_RW_GAP<0.8>*L_GDP_RW_GAP{-1} + SHK_L_GDP_RW_GAP<sigma=1>;
217: DLA_CPI_RW = rho_DLA_CPI_RW<0.8>*DLA_CPI_RW{-1} + (1-rho_DLA_CPI_RW<0.8>)*ss_DLA_CPI_RW<3> + SHK_DLA_CPI_RW<sigma=2>;
218: RS_RW = rho_RS_RW<0.8>*RS_RW{-1} + (1-rho_RS_RW<0.8>)*(RR_RW_BAR + DLA_CPI_RW) + SHK_RS_RW<sigma=1>;
219: RR_RW_BAR = rho_RR_RW_BAR<0.8>*RR_RW_BAR{-1} + (1-rho_RR_RW_BAR<0.8>)*ss_RR_RW_BAR<1.35> + SHK_RR_RW_BAR<sigma=0.5>;
220: RR_RW = RS_RW - DLA_CPI_RW;
221: RR_RW_GAP = RR_RW - RR_RW_BAR;
222:
223: DLA_CPI_RW = 4*(L_CPI_RW - L_CPI_RW{-1});
224:
225: %% === Tune Identities ===
226: TUNE_L_GDP_GAP = L_GDP_GAP;
227: TUNE_L_GDP_OTH_GAP = L_GDP_OTH_GAP;
228: TUNE_L_GDP_MINE_GAP = L_GDP_MINE_GAP;
229:
230: %% ----- %
231: !measurement_variables
232: OBS_L_GDP
233: OBS_L_GDP_MINE
234: OBS_L_GDP_OTH
235: OBS_L_CPI
236: OBS_RS
237: OBS_L_S
238: OBS_D4L_CPI_TAR
239:
240: OBS_L_GDP_RW_GAP
241: OBS_DLA_CPI_RW
242: OBS_RS_RW
243: OBS_L_GDP_GAP

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244: OBS_L_GDP_OTH_GAP
245: OBS_L_GDP_MINE_GAP
246:
247: !measurement_equations
248: OBS_L_GDP = L_GDP;
249: OBS_L_GDP_MINE = L_GDP_MINE;
250: OBS_L_GDP_OTH = L_GDP_OTH;
251: OBS_L_CPI = L_CPI;
252: OBS_RS      = RS;
253: OBS_L_S      = L_S;
254: OBS_D4L_CPI_TAR = D4L_CPI_TAR;
255:
256: OBS_L_GDP_RW_GAP = L_GDP_RW_GAP;
257: OBS_DLA_CPI_RW    = DLA_CPI_RW;
258: OBS_RS_RW         = RS_RW;
259:
260:
261: %% tune variables
262: OBS_L_GDP_GAP = TUNE_L_GDP_GAP;
263: OBS_L_GDP_OTH_GAP = TUNE_L_GDP_OTH_GAP;
264: OBS_L_GDP_MINE_GAP = TUNE_L_GDP_MINE_GAP;
265:
266:
267: %% ----- %
268: Legend
269: _GAP      cyclical deviation from a trend
270: _BAR      trend (equilibrium)
271: ss_       steady-state value
272: DLA_      q-o-q change
273: D4L_      y-o-y change
274: _RW       foreign variable
275: SHK_      equation residual

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Steady state

Variable	Description	Value
L_GDP_GAP	Output Gap (in %)	0
DLA_GDP	Quarterly Growth in Real GDP(in % pa)	3.4
D4L_GDP	Real GDP Growth YoY (in % pa)	3.4
DLA_GDP_BAR	Real GDP Trend Growth QoQ annualized (in % pa)	3.4
L_GDP_OTH_GAP	NON-MINING Output Gap (in %)	0
DLA_GDP_OTH	Quarterly Growth in Real NON-MINING GDP(in % pa)	4
D4L_GDP_OTH	Real NON-MINING GDP Growth YoY (in % pa)	4
DLA_GDP_OTH_BAR	Real NON-MINING GDP Trend Growth QoQ annualized (in % pa)	4
L_GDP_MINE_GAP	MINING Output Gap (in %)	0
DLA_GDP_MINE	Quarterly Growth in Real MINING GDP(in % pa)	0
D4L_GDP_MINE	Real MINING GDP Growth YoY (in % pa)	0
DLA_GDP_MINE_BAR	Real MINING GDP Trend Growth QoQ annualized (in % pa)	0
DL_GDP_yearly	Real GDP Growth Yearly (in % pa)	3.4
DL_GDP_MINE_yearly	Real MINING GDP Growth Yearly (in % pa)	0
DL_GDP_OTH_yearly	Real NON-MINING GDP Growth Yearly (in % pa)	4
MCI	Real Monetary Condition Index (in % pa)	0
DLA_CPI	CPI Inflation QoQ annualized (in % pa)	6
E_DLA_CPI	Expected CPI Inflation QoQ annualized (in % pa)	6
E_D4L_CPI	Expected CPI Inflation YoQ (in % pa)	6
D4L_CPI	CPI Inflation YoY (in % pa)	6
D4L_CPI_TAR	Inflation Target (in % pa)	6
RMC	Real Marginal Cost (in %)	0
DLA_S	Nominal Exch. Rate Depreciation QoQ annualized (in % pa)	6
D4L_S	Nominal Exch. Rate Depreciation YoY (in % pa)	6
PREM	Country Risk Premium (in % pa)	-1.35
RS	Nominal Policy Interest Rate (in % pa)	9
RR	Real Interest Rate (in % pa)	3
RR_BAR	Trend Real Interest Rate (in % pa)	3
RR_GAP	Real Interest Rate Gap (in %)	0
RSNEUTRAL	Nominal Policy Neutral Interest Rate (in % pa)	9
L_Z_GAP	Real Exchange Rate Gap (in %)	0
DLA_Z	Real Exchange Rate Depreciation QoQ annualized (in % pa)	3
DLA_Z_BAR	Trend Real Exchange Rate Depreciation QoQ annualized(in % pa)	3

Variable	Description	Value
L_GDP_RW_GAP	Foreign Output Gap (in %)	0
RS_RW	Foreign Nominal Interest Rate (in % pa)	4.35
RR_RW	Foreign Real Interest Rate (in % pa)	1.35
RR_RW_BAR	Foreign Real Interest Rate Trend (in % pa)	1.35
RR_RW_GAP	Foreign Real Interest Rate Gap (in %)	0
DLA_CPI_RW	Foreign Inflation QoQ annualized (in % pa)	3
TUNE_L_GDP_GAP		0
TUNE_L_GDP_OTH_GAP		0
TUNE_L_GDP_MINE_GAP		0