# Comment on Cochrane, 'Michelson-Morley, Occam and Fisher: The Radical Implications of Stable Inflation at Near-Zero Interest Rates'

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# John's Headline Argument

- Federal Funds rate (nearly) constant since early 2009.
  - ▶ John's inference: Fed was on (sort of) an interest rate peg.
- Standard NK model (active monetary/passive fiscal policy):
  - ▶ With peg, equilibrium *indeterminate* with possibility of sunspot volatility.
- But, no apparent sunspot volatility after 2009, since inflation smooth.
  - ▶ Standard NK model not useful.
- So, starting from the peg assumption, John concludes:
  - ▶ We need a new standard model.
  - ▶ It must have determinate equilibrium under peg.
  - ▶ Fiscal Theory of the Price Level (FTPL)!
- My response: but, Fed policy was NOT on an interest rate peg.
  - ▶ So, this case for FTPL not convincing.

# Interest Rate Peg?

- People expected 'peg' to end soon (Swanson-Williams AER, 2014).
  - In 2009-2011, Blue Chip forecasters expected lift off in a year.
  - In August, 2011, Fed thinks lift-off won't occur until mid-2013, and Blue Chip forecasters agree.

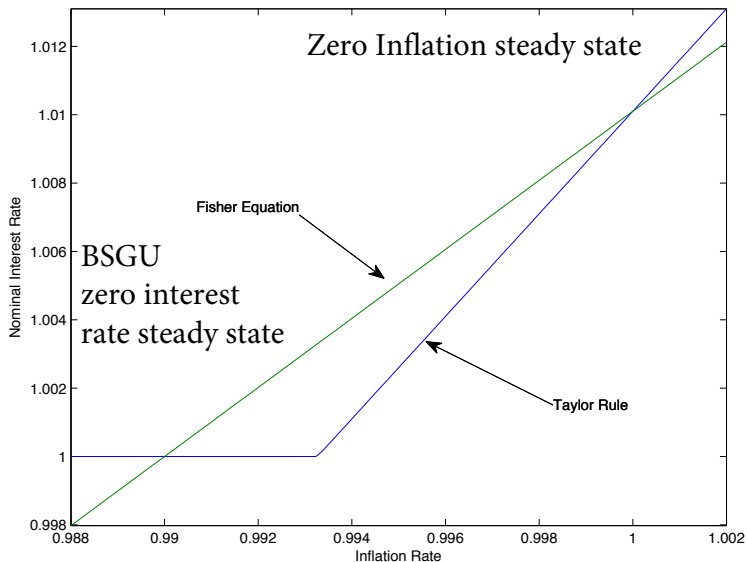- Consistent with expectations, lift-off has now begun.

# Other Reasons John Doesn't Like Standard NK Model

- Multiplicity of Equilibria.

- Standard NK model has 'unappealing' properties.

- John appears to suggest that the standard NK model provides an unsatisfactory account of comovement between inflation and the interest rate.

# Uniqueness Problem in NK Model

- Equilibrium multiplicities in and out of the zero lower bound (ZLB) (Benhabib, et al., Mertens-Ravn; Braun, et. al.)

  - Interestingly, the multiplicities in ZLB not visible to analysts who focus on linear approximations of equilibrium conditions.

- Learning as an equilibrium selection device.

  - Christiano-Eichenbaum-Johannsen (2012, 2016) show that only one of multiple NK equilibria learnable.

- Robustness of Rational Expectations Equilibrium to learning seems particularly appealing now.

  - Recent events unfamiliar.

    - ⋆ US has had little experience with ZLB.
    - ⋆ Financial crises in advanced economies were thought to be a thing of the past.

# Multiple Equilibria



Figure showing Nominal Interest Rate (y-axis, from 0.998 to 1.012) versus Inflation Rate (x-axis, from 0.988 to 1.002). Labels: "Zero Inflation steady state", "BSGU zero interest rate steady state", "Fisher Equation", and "Taylor Rule".

# Unappealing Properties of Standard NK Model, According to John

- Dramatic, counterfactual, drop in inflation in zero lower bound.
    - Two forces prevented inflation collapse: fall in TFP and working capital problems (see Christiano, et al., and Gilchrist et al.).

- Perverse implications for effect of technology shock in ZLB.
    - Bad, temporary technology shock expansionary in ZLB.
    - But, with persistence a bad TFP shock has normal effect.

- Reducing price stickiness makes economy unstable without limit.
    - The economics of this result is classic, and can be traced back to DeLong and Summers (AER 1986).
    - The 'without limit' result is artifact linearization.

- Future policy actions have unrealistically large effects today.
    - True, but probably reflects taking rational expectations or details of price adjustment too seriously (Gabaix, Kiley).

# Classical Beliefs and NK Model

- John's desideratum: model should be useful to determine whether there is a set of coherent assumptions that rationalize a classic belief.

- A classic belief is that, to kill inflation ('Volcker belief'):
  - Must initially raise the interest rate, suffering an output loss.
  - Eventually, interest rates and inflation are both reduced, leaving output at its original level.

