

## 1 RW

### 1.1 Optimisation problem

$$\max_{\pi_t, y_t} U_t = -0.5 (-\text{pistar} + \pi_t)^2 + \beta \text{E}_t [U_{t+1}] - 0.5 \kappa \theta^{-1} y_t^2 \quad (1.1)$$

s.t. :

$$\pi_{t-1} = \log \text{etapi}_{t-1} + \beta \pi_t + \kappa y_{t-1} \quad \left( \lambda_t^{\text{RW}^1} \right) \quad (1.2)$$

### 1.2 First order conditions

$$\text{pistar} - \pi_t + \beta \lambda_t^{\text{RW}^1} - \beta \text{E}_t \left[ \lambda_{t+1}^{\text{RW}^1} \right] = 0 \quad (\pi_t) \quad (1.3)$$

$$\beta \kappa \text{E}_t \left[ \lambda_{t+1}^{\text{RW}^1} \right] - \kappa \theta^{-1} y_t = 0 \quad (y_t) \quad (1.4)$$

## 2 EXOG

### 2.1 Identities

$$\text{etapi}_t = e^{\epsilon_t^\pi + \phi \log \text{etapi}_{t-1}} \quad (2.1)$$

## 3 Equilibrium relationships (after reduction)

$$-\text{etapi}_t + e^{\epsilon_t^\pi + \phi \log \text{etapi}_{t-1}} = 0 \quad (3.1)$$

$$\beta \kappa \text{E}_t \left[ \lambda_{t+1}^{\text{RW}^1} \right] - \kappa \theta^{-1} y_t = 0 \quad (3.2)$$

$$\text{pistar} - \pi_t + \beta \lambda_t^{\text{RW}^1} - \beta \text{E}_t \left[ \lambda_{t+1}^{\text{RW}^1} \right] = 0 \quad (3.3)$$

$$-\pi_{t-1} + \log \text{etapi}_{t-1} + \beta \pi_t + \kappa y_{t-1} = 0 \quad (3.4)$$

$$U_t + 0.5 (-\text{pistar} + \pi_t)^2 - \beta \text{E}_t [U_{t+1}] + 0.5 \kappa \theta^{-1} y_t^2 = 0 \quad (3.5)$$

## 4 Steady state relationships (after reduction)

$$-etapi_{ss} + e^{\phi \log etapi_{ss}} = 0 \quad (4.1)$$

$$\beta \kappa \lambda_{ss}^{RW^1} - \kappa \theta^{-1} y_{ss} = 0 \quad (4.2)$$

$$pistar - \pi_{ss} = 0 \quad (4.3)$$

$$-\pi_{ss} + \log etapi_{ss} + \beta \pi_{ss} + \kappa y_{ss} = 0 \quad (4.4)$$

$$U_{ss} + 0.5 (-pistar + \pi_{ss})^2 - \beta U_{ss} + 0.5 \kappa \theta^{-1} y_{ss}^2 = 0 \quad (4.5)$$

## 5 Parameter settings

$$\beta = 0.99 \quad (5.1)$$

$$\kappa = 0.2465 \quad (5.2)$$

$$\phi = 0 \quad (5.3)$$

$$pistar = 0 \quad (5.4)$$

$$\sigma = 1 \quad (5.5)$$

$$\theta = 6 \quad (5.6)$$

## 6 Steady-state values

	Steady-state value
$\epsilon\lambda\pi_i$	1
$\lambda^{\text{RW}^1}$	0
$\pi$	0
$y$	0
$U$	0

## 7 Model statistics

### 7.1 Basic statistics

	Steady-state value	Std. dev.	Variance	Loglin
$\epsilon\lambda\pi_i$	1	0.0964	0.0093	Y
$\lambda^{\text{RW}^1}$	0	0.0611	0.0037	N
$\pi$	0	0.0311	0.001	N
$y$	0	0.2734	0.0747	N
$U$	0	0	0	N

### 7.2 Correlation matrix

	$\epsilon\lambda\pi_i$	$\lambda^{\text{RW}^1}$	$\pi$	$y$
$\epsilon\lambda\pi_i$	1	-0.662	0.104	-0.949
$\lambda^{\text{RW}^1}$		1	0.677	0.864
$\pi$			1	0.215
$y$				1

### 7.3 Cross correlations with the reference variable ( $\pi$ )

	$\sigma[\cdot]$ rel. to $\sigma[\pi]$	$\pi_{t-5}$	$\pi_{t-4}$	$\pi_{t-3}$	$\pi_{t-2}$	$\pi_{t-1}$	$\pi_t$	$\pi_{t+1}$	$\pi_{t+2}$	$\pi_{t+3}$	$\pi_{t+4}$	$\pi_{t+5}$
$\epsilon\lambda\pi_t$	3.098	0.08	0.064	-0.003	-0.228	-0.949	0.104	0.098	0.091	0.083	0.073	0.064
$\lambda_t^{\text{RW}^1}$	1.962	-0.14	-0.132	-0.072	0.147	0.864	0.677	0.089	-0.089	-0.135	-0.139	-0.129
$\pi_t$	1	-0.108	-0.112	-0.099	-0.029	0.215	1	0.215	-0.029	-0.099	-0.112	-0.108
$y_t$	8.784	-0.112	-0.099	-0.029	0.215	1	0.215	-0.029	-0.099	-0.112	-0.108	-0.097

