1 Modelo Nash: Análisis Dinámico

1.1 Variables de Estado

Las siguientes variables aparecen con rezago:

- $y(t-1)$
- $r(t-1)$
- $g(t-1)$
- $a(t-1)$
- $c^*(t-1)$
- $\xi_\pi(t-1)$
- $\xi_r(t-1)$
- $\xi_g(t-1)$
- $r(t-2)$

Variables forward-looking:

- $y(t+1)$
- $\pi(t+1)$
- $b(t+1)$
- $g(t+1)$

Variables estáticas:

- r^{nat}

1.2 Valores en Estado Estacionario

Variable	Valor
y	0.522114
π	-0.0573607
b	-93.3927
r	-0.0573607
g	0.507831
r^{nat}	0
a	0
c^*	0
ξ_π	0
ξ_r	0
ξ_g	0

Table 1: Resultados del Estado Estacionario

1.3 Autovalores

Módulo	Real	Imaginario
3.623e-17	-3.623e-17	0
0.2704	0.2064	0.1747
0.2704	0.2064	-0.1747
0.3838	0.3838	0
0.5	0.5	0
0.5	0.5	0
0.5	0.5	0
0.5	0.5	0
0.7	0.7	0
1.01	1.01	0
2.631	2.631	0
3.737	2.907	2.348
3.737	2.907	-2.348

Table 2: Autovalores del Sistema

1.4 Descomposición de Varianza (%)

Variable	ε_a	ε_{c^*}	ε_π	ε_r	ε_g
y	0.11	0.00	11.60	0.30	87.99
π	3.54	0.03	7.64	87.68	1.09
b	0.34	0.00	62.81	5.47	31.38
r^{nat}	99.04	0.96	0.00	0.00	0.00
r	23.44	0.23	60.19	15.15	1.00
g	0.66	0.01	75.85	1.88	21.60

Table 3: Descomposición de Varianza

1.5 Matriz de Correlaciones

Variables	y	π	b	r^{nat}	r	g
y	1.0000	-0.0273	-0.2366	0.0203	-0.3283	0.1291
π	-0.0273	1.0000	0.3188	-0.0332	0.2290	-0.2217
b	-0.2366	0.3188	1.0000	0.0084	-0.4678	-0.9837
r^{nat}	0.0203	-0.0332	0.0084	1.0000	0.4605	-0.0508
r	-0.3283	0.2290	-0.4678	0.4605	1.0000	0.5563
g	0.1291	-0.2217	-0.9837	-0.0508	0.5563	1.0000

Table 4: Matriz de Correlaciones

1.6 Coeficientes de Autocorrelación

Variable	Orden 1	Orden 2	Orden 3	Orden 4	Orden 5
y	0.7207	0.4415	0.2511	0.1372	0.0731
π	0.5488	0.3705	0.2641	0.1874	0.1317
b	0.6073	0.3322	0.1760	0.0930	0.0496
r^{nat}	0.5000	0.2500	0.1250	0.0625	0.0312
r	0.7425	0.4403	0.2414	0.1317	0.0740
g	0.6164	0.3363	0.1755	0.0906	0.0468

Table 5: Coeficientes de Autocorrelación

Table 6: MATRIX OF COVARIANCE OF EXOGENOUS SHOCKS

$Variables$	ε^a	ε^c	ε^π	ε^r	ε^g
ε^a	0.062500	0.000000	0.000000	0.000000	0.000000
ε^c	0.000000	0.490000	0.000000	0.000000	0.000000
ε^π	0.000000	0.000000	0.160000	0.000000	0.000000
ε^r	0.000000	0.000000	0.000000	0.360000	0.000000
ε^g	0.000000	0.000000	0.000000	0.000000	0.250000

