Insider-Outsider Labor Markets, Hysteresis and Monetary Policy

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Figure 1. Unemployment Rate in the Euro Area

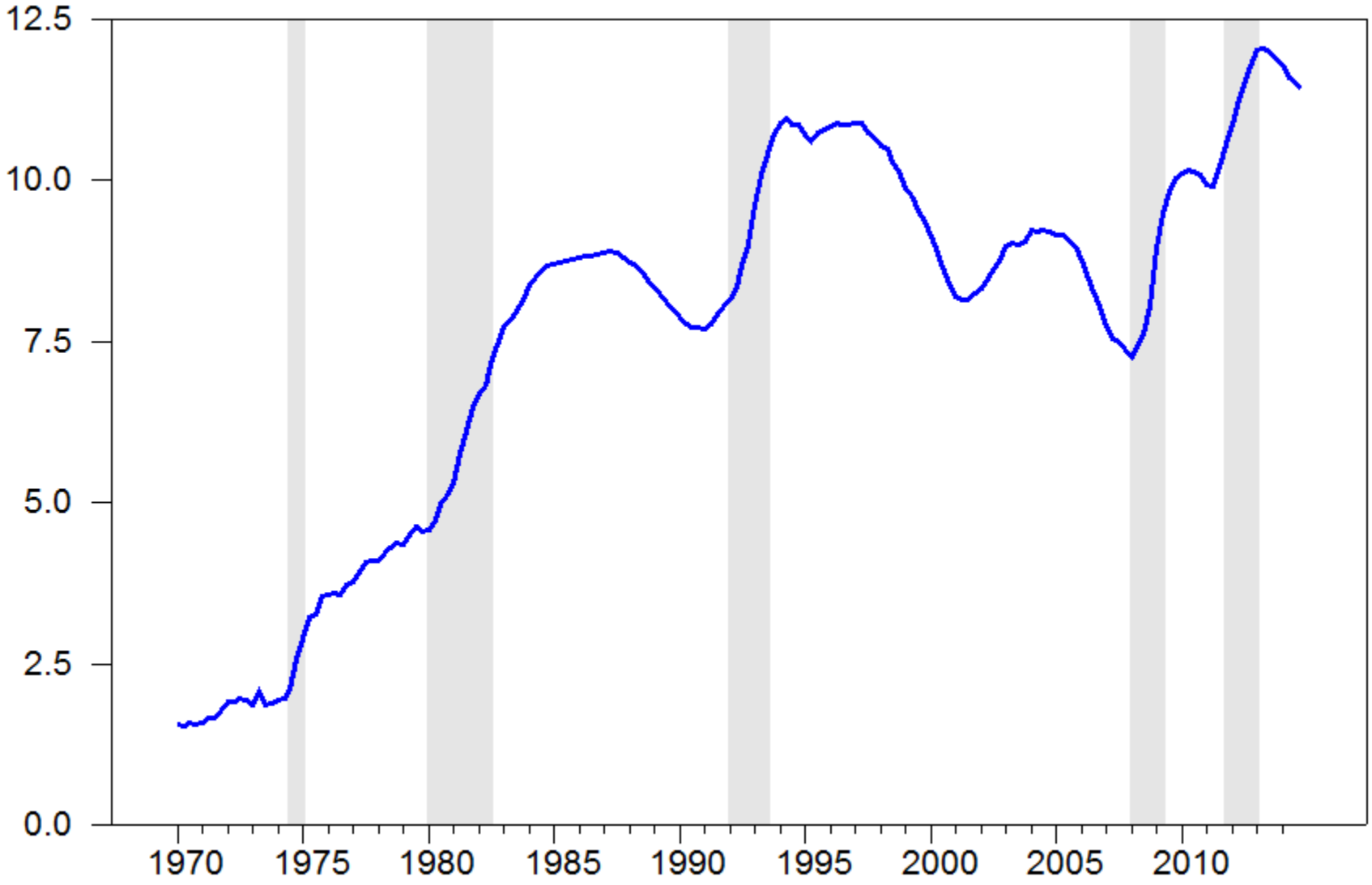
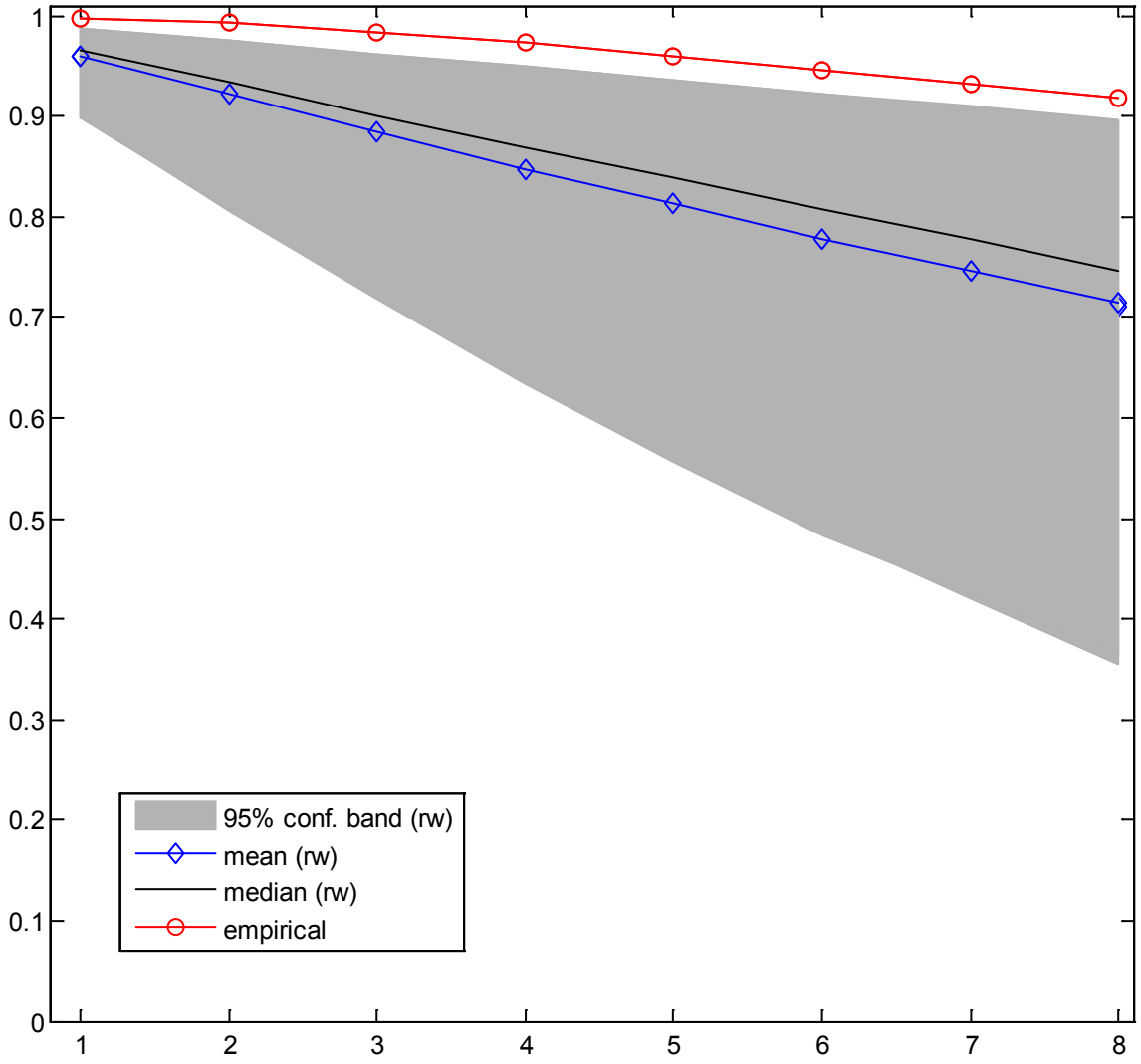


Figure 2.a Euro Area Unemployment: Autocorrelogram

1970Q1-2014Q4 (180 obs.)



Outline

- Can the New Keynesian model account for the high persistence of European unemployment?

