GPM-MX Report: Version Feb14 V0

February 14, 2011

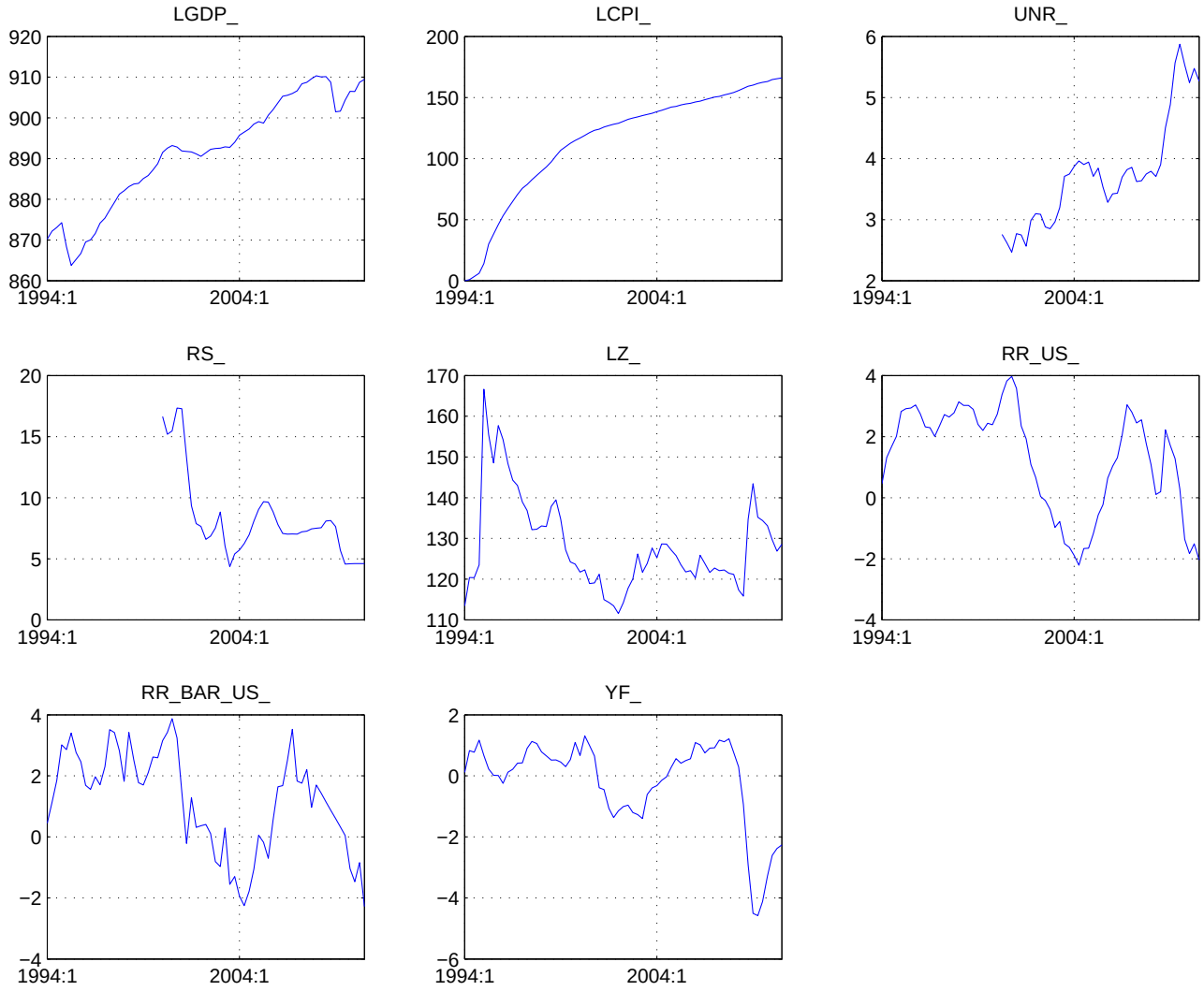
The Model

```
% Single Open Economy Model, Satellite Module to GPM- Iris version
!variables:transition

LGDP, LGDP_BAR, G, Y, GROWTH, GROWTH4, GROWTH_BAR, GROWTH4_BAR
UNR, UNR_GAP, UNR_BAR, UNR_G,
PIE, PIE4, LCPI, E4_PIE4, PIETAR, RS, RR, RR_BAR, E1_Y, LZ, LZ_BAR, LZ_GAP
YF, RR_US, RR_BAR_US, LZ_E, E1_PIE

!parameters

alpha1, alpha2, alpha3, alpha4
beta1, beta2, beta3, beta4, beta5,
gamma1, gamma2, gamma4,
lambda1, lambda2, lambda3,
phi, rho, tau, growth_ss, rr_bar_ss,
rhobar_us, rho_us, betaf, rr_bar_us_ss, unr_ss, pietar_ss

!shocks:transition

RES_LGDP_BAR, RES_Y, RES_G,
RES_UNR_GAP, RES_UNR_BAR, RES_UNR_G,
RES_PIE, RES_PIETAR, RES_RS, RES_RR_BAR, RES_RR_DIFF, RES_LZ_BAR,
RES_RR_BAR_US, RES_RR_US, RES_YF

!equations:transition

% Host

    Y = LGDP - LGDP_BAR;

LGDP_BAR = LGDP_BAR{-1} + G/4 + RES_LGDP_BAR;
    GROWTH = 4*(LGDP - LGDP{-1});
    GROWTH4 = LGDP - LGDP{-4};
    GROWTH_BAR = 4*(LGDP_BAR - LGDP_BAR{-1});
    GROWTH4_BAR = LGDP_BAR - LGDP_BAR{-4};

G = tau*growth_ss + (1-tau)*G{-1} + RES_G;
```

```
Y = beta1*Y{-1} + beta2*Y{+1} - beta3*(RR{-1} - RR_BAR{-1}) + beta4*LZ_GAP{-1} +beta5*YF + RES_Y;

UNR_GAP = alpha1*UNR_GAP{-1} + alpha2*Y + RES_UNR_GAP;

UNR =  UNR_BAR - UNR_GAP;

UNR_BAR = (1-alpha3)*UNR_BAR{-1} + alpha3*unr_ss + UNR_G + RES_UNR_BAR;
    UNR_G = (1 - alpha4)*UNR_G{-1} + RES_UNR_G;

PIE = lambda1*PIE{+1} + (1-lambda1)*PIE{-1} + lambda2*Y{-1} + lambda3*(LZ-LZ{-1}) +  RES_PIE;

PIE4 = (PIE + PIE{-1} + PIE{-2} + PIE{-3})/4;

LCPI = LCPI{-1} + PIE/4;

E4_PIE4 = PIE4{+4};

RR = RS - PIE{+1};

    E1_PIE = PIE{+1};

RR_BAR = rho*rr_bar_ss + (1-rho)*RR_BAR{-1} + RES_RR_BAR;

RS = gamma1*RS{-1} + (1-gamma1)*(RR_BAR + E4_PIE4 + gamma2*(PIE4{+3} - PIETAR{+3}) + gamma4*Y) + RES_RS;

E1_Y = Y{+1};

PIETAR = PIETAR{-1} + RES_PIETAR;

LZ_GAP = LZ - LZ_BAR;

LZ_BAR = LZ_BAR{-1} + RES_LZ_BAR;

RR - RR_US = 4*(LZ_E-LZ) + RR_BAR - RR_BAR_US + RES_RR_DIFF;

LZ_E = phi*LZ{+1} + (1-phi)*LZ{-1};

    %Foreign block

    RR_BAR_US = rhobar_us*rr_bar_us_ss + (1-rhobar_us)*RR_BAR_US{-1} + RES_RR_BAR_US;
```

```
RR_US = rho_us*rr_bar_us_ss + (1-rho_us)*RR_US{-1} + RES_RR_US;

YF = betaf*YF{-1} + RES_YF;

!variables:measurement

    LGDP_, LCPI_, UNR_, RS_, LZ_, RR_US_,RR_BAR_US_, YF_

!equations:measurement

    LGDP_ = LGDP;
    LCPI_ = LCPI;
    UNR_ = UNR;
    RS_ = RS;
    LZ_ = LZ;
    RR_US_ = RR_US;
RR_BAR_US_ = RR_BAR_US;
YF_=YF;
```

Historical Plots of Measurement Variables

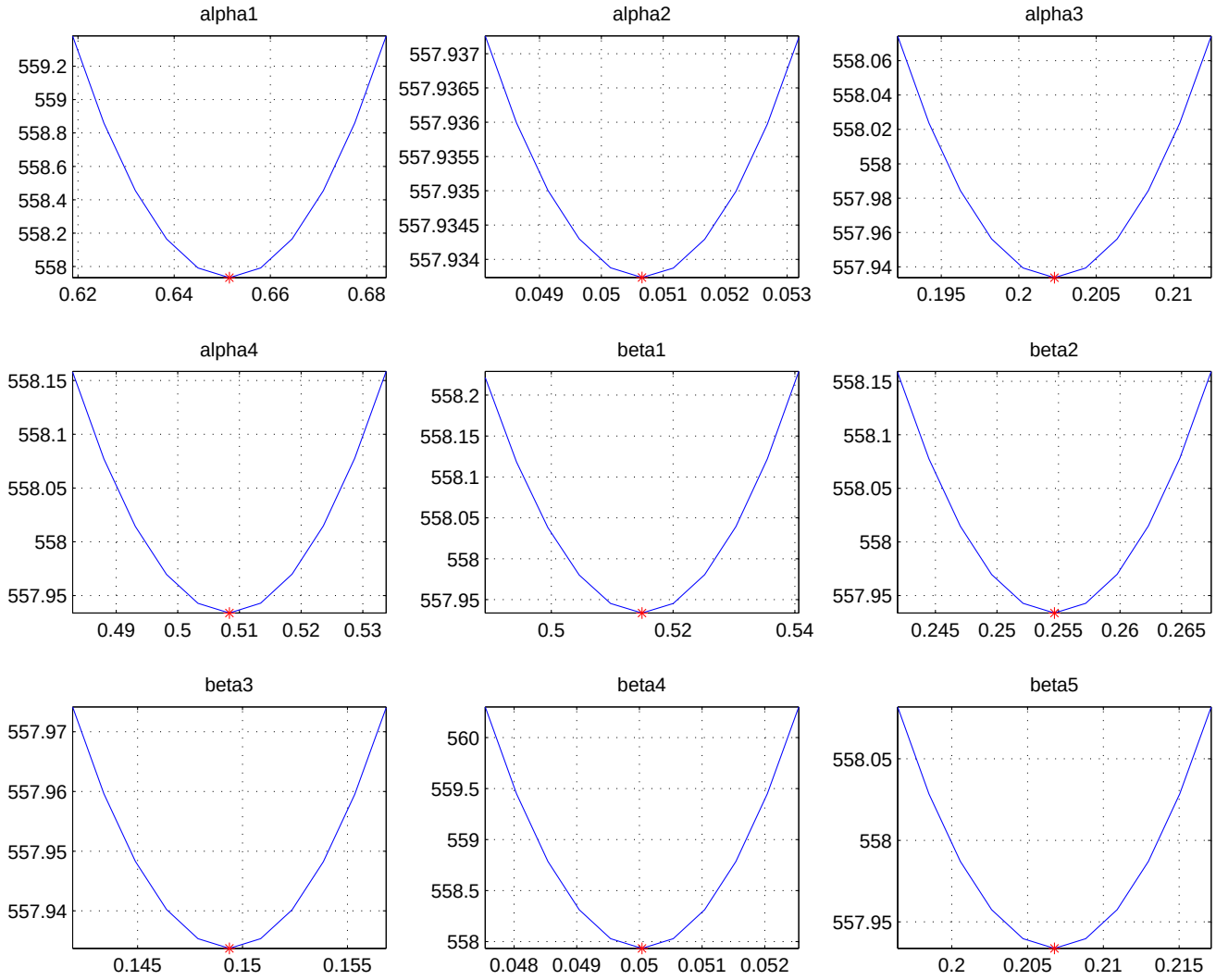


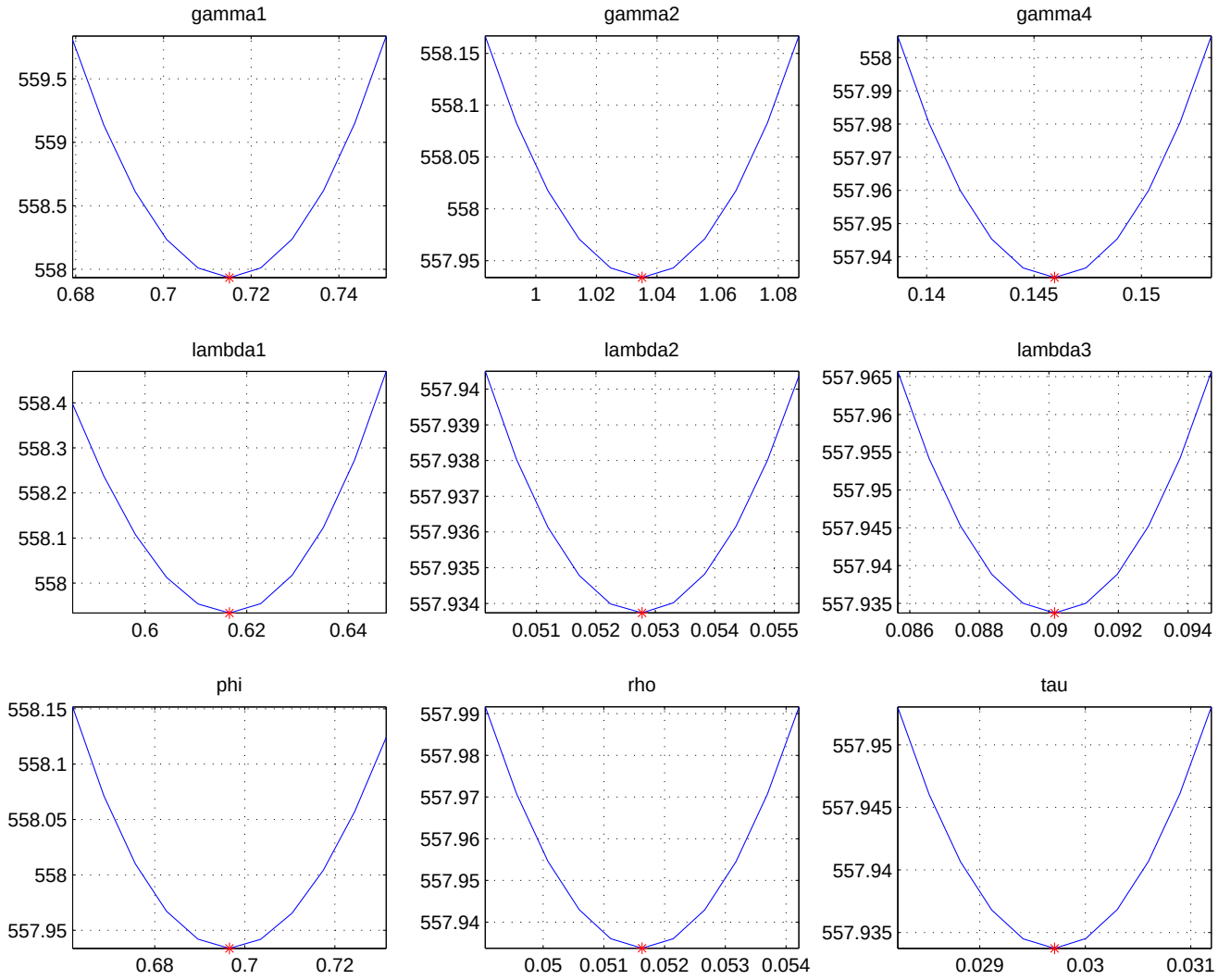
Regularized Maximum Likelihood

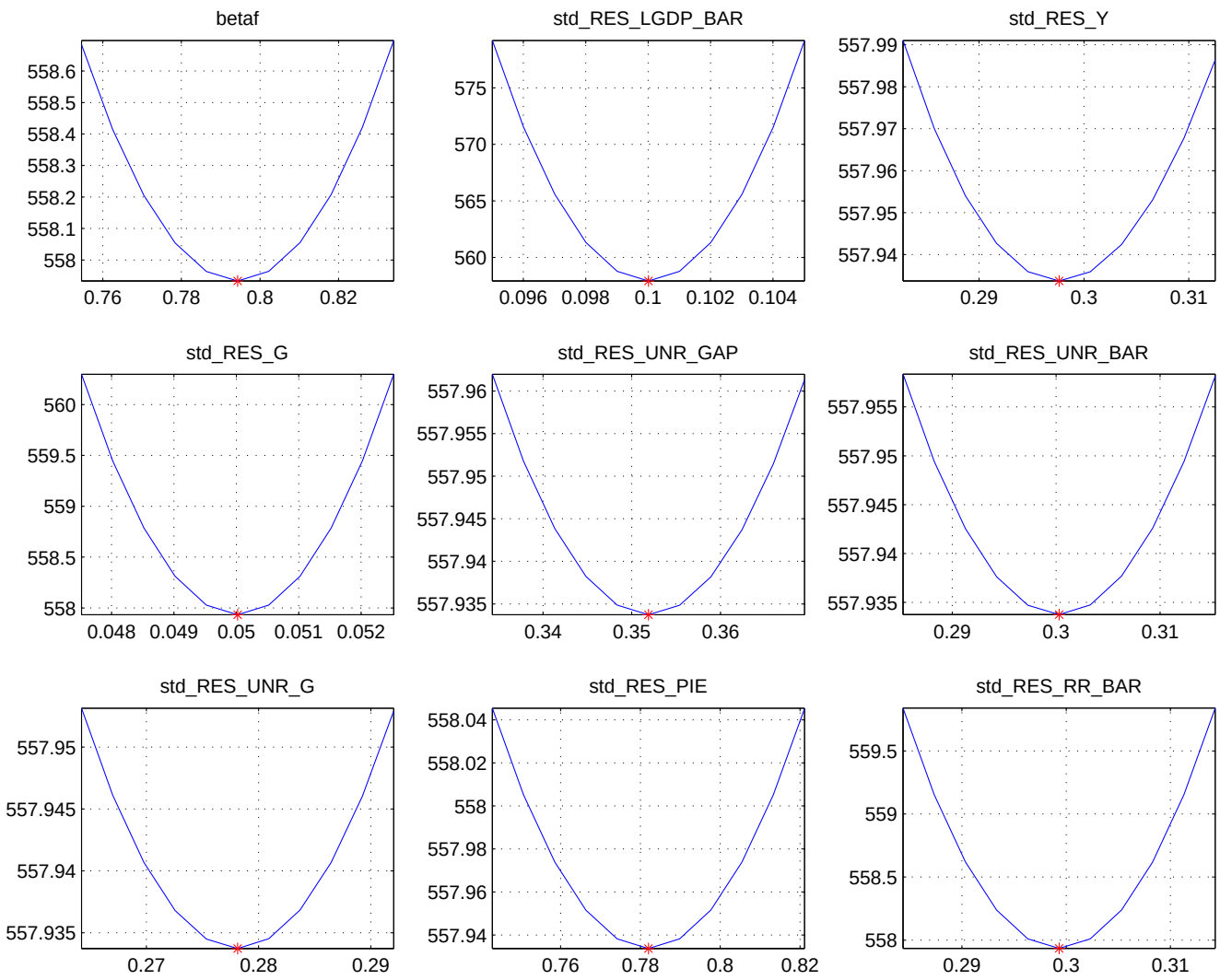
Parameter	Prior		Posterior	
	Mode	Dispersion	Mode	Dispersion
alpha1	0.650	0.158	0.651	0.020
alpha2	0.050	0.253	0.051	0.034
alpha3	0.200	0.158	0.202	0.020
alpha4	0.500	0.316	0.508	0.039
beta1	0.500	0.316	0.515	0.036
beta2	0.250	0.158	0.255	0.020
beta3	0.150	0.221	0.149	0.027
beta4	0.050	0.009	0.050	0.001
beta5	0.200	0.158	0.207	0.020
betaf	0.750	0.316	0.794	0.019
gamma1	0.700	0.158	0.715	0.079
gamma2	1.050	0.632	1.035	0.020
gamma4	0.150	0.158	0.146	0.034
lambda1	0.550	0.253	0.617	0.027
lambda2	0.100	0.316	0.053	0.020
lambda3	0.100	0.158	0.090	0.065
phi	0.800	0.632	0.697	0.008
rho	0.050	0.063	0.052	0.008
tau	0.030	0.063	0.030	0.035