Table 7: Parameter Values

Parameter	Value	Description
θ	0.500	Calvo Probability
σ	1.000	Inverse EIS
α	0.430	Openness Degree
ϕ	1.000	Inverse Labor Supply Elasticity
β	0.990	Discount Factor
ρ_{α}	0.500	Productivity Shock Autocorrelation
ρ_{c^*}	0.500	Int. Consumption Shock Autocorrelation
ρ_{π}	0.500	Domestic Price Shock Autocorrelation
ρ_r	0.700	Interest Rate Shock Autocorrelation
ρ_g	0.500	Public Spending Shock Autocorrelation
γ_{π}	1.250	Monetary Authority Inflation Gap Response
ζ_{π}	0.250	Fiscal Authority Inflation Gap Response
γ_y	0.250	Monetary Authority Output Gap Response
ζ_y	1.250	Fiscal Authority Output Gap Response
γ_r	0.700	Interest Rate Smoothing
ζ_g	0.250	Government Spending Response
η	0.690	Domestic-Imported Goods Substitution Elasticity
υ	1.000	Cross-Country Goods Substitution Elasticity
τ	0.033	Effective Income Tax Rate
$\frac{\bar{B}}{\bar{Y}}$	0.530	Steady State Debt-GDP Ratio
$\frac{\bar{C}}{\bar{Y}}$	0.700	Steady State Consumption-GDP Ratio
r^*	0.000	Steady State Interest Rate

Table 8: COEFFICIENTS OF AUTOCORRELATION

Order	1	2	3	4	5
$\tilde{y}_t$	0.7207	0.4415	0.2511	0.1372	0.0731
π_t	0.5488	0.3705	0.2641	0.1874	0.1317
$\tilde{b}_t$	0.6073	0.3322	0.1760	0.0930	0.0496
r^n	0.5000	0.2500	0.1250	0.0625	0.0312
r_t	0.7425	0.4403	0.2414	0.1317	0.0740
$\tilde{g}_t$	0.6164	0.3363	0.1755	0.0906	0.0468

Table 9: MATRIX OF CORRELATIONS

$Variables$	$\tilde{y}_t$	π_t	$\tilde{b}_t$	r^n	r_t	$\tilde{g}_t$
$\tilde{y}_t$	1.0000	-0.0273	-0.2366	0.0203	-0.3283	0.1291
π_t	-0.0273	1.0000	0.3188	-0.0332	0.2290	-0.2217
$\tilde{b}_t$	-0.2366	0.3188	1.0000	0.0084	-0.4678	-0.9837
r^n	0.0203	-0.0332	0.0084	1.0000	0.4605	-0.0508
r_t	-0.3283	0.2290	-0.4678	0.4605	1.0000	0.5563
$\tilde{g}_t$	0.1291	-0.2217	-0.9837	-0.0508	0.5563	1.0000

Table 10: THEORETICAL MOMENTS

$VARIABLE$	$MEAN$	$STD.DEV.$	$VARIANCE$
$\tilde{y}_t$	0.5221	0.1897	0.0360
π_t	-0.0574	0.1745	0.0304
$\tilde{b}_t$	-93.3927	1.6338	2.6693
r^n	0.0000	0.1508	0.0227
r_t	-0.0574	0.1744	0.0304
$\tilde{g}_t$	0.5078	0.3781	0.1430

Table 11: VARIANCE DECOMPOSITION (in percent)

	ε^a	ε^c	ε^π	ε^r	ε^g
$\tilde{y}_t$	0.11	0.00	11.60	0.30	87.99
π_t	3.54	0.03	7.64	87.68	1.09
$\tilde{b}_t$	0.34	0.00	62.81	5.47	31.38
r^n	99.04	0.96	0.00	0.00	0.00
r_t	23.44	0.23	60.19	15.15	1.00
$\tilde{g}_t$	0.66	0.01	75.85	1.88	21.60