  (i) standard model
  (ii) a model with insider-outsider labor markets and hysteresis

- Implications of insider-outsider labor markets and hysteresis for the design of monetary policy

  (i) optimal policy
  (ii) optimal policy vs. simple rules

A New Keynesian Model with Unemployment

- Based on Galí (2011) and Galí-Smets-Wouters (2013)
- Infinitely-lived household
- Continuum of occupations, indivisible labor, risk sharing.
- Preferences

$$E_0 \sum_{t=0}^{\infty} \beta^t \left(\log C_t - \int_0^1 \frac{\mathcal{N}_t(j)^{1+\varphi}}{1+\varphi} dj \right) Z_t$$

where $z_t \equiv \log Z_t \sim AR(1)$ and $x_t \equiv \log \frac{\epsilon_{p,t}}{\epsilon_{p,t-1}} \sim AR(1)$

- Monopolistic competition in goods and labor markets
- Staggered price and wage setting à la Calvo

A New Keynesian Model with Unemployment

- Technology

$$Y_t(i) = A_t N_t(i)^{1-\alpha}$$

where $a_t \equiv \log A_t \sim AR(1)$

- Monetary policy

$$i_t = \phi_i i_{t-1} + (1-\phi_i) i_t^*$$

$$i_t^* = \phi_\pi \pi_t^p + \phi_y \Delta y_t$$

A New Keynesian Model with Unemployment

- Aggregate participation

$$w_t - p_t = c_t + \varphi l_t$$

- Average wage markup

$$\mu_t^w \equiv (w_t - p_t) - (c_t + \varphi n_t)$$

- Unemployment

$$u_t \equiv l_t - n_t$$

- Unemployment and the wage markup

$$\mu_t^w = \varphi u_t$$

Wage Setting in the Standard NK Model

- Staggered wage setting à la Calvo

$$w_t = \theta_w w_{t-1} + (1-\theta_w) w_t^*$$

- Optimal wage setting rule:

$$w_t^* = \mu^w + (1-\beta\theta_w) \sum_{k=0}^{\infty} (\beta\theta_w)^k E_t \left\{ \underline{w}_{t+k|t} \right\}$$

where $\underline{w}_{t+k|t} \equiv p_{t+k} + c_{t+k} + \varphi n_{t+k|t}$ and $\mu^w \equiv \log \frac{\epsilon_w}{\epsilon_w - 1}$.

- Equivalently, and letting $\mu^w_{t+k|t} \equiv w_t^* - \underline{w}_{t+k|t}$:

$$(1-\beta\theta_w) \sum_{k=0}^{\infty} (\beta\theta_w)^k E_t \left\{ \mu^w_{t+k|t} \right\} = \mu^w$$

Wage Setting in the Standard NK Model

- Wage inflation equation:

$$\pi_t^w = \beta E_t\{\pi_{t+1}^w\} - \lambda_w(\mu_t^w - \mu^w)$$

- Wage inflation and unemployment

$$\pi_t^w = \beta E_t\{\pi_{t+1}^w\} - \lambda_w \varphi(u_t - u)$$

where $u \equiv \frac{\mu^w}{\varphi}$ is the *natural* rate of unemployment

- Sources of unemployment stationarity

Unemployment Persistence: Simulations

- Calibration
- Unemployment persistence in the standard New Keynesian model

Table 2. Calibration		
φ	Curvature of labor disutility	3.4
β	Discount factor	0.99
α	Decreasing returns to labor	0.26
ϵ_w	Elasticity of substitution (labor)	4.3
ϵ_p	Elasticity of substitution (goods)	3.8
θ_p	Calvo index of price rigidities	0.75
θ_w	Calvo index of wage rigidities	0.75
ϕ_i	Lagged interest rate coefficient	0.9
ϕ_π	Inflation coefficient	1.5
ϕ_y	Output growth coefficient	0.5

Table 3 (s)
Unemployment Persistence in the Standard New Keynesian Model

	$\rho_u(1)$	$\rho_u(4)$	$\rho_u(8)$
Data			
1970Q1-2014Q4	0.99	0.97	0.91
1985Q1-2014Q4	0.98	0.83	0.52
Baseline ($\theta_w = 0.75$)			
Technology	0.86 (0.77,0.90)	0.50 (0.23,0.68)	0.19 (−0.10,0.46)
Markup	0.95 (0.91,0.97)	0.69 (0.49,0.81)	0.33 (−0.01,0.59)
Demand	0.81 (0.72,0.87)	0.41 (0.18,0.60)	0.14 (−0.16,0.42)

Note: Based on 200 simulations of 180 observations each. Persistence of driving forces: $\rho_a = \rho_x = \rho_z = 0.99$. For each statistic, the table reports the median and 95% confidence interval (in brackets).

Table 3
Unemployment Persistence in the Standard New Keynesian Model

	$\rho_u(1)$	$\rho_u(4)$	$\rho_u(8)$
Data			
1970Q1-2014Q4	0.99	0.97	0.91
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Demand	0.81 (0.72,0.87)	0.41 (0.18,0.60)	0.14 (−0.16,0.42)
High stickiness ($\theta_w = 0.95$)			
Technology	0.97 (0.81,0.56)	0.81 (0.63,0.91)	0.56 (0.21,0.78)
Markup	0.97 (0.94,0.98)	0.80 (0.63,0.91)	0.54 (0.21,0.78)
Demand	0.90 (0.82,0.96)	0.68 (0.43,0.86)	0.50 (0.12,0.76)

Note: Based on 200 simulations of 180 observations each. Persistence of driving forces: $\rho_a = \rho_x = \rho_z = 0.99$. For each statistic, the table reports the median and 95% confidence interval (in brackets).

Wage Setting: An Insider-Outsider Model

- Blanchard-Summers (1986), Gottfries and Horn (1987), Lindbeck and Snower (1988),...

"...there is a fundamental asymmetry in the wage-setting process between insiders who are employed and outsiders who want jobs. Outsiders are disenfranchised and wages are set with a view to ensuring the jobs of insiders. Shocks that lead to reduced employment change the number of insiders and thereby change the subsequent equilibrium wage rate, given rise to hysteresis..." *Blanchard and Summers (1986).*

Wage Setting: An Insider-Outsider Model

- Staggered wage setting à la Calvo

$$w_t = \theta_w w_{t-1} + (1-\theta_w) w_t^*$$

- Wage setting rule

$$(1-\beta\theta_w) \sum_{k=0}^{\infty} (\beta\theta_w)^k E_t \left\{ n_{t+k|t}(j) \right\} = n_t^*(j)$$

- Introducing hysteresis

$$n_t^*(j) = \gamma n_{t-1}(j) + (1-\gamma) n^*$$

Wage Setting: An Insider-Outsider Model

- Implied wage inflation equation:

$$\pi_t^w = \beta E_t\{\pi_{t+1}^w\} + (1-\gamma)\lambda_n(1-\beta\theta_w)\widehat{n}_t + \gamma\lambda_n\Delta n_t$$

  where $\lambda_n \equiv \frac{1-\theta_w}{\theta_w \epsilon_w}$.

- Extreme case (I): *No hysteresis* ($\gamma = 0$)

$$\pi_t^w = \beta E_t\{\pi_{t+1}^w\} + \lambda_n(1-\beta\theta_w)\widehat{n}_t$$

- Extreme case (II): *Full hysteresis* ($\gamma = 1$)

$$\pi_t^w = \beta E_t\{\pi_{t+1}^w\} + \lambda_n\Delta n_t$$

Unemployment Persistence: Simulations

- Calibration
- Unemployment persistence in the standard New Keynesian model
- Unemployment persistence in the New Keynesian model with insider-outsider labor markets and hysteresis