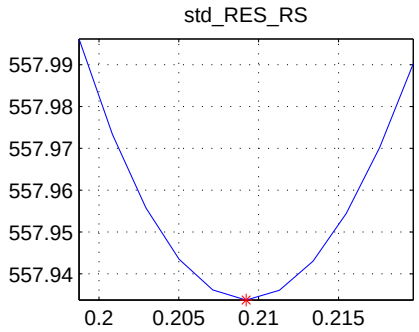
Parameter	Prior		Posterior	
	Mode	Dispersion	Mode	Dispersion
std_RES_LGDP_BAR	0.100	0.006	0.370	0.020
std_RES_Y	0.400	0.632	1.101	0.034
std_RES_G	0.050	0.009	0.185	0.020
std_RES_UNR_GAP	0.600	0.632	1.302	0.039
std_RES_UNR_BAR	0.500	0.632	1.111	0.036
std_RES_UNR_G	0.500	0.632	1.029	0.020
std_RES_PIE	1.000	0.632	2.893	0.027
std_RES_RR_BAR	0.300	0.063	1.107	0.001
std_RES_RS	0.200	0.632	0.774	0.020
std_RES_PIETAR	0.100	0.632	0.281	0.019
std_RES_RR_DIFF	2.000	0.632	7.337	0.079
std_RES_LZ_BAR	2.000	0.632	7.338	0.020
std_RES_YF	0.400	0.632	0.719	0.034
std_RES_RR_BAR_US	0.300	0.063	1.162	0.027
std_RES_RR_US	0.250	0.632	1.627	0.020

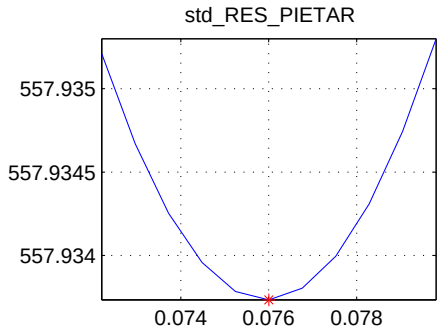
Historical Plots of Measurement Variables

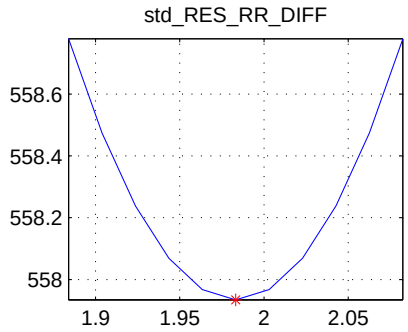


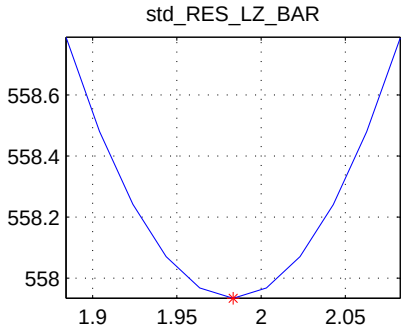

gamma1
559.5
559
558.5
558
0.68
0.7
0.72
0.74
gamma2
558.15
558.1
558.05
558
557.95
1
1.02
1.04
1.06
1.08
gamma4
558
557.99
557.98
557.97
557.96
557.95
557.94
0.14
0.145
0.15
lambda1
558.4
558.3
558.2
558.1
558
0.6
0.62
0.64
lambda2
557.94
557.939
557.938
557.937
557.936
557.935
557.934
0.051
0.052
0.053
0.054
0.055
lambda3
557.965
557.96
557.955
557.95
557.945
557.94
557.935
0.086
0.088
0.09
0.092
0.094
phi
558.15
558.1
558.05
558
557.95
0.68
0.7
0.72
rho
557.99
557.98
557.97
557.96
557.95
557.94
0.05
0.051
0.052
0.053
0.054
tau
557.95
557.945
557.94
557.935
0.029
0.03
0.031

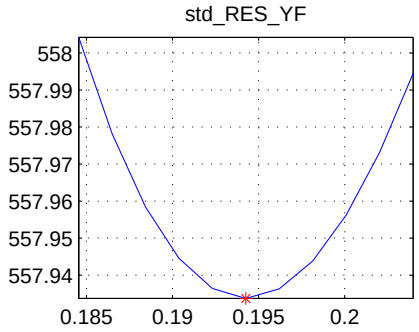

betaf
558.6
558.5
558.4
558.3
558.2
558.1
558
0.76 0.78 0.8 0.82
std_RES_LGDP_BAR
575
570
565
560
0.096 0.098 0.1 0.102 0.104
std_RES_Y
557.99
557.98
557.97
557.96
557.95
557.94
0.29 0.3 0.31
std_RES_G
560
559.5
559
558.5
558
0.048 0.049 0.05 0.051 0.052
std_RES_UNR_GAP
557.96
557.955
557.95
557.945
557.94
557.935
0.34 0.35 0.36
std_RES_UNR_BAR
557.955
557.95
557.945
557.94
557.935
0.29 0.3 0.31
std_RES_UNR_G
557.95
557.945
557.94
557.935
0.27 0.28 0.29
std_RES_PIE
558.04
558.02
558
557.98
557.96
557.94
0.76 0.78 0.8 0.82
std_RES_RR_BAR
559.5
559
558.5
558
0.29 0.3 0.31

