

Discussion of
Bodenstein, Erceg and Guerreri
and
Levin, Lopez-Salido, Nelson and Yun

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Each paper attacks practical policy question using modern methods.

- BEG: Which inflation measure should the Fed target?

- LLNY: What is the optimal long run inflation rate?

What is the optimal short run stabilization policy?

Both representative of a contemporary literature that owes much to Taylor

Optimal Monetary Policy Design in Quantitative Macro-Models: An Abbreviated History

Tinbergen/Theil policy problem:

$$\max E_0 \sum_t \beta^t x_t' A x_t$$

subject to

$$x_t = Bx_{t-1} + u_t$$

- Linear macro-economic model with quadratic policy objective.
- Private sector behavior not modeled explicitly.
- Objective function is arbitrary.

Shift away from TT approach in 1970s:

Contributing factors:

1. Breakdown of empirical macro models
2. Theoretical critiques: Lucas (1976), Sims (1981)

Taylor (1979): "Estimation and Control of a Macroeconomic Model with Rational Expectations" *Econometrica* 1979

- Introduces rational expectations
- First to do so in an estimated model where the systematic component of monetary policy matters.
- Does optimal control exercises a la Tinbergen/Theil, but where private sector beliefs respond to the policy environment.

Taylor's framework:

$$\max E_0 \sum_t \beta^t x_t' A x_t$$

$$x_t = Bx_{t-1} + CE_{t-1}x_t + u_t$$

- Rational expectations, though not optimization based.
- Cross-equation restrictions from RE imposed in the estimation.
- M is the policy instrument. (Policy rule not estimated - strong assumption made to achieve identification.)

These papers:

Examine optimal policy in "optimization-based" model.