$$omega = \sigma\,\upsilon + (1-\alpha)\,(\sigma\,\eta - 1)$$

$$sigma\_alpha = \frac{\sigma}{1+\alpha\,(omega-1)}$$

$$lambda = \frac{(1-\beta\,\theta)\,(1-\theta)}{\theta}$$

$$kappa\_upsilon = lambda\,(sigma\_alpha + \phi)$$

$$OMICRON\_R\_LAG1 = \frac{1+\beta+sigma\_alpha\,kappa\_upsilon}{\beta}$$

$$OMICRON\_R\_LAG2 = \frac{(-1)}{\beta}$$

$$OMICRON\_PI = \frac{kappa\_upsilon\,\gamma_\pi}{sigma\_alpha\,\gamma_y}$$

$$OMICRON\_Y = \frac{\gamma_y}{sigma\_alpha\,\gamma_r}$$

$$OMICRON\_R\_TAR = \frac{(-(sigma\_alpha\,kappa\_upsilon))}{\beta}$$

$$D = kappa\_upsilon + sigma\_alpha + \beta\,sigma\_alpha$$

$$PSI\_G\_PLUS = \frac{\beta\,sigma\_alpha}{D}$$

$$PSI\_G\_LAG = \frac{sigma\_alpha}{D}$$

$$PSI\_Y\_PLUS = \frac{\beta\,sigma\_alpha\,\zeta_y}{D\,\zeta_g}$$

$$PSI\_Y\_0 = \frac{sigma\_alpha\,\zeta_y\,(2+\beta)}{D\,\zeta_g}$$

$$PSI\_Y\_LAG = \frac{sigma\_alpha\,\zeta_y}{D\,\zeta_g}$$

$$PSI\_PI\_PLUS = \frac{\beta \, sigma\_alpha \, \zeta_{\pi} \, (sigma\_alpha - kappa\_upsilon)}{D \, \zeta_g}$$

$$PSI\_PI\_0 = \frac{(sigma\_alpha - kappa\_upsilon) \, sigma\_alpha \, \zeta_{\pi}}{D \, \zeta_g}$$

$$CONS = \frac{\alpha \left(sigma\_alpha \, \frac{\bar{C}}{\bar{Y}} - sigma\_alpha - kappa\_upsilon \, \frac{\bar{C}}{\bar{Y}} + sigma\_alpha \, \tau - \frac{\bar{B}}{\bar{Y}} \, sigma\_alpha^2 + kappa\_up\right.}{D \, \zeta_g \, \beta \, \frac{\bar{B}}{\bar{Y}}}$$

$$\pi_{tt} = \beta \, \pi_{tt+1} + kappa\_upsilon \, \tilde{y}_{tt} - sigma\_alpha \, \tilde{g}_{tt} + \xi_{\pi t} \tag{1}$$

$$\tilde{y}_{tt} = \tilde{y}_{tt+1} - \frac{1}{sigma\_alpha} \, (r_{tt} - \pi_{tt+1} - {r^n}_t) - (\tilde{g}_{tt+1} - \tilde{g}_{tt}) \tag{2}$$

$$\tilde{b}_{tt+1} = r_{tt} - {r^n}_t + \frac{1}{\beta} \left(\tilde{b}_{tt} - \pi_{tt} + \tilde{g}_{tt} \, \frac{\frac{\bar{C}}{\bar{Y}}}{\frac{\bar{B}}{\bar{Y}}} + \tilde{y}_{tt} \, \frac{1 - \tau - \frac{\bar{C}}{\bar{Y}}}{\frac{\bar{B}}{\bar{Y}}} \right) \tag{3}$$

$$\begin{aligned} r_{tt} = {} & OMICRON\_R\_LAG1 \, r_{tt-1} + OMICRON\_R\_LAG2 \, r_{tt-2} + \pi_{tt} \, OMICRON\_PI \\ & + \tilde{y}_{tt} \, OMICRON\_Y + OMICRON\_Y \, \tilde{y}_{tt-1} + OMICRON\_R\_TAR \, r^{*} + \xi_{rt} \end{aligned} \tag{4}$$