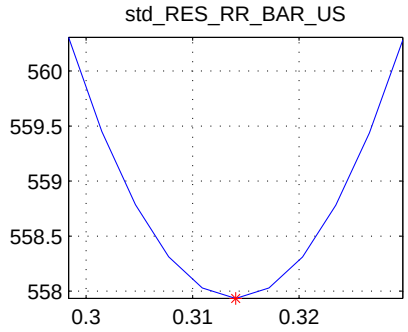

std_RES_RS
557.99
557.98
557.97
557.96
557.95
557.94
0.2
0.205
0.21
0.215

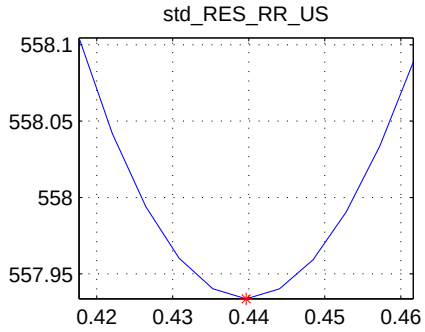

std_RES_PIETAR
557.935
557.9345
557.934
0.074
0.076
0.078


std_RES_RR_DIFF
558.6
558.4
558.2
558
1.9
1.95
2
2.05


std_RES_LZ_BAR
558.6
558.4
558.2
558
1.9
1.95
2
2.05

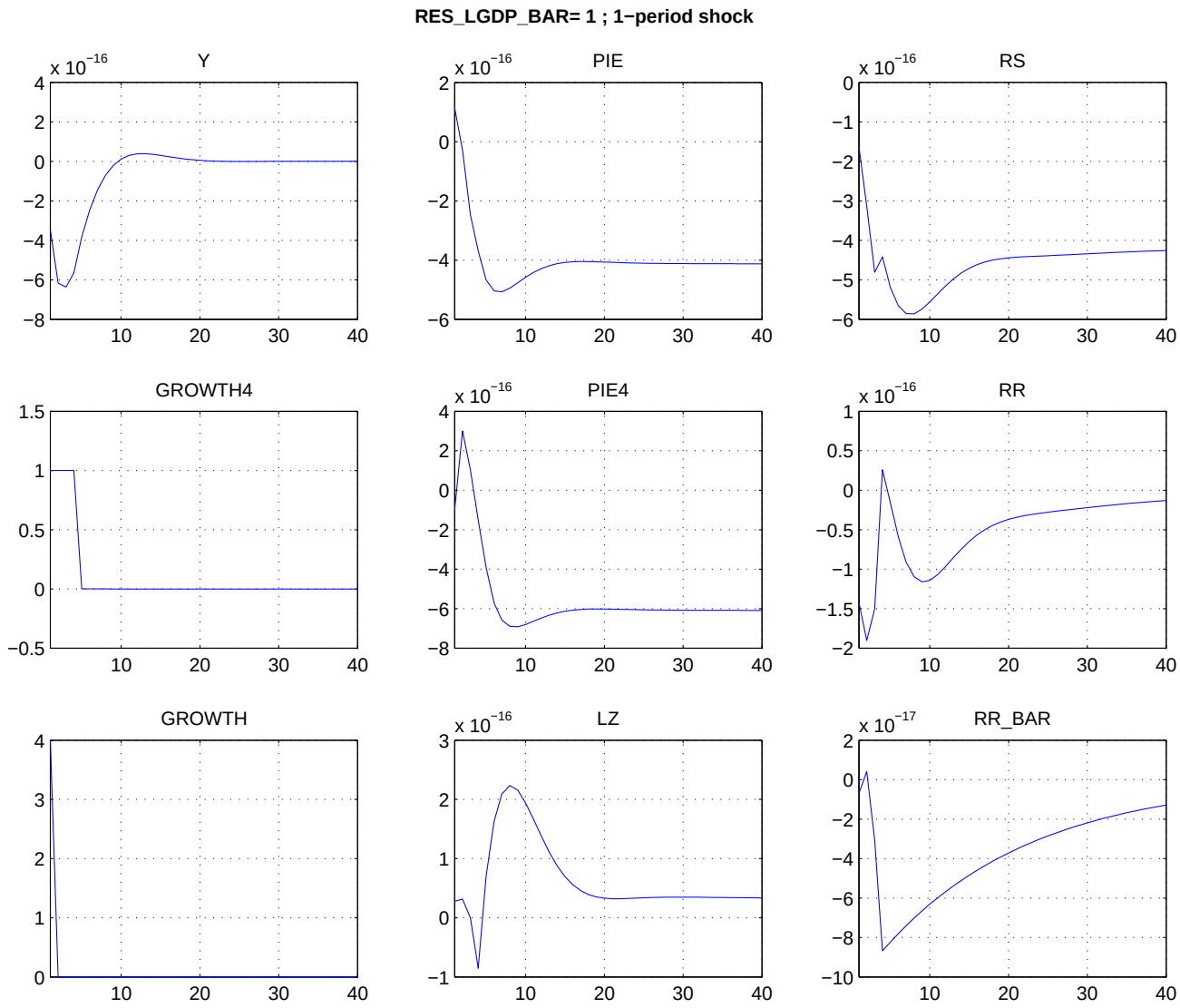

std_RES_YF
558
557.99
557.98
557.97
557.96
557.95
557.94
0.185
0.19
0.195
0.2

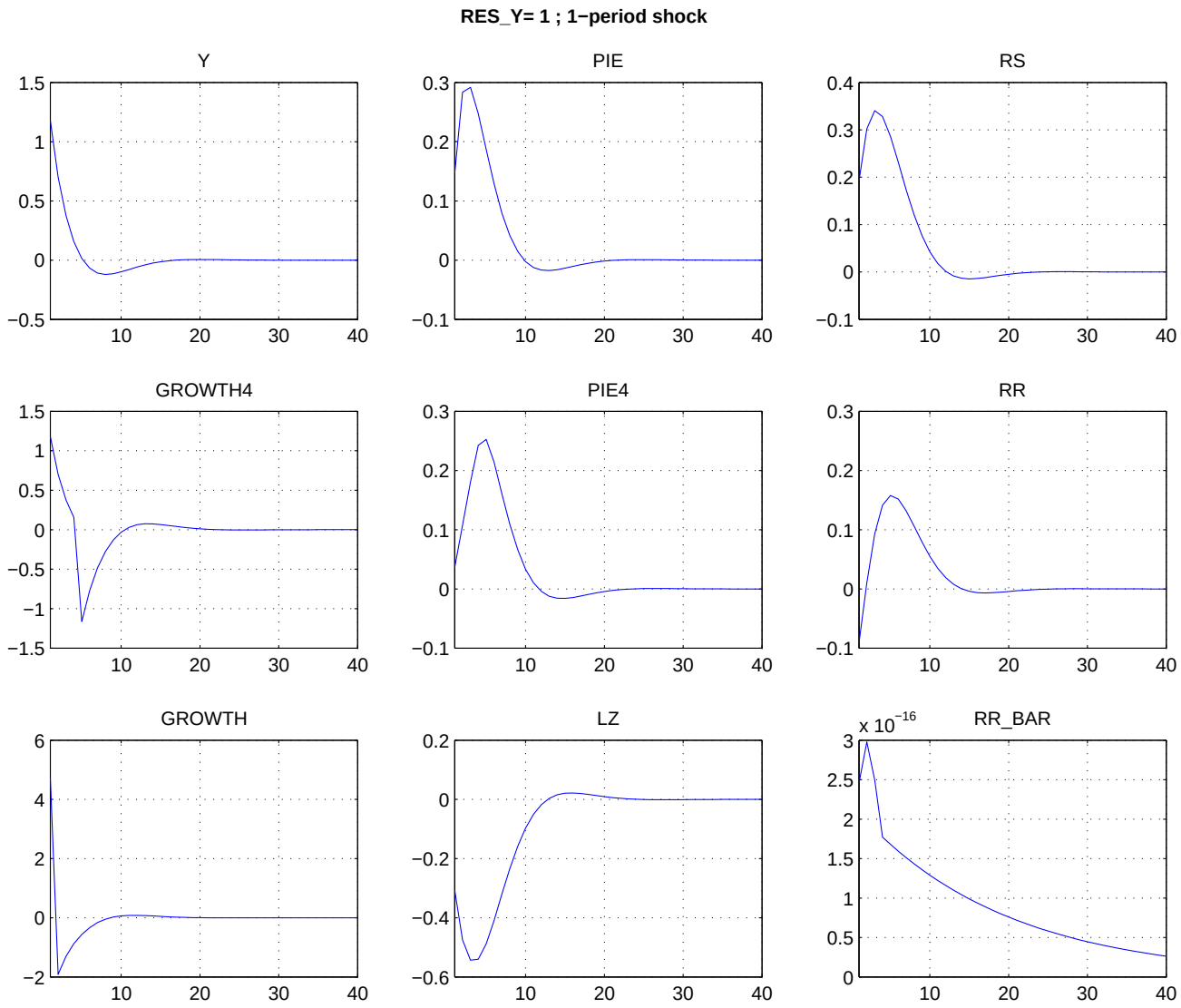

std_RES_RR_BAR_US
560
559.5
559
558.5
558
0.3
0.31
0.32

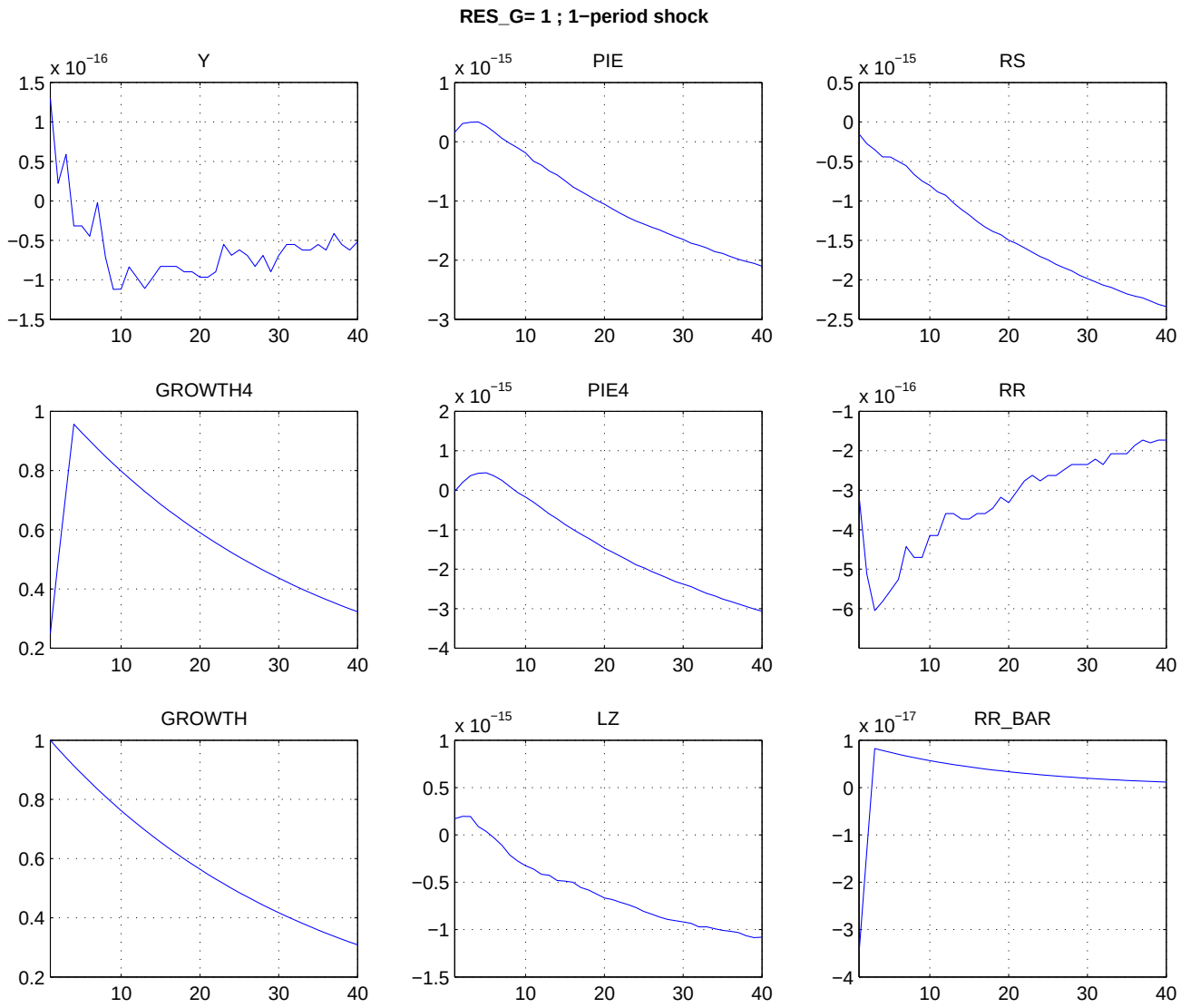

std_RES_RR_US
558.1
558.05
558
557.95
0.42
0.43
0.44
0.45
0.46

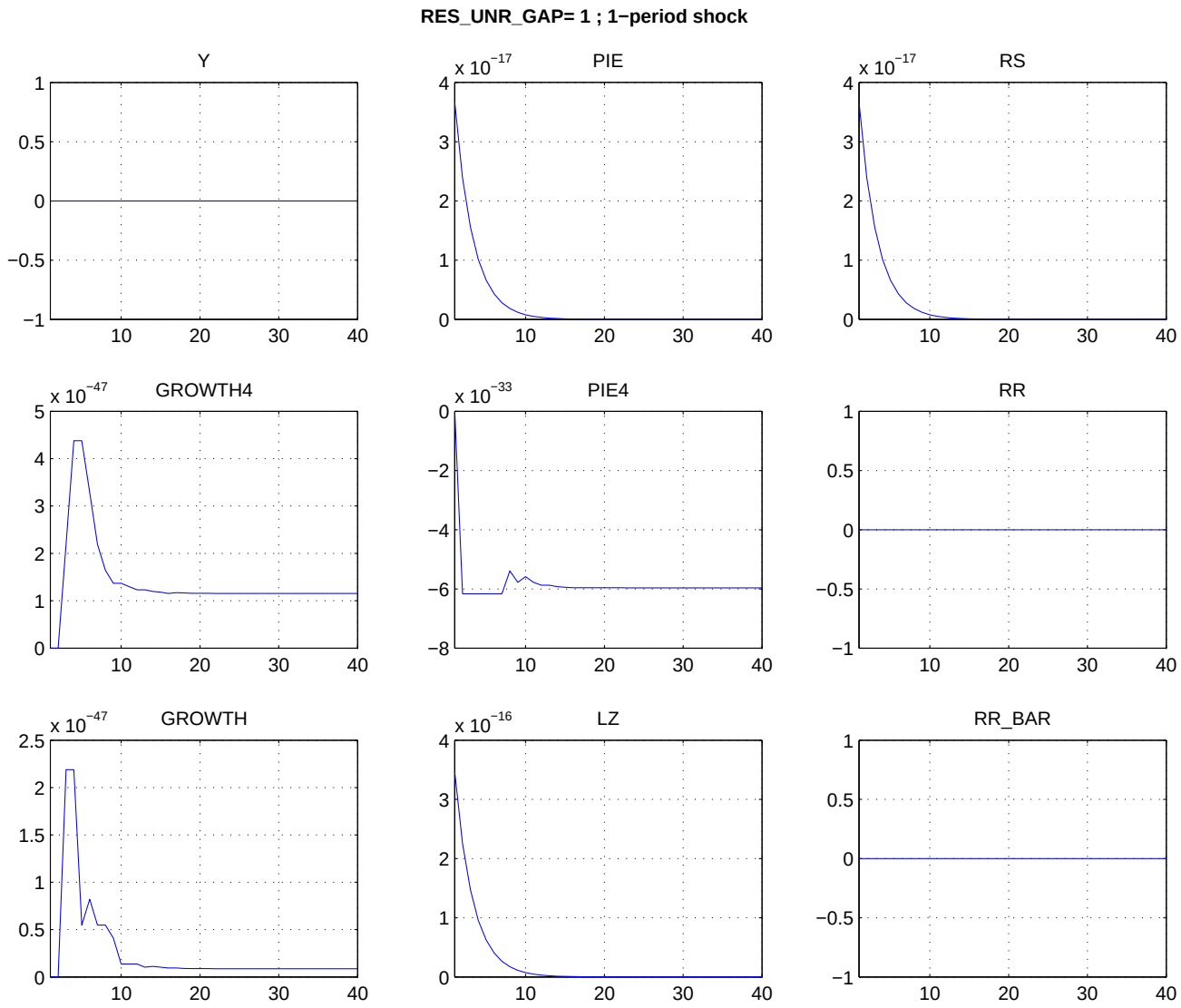
Calibrated Parameters

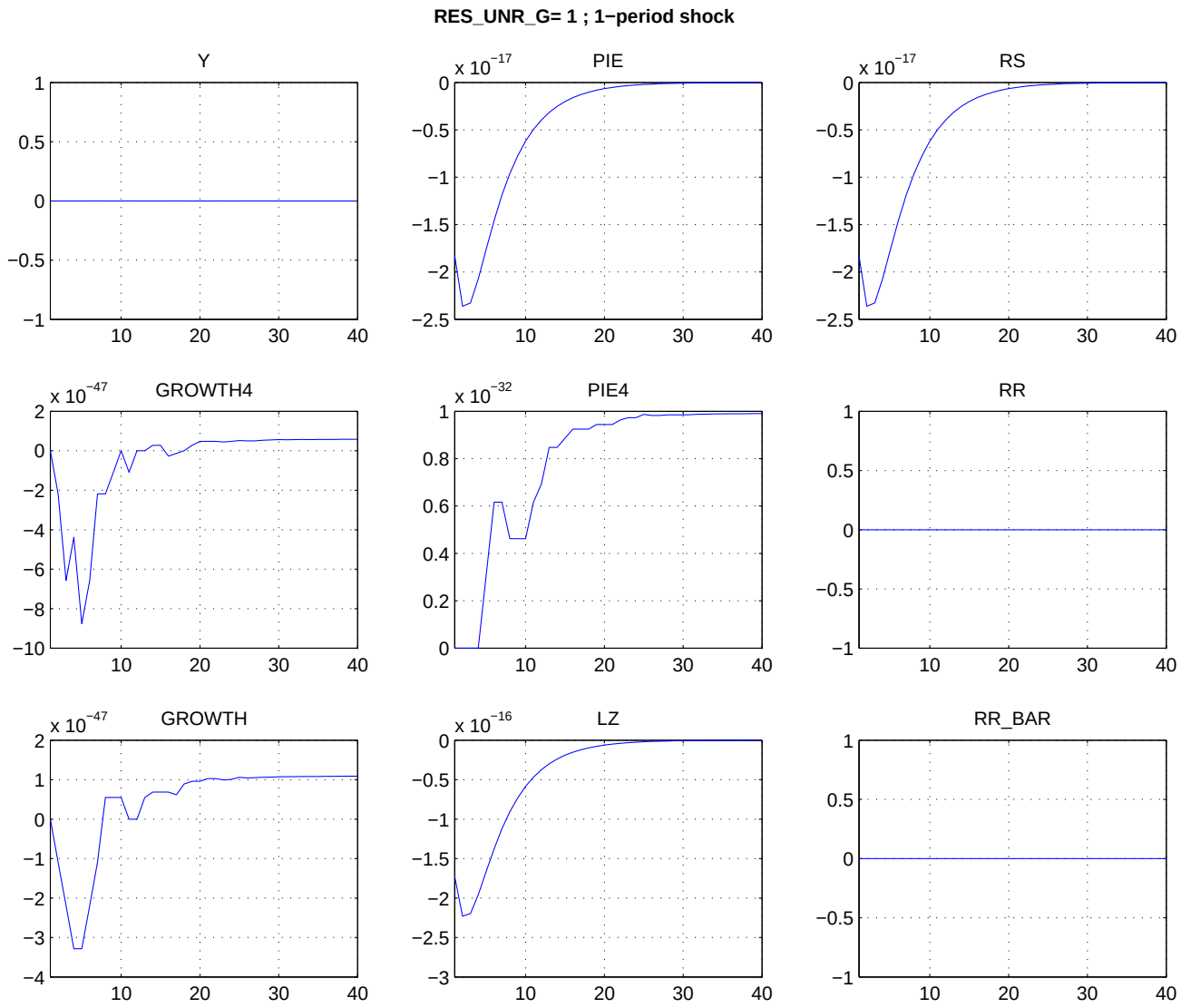
Parameter	Value
growth_ss	3.000
rr_bar_ss	2.500
rhobar_us	0.900
rho_us	0.800
rr_bar_us_ss	1.900
unr_ss	4.000
pietar_ss	3.000

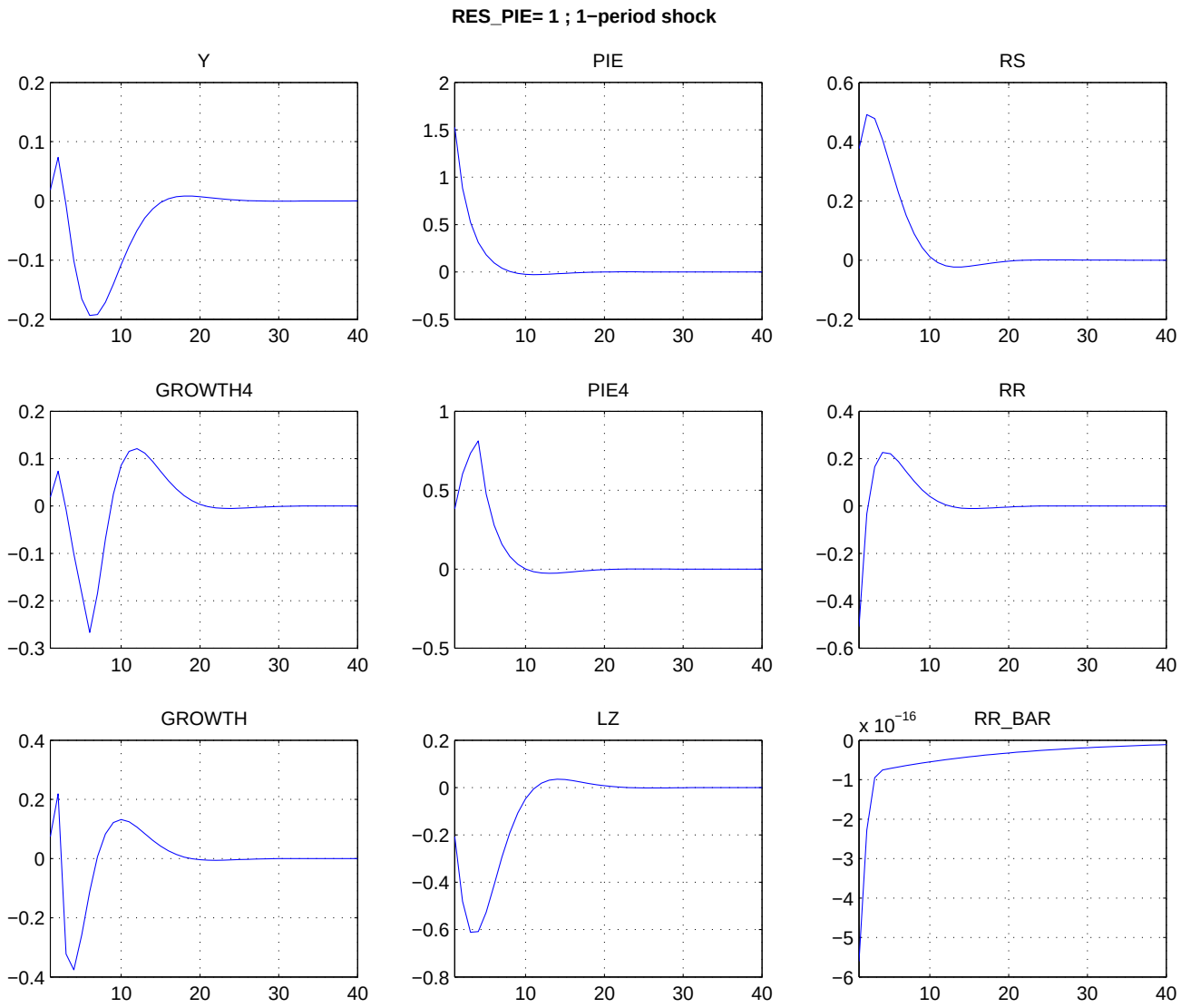

RES_LGDP_BAR= 1 ; 1−period shock
Y
x 10−16
PIE
x 10−16
RS
x 10−16
GROWTH4
PIE4
x 10−16
RR
x 10−16
GROWTH
LZ
x 10−16
RR_BAR
x 10−17

