EC 831: Empirical Methods in Macroeconomics

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Why Inflation Rose And Fell: Policy-makers' Beliefs And U.S. Postwar Stabilization Policy

- "provides an explanation for the run-up of U. S. inflation in the 1960s and 1970s and the sharp disinflation in the early 1980s "
- "policy-makers underestimate both the natural rate of unemployment and the persistence of inflation in the Phillips curve"

The Model

$$
\begin{aligned}
\pi_t &= \pi_t^e - \theta(L)(u_{t-1} - u_{t-1}^N) + \varepsilon_t \\
(u_t - u_t^N) &= \rho(L)(u_{t-1} - u_{t-1}^N) + V_{t-1} + \eta_t \\
u_t^N &= (1-\gamma)u^* + \gamma u_{t-1}^N + \tau_t
\end{aligned}
$$

π^e: Inflation Expectations (backward-looking here)
u_t^N: Natural rate of unemployment
V_t: controlled by policy makers
ε_t and η_t: normal shocks

Optimal Policy

Uncertainty about structure of economy

- policy-makers know the structure of the true Phillips curve and aggregate demand of the economy
- do not know the value of the coefficients of these equations

Uncertainty about natural rate of unemployment

- do not know current natural rate
- do not know the stochastic process for natural rate

Optimal Policy

Anticipated utility maximizers

- estimate the natural rate and the other coefficients of the model in every period
- treat these estimates as true values, neglecting both estimates' uncertainty and the possibility of future updates

Optimal Policy

Minimize the loss function

$$min_{\{V_{s|t}\}_{s=t}^{\infty}} L_t =$$

$$E_t \sum_{s=t}^{\infty} \delta^{s-t} \left[(\pi - \pi^*)^2 + \lambda (u_s - k\widehat{u}_{s|t}^N)^2 + \phi (V_s - V_{s-1})^2 \right]$$

s.t.

$$\begin{aligned} \pi_s &= \widehat{c}_{\pi,t} + \widehat{\alpha}_t(L)\pi_{s-1} - \widehat{\theta}_t(L)(u_{s-1} - \widehat{u}_{s-1|t}^N) + \widehat{\varepsilon}_s \\ (u_s - \widehat{u}_{s|t}^N) &= \widehat{c}_{u,t} + \widehat{\rho}_t(u_{s-1} - \widehat{u}_{s-1|t}^N) + V_{s-t|t} + \widehat{\eta}_s \end{aligned}$$

The constraints are estimated counterparts to the Phillips curve and aggregate demand equation

The optimal policy rule

Quadratic loss function with linear constraints gives

$$V_t = g(\widehat{\beta}_t) S_t$$

where $\widehat{\beta}_t$ contains

- the estimated parameters of the constraints
- preference parameters of the policy maker

S_t contains the state variables which include

- current and lagged pi, u and V
- current and lagged beliefs about natural rate of unemployment

The optimal policy rule

Lower optimal response to inflation

1. lower the estimate of inflation persistence $(\widehat{\alpha}(1))$
   - If inflation is mean-reverting, less need for policy-maker intervention
2. lower the estimate of "slope" of Phillips curve $\widehat{\theta}(1)$
   - If policy-makers perceive a very costly inflation-unemployment trade-off, they will not be willing to accept higher unemployment for a limited relief from inflation

Policy-maker learning

Policy-makers update their beliefs using constant gain algorithms

Two step procedure:

1. First estimate the natural rate

$$\begin{aligned} u^N_{t|t} &= u^N_{t-1|t-1} + g_N R^{-1}_{N,t-1}(u_t - u^N_{t-1|t-1}) \\ R_{N,t} &= R_{N,t-1} + g_N(1 - R_{N,t-1}) \end{aligned}$$