$$\begin{aligned} \tilde{g}_{tt} = {} & \tilde{g}_{tt+1} \, PSI\_G\_PLUS - CONS + PSI\_G\_LAG \, \tilde{g}_{tt-1} + \tilde{y}_{tt+1} \, PSI\_Y\_PLUS \\ & - \tilde{y}_{tt} \, PSI\_Y\_0 + \tilde{y}_{tt-1} \, PSI\_Y\_LAG - \pi_{tt+1} \, PSI\_PI\_PLUS + \pi_{tt} \, PSI\_PI\_0 + \xi_{g_t} \end{aligned} \tag{5}$$

$${r^n}_t = \frac{sigma\_alpha \, (1 + \phi) \, (\rho_{\alpha} - 1)}{sigma\_alpha + \phi} \, a_{tt} + \frac{(omega - 1) \, \alpha \, \phi}{sigma\_alpha + \phi} \, (\rho_{c^*} - 1) \, c^{*}_{t\,t} \tag{6}$$

$$a_{tt} = \rho_{\alpha} \, a_{tt-1} + {\varepsilon^a}_t \tag{7}$$

$$c^{*}_{t\,t} = \rho_{c^*} \, c^{*}_{t\,t-1} + {\varepsilon^c}_t \tag{8}$$

$$\xi_{\pi t} = \rho_{\pi} \, \xi_{\pi t-1} + {\varepsilon^{\pi}}_t \tag{9}$$

$$\xi_{rt} = \rho_r \, \xi_{rt-1} + {\varepsilon^r}_t \tag{10}$$

$$\xi_{g_t} = \rho_g \, \xi_{g_{t-1}} + {\varepsilon^g}_t \tag{11}$$

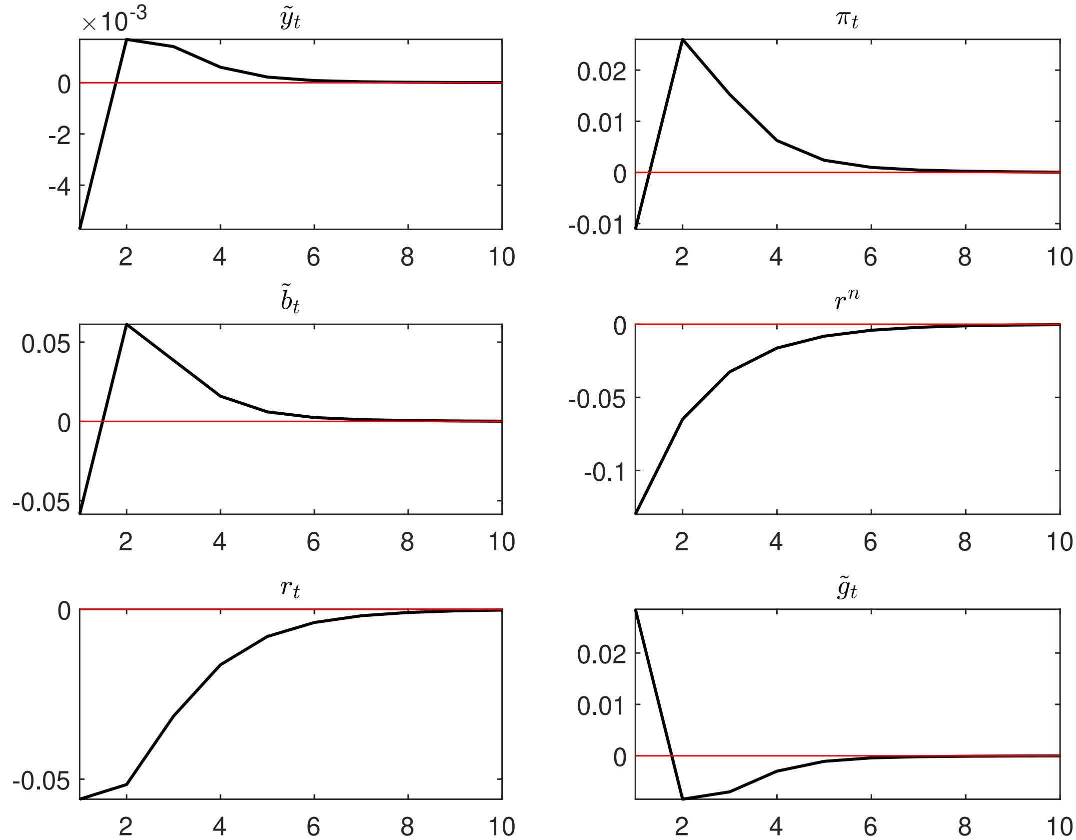

Figure 1: Impulse response functions (orthogonalized shock to ε^a).

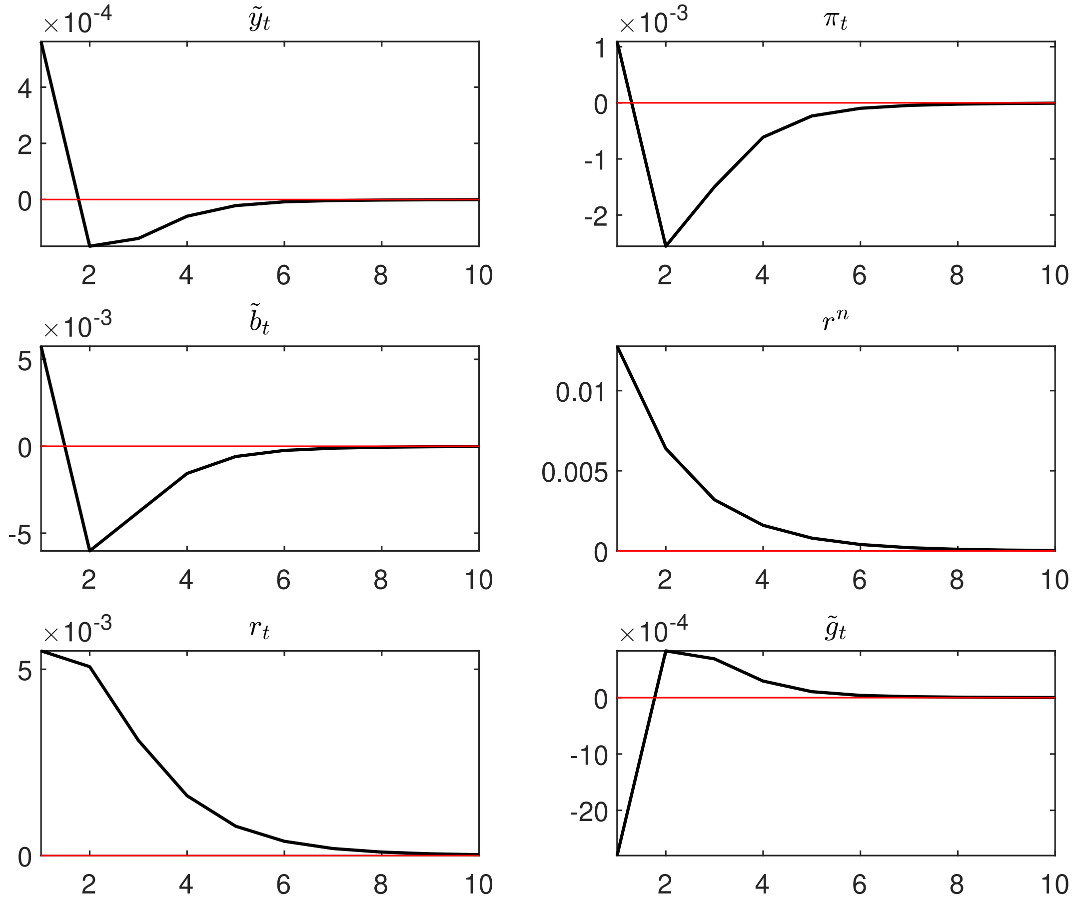

Figure 2: Impulse response functions (orthogonalized shock to ε^c).