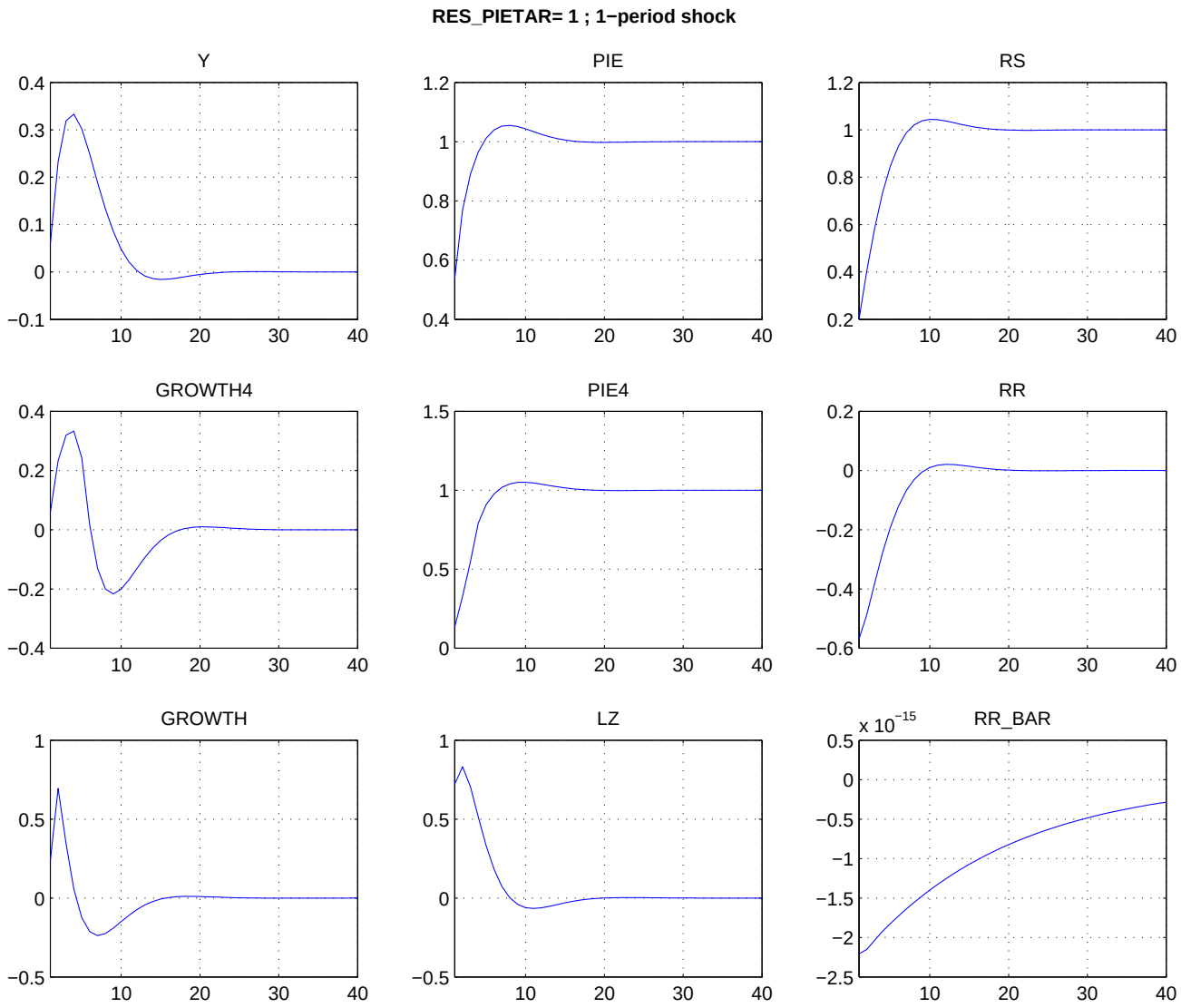

RES_Y= 1 ; 1−period shock
Y
PIE
RS
GROWTH4
PIE4
RR
GROWTH
LZ
x 10^−16
RR_BAR

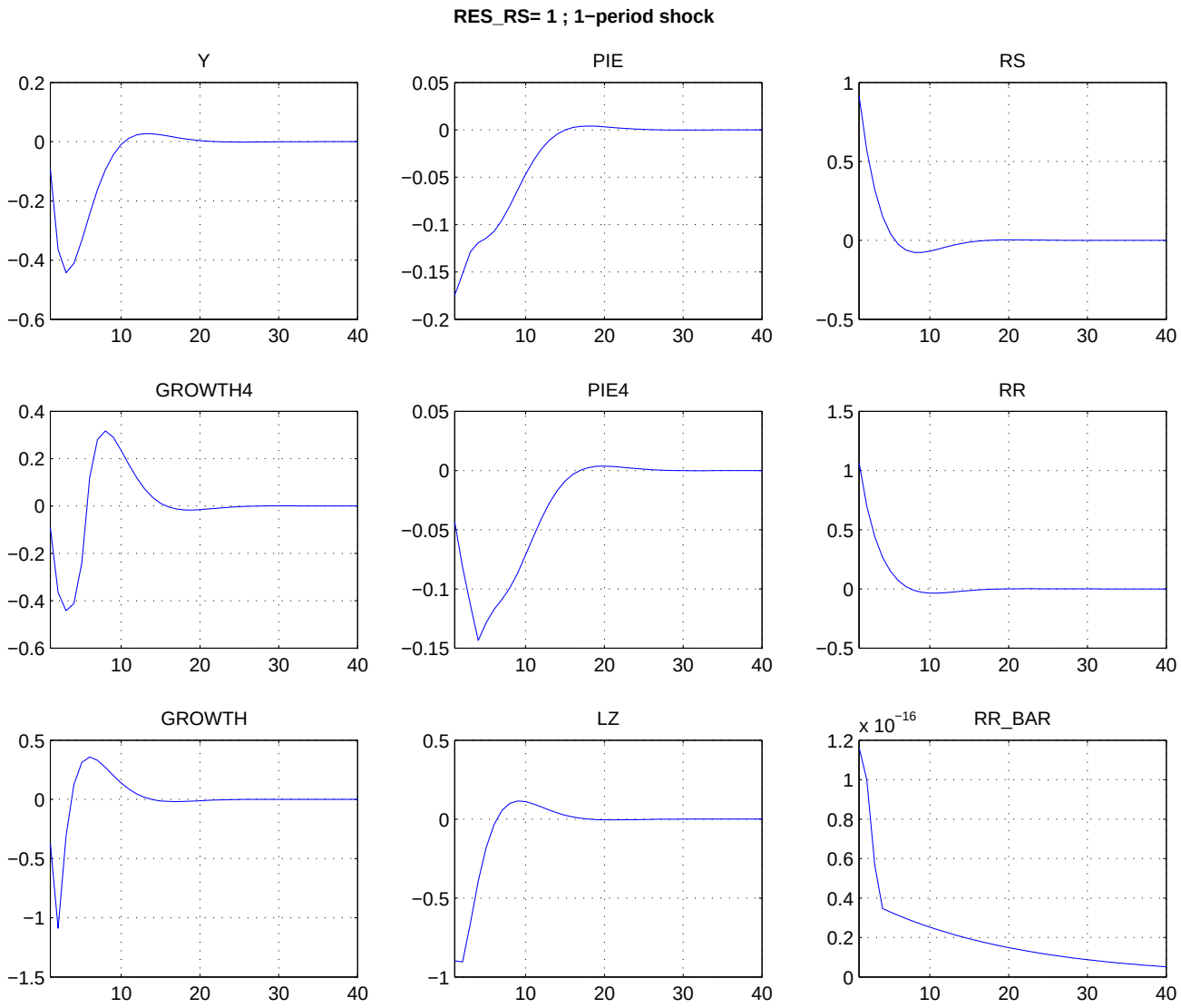

RES_G= 1 ; 1−period shock
Y
x 10−16
PIE
x 10−15
RS
x 10−15
GROWTH4
PIE4
x 10−15
RR
x 10−16
GROWTH
LZ
x 10−15
RR_BAR
x 10−17

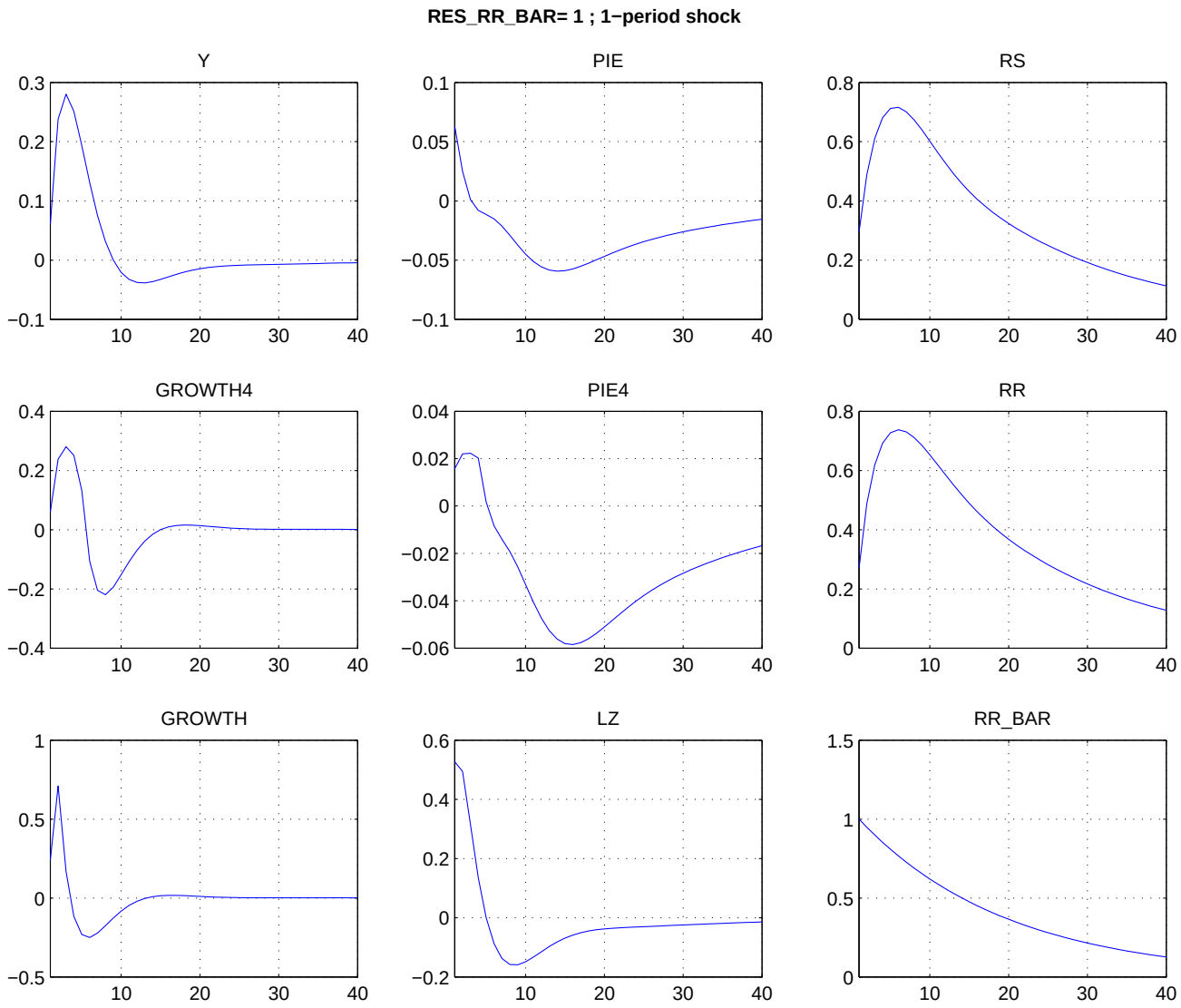

RES_UNR_GAP= 1 ; 1−period shock
Y
PIE
x 10^−17
RS
x 10^−17
GROWTH4
x 10^−47
PIE4
x 10^−33
RR
GROWTH
x 10^−47
LZ
x 10^−16
RR_BAR

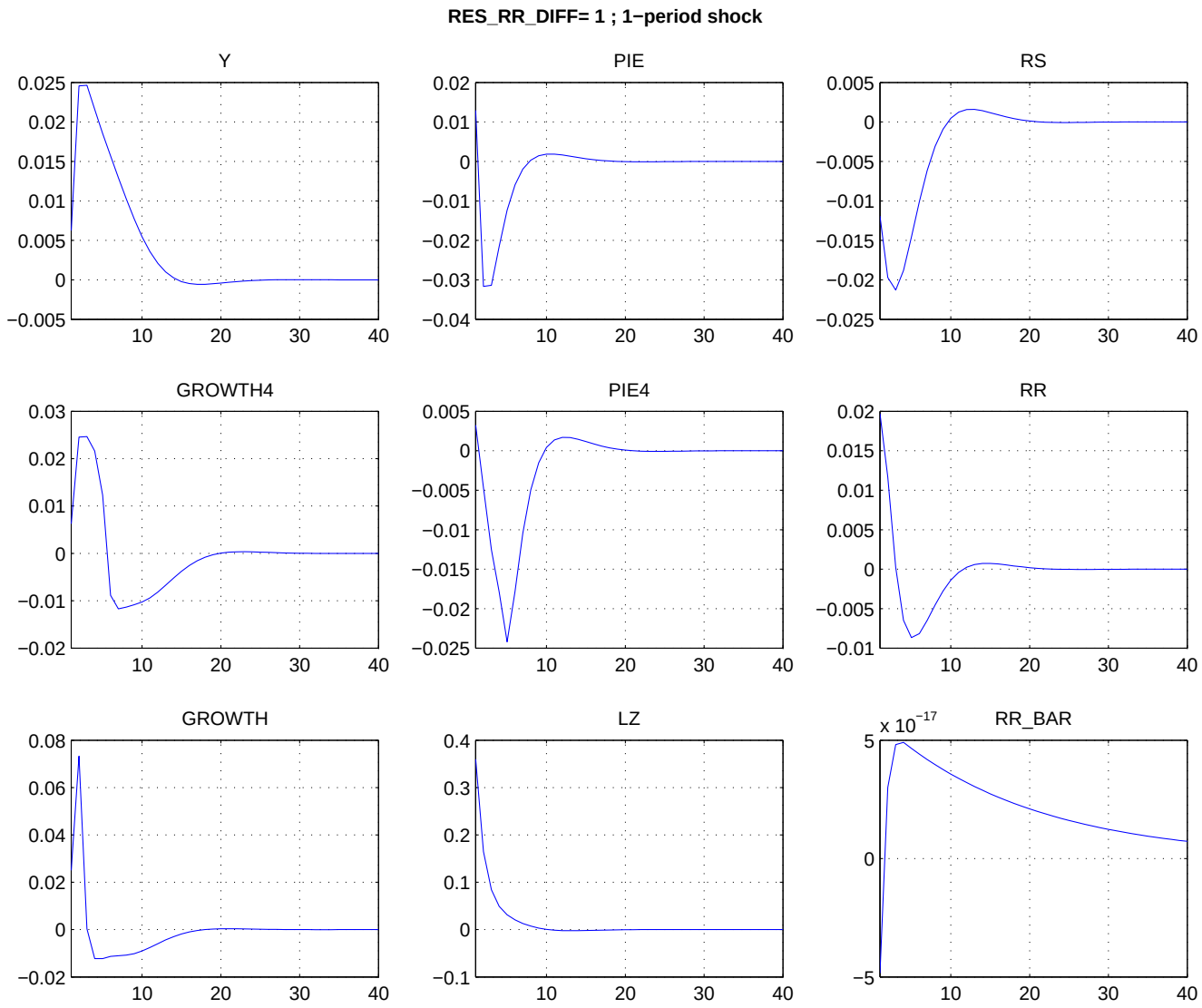

RES_UNR_G= 1 ; 1−period shock
Y
PIE
x 10^−17
RS
x 10^−17
GROWTH4
x 10^−47
PIE4
x 10^−32
RR
GROWTH
x 10^−47
LZ
x 10^−16
RR_BAR

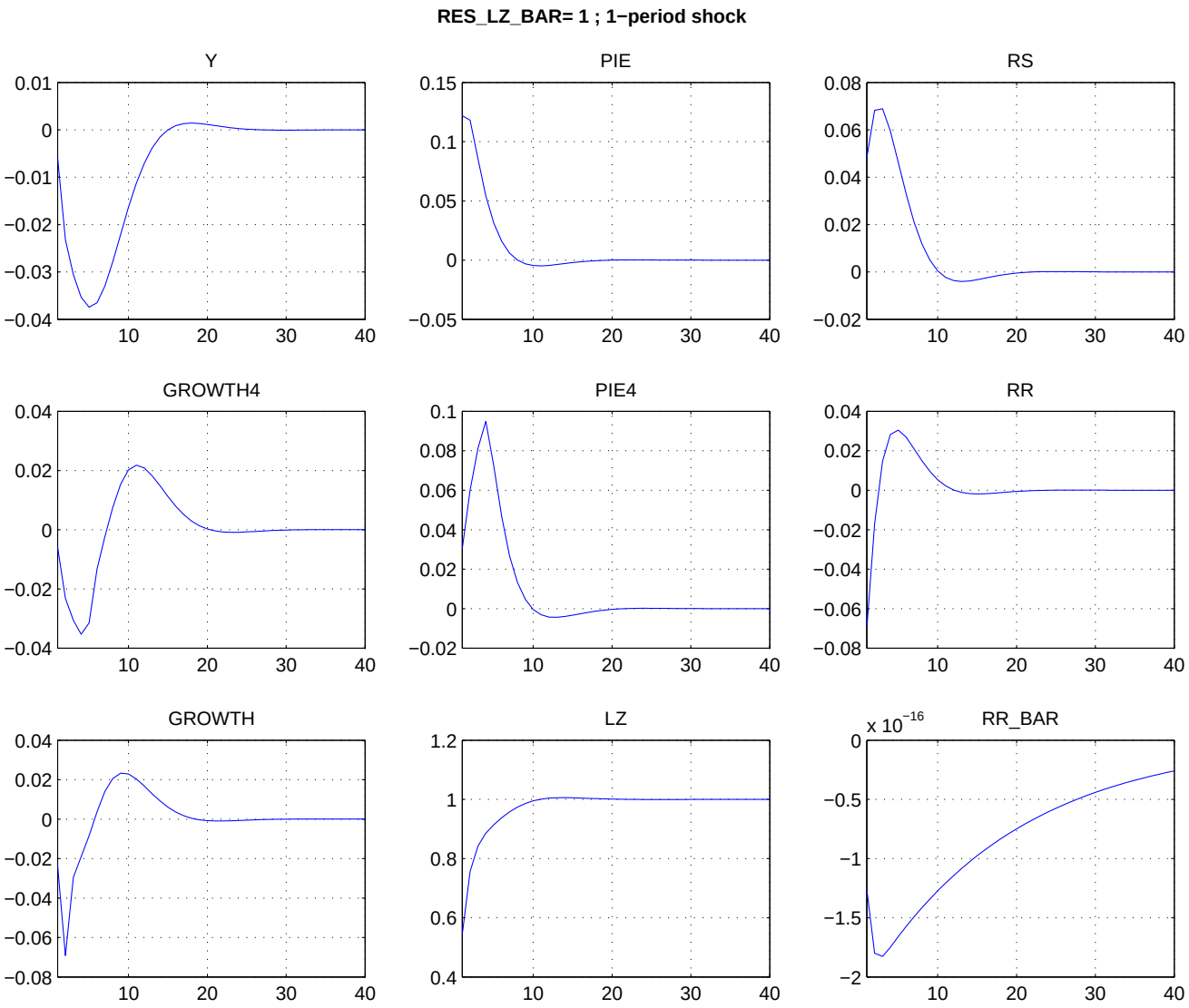

RES_PIE= 1 ; 1−period shock
Y
PIE
RS
GROWTH4
PIE4
RR
GROWTH
LZ
x 10^−16
RR_BAR

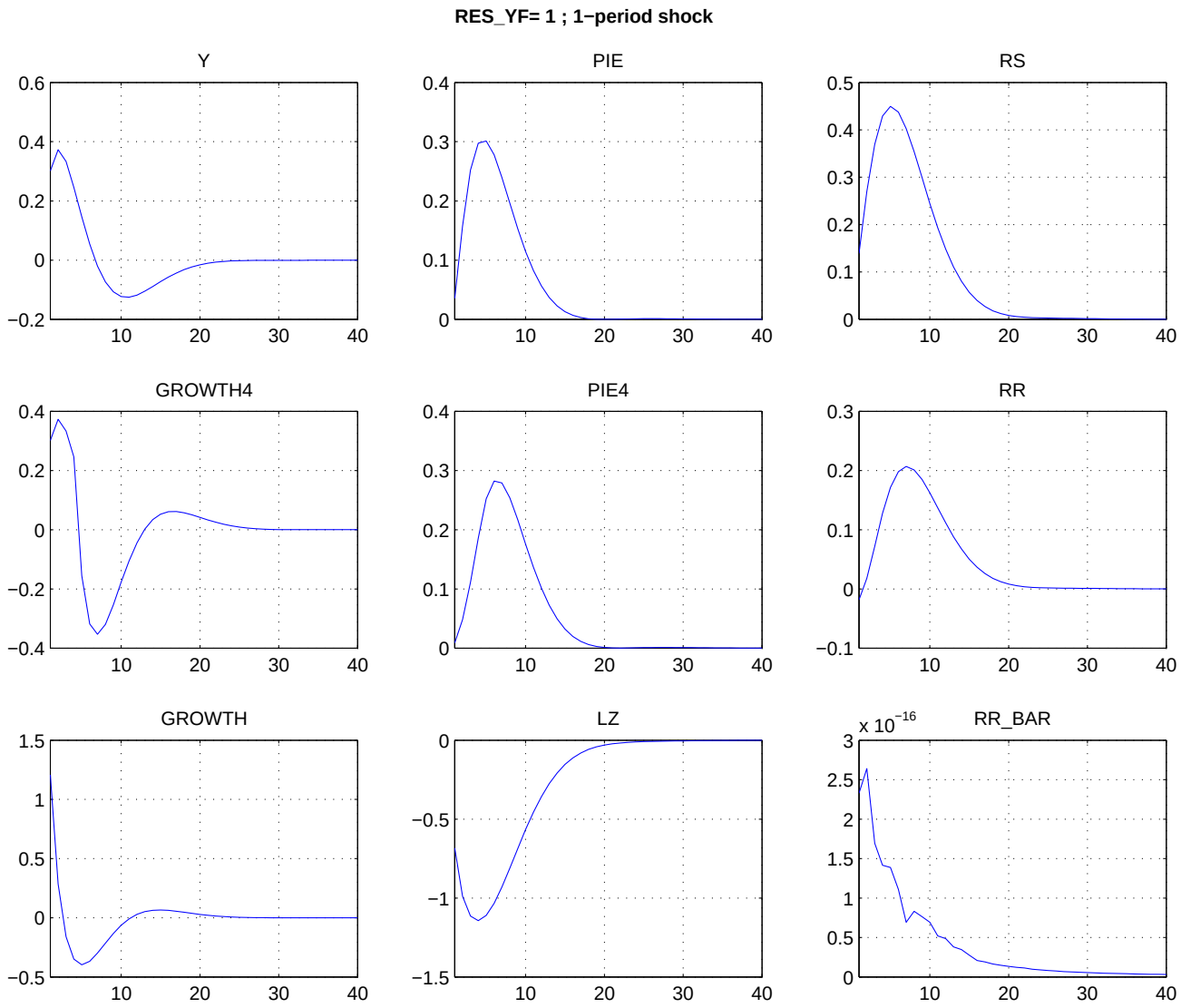

RES_PIETAR= 1 ; 1−period shock
Y
PIE
RS
GROWTH4
PIE4
RR
GROWTH
LZ
x 10^−15
RR_BAR