Table 4
Unemployment Persistence with Insider-Outsider Labor Markets

	$\rho_u(1)$	$\rho_u(4)$	$\rho_u(8)$
Data			
1970Q1-2014Q4	0.99	0.97	0.91
1985Q1-2014Q4	0.98	0.83	0.52
Technology			
Standard	0.62 (0.50,0.72)	0.06 (−0.16,0.26)	−0.09 (−0.25,0.12)
$\gamma = 0.0$	0.61 (0.51,0.71)	0.03 (−0.16,0.22)	−0.10 (−0.32,0.08)
$\gamma = 0.9$	0.83 (0.67,0.93)	0.57 (0.16,0.83)	0.45 (−0.06,0.78)
$\gamma = 1.0$	0.93 (0.74,0.98)	0.82 (0.34,0.94)	0.73 (0.18,0.90)
Markup			
Standard	0.95 (0.91,0.97)	0.63 (0.46,0.76)	0.21 (−0.09,0.46)
$\gamma = 0.0$	0.95 (0.91,0.97)	0.62 (0.40,0.76)	0.15 (−0.20,0.45)
$\gamma = 0.9$	0.97 (0.93,0.99)	0.83 (0.59,0.92)	0.58 (0.20,0.81)
$\gamma = 1.0$	0.97 (0.94,0.99)	0.87 (0.69,0.96)	0.70 (0.36,0.92)
Demand			
Standard	0.80 (0.71,0.87)	0.41 (0.18,0.57)	0.12 (−0.18,0.37)
$\gamma = 0.0$	0.81 (0.69,0.88)	0.42 (0.14,0.62)	0.15 (−0.16,0.40)
$\gamma = 0.9$	0.93 (0.82,0.97)	0.77 (0.45,0.92)	0.60 (0.17,0.85)
$\gamma = 1.0$	0.96 (0.87,0.99)	0.86 (0.58,0.96)	0.73 (0.33,0.91)

Note: Based on 200 simulations of 180 observations each. Persistence of driving forces: $\rho_a = \rho_x = \rho_z = 0.92$. For each statistic, the table reports the median and 95% confidence interval (in brackets).

Monetary Policy Design with Insider-Outsider Labor Markets

- Optimal monetary policy

$$\min E_0 \sum_{t=0}^{\infty} \beta^t \left((1+\varphi)(1-\alpha)\widehat{n}_t^2 + \frac{\epsilon_p}{\lambda_p}(\pi_t^p)^2 + \frac{\epsilon_w(1-\alpha)}{\lambda_w}(\pi_t^w)^2 \right)$$

subject to

$$\pi_t^p = \beta E_t\{\pi_{t+1}^p\} + \lambda_p \alpha \widehat{n}_t + \lambda_p \widetilde{\omega}_t$$

$$\pi_t^w = \beta E_t\{\pi_{t+1}^w\} + (1-\gamma)\lambda_n(1-\beta\theta_w)\widehat{n}_t + \gamma\lambda_n \Delta n_t$$

$$\widetilde{\omega}_{t-1} \equiv \widetilde{\omega}_t - \pi_t^w + \pi_t^p + \Delta a_t - \Delta x_t$$

for $t = 0, 1, 2, ..$where $\widetilde{\omega}_t \equiv \omega_t - (a_t - \alpha n + \log(1-\alpha) - x_t)$

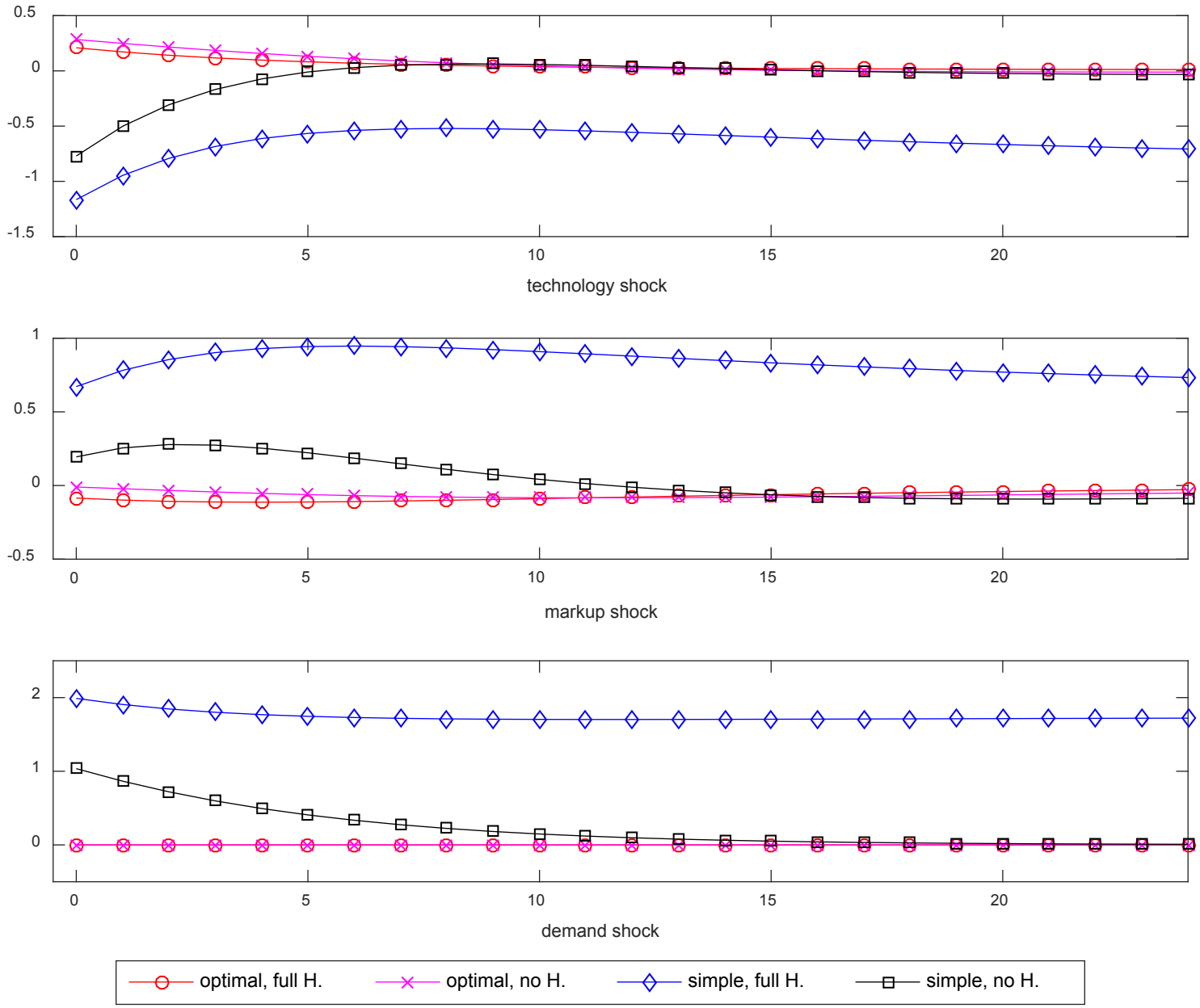
Monetary Policy Design with Insider-Outsider Labor Markets