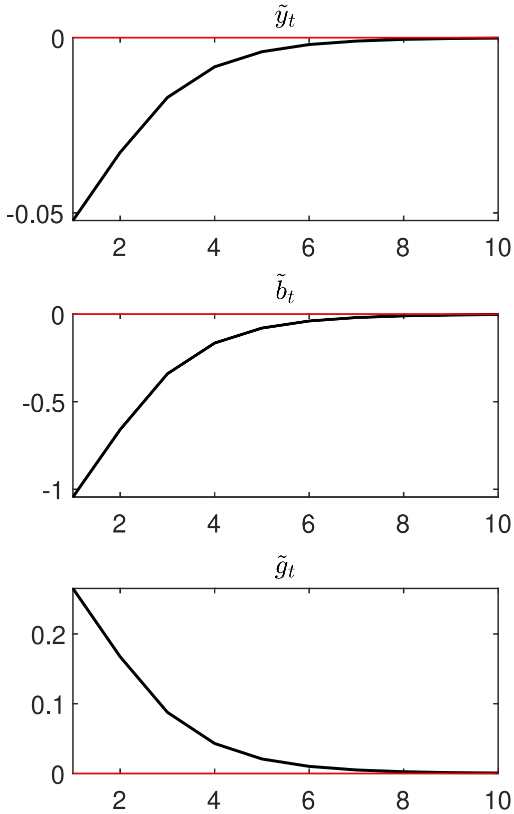

Figure 3: Impulse response functions (orthogonalized shock to ε^{π}).