RES_RS= 1 ; 1−period shock
Y
PIE
RS
GROWTH4
PIE4
RR
GROWTH
LZ
x 10^−16
RR_BAR


RES_RR_BAR= 1 ; 1−period shock
Y
PIE
RS
GROWTH4
PIE4
RR
GROWTH
LZ
RR_BAR

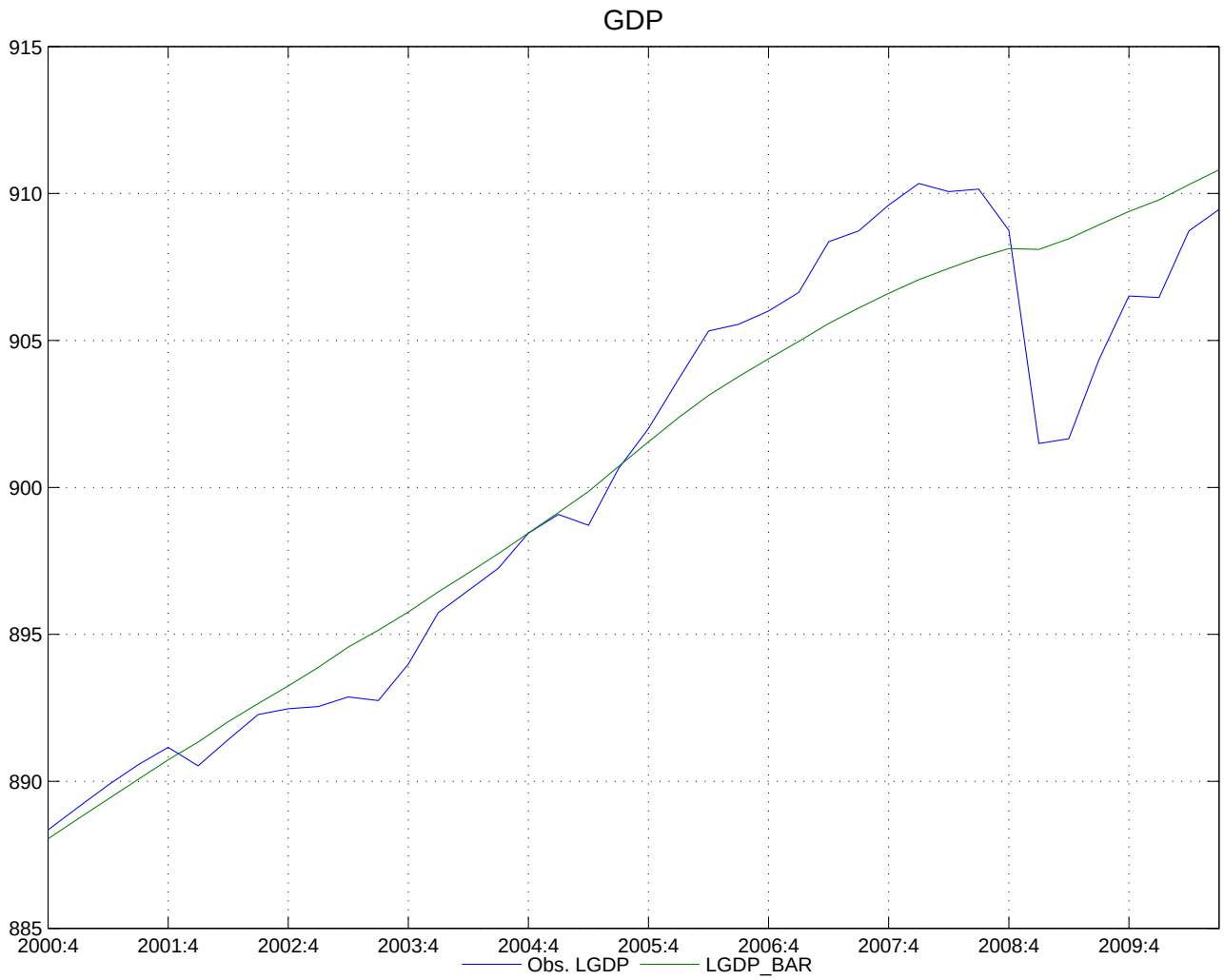

RES_RR_DIFF= 1 ; 1−period shock
Y
PIE
RS
GROWTH4
PIE4
RR
GROWTH
LZ
x 10^−17
RR_BAR

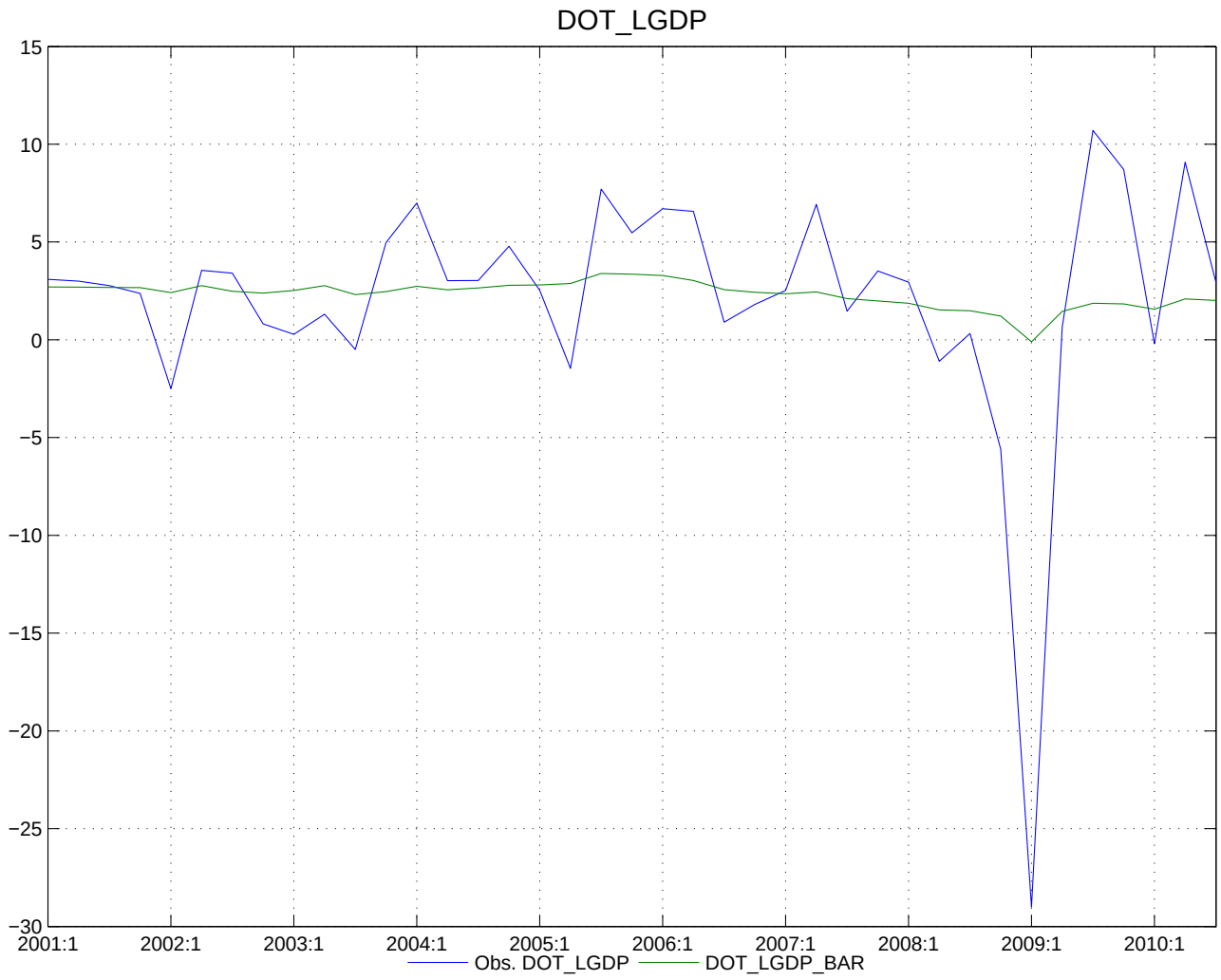

RES_LZ_BAR= 1 ; 1−period shock
Y
PIE
RS
GROWTH4
PIE4
RR
GROWTH
LZ
x 10^−16
RR_BAR

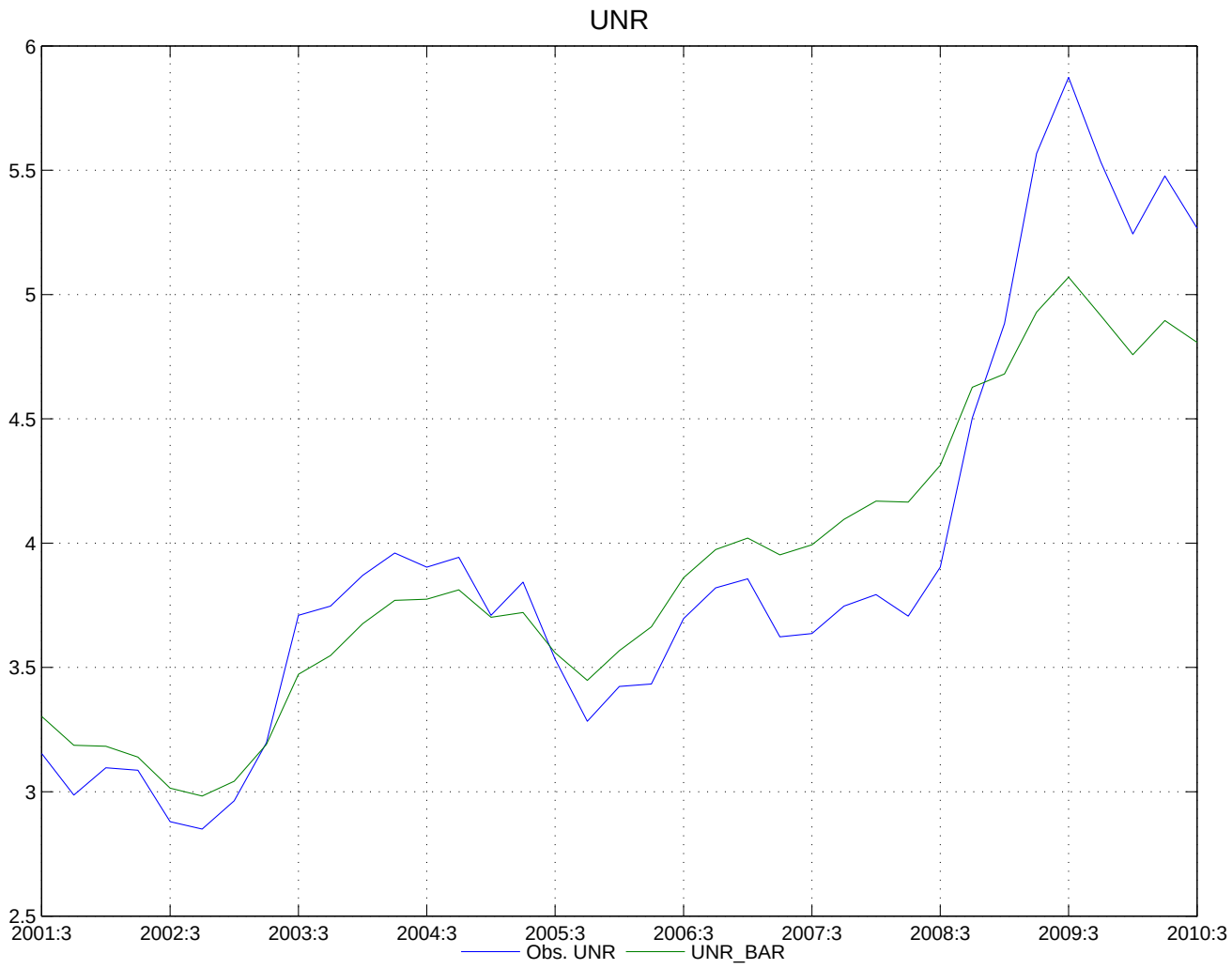

RES_YF= 1 ; 1−period shock
Y
PIE
RS
GROWTH4
PIE4
RR
GROWTH
LZ
x 10^−16
RR_BAR

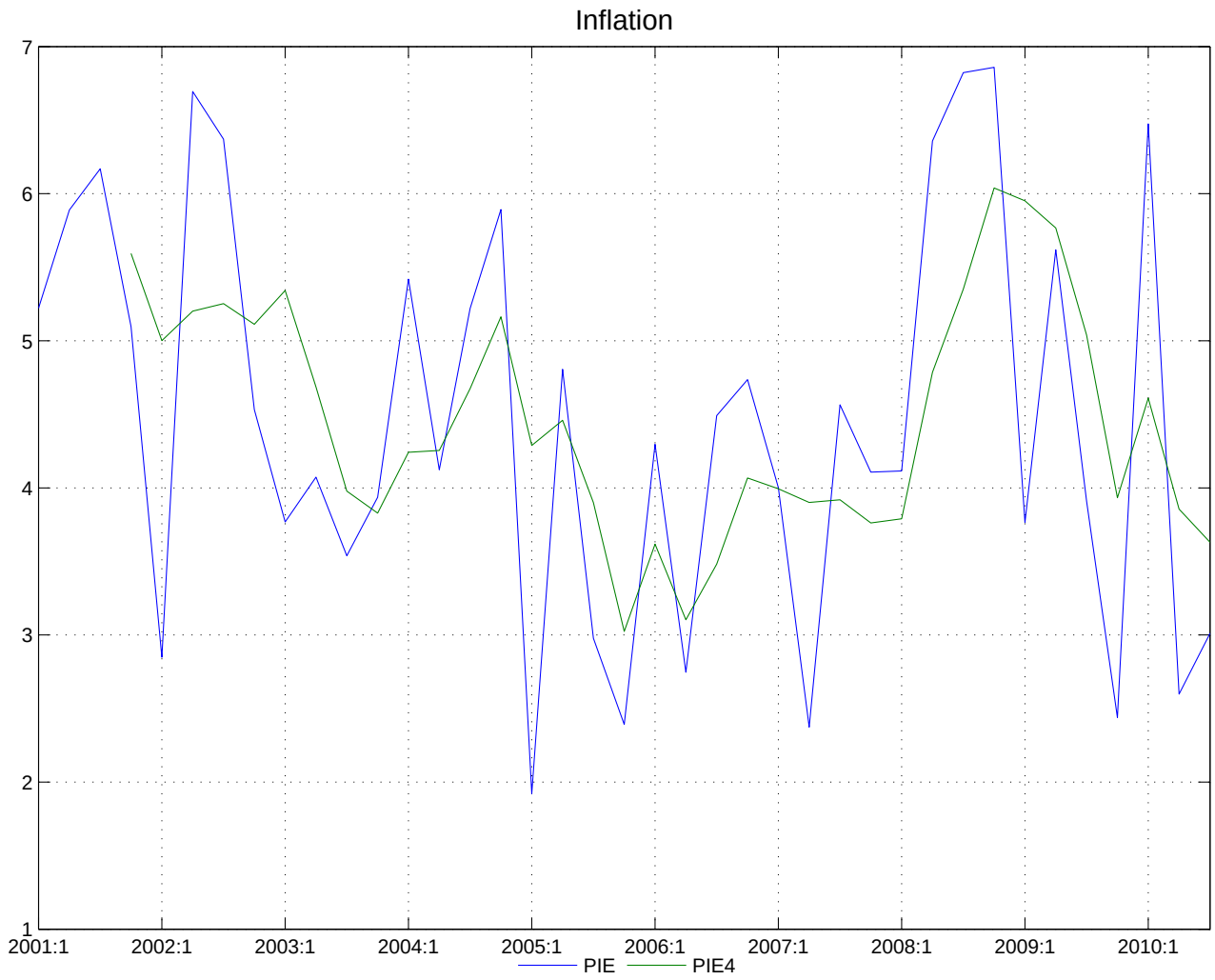
RMSEs

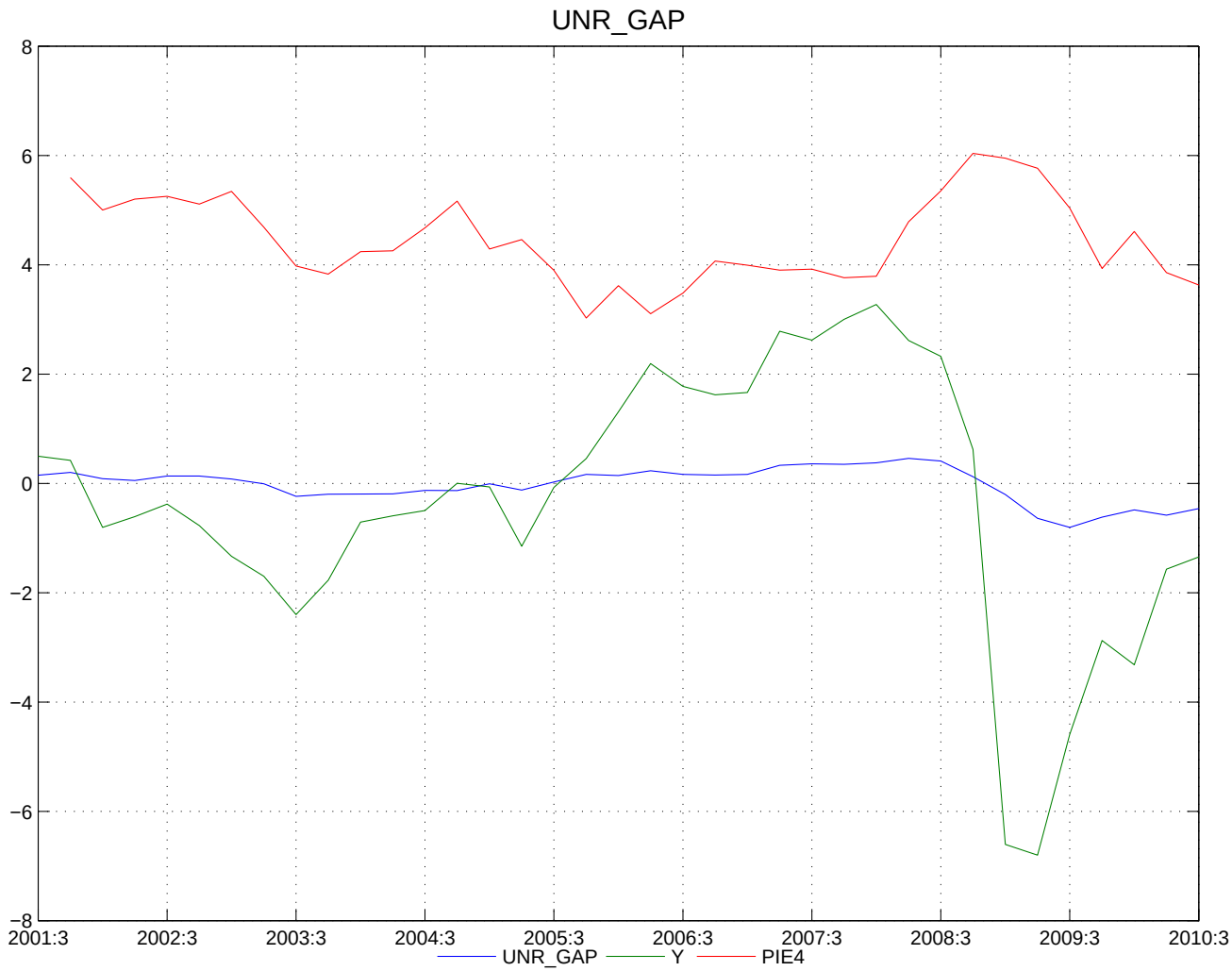
Parameter	1Q Ahead	4Q Ahead	8Q Ahead
GROWTH	6.981	7.146	7.169
GROWTH4	1.745	4.086	4.006
RS	0.535	1.731	1.839
PIE	1.717	1.695	1.438
PIE4	0.429	1.119	0.879