- Optimal policy vs. baseline simple rule

$$i_t^* = 1.5\pi_t^p + 0.5\Delta y_t$$

with $\phi_i = 0.9$

Figure 4. Unemployment Response to Shocks: Optimal Policy vs. Simple Rule



Monetary Policy Design with Insider-Outsider Labor Markets

- Optimal policy vs. baseline simple rule

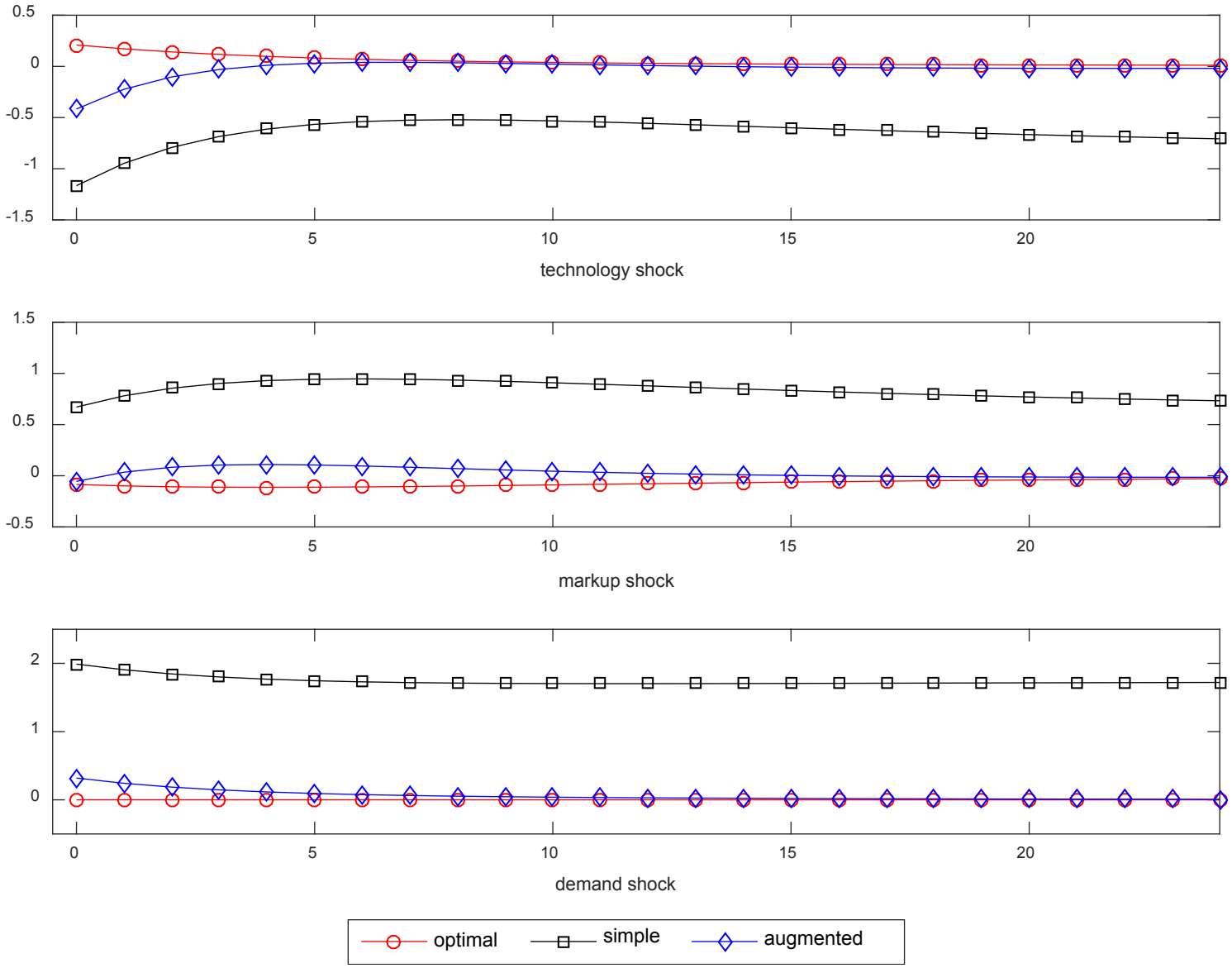
$$i_t^* = 1.5\pi_t^p + 0.5\Delta y_t$$

- Optimal policy vs. augmented simple rule

$$i_t^* = 1.5\pi_t^p + 0.5\Delta y_t - 0.5u_t$$

with $\phi_i = 0.9$

Figure 5. Unemployment Response to Shocks under Full Hysteresis (γ=1): Optimal Policy, Simple Rule and Augmented Rule



Monetary Policy Design with Insider-Outsider Labor Markets

- Optimal policy vs. baseline simple rule

$$i_t^* = 1.5\pi_t^p + 0.5\Delta y_t$$

- Optimal policy vs. augmented simple rule

$$i_t^* = 1.5\pi_t^p + 0.5\Delta y_t - 0.5u_t$$

  with $\phi_i = 0.9$
- Welfare

Table 5 (s)
Hysteresis, Monetary Policy and Welfare

	Hysteresis Parameter					
	$\gamma = 0$		$\gamma = 0.9$		$\gamma = 1$	
Technology						
Simple	0.067	1.0	0.101	1.0	0.425	1.0
Optimal	0.017	0.25	0.018	0.17	0.018	0.04
Markup						
Simple	0.046	1.0	0.097	1.0	0.410	1.0
Optimal	0.017	0.36	0.018	0.18	0.018	0.04
Demand						
Simple	0.135	1.0	0.294	1.0	1.953	1.0
Optimal	0.0	0.0	0.0	0.0	0.0	0.0

Table 5
Hysteresis, Monetary Policy and Welfare

	Hysteresis Parameter					
	$\gamma = 0$		$\gamma = 0.9$		$\gamma = 1$	
Technology						
Simple	0.067	1.0	0.101	1.0	0.425	1.0
Optimal	0.017	0.25	0.018	0.17	0.018	0.04
Augmented	0.035	0.52	0.031	0.30	0.032	0.07
Markup						
Simple	0.046	1.0	0.097	1.0	0.410	1.0
Optimal	0.017	0.36	0.018	0.18	0.018	0.04
Augmented	0.040	0.87	0.023	0.23	0.026	0.06
Demand						
Simple	0.135	1.0	0.294	1.0	1.953	1.0
Optimal	0.0	0.0	0.0	0.0	0.0	0.0
Augmented	0.007	0.05	0.004	0.01	0.005	< 0.01

Concluding Remarks

- The standard New Keynesian model cannot account for high unemployment persistence (as observed in Europe), given plausible nominal wage rigidities.
- A simple modification of the model, incorporating insider-outsider labor markets and hysteresis in unions' employment target can generate high persistence in unemployment (even a unit root).
- The presence of hysteresis calls for a more aggressive stabilization of unemployment than a baseline simple rule, in response to any shock.
- The welfare gains from shifting to the optimal policy can be considerable, and increasing in the degree of hysteresis.
- The optimal policy can be approximated reasonably well by an augmented simple rule that responds to the unemployment rate.
- In the absence of such a response the economy may stabilize at an inefficient level without generating any inflationary pressures and, hence, without eliciting a policy response.

Figure 2.b Euro Area Unemployment: Autocorrelogram

1985Q1-2014Q4 (120 obs.)

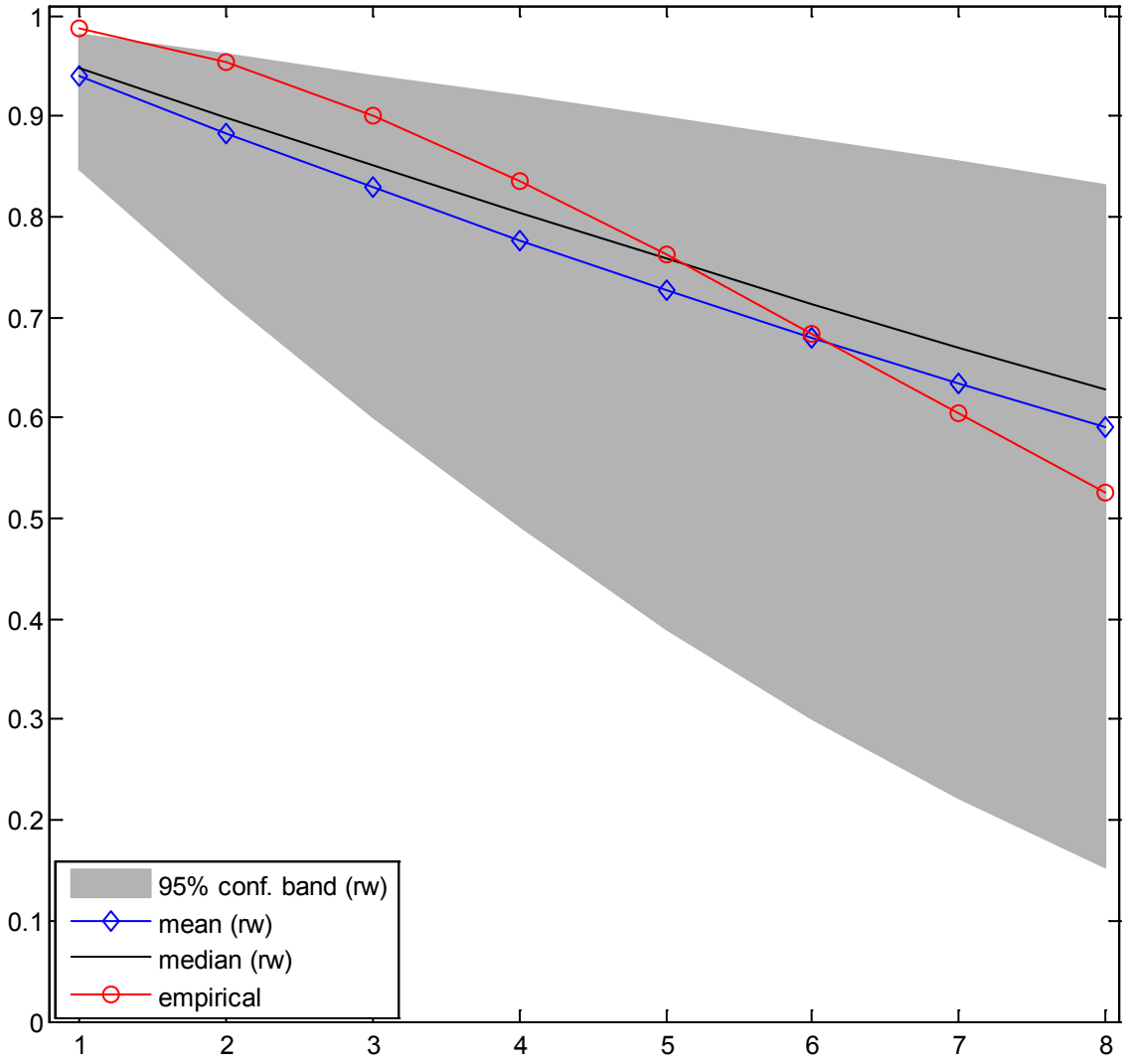


Figure A2. Euro Area Unemployment: Autocorrelogram

1999Q1-2014Q4 (64 obs.)