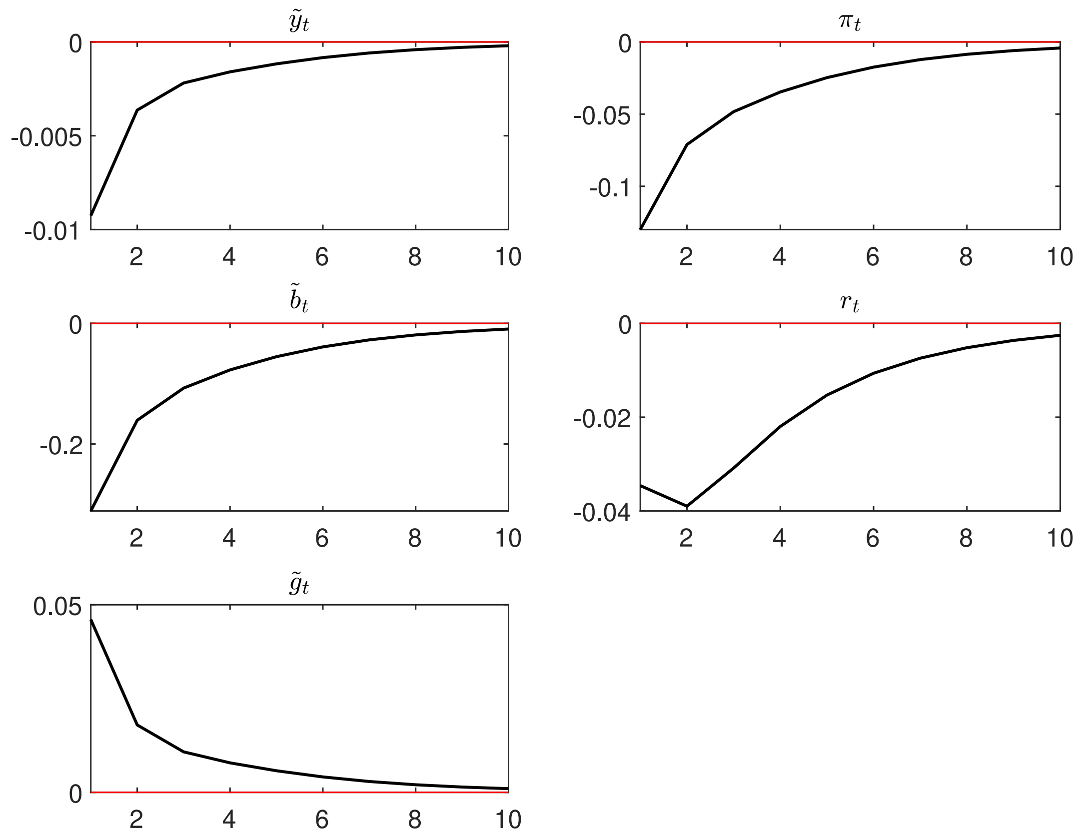

Figure 4: Impulse response functions (orthogonalized shock to ε^r).

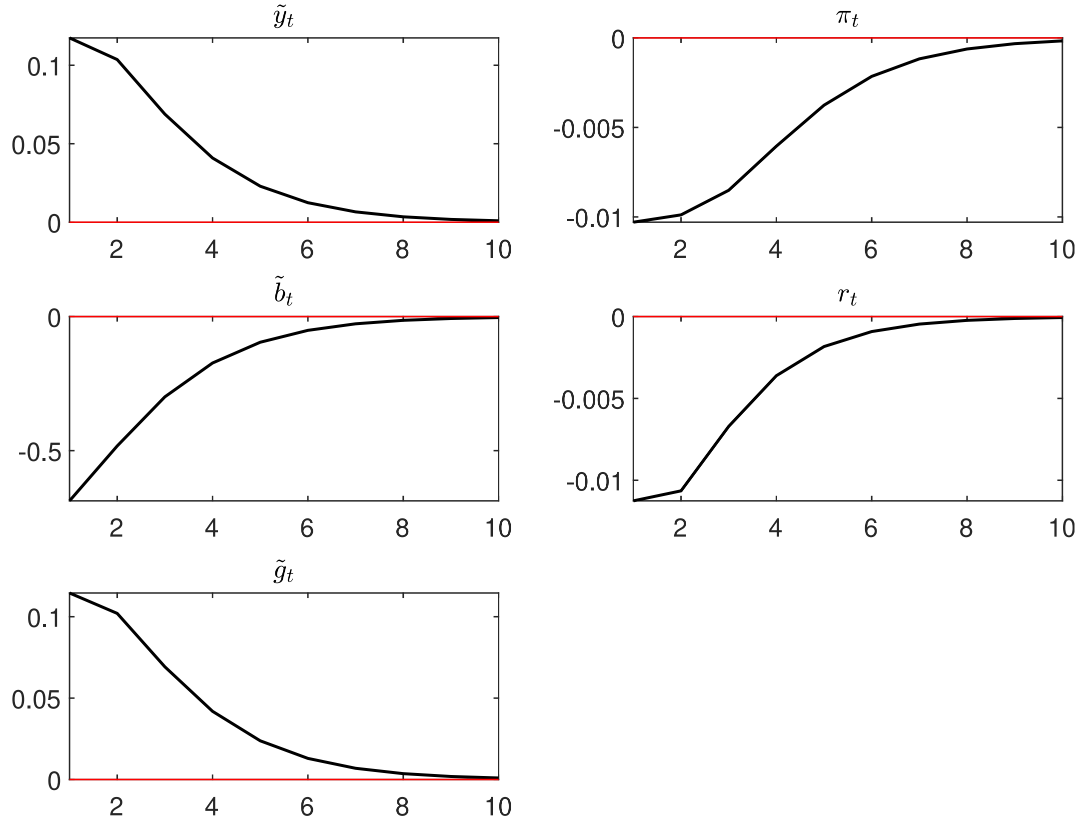

Figure 5: Impulse response functions (orthogonalized shock to ε^g).