GDP
915
910
905
900
895
890
885
2000:4
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4
Obs. LGDP
LGDP_BAR


DOT_LGDP
15
10
5
0
−5
−10
−15
−20
−25
−30
2001:1
2002:1
2003:1
2004:1
2005:1
2006:1
2007:1
2008:1
2009:1
2010:1
Obs. DOT_LGDP
DOT_LGDP_BAR

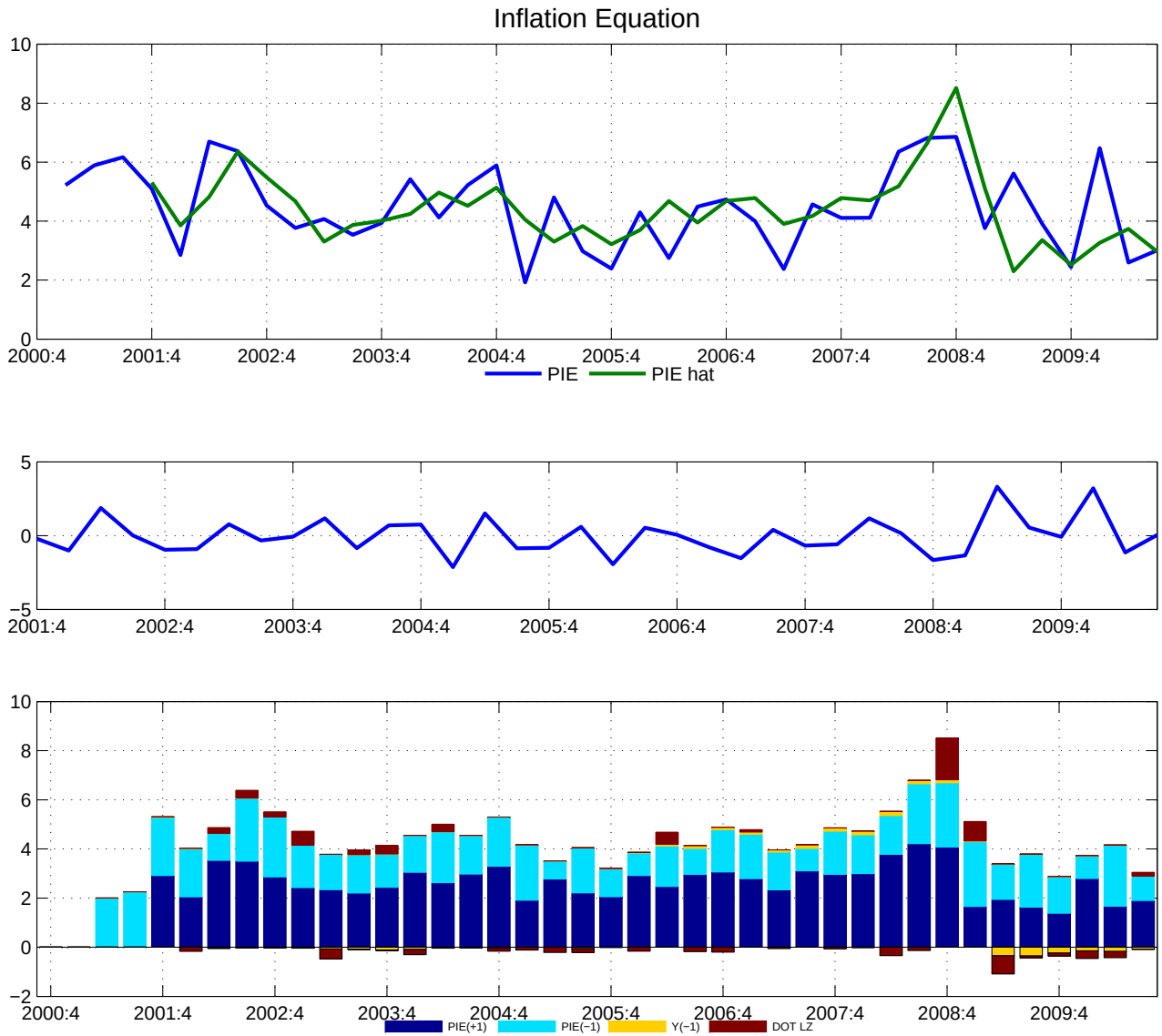

UNR
6
5.5
5
4.5
4
3.5
3
2.5
2001:3
2002:3
2003:3
2004:3
2005:3
2006:3
2007:3
2008:3
2009:3
2010:3
Obs. UNR
UNR_BAR

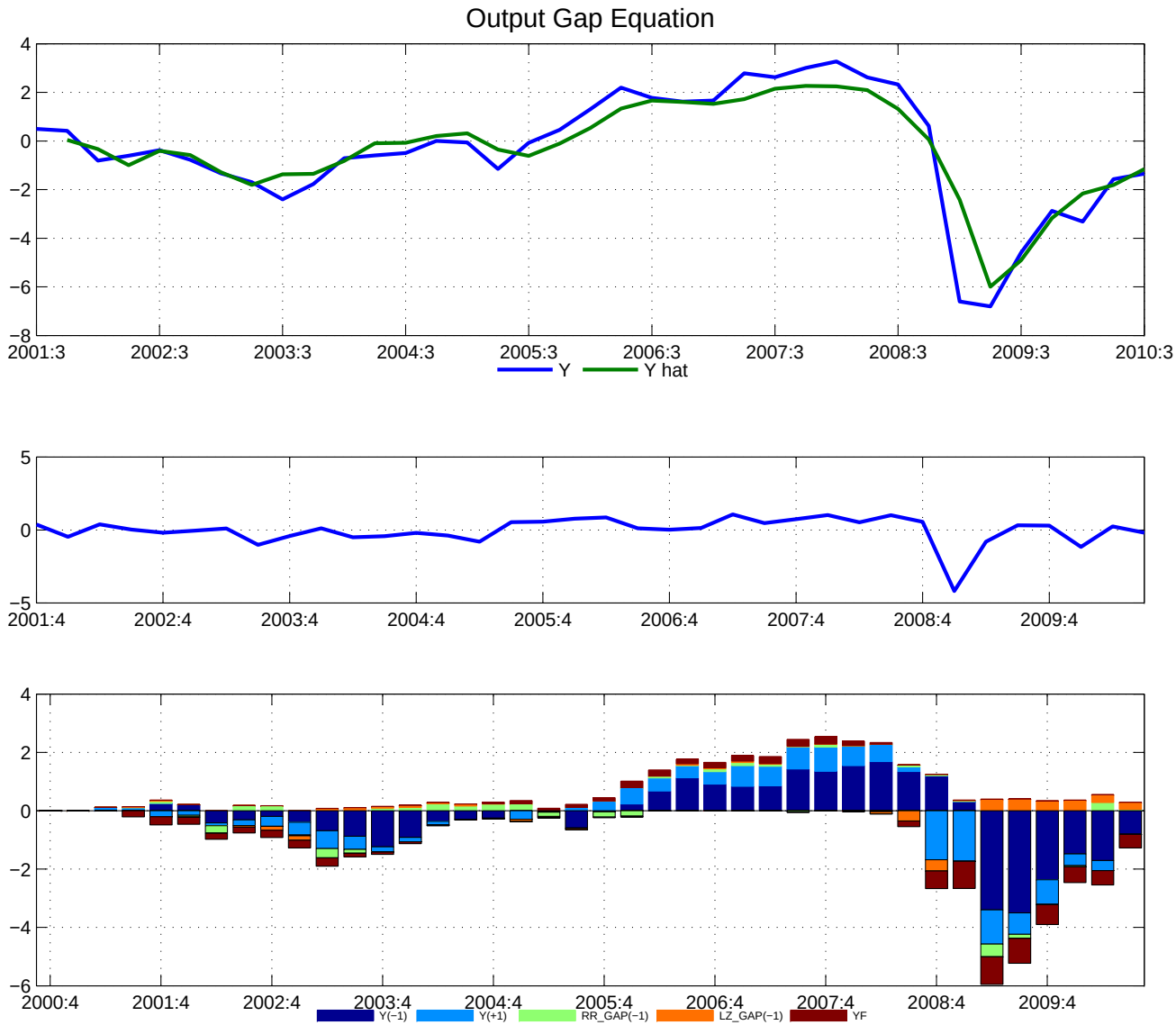

Inflation
7
6
5
4
3
2
1
2001:1
2002:1
2003:1
2004:1
2005:1
2006:1
2007:1
2008:1
2009:1
2010:1
PIE
PIE4

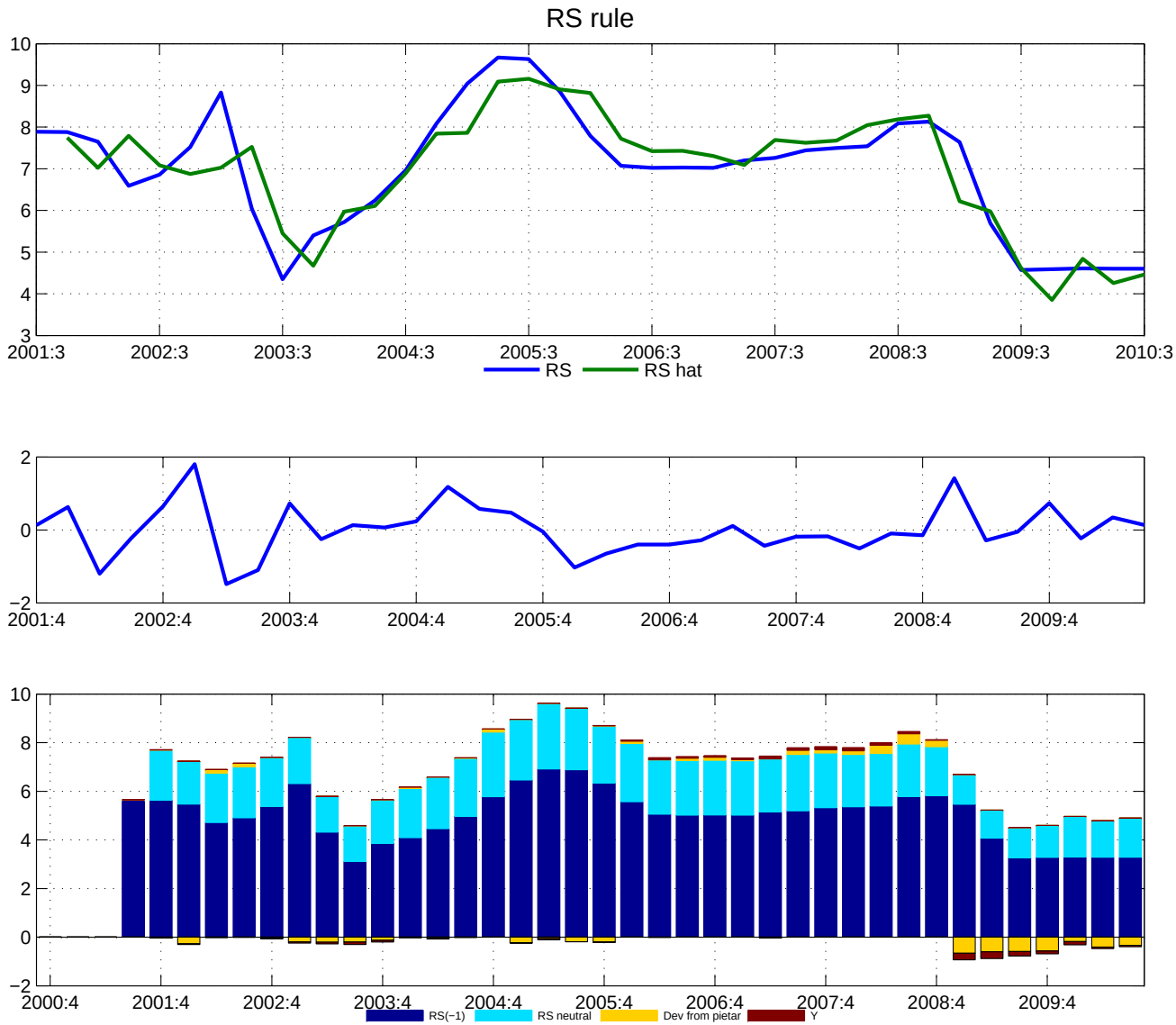

UNR_GAP
8
6
4
2
0
−2
−4
−6
−8
2001:3
2002:3
2003:3
2004:3
2005:3
2006:3
2007:3
2008:3
2009:3
2010:3
UNR_GAP
Y
PIE4

LZ
145
140
135
130
125
120
115
110
2001:3
2002:3
2003:3
2004:3
2005:3
2006:3
2007:3
2008:3
2009:3
2010:3
LZ
LZ_BAR

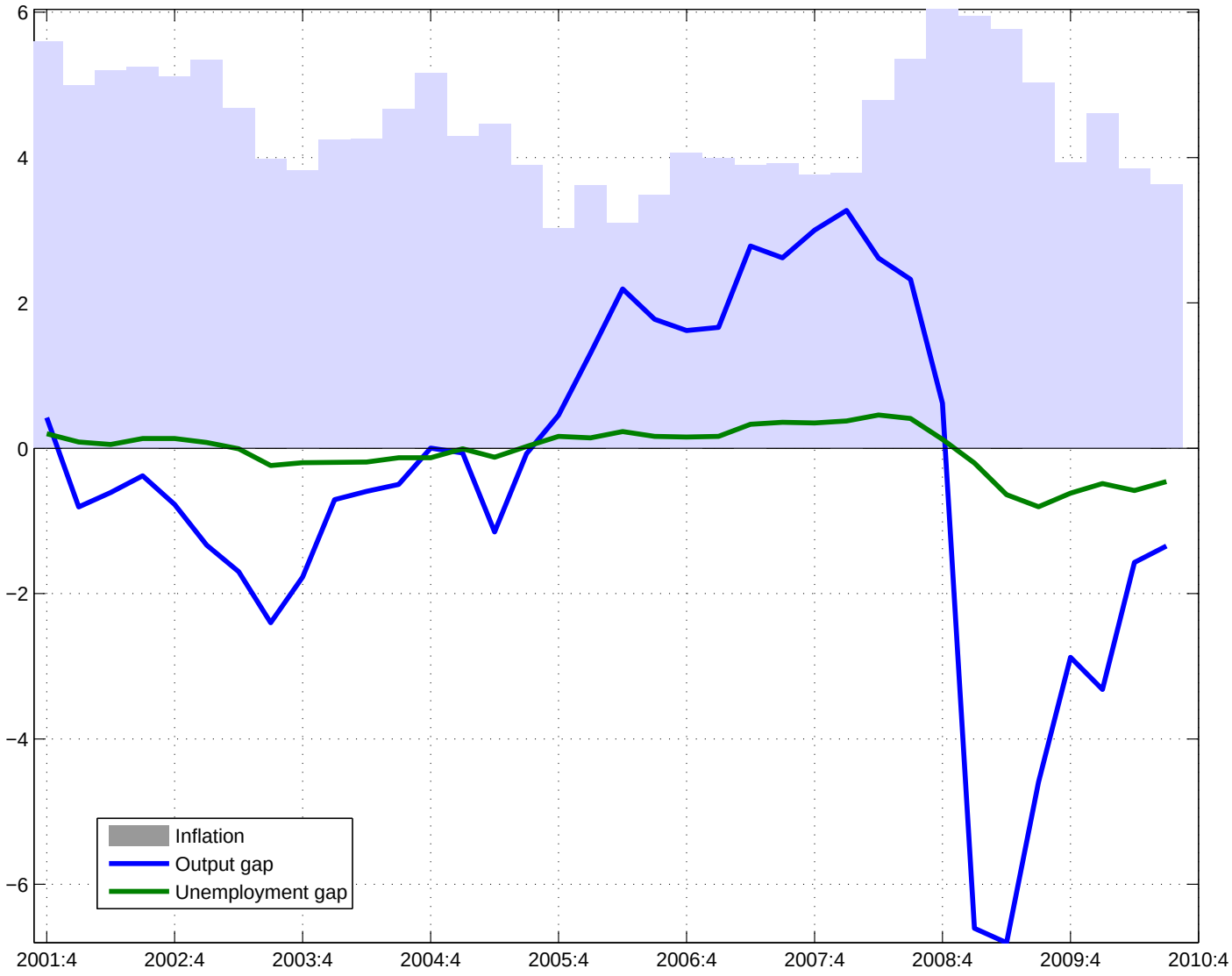
Interest Rates
10
9
8
7
6
5
4
3
2
1
0
2001:3
2002:3
2003:3
2004:3
2005:3
2006:3
2007:3
2008:3
2009:3
2010:3
RS
RR
RR_BAR