$$\max E_0 \sum_t \beta^t x_t' A x_t$$

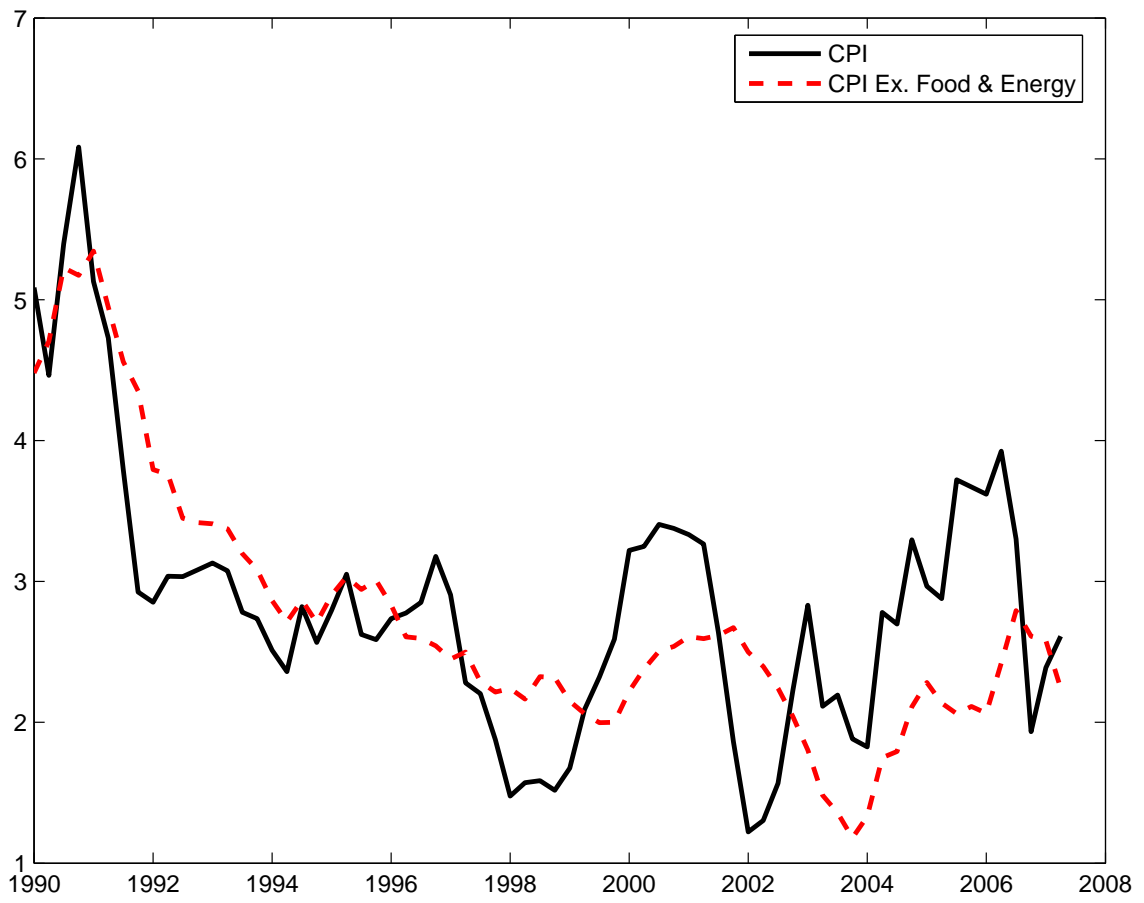
$$x_t = Bx_{t-1} + CE_t x_{t+1} + u_t$$

- Coefficients of A , B , and C are explicit functions of model primitives.
- The short term interest rate is the policy instrument.

Two potential benefits:

1. More coherent grounds to justify structural stability:
2. Explicit criteria for welfare evaluation: Welfare function derived explicitly.
 - Indeed questions that each paper poses cannot be addressed without going this route.

Figure 1: CPI Inflation



Model:

- Two final goods: non-energy C_N and energy O_C
- C_N is a composite of monopolistically competitive retail goods:
- Retailers use wholesale goods, Y_w , as inputs and set prices on a staggered basis a la Calvo.
- O_C is homogenous and competitively priced.
- Wholesale good produced competitively using labor N and energy O_w

Objective function obtained as quadratic approximation of the utility of the representative agent:

$$\min E_0 \sum_t [\pi_t^2 + \alpha(y_t - y_t^*)^2 + \dots]$$

where π_t is core (non-energy) inflation.

- Costs of inflation related to effect on the dispersion of relative prices - relevant only to the non-energy sector, where there is staggered price setting.
- Rationalizes focus on core inflation (Aoki, Benigno).

Two Caveats:

1. Result tied to the way costs of inflation model.
2. These costs are generally not large quantitatively.

Alternative rationale: Fine tuning inflation is difficult → Better to accommodate transitory movements in non-core prices (food and energy)

$$\pi_{cpi,t} = \gamma\pi_t + (1 - \gamma)\pi_{0,t}$$

where core inflation, π_t , obeys the following Phillips curve

$$\pi_t = \lambda(y_{,t} - y_{,t}^o) + \beta E_t \pi_{t+1} + u_t$$

- Central bank short run control over π_t is indirect and imprecise.
- Trying to adjust π_t to offset transitory movements in $\pi_{0,t}$ might just introduce volatility.

LLNY: Models with different micro-economic underpinnings can have observationally equivalent macroeconomic structures to a first order:

$$\max E_0 \sum_t \beta^t x_t' A x_t$$

$$x_t = Bx_{t-1} + CE_t x_{t+1} + u_t$$

- Macroeconometric equivalence: Models with different microeconomic structures can generate the same values of B and C .
- Microeconomic dissonance: The implied value of A will differ.

Examples:

1. Modeling inflation dynamics
2. Real rigidities (pricing complementarities)
3. Preferences: standard vs. risk sensitive
 - Paper illustrates how modeling choices in each case may affect optimal steady state inflation and short run stabilization policy.
 - 3. is particularly interesting - standard formulation yields weight of unity on inflation in objective since there is not much aversion to aggregate risk.

Key message: For optimal policy, important to get the microeconomic structure correct.

To address the identification problem:

1. Exploit microeconomic data
2. Use additional data (e.g. asset prices)
3. Estimate non-linear model

Issues

- Unlikely that anytime soon we will precisely pin down the microeconomic structure: → Important to follow policies that are robust across different plausible structures.
- Big gains in policy come from avoiding disasters, as opposed to fine tuning. Rules should be designed from this perspective.

These are themes of Taylor's more recent research...

Taylor rule designed as pragmatic solution to the kind of optimal policy problem he posed in 1979:

$$r_t = rr_t^* + \pi^o + \phi_\pi(\pi_t - \pi^o) + \phi_y(y_t - y_t^o)$$

- Rule is robust - has desirable properties across a broad array of plausible macro models.
- Helps avert disasters
- Best thought of as a guideline, since we do not observe rr_t^* and y_t^o
- BEG and LLNY helpful about choices of (1) inflation measure; (2) π^o ; and (3) ϕ_π and ϕ_y .