Monetary Policy, Inflation and the Business Cycle: Introduction

Background: the RBC Revolution

- methodological aspects:
  - DSGE models, optimizing agents, rational expectations
  - quantitative analysis: calibration, simulation, evaluation

- conceptual aspects:
  - central role for technology (end of dichotomy)
  - business cycles as optimal responses to shocks
  - abstraction from monetary aspects

Modern Monetary Theory: the New Keynesian Perspective

Course Outline
Some Empirical Evidence

• The Long Run

• The Short Run
  - cyclical behavior of nominal variables
  - identified effects of monetary policy shocks

• Micro evidence on patterns of price-setting
Long Run Evidence

McCandless and Weber (1995)
- sample of 110 countries
- average CPI inflation, GDP growth, money supply growth over 1960-90 period
- main findings

Barro (1998)
- 80 countries, three observations per country (65-75,75-85,85-95)
- average inflation and standard deviation of inflation added to a conventional growth regression
- main findings. convergence interpretation and non-linearities.

Bruno and Easterly (1998)
- episodes of high inflation crisis $\pi \geq 40\%$ over the period 1961-94
- pattern of output growth around crisis
Estimated Effects of Monetary Policy Shocks

Romer and Romer (1989)

- narrative approach
- six dates marking the beginning of a stronger anti-inflation stance
- empirical equation

\[ y_t = a + \sum_{k=1}^{24} b_k \cdot y_{t-k} + \sum_{k=0}^{36} c_k \cdot D_{t-k} + \varepsilon_t \]

- impulse responses
- shortcomings
Specification and Estimation of Monetary Policy Rules

- explicit feedback rule for instrument $s_t$

$$s_t = \sum_{j \geq 1} \alpha_j s_{t-j} + \sum_{j \geq 0} \beta_j x_{1,t-j} + \sum_{j \geq 1} \gamma_j x_{2,t-j} + \varepsilon_t^m$$

- recursivity assumption:

$$E\{x_{1t-j}, \varepsilon_t^m\} = 0 \text{ for } j = 0, 1, 2, \ldots \quad ; \quad E\{x_{2t-j}, \varepsilon_t^m\} = 0 \text{ for } j = 1, 2, 3, \ldots$$

- impulse responses $\{\phi_j\}$

$$z_t = \sum_{j \geq 0} \phi_j \varepsilon_{t-j} + \xi_t$$


- FF model: $x_{1t} = [y_t, p_t, pc_{om_t}]'$, $s_t = ff_t$, $x_{2t} = [tr_t, nbt_t, m_t]'$
- NBR model: $x_{1t} = [y_t, p_t, pc_{om_t}]'$, $s_t = nbt_t$, $x_{2t} = [tr_t, ff_t, m_t]'$
- NBR/TR model: $x_{1t} = [y_t, p_t, pc_{om_t}, tr_t]'$, $s_t = nbt_t$, $x_{2t} = [ff_t, m_t]'$

- main findings
Fully-identified VARs

- structural model
  \[ A(L) \, x_t = \varepsilon_t \quad ; \quad x_t = C(L) \, \varepsilon_t \]
  where \( A(L) \equiv A_0 - A_1 L - \ldots - A_p L^p \) and \( \varepsilon_t \) is an \((n \times 1)\) vector of structural shocks, and \( E\varepsilon_t \varepsilon_t' = I \).

- reduced form:
  \[ B(L) \, x_t = u_t \quad ; \quad x_t = E(L) \, u_t \]
  where \( B(0) \equiv I, \, E\{u_t u_t'\} = \Sigma \) and \( E\{u_t x_{t-k}'\} = 0, \, k = 1, 2, 3, \ldots \)

- assumption: \( u_t = S \varepsilon_t \) (implying \( SS' = \Sigma \))

- given \( S \), we have \( C(L) = E(L) \, S \)

  \[ x_t = [\Delta y_t, \Delta r_t, r_t - \Delta p_t, \Delta m_t - \Delta p_t]' \]
  \[ \varepsilon_t = [\varepsilon_{t}^{s}, \varepsilon_{t}^{ms}, \varepsilon_{t}^{md}, \varepsilon_{t}^{ts}]' \]
  \[ C^{12}(1) = C^{13}(1) = C^{14}(1) = 0 \, ("long run neutrality") \]
  \[ S_{12} = S_{13} = 0 \, ("transmission lags") \]
  \[ A^{23}(0) + A^{24}(0) = 0 \, ("information lags") \]
Micro Evidence on Nominal Rigiditys and Patterns of Price Setting

The Benchmark Perfectly Competitive Model

\[ p_t(j) = mc_t^n(i) \]
\[ = p_t + (w_t - p_t) - mpn_t(i) \]
\[ = p_t + b_0 y_t + b_1 y_t(i) - b_2 a_t(i) \]


- monthly frequency of price changes for 350 categories of goods and services underlying CPI

The Eurosystem IPN Project

- evidence for 12 euro area countries
- price trajectories of individual goods prices underlying CPI and PPI
- qualitative evidence based on surveys