Expectations and the neutrality of interest rates

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Challenge:

- Lucas (1972) but central banks set interest rates, not money supply.
- What is the dynamic response of inflation to interest rate targets?
- Central missing piece of theory, and solid empirical understanding.
- Important for today’s policy questions too.
Shaded areas indicate U.S. recessions.

Sources: BLS; Board of Governors

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Model: \[ x_t = E_t x_{t+1} - \sigma (i_t - \pi^e_t) \]
\[ \pi_t = \pi^e_t + \kappa x_t \]

Inflation dynamics: \[ \dot{\pi}_t = (1 + \sigma \kappa) \pi^e_t - \sigma \kappa (i_t - r) . \]

Adaptive: \( \pi^e_t = \pi_{t-1} \)
\[ \pi_t = (1 + \sigma \kappa) \pi_{t-1} - \sigma \kappa (i_t - r) . \]

Friedman (1968): i target is unstable

Rational: \( \pi^e = E_t \pi_{t+1} \)
\[ E_t \pi_{t+1} = \frac{1}{1 + \sigma \kappa} \pi_t + \frac{\sigma \kappa}{1 + \sigma \kappa} (i_t - r) \]

Sargent Wallace (1975): Stable, indeterminate

FTPL: \[ \pi_{t+1} - E_t \pi_{t+1} = - (E_{t+1} - E_t) \sum_{j=0}^{\infty} \rho^j \tilde{s}_{t+1+j} \]
Inflation is stable and determinate (At last)

(Taylor rule? \( i_t = \phi \pi_t \))
\[ \pi_t = \frac{1 + \sigma \kappa}{1 + \sigma \kappa \phi} \pi_{t-1} + \frac{\sigma \kappa}{1 + \sigma \kappa \phi} r . \]
Fed stabilizes inflation with adaptive \( E \).

(Taylor rule? \( i_t = \phi \pi_t \))
\[ (\text{New-Keynesian? } \phi > 1 \text{ Fed destabilizes inflation to select equilibria.}) \]
The long quiet zero bound ($\phi = 0$).
Neither instability (deflation spirals) nor volatility (multiple equilibrium sunspots).
The longer quiet zero bound: Europe and Japan

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**Core CPI**

**ECB Rates: Deposit; Refinancing**

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**Interest rate**

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**Core CPI**

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Source: Organization for Economic Co-operation and Development

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Uncomfortable logical implications

So far. Rational expectations+FTPL: Inflation is stable and determinate under an interest rate target or peg. Theory generalizes a frictionless model. Confirmed by long zero bound.

Stable +determinate = neutrality:
• A k-percent rule (peg) can work.
• If the Fed did nothing, and there are no more fiscal shocks, inflation would eventually settle down on its own. (Like 4% money growth).
• Higher interest rates must eventually lead to higher inflation. (“Fisherian” in the long run).

Like MV=PY! Beautiful model, inexorable logic. But experience that higher rates lower inflation?

Needed: Like Lucas (1972) a short-run non-neutrality, higher rates temporarily lower inflation.
An imperfect model of temporary non-neutrality

\begin{align*}
x_t &= E_t x_{t+1} - 0.5(i_t - E_t \pi_{t+1}) \\
\pi_t &= E_t \pi_{t+1} + 0.5 x_t \\
i_t &= i_{t-1} + \varepsilon_{i,t} \\
\rho v_{t+1} &= v_t + r^n_{t+1} - \pi_{t+1} - \tilde{s}_{t+1} \\
E_t r^n_{t+1} &= i_t \\
r^n_{t+1} &= 0.9 q_{t+1} - q_t
\end{align*}

- Key: long term debt
- Stepping on a rake/unpleasant arithmetic

But:
- Needs long term debt
- Stickier prices *lower* the effect
- Only an unexpected rate rise
- Too sudden/strong (next slide)
- Unexpected inflation, not lower expected inflation; not adaptive short run/rational long run
- Not Lucas holy water on monetarist/ISLM intuition!
Estimates of the effects of higher interest rates

- Slow delayed decline, not AR(1). If at all!
- *This* is the Fed’s big stick?

But
- By design, leaves out the most important interventions: long-lasting moves; change in regime that changes expectations

Source: Ramey (2016)
Needed: Lucas (2022). Expectations and the (temporary non-) neutrality of interest rates

- Irrational expectations? Stability, determinacy, long run neutrality are deep.
- DSGE smorgasbord? What is the minimal, robust, economically necessary set of ingredients/frictions that delivers a short run negative effect?
- Current Phillips curves have theory & empirical shortcomings. Relation between all prices, wages and output? Basic sign, output with inflation rising or falling?
• Lucas: How does inflation affect output/employment? Not money to inflation.
• Us: Interest rates to inflation, and not (yet or centrally) output, employment.
  \[ i_t = r_t + E_t \pi_{t+1} \]  We use \( r_t = -x_t / \sigma = (E_t \pi_{t+1} - \pi_t) / \kappa \sigma. \)
• Attack \( \pi_t = a(L)i_t + \varepsilon_t \) directly?
• \( i_t = r_t + E_t \pi_{t+1} \) is harder than \( m_t + v = p_t + y_t \) because \( r_i \) must decline more than 1-1.
• Or, maybe, the goal of short-run adaptive behavior, long-run neutrality isn’t true?
• 50 years later. Lots achieved. Lots we don’t know. Lots to do both theory and empirical.
Adaptive expectations. Unstable (determinate)

Rational expectations. Stable, indeterminate
FTPL adds determinacy