- Standard NK model provides insight into the Volcker belief.
  - Transient cut in inflation target drives nominal interest rate up and output down (CEE 2005).
  - A permanent (credible) cut in the inflation target has an instantaneous Fisherian effect:
    - ★ immediate and equal drop in inflation and interest rate.

- Cannot rationalize Volcker belief in standard NK model.
  - With uncertainty over whether a change in inflation target is temporary or permanent, then do rationalize Volcker belief (Erceg and Levin)

# What About the FTPL?

- John reports that NK model modified to include FTPL has nice properties.

  - Uniqueness under interest rate peg. Other nice properties too.

- Problems:

  - Uniqueness property of FTPL is fragile (Canzoneri, et al).

  - In practice, FTPL does not provide a simple account of inflation/fiscal policy data.

    - ★ Huge Reagan deficits led to inflation *collapse* in 1980s.
    - ★ Huge Obama deficits led to *drop* in inflation recently.

  - Other problems.

# Simple Example of FTPL

- Deterministic, with $t = 0, 1, 2, ...$
- Real gov't flow budget constraint:

$$b_t = \beta^{-1} \left( b_{t-1} - \overbrace{s_t}^{\text{gov't surplus}} \right), \qquad \overbrace{b_{t-1}}^{\text{quantity of goods owed in } t} \equiv \frac{B_{t-1}}{P_t}$$

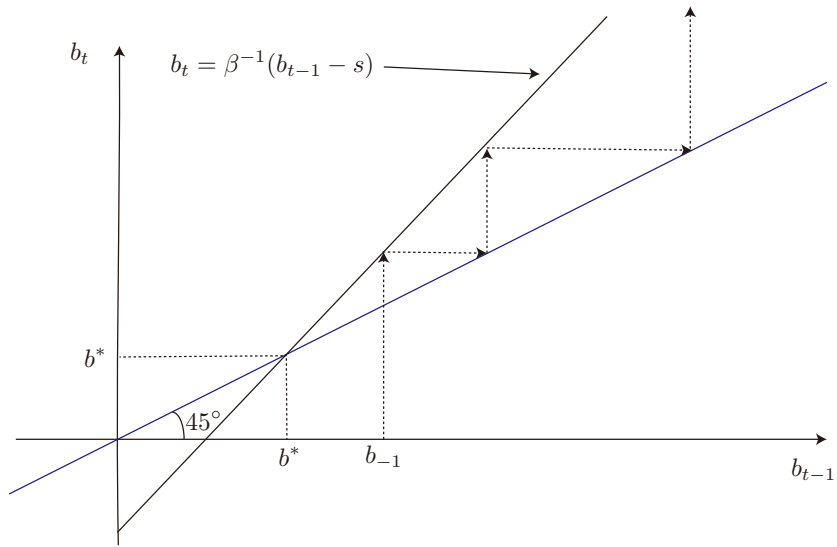- Household transversality condition:

$$\lim_{T \to \infty} \beta^T b_{T-1} = 0.$$

- Under FTPL:

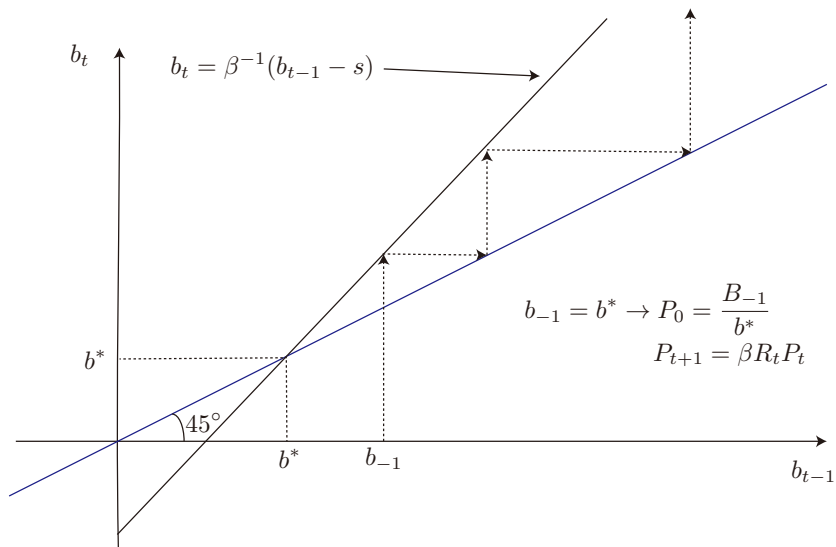$$s_t \text{ not a function of } b_{t-1}$$
$$= \quad s > 0 \text{ for simplicity.}$$

- Real flow budget constraint:

$$b_t = \beta^{-1} \left( b_{t-1} - s \right)$$

$b_t$

$b_t = \beta^{-1}(b_{t-1} - s)$

$b^*$

$45°$

$b^*$  $b_{-1}$

$b_{t-1}$

$b_t$

$b_t = \beta^{-1}(b_{t-1} - s)$

$b^*$

$45°$

$b^*$    $b_{-1}$

$b_{t-1}$

$b_{-1} = b^* \rightarrow P_0 = \dfrac{B_{-1}}{b^*}$

$P_{t+1} = \beta R_t P_t$

# Fragility of FTPL

- Assumption of FTPL makes it a *simple* theory of the price level:

$$b_{-1} = \frac{B_{-1}}{P_0} = \sum_{t=0}^{\infty} \beta^t s_t.$$

One equation in one unknown!