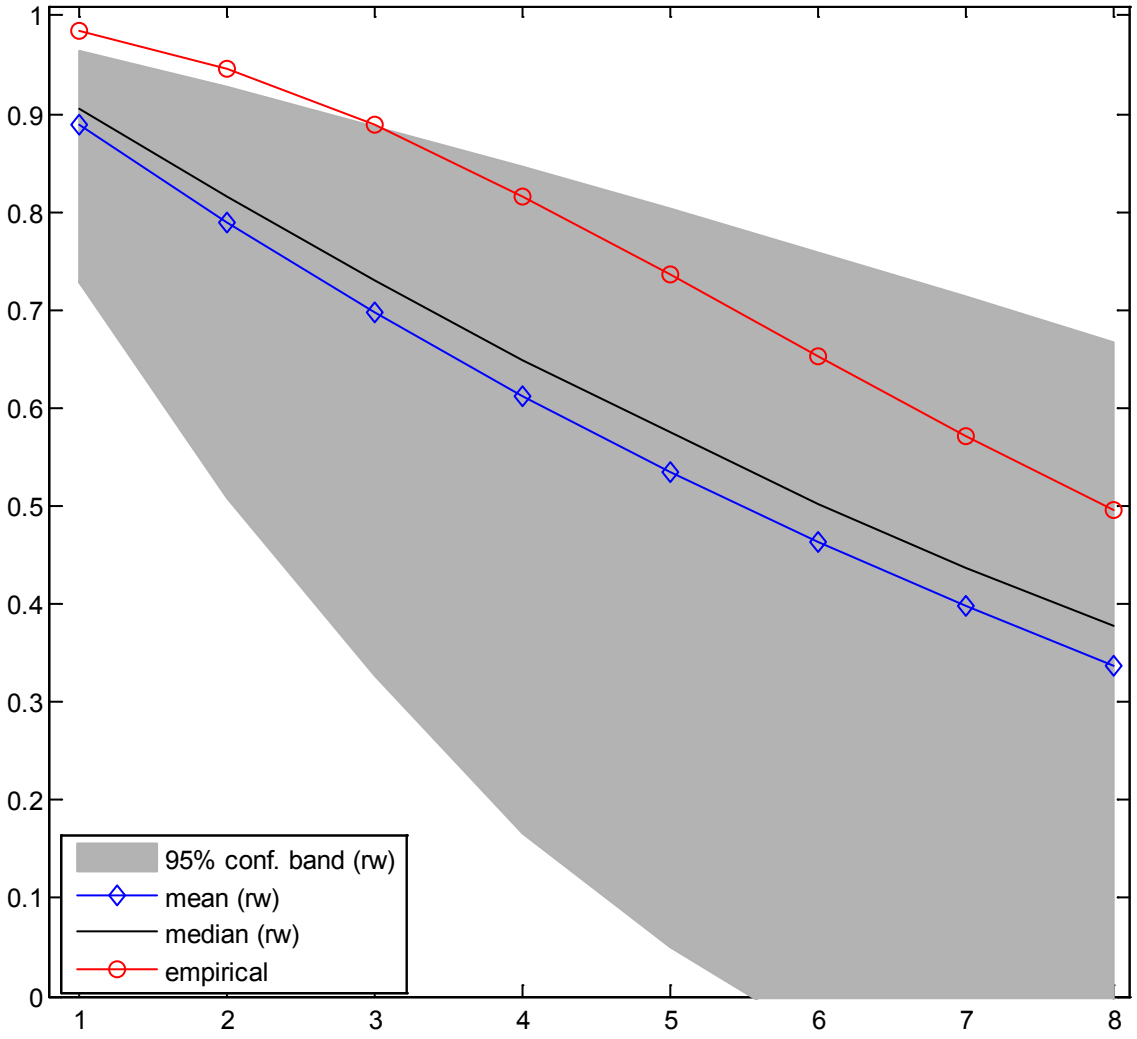


Figure 3. Hysteresis and Unemployment Rate Persistence

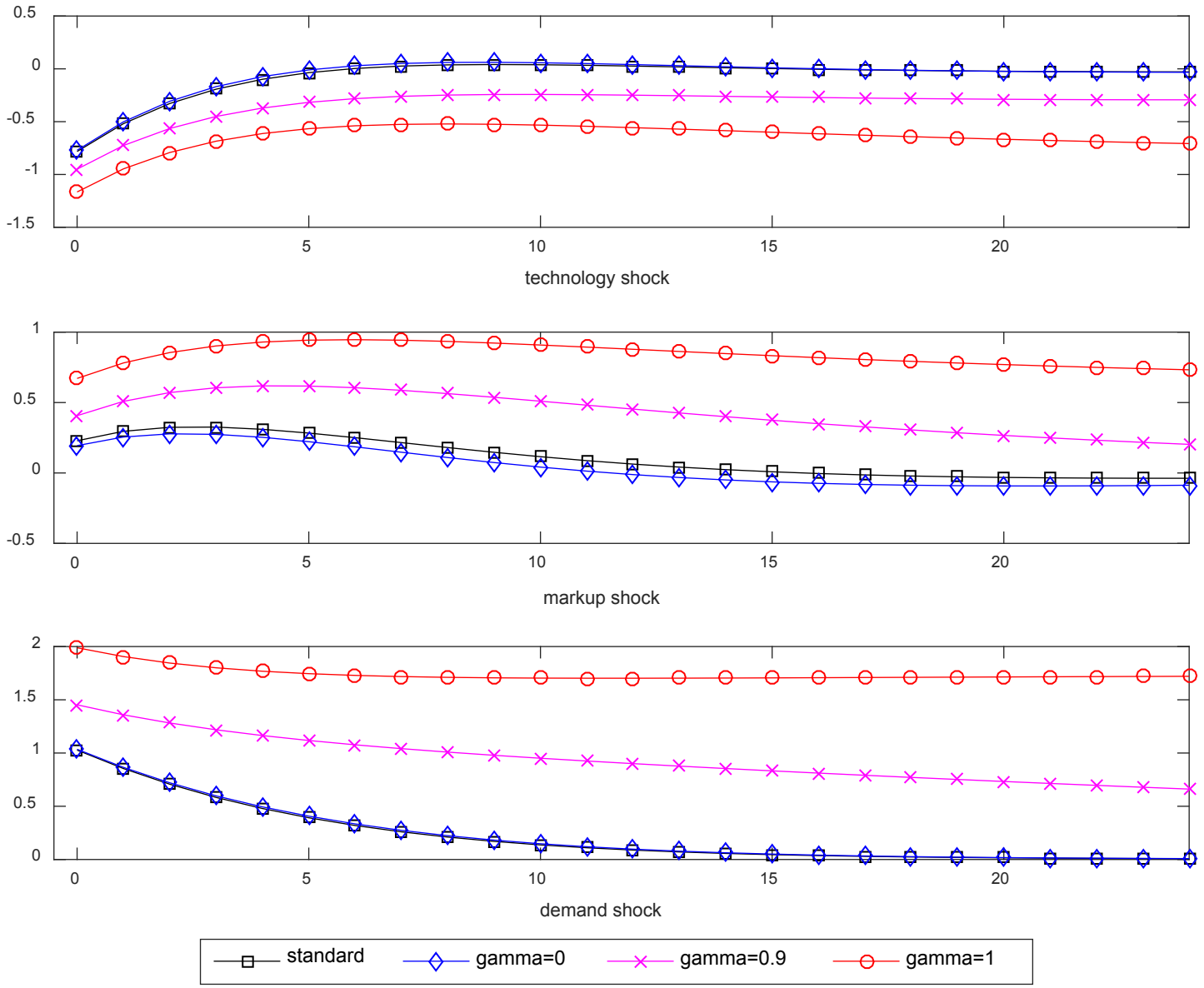


Figure 6.a Optimal vs. Augmented Rule: Technology Shocks

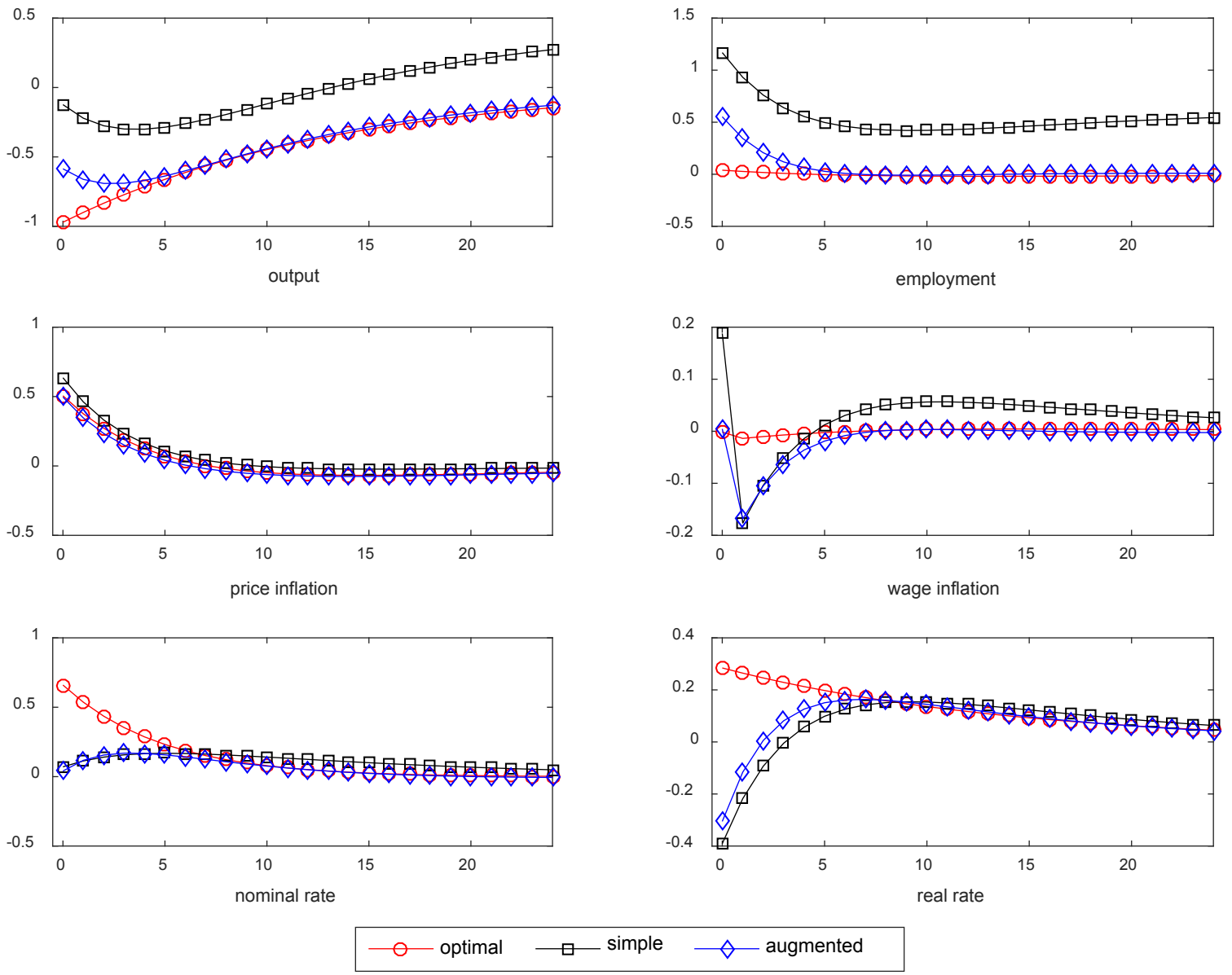


Figure 6.b Optimal vs. Augmented Rule: Markup Shocks