2. Then estimate the parameters of the constraints

$$\begin{aligned} \widehat{\beta}^i_t &= \widehat{\beta}^i_{t-1} + gR^{-1}_{i,t-1}x^i_t(y^i_t - x^{i'}_t\widehat{\beta}^i_{t-1}u^N_{t-1|t-1}) \\ R_{i,t} &= R_{i,t-1} + g(x^i_t x^{i'}_t - R_{i,t-1}) \qquad i = \{\pi, u\} \end{aligned}$$

Note: This is just a version of the Kalman Filter

Interpreting the Great Inflation

1) The Period of Overoptimism:

- Estimates of natural rate too "rosy"
- Underestimated inflation persistence

2) The period of Overpessimism

- policy-makers kept reacting weakly to inflation, this time because they perceived a very costly inflation-unemployment trade-off

3) The Disinflation

- sequence of new exogenous shocks, which caused updates of policy maker beliefs
- they finally had a model of the economy that was approximately correct

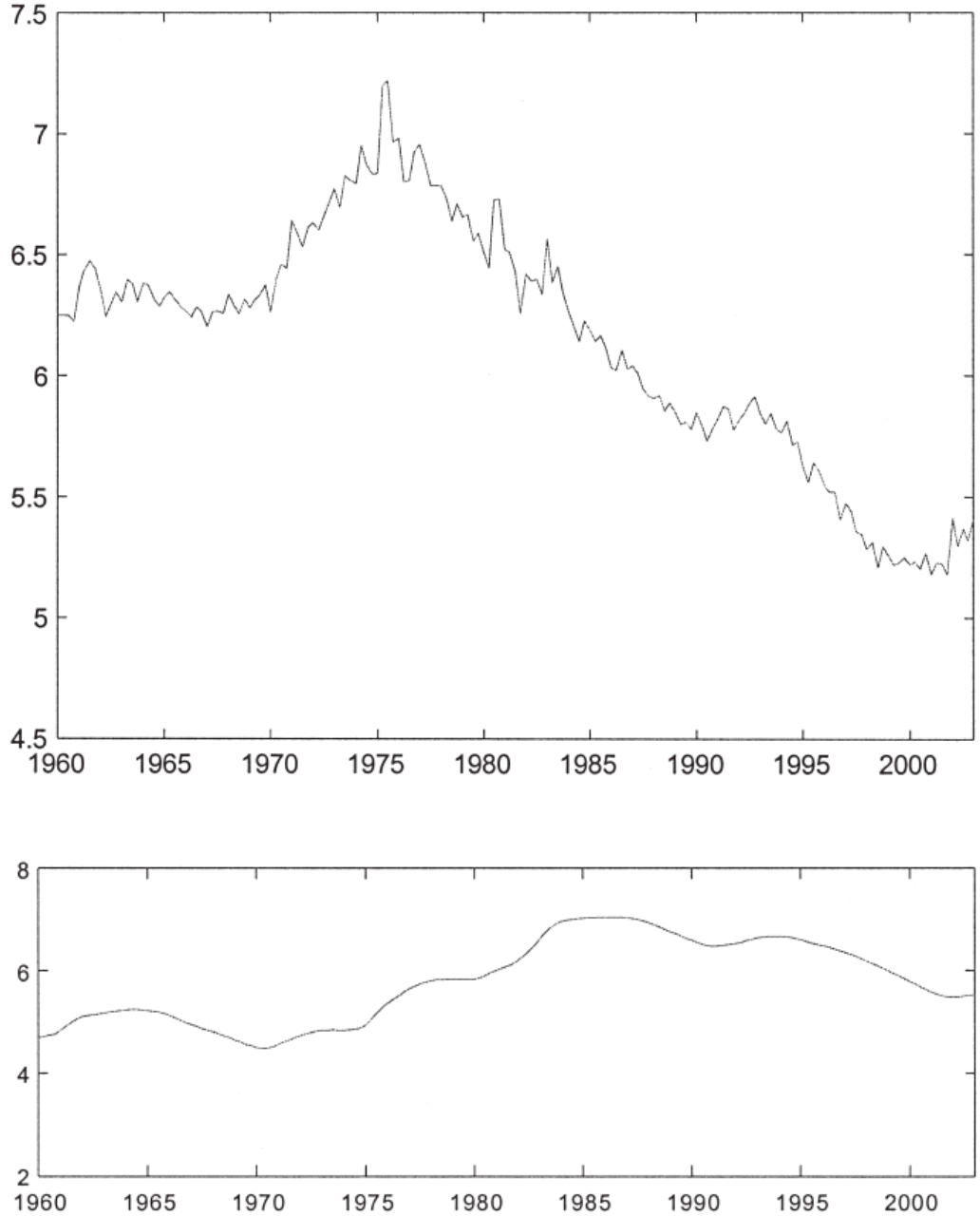
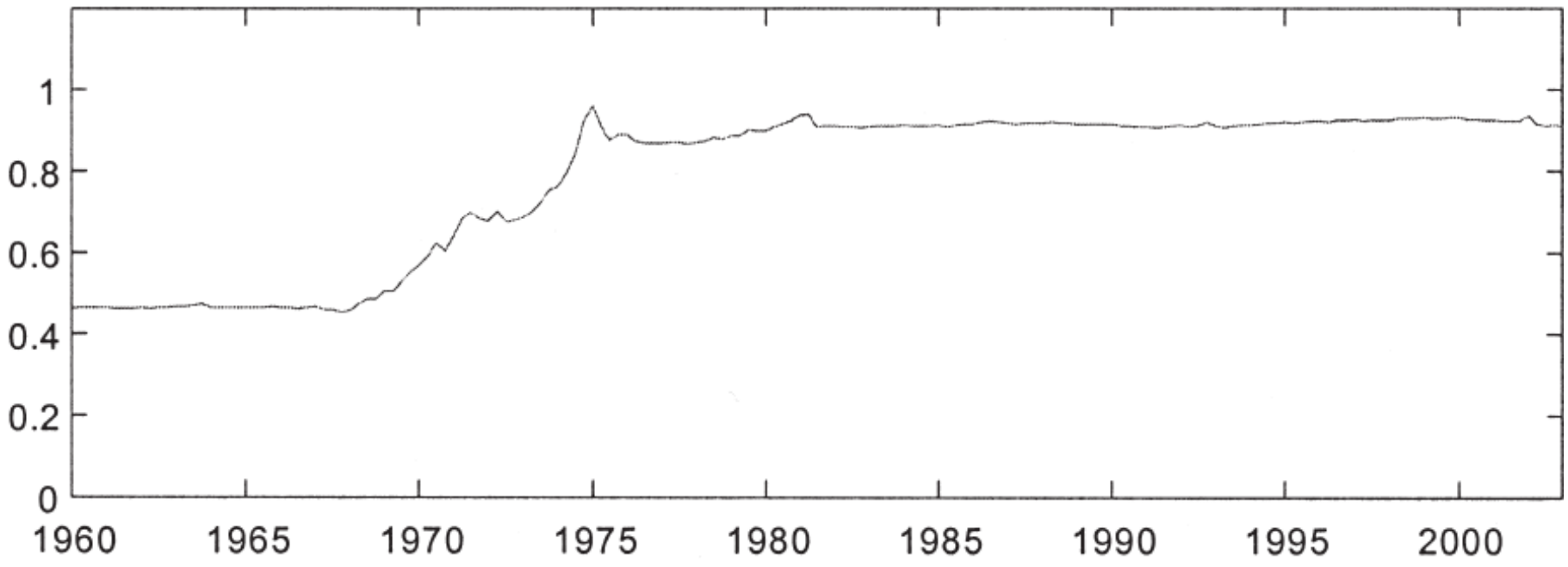
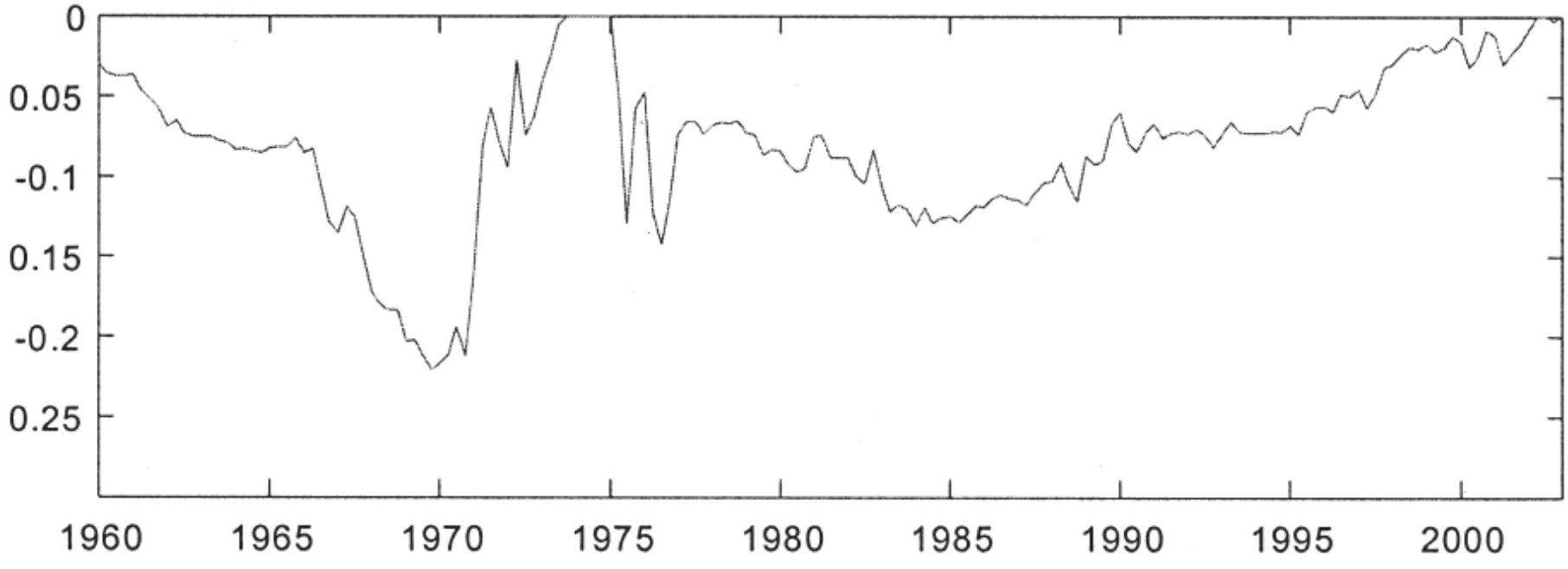


Figure: Above: Smoothed "True" Natural Rate of Unemployment, Below:Policy-maker Beliefs about Natural Rate of Unemployment

Perceived Persistence of Inflation in the Phillips Curve



Perceived Slope of the Phillips Curve



Parameter Estimates

MAXIMUM LIKELIHOOD ESTIMATES OF THE MODEL'S PARAMETERS

Coefficients	CG	OLS	DLS
α_1	0.707	0.711	0.707
	(0.074)	(0.074)	(0.073)
θ_1	−1.053	−1.021	−1.057
	(0.292)	(0.290)	(0.291)
θ_2	0.928	0.903	0.943
	(0.289)	(0.287)	(0.289)
ρ_1	1.661	1.756	1.640
	(0.057)	(0.065)	(0.056)
ρ_2	−0.737	−0.779	−0.719
	(0.057)	(0.060)	(0.056)
σ_ε^2	1.033	1041	1.033
	(0.113)	(0.113)	(0.109)
σ_η^2	0.036	0.036	0.035
	(0.006)	(0.006)	(0.006)
ϕ	2131	475.5	1902
	(1570)	(273.9)	(1119)
k	0.872	0.960	0.809
	(0.026)	(0.014)	(0.032)