### 7.4 Autocorrelations

	Lag 1	Lag 2	Lag 3	Lag 4	Lag 5
$\epsilon\lambda\pi_i$	-0.074	-0.071	-0.066	-0.06	-0.054
$\lambda^{\text{RW}^1}$	0.556	0.021	-0.137	-0.174	-0.171
$\pi$	0.215	-0.029	-0.099	-0.112	-0.108
$y$	0.215	-0.029	-0.099	-0.112	-0.108

## 8 Impulse response functions

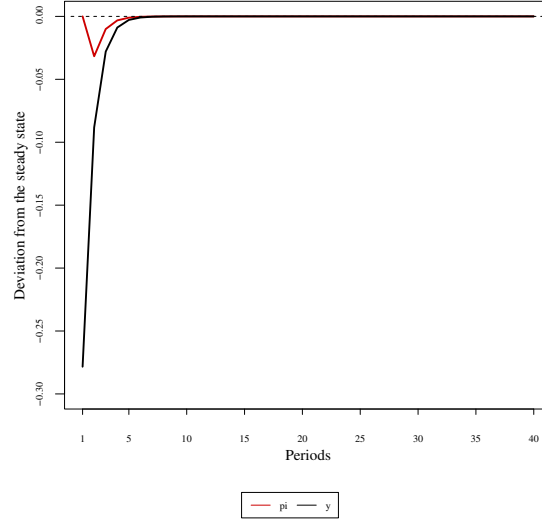


Figure 1: Impulse responses  $(\pi, y)$  to  $\epsilon^\pi$  shock

## 9 Model statistics

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	Steady-state value	Std. dev.	Variance	Loglin
$\epsilon^{\pi} \pi$	1	0.0964	0.0093	Y
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	$\epsilon^{\pi} \pi$	$\lambda^{\text{RW}^1}$	$\pi$	$y$
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$\lambda^{\text{RW}^1}$		1	0.677	0.864
$\pi$			1	0.215
$y$				1

### 9.3 Cross correlations with the reference variable ( $\pi$ )

	$\sigma[\cdot]$ rel. to $\sigma[\pi]$	$\pi_{t-5}$	$\pi_{t-4}$	$\pi_{t-3}$	$\pi_{t-2}$	$\pi_{t-1}$	$\pi_t$	$\pi_{t+1}$	$\pi_{t+2}$	$\pi_{t+3}$	$\pi_{t+4}$	$\pi_{t+5}$
$\epsilon^{\pi} \pi_t$	3.098	0.08	0.064	-0.003	-0.228	-0.949	0.104	0.098	0.091	0.083	0.073	0.064
$\lambda_t^{\text{RW}^1}$	1.962	-0.14	-0.132	-0.072	0.147	0.864	0.677	0.089	-0.089	-0.135	-0.139	-0.129
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## 10 Impulse response functions

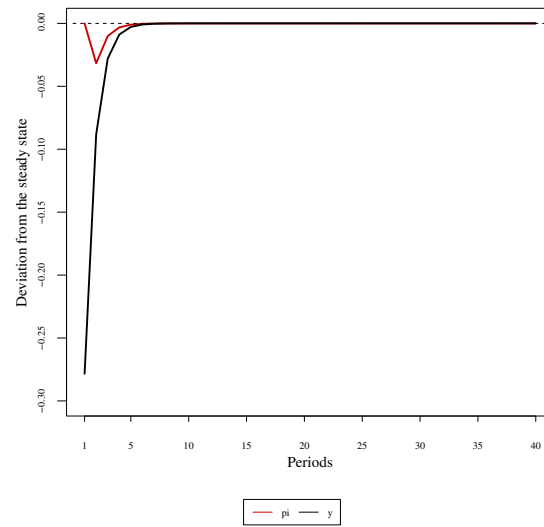


Figure 2: Impulse responses  $(\pi, y)$  to  $\epsilon^\pi$  shock

## 11 Impulse response functions

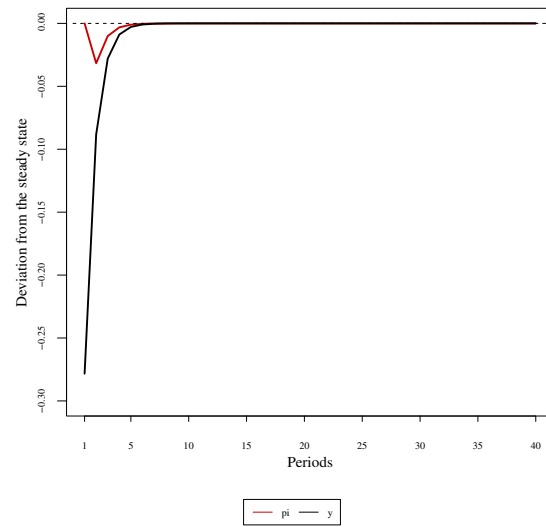


Figure 3: Impulse responses  $(\pi, y)$  to  $\epsilon^\pi$  shock