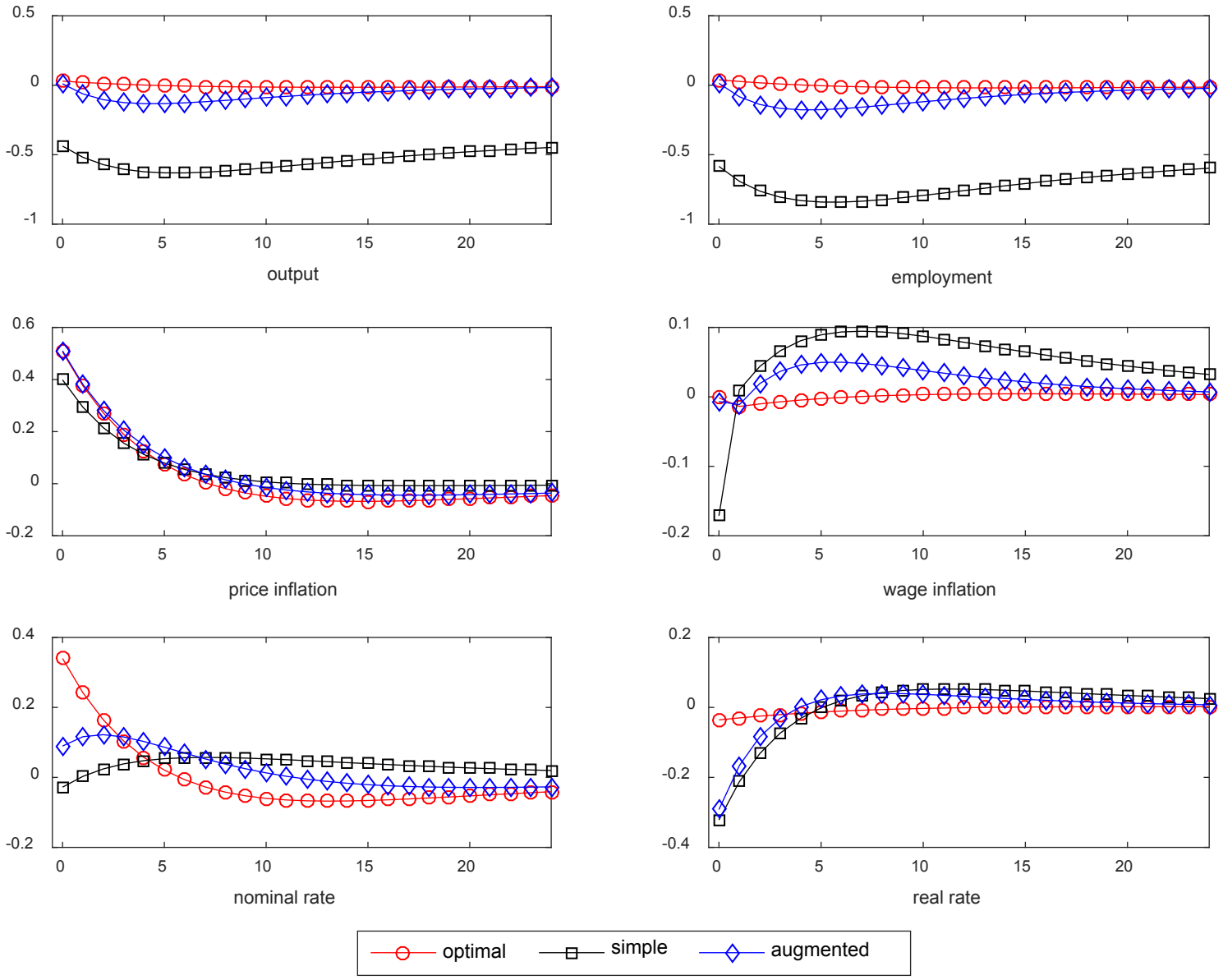


Figure 6.c Optimal vs. Augmented Rule: Demand Shocks

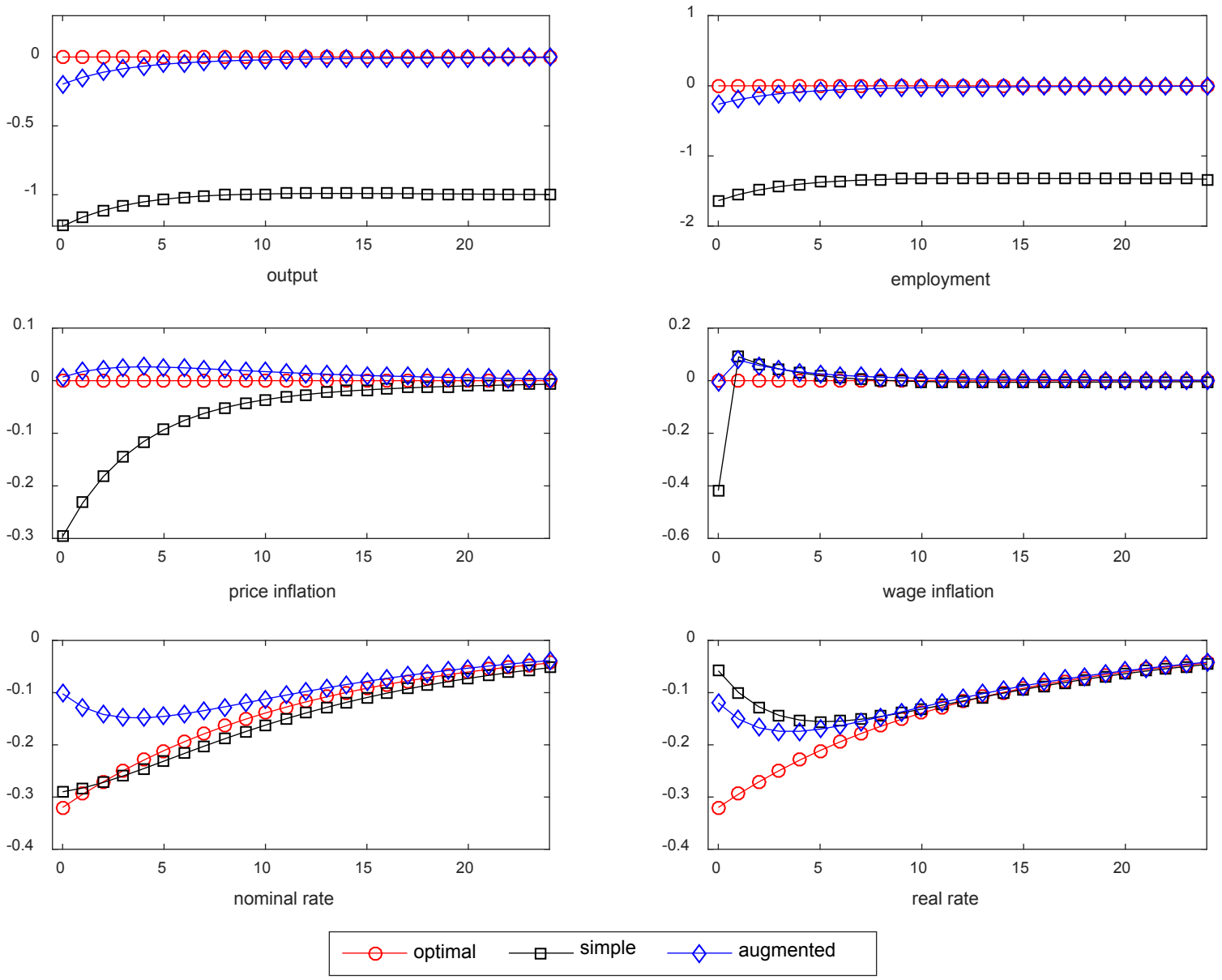


Figure A1 Optimal Policy vs. Simple Rule: Technology Shocks

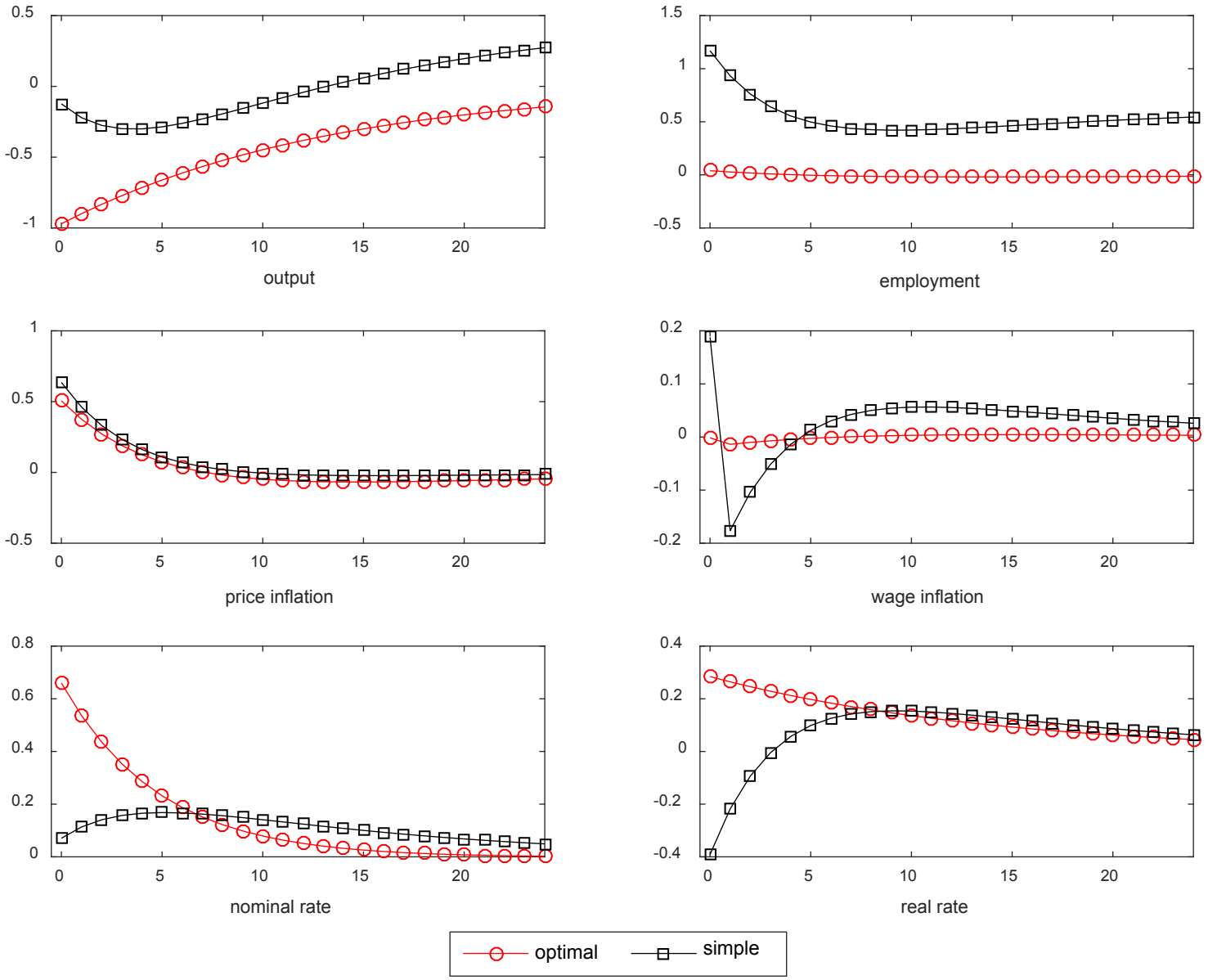


Figure A2. Optimal Policy vs. Simple Rule: Markup Shocks