Inflation Equation
10
8
6
4
2
0
2000:4
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4
PIE
PIE hat
5
0
−5
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4
10
8
6
4
2
0
−2
2000:4
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4
PIE(+1)
PIE(−1)
Y(−1)
DOT LZ

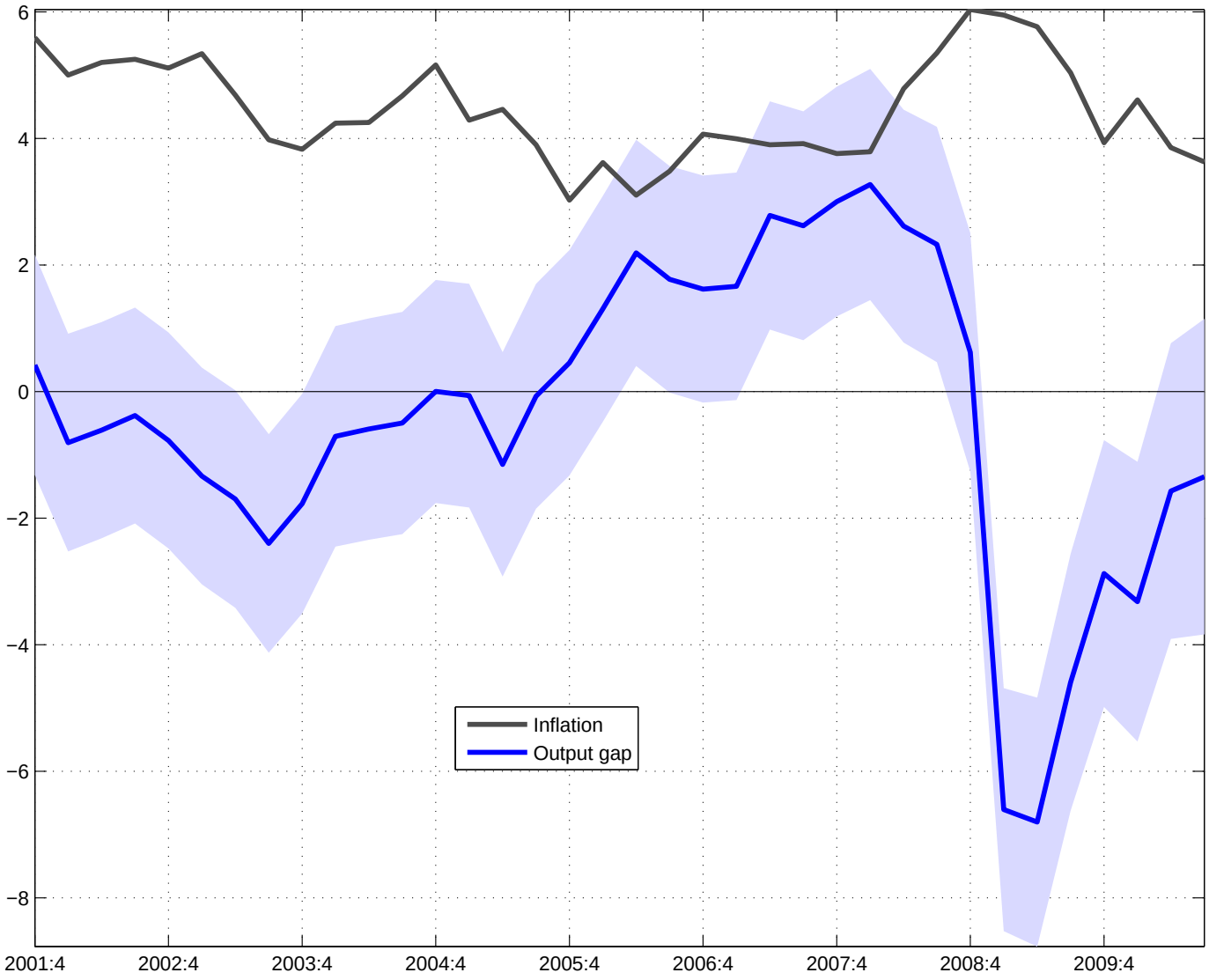

Output Gap Equation
4
2
0
−2
−4
−6
−8
2001:3
2002:3
2003:3
2004:3
2005:3
2006:3
2007:3
2008:3
2009:3
2010:3
Y
Y hat
5
0
−5
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4
4
2
0
−2
−4
−6
2000:4
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4
Y(−1)
Y(+1)
RR_GAP(−1)
LZ_GAP(−1)
YF


RS rule
10
9
8
7
6
5
4
3
2001:3
2002:3
2003:3
2004:3
2005:3
2006:3
2007:3
2008:3
2009:3
2010:3
RS
RS hat
2
0
−2
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4
10
8
6
4
2
0
−2
2000:4
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4
RS(−1)
RS neutral
Dev from pietar
Y

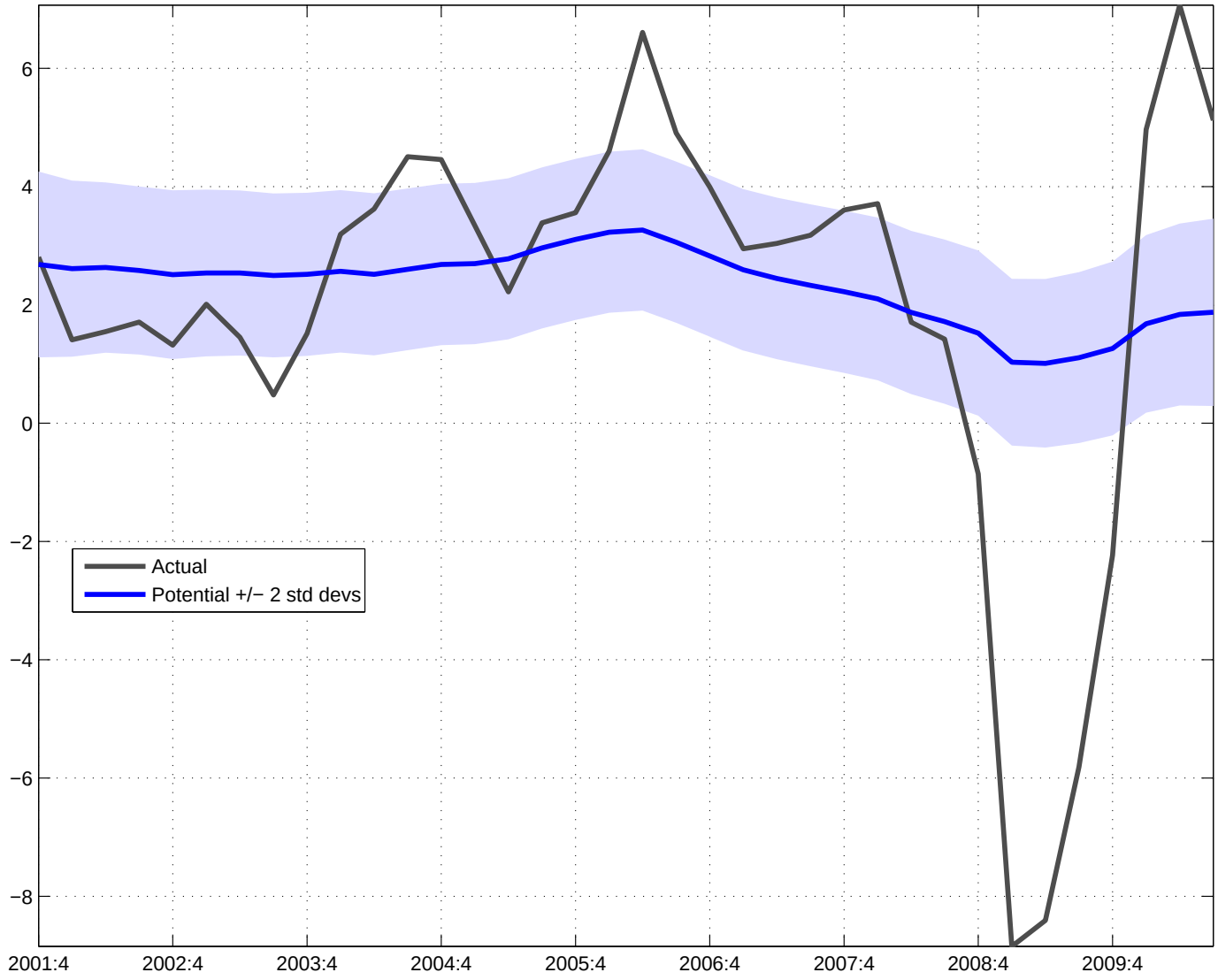
Mexico: Economic activity gaps

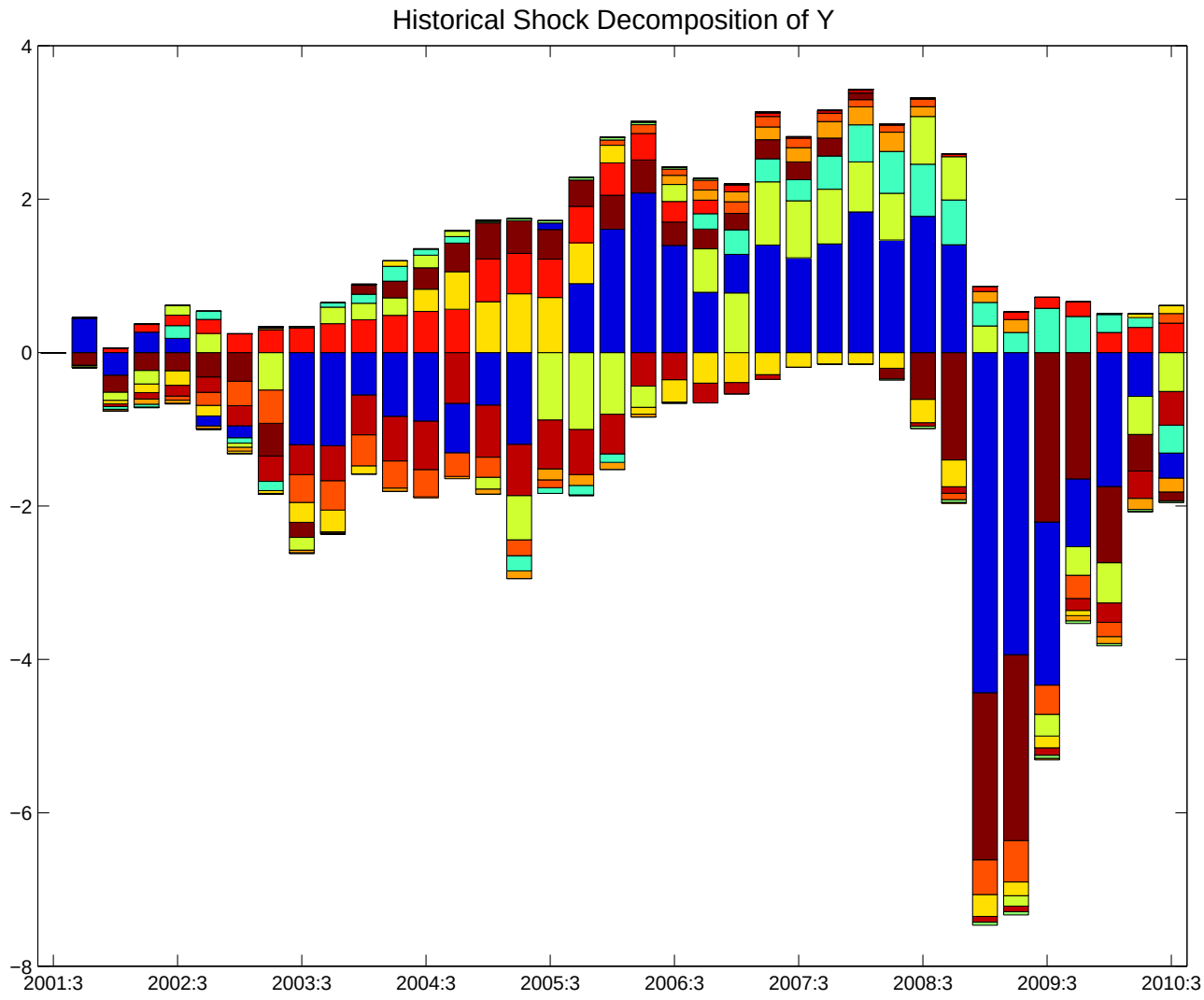


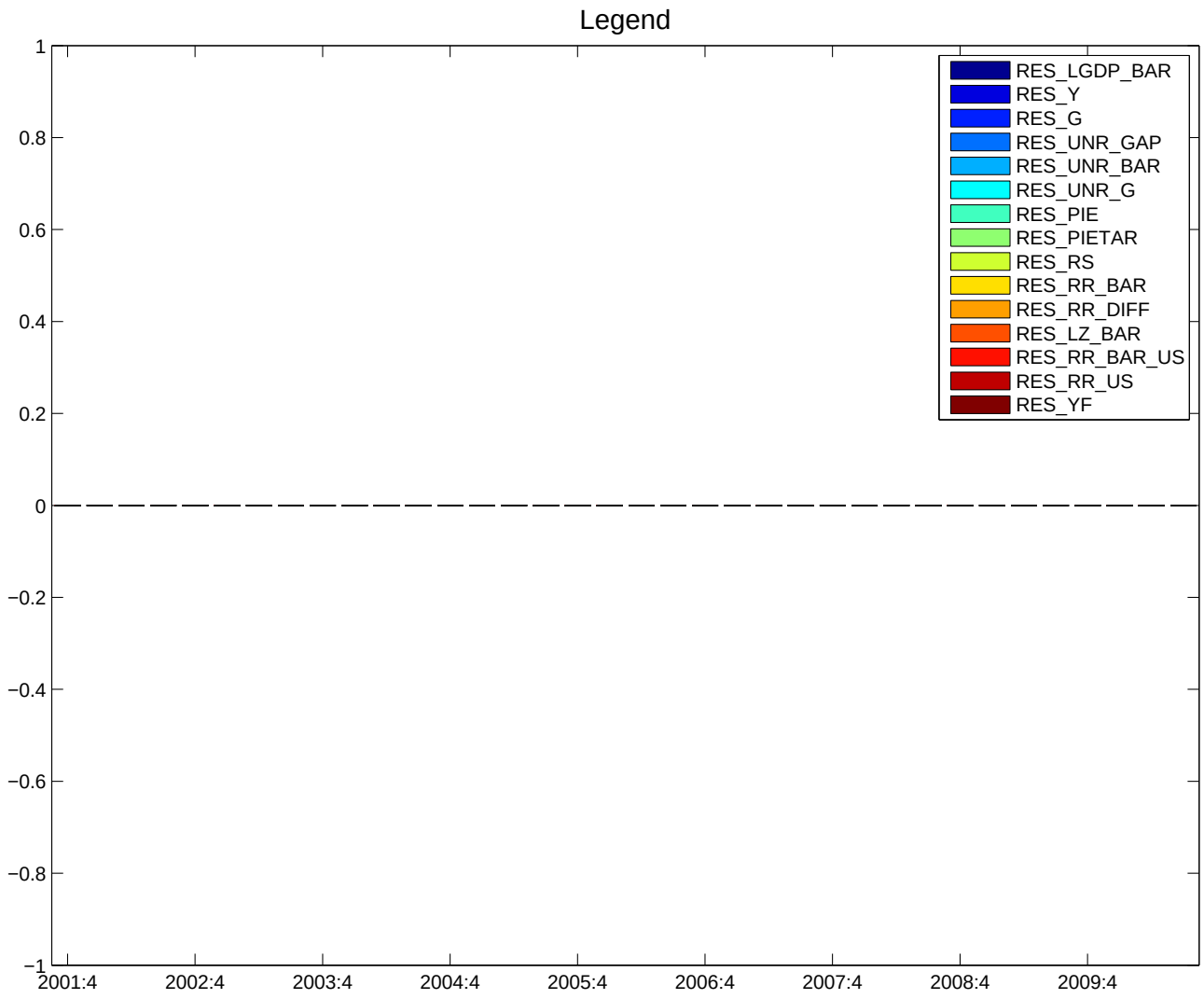
Output Gap +/- 2 std devs (w/o model or parameter uncertainty)