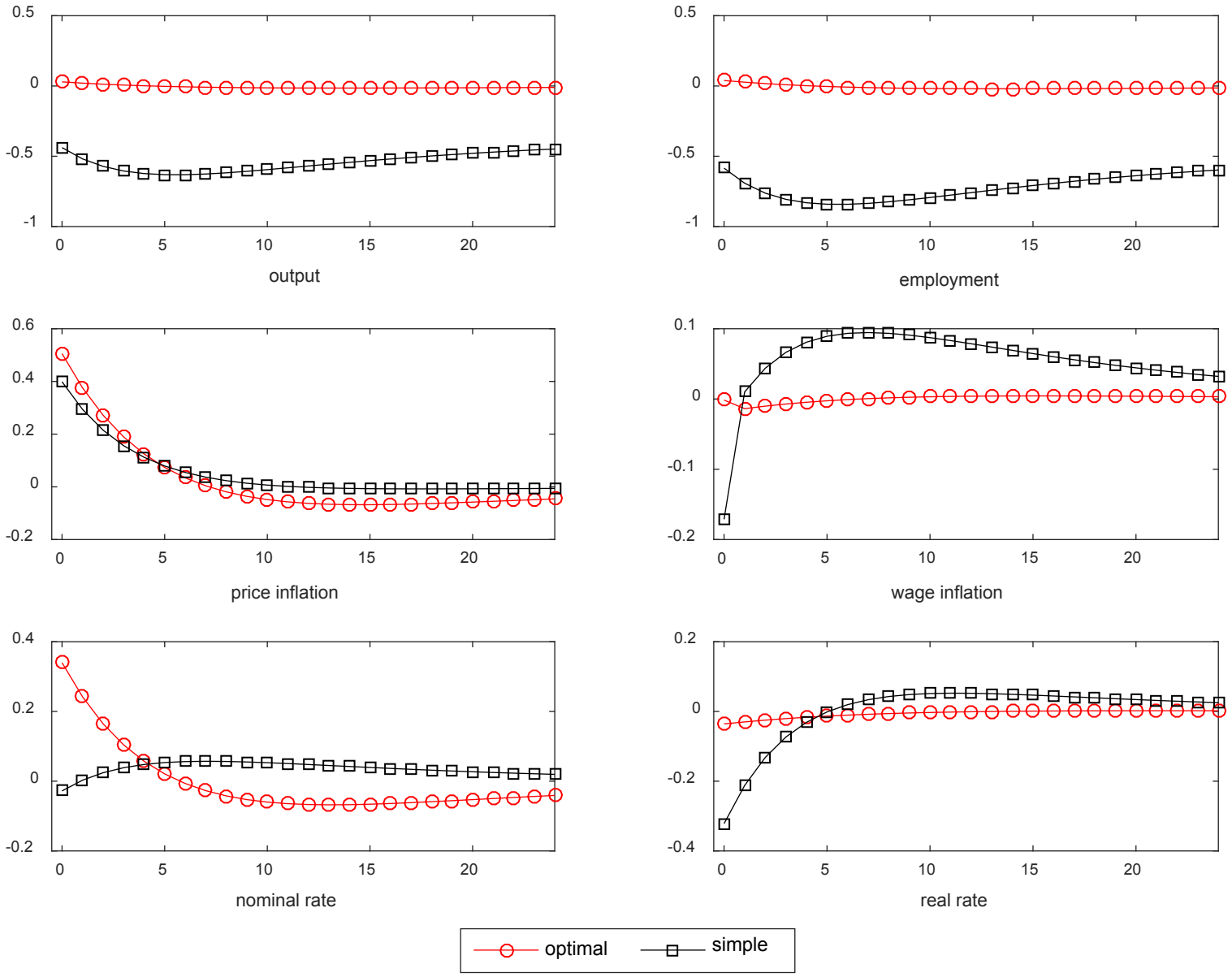


Figure A3 Optimal Policy vs. Simple Rule: Demand Shocks

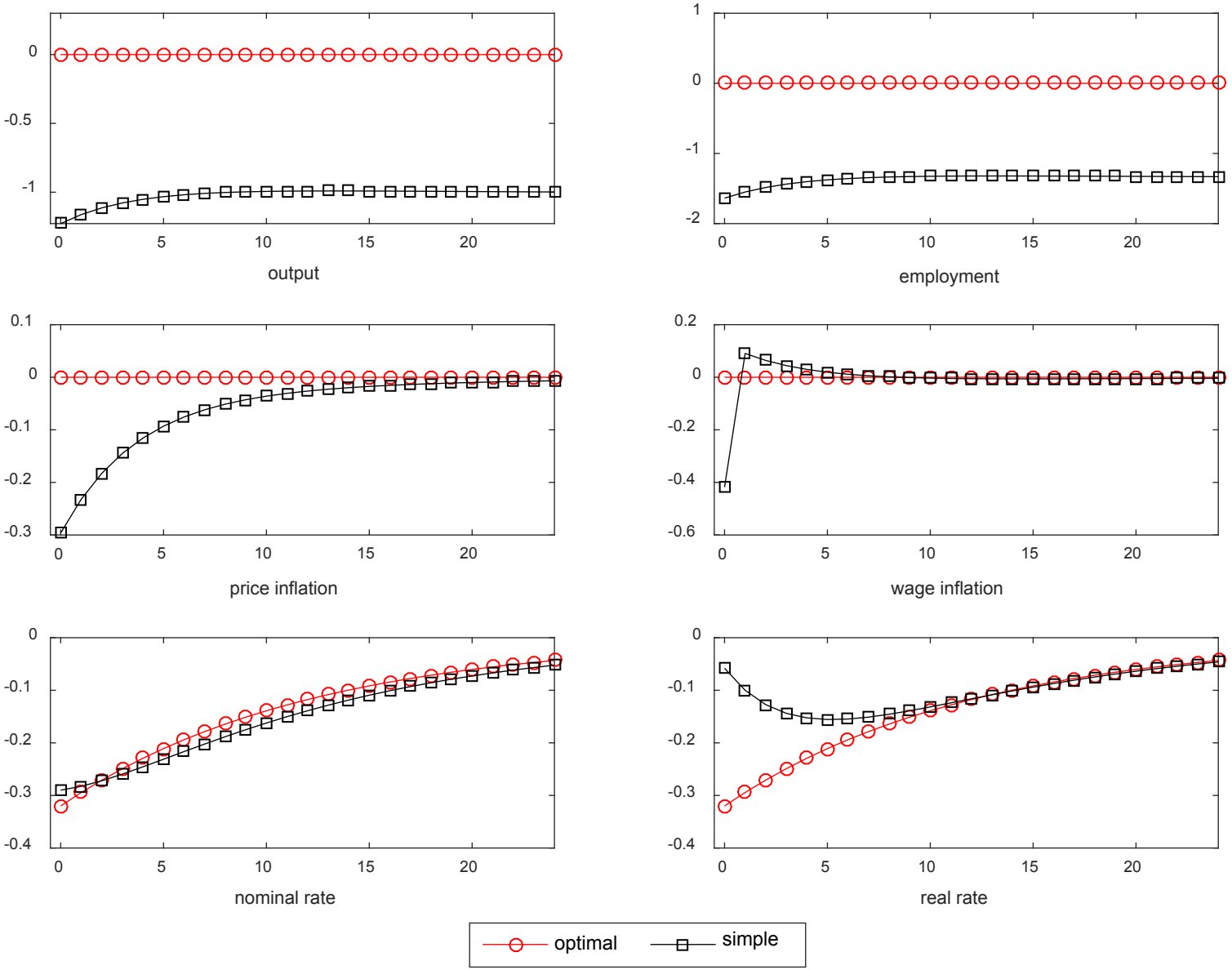


Table 1. ADF Unit Root Tests		
	1 lag	*4 lags*
1970Q1-2014Q4	−2.03 (−2.87)	−1.91 (−2.87)
1985Q1-2014Q4	−2.97* (−2.88)	−1.82 (−2.88)
1999Q1-2014Q4	−2.11 (−2.90)	−0.87 (−2.91)

Note: t-statistics of Augmented Dickey-Fuller tests (with intercept) for the null of a unit root in the unemployment rate. Sample period 1970Q1-2014Q4. Asterisks denote significance at the 5 percent level. Critical value (adjusted for sample size) for the null of a unit root shown in brackets.