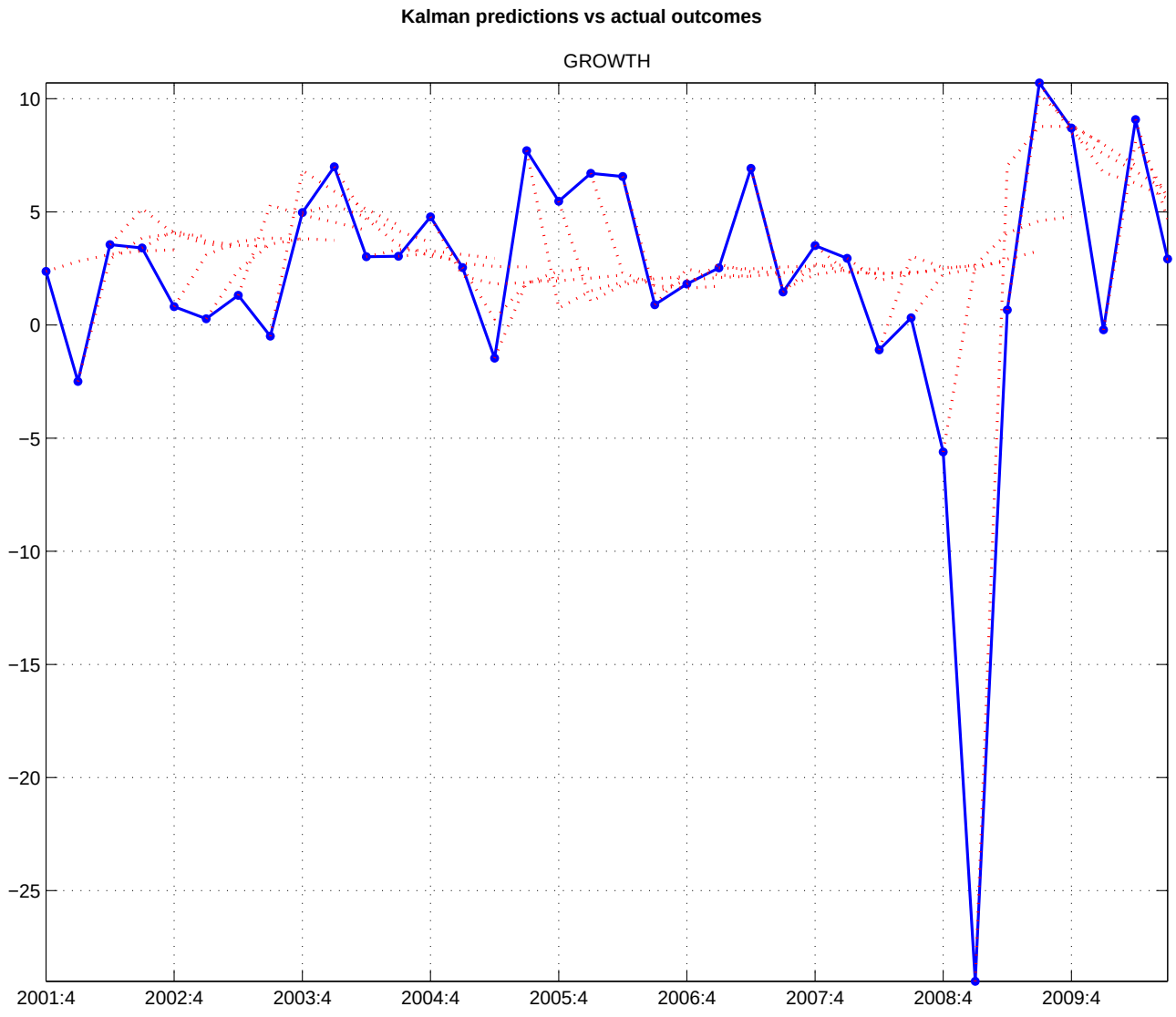


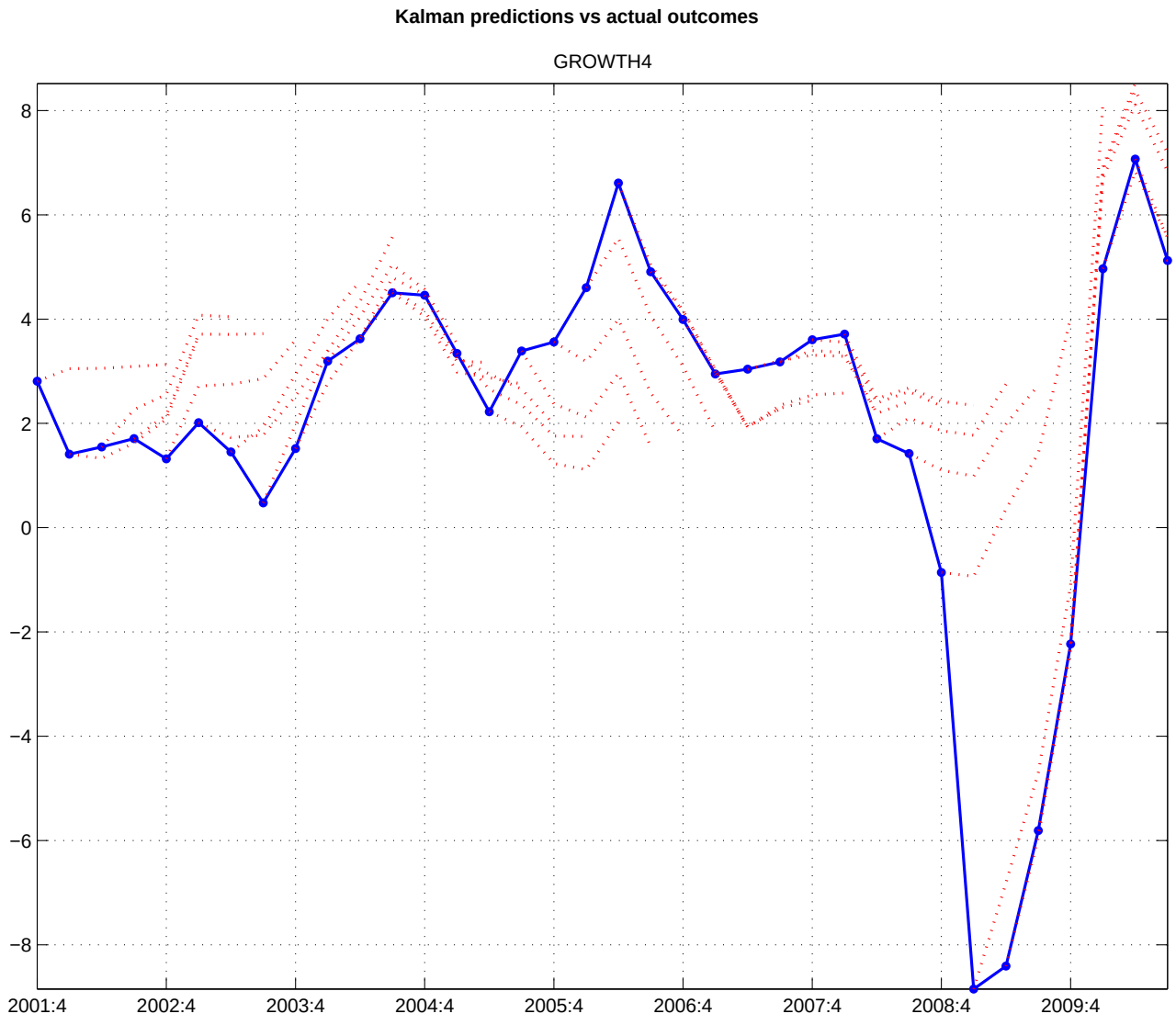
Output Growth (Y/Y) +/- 2 std devs (w/o model or parameter uncertainty)

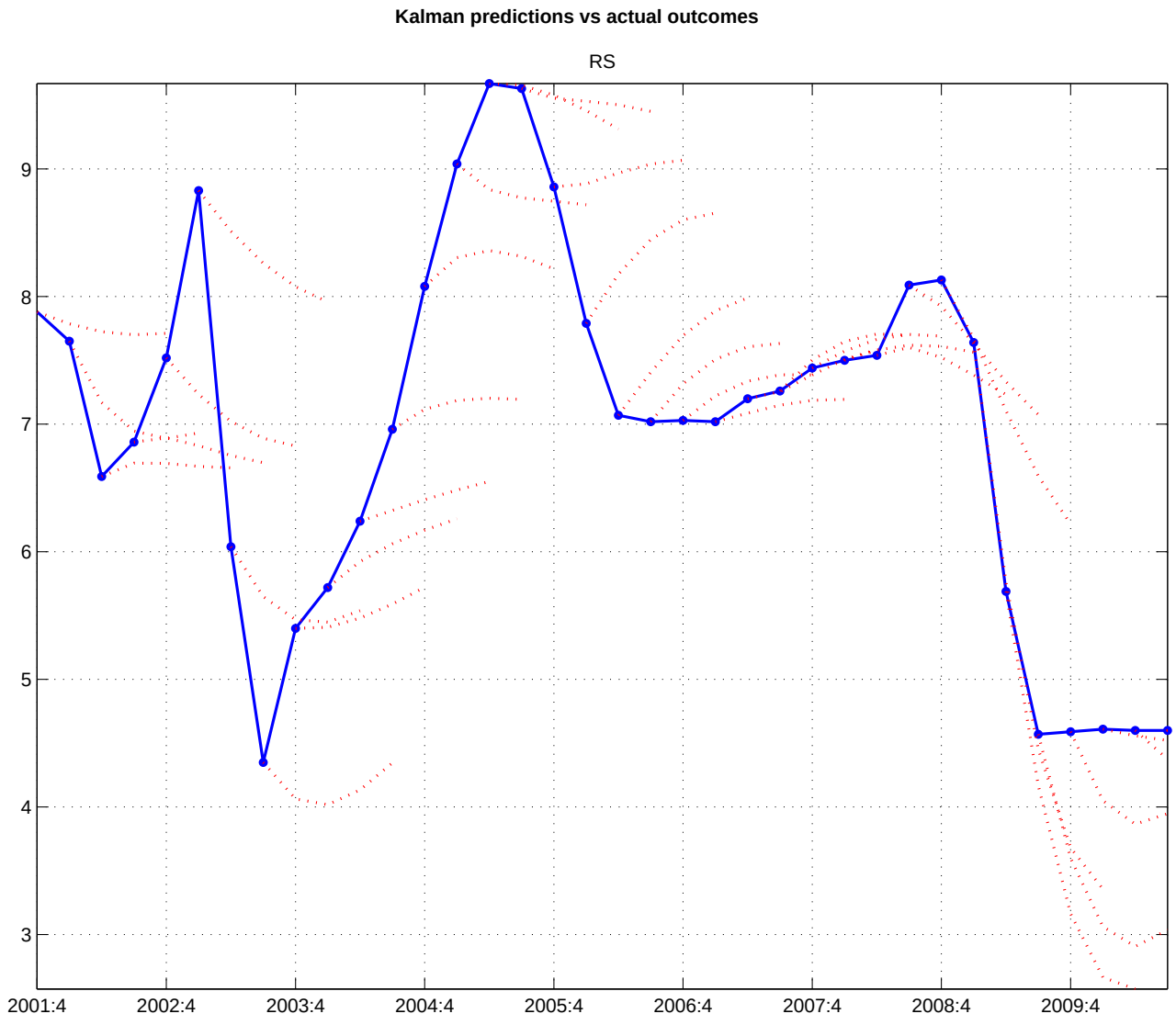


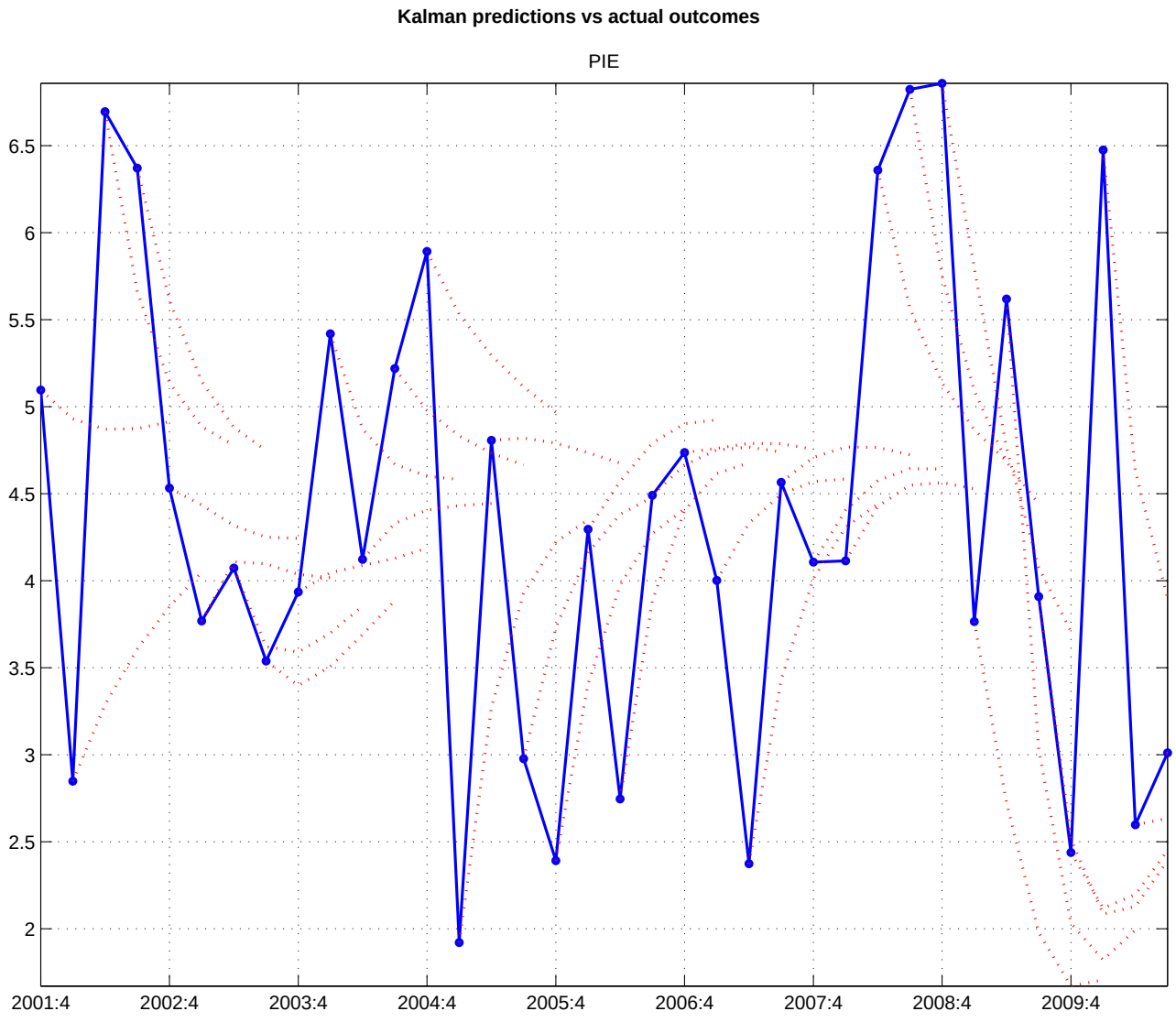

Historical Shock Decomposition of Y
4
2
0
−2
−4
−6
−8
2001:3
2002:3
2003:3
2004:3
2005:3
2006:3
2007:3
2008:3
2009:3
2010:3

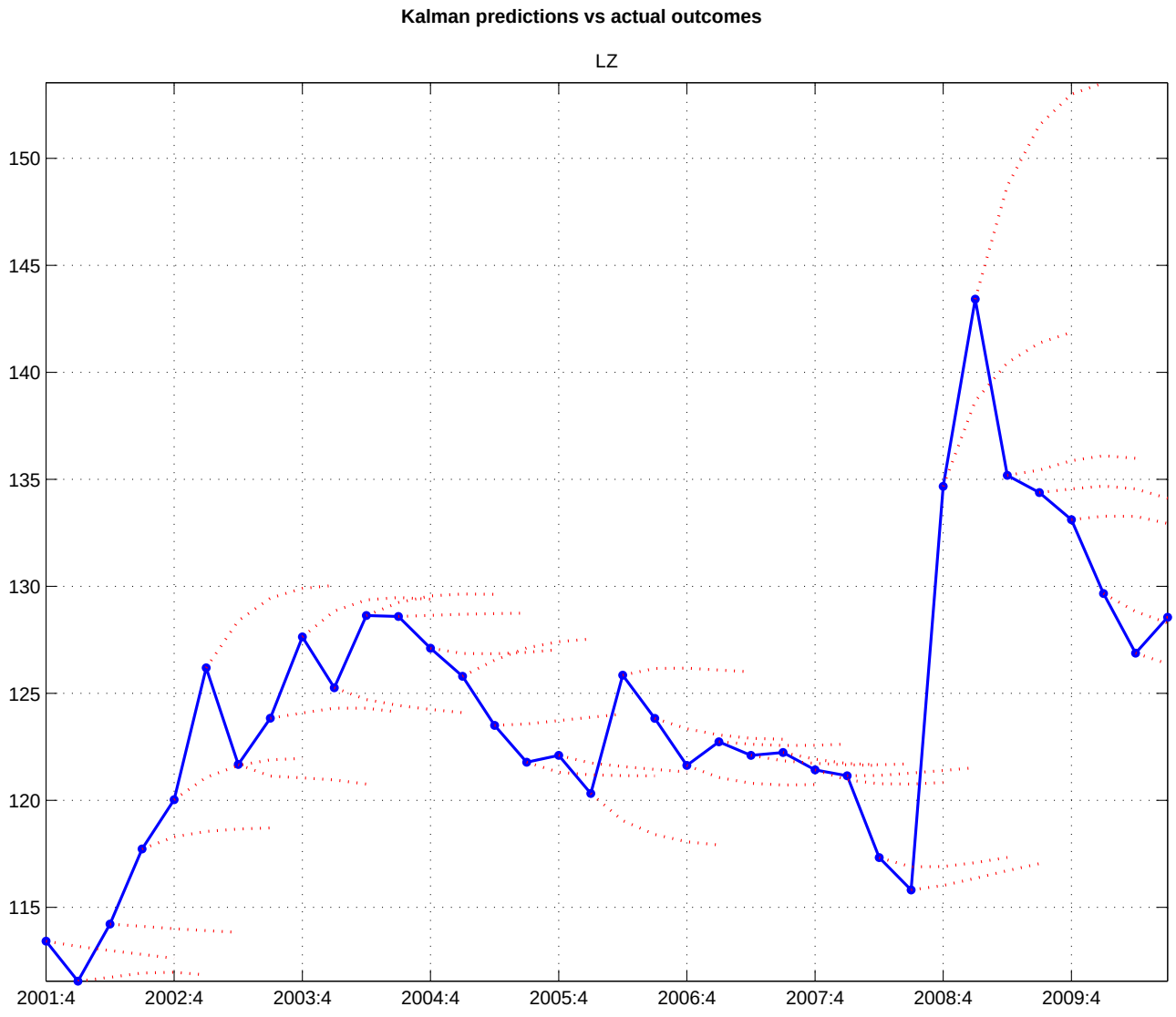

Legend
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4
RES_LGDP_BAR
RES_Y
RES_G
RES_UNR_GAP
RES_UNR_BAR
RES_UNR_G
RES_PIE
RES_PIETAR
RES_RS
RES_RR_BAR
RES_RR_DIFF
RES_LZ_BAR
RES_RR_BAR_US
RES_RR_US
RES_YF


Kalman predictions vs actual outcomes
GROWTH
10
5
0
−5
−10
−15
−20
−25
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4


Kalman predictions vs actual outcomes
GROWTH4
8
6
4
2
0
−2
−4
−6
−8
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4


Kalman predictions vs actual outcomes
RS
9
8
7
6
5
4
3
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4


Kalman predictions vs actual outcomes
PIE
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4


Kalman predictions vs actual outcomes
LZ
150
145
140
135
130
125
120
115
2001:4
2002:4
2003:4
2004:4
2005:4
2006:4
2007:4
2008:4
2009:4