- The assumption that fiscal policy, $s_t$, is independent of $b_{t-1}$, seems extreme.
  - But, most model assumptions aren't literally true in reality.
  - However, we do hope that the results don't completely collapse under reasonable perturbations.

- But, the FTPL's ability to determine the price level does collapse under tiniest reasonable perturbation.
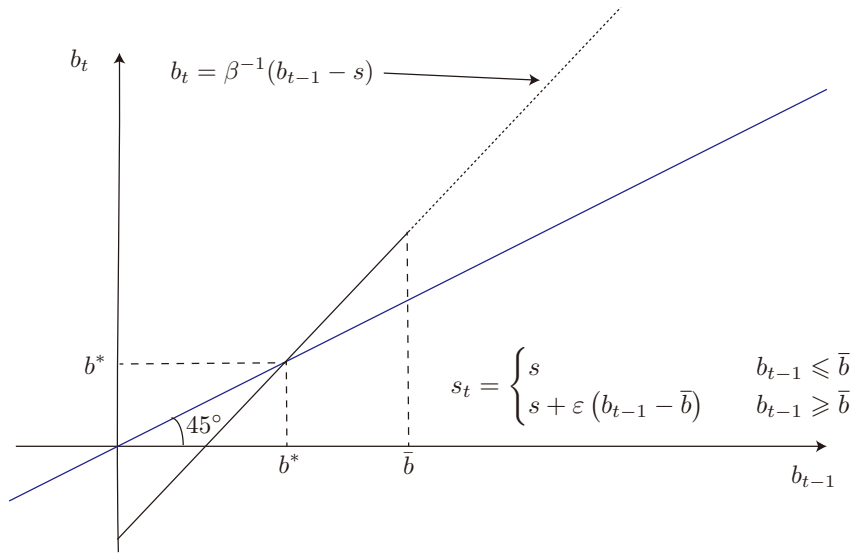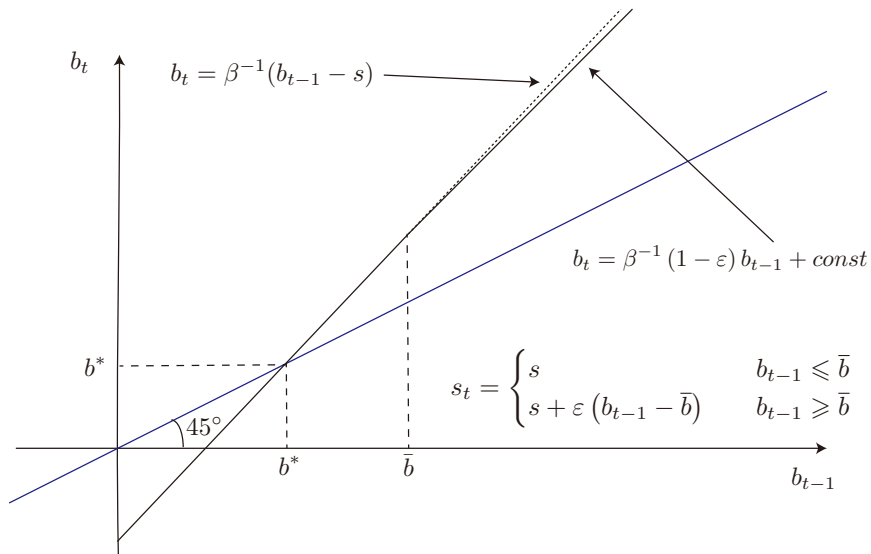
# Fiscal Policy and Government Debt

- A common sense perturbation suggests that $s_t$ is increasing in $b_t$.
    - VAT tax gradually increasing from 3% in 1989 to 8% in 2014 in Japan, out of concern for large government debt.
    - Maastricht treaty requires that member countries adjust fiscal policy so that debt does not grow too much.
    - IMF pressures countries whose debt gets out of hand.

- Following is an $\varepsilon > 0$ deviation from FTPL that captures endogeneity of fiscal policy:

$$s_t = \begin{cases} s + \varepsilon \left( b_{t-1} - \bar{b} \right) & b_{t-1} \geq \bar{b} \\ s & b_{t-1} \leq \bar{b} \end{cases},$$

so that

$$b_t = \beta^{-1} \left( 1 - \varepsilon \right) b_{t-1} + \text{constant}.$$

$$b_t = \beta^{-1}(b_{t-1} - s)$$

$$b_t$$

$$b^*$$

$$45°$$

$$b^* \qquad \overline{b}$$

$$b_{t-1}$$

$$s_t = \begin{cases} s & b_{t-1} \leqslant \overline{b} \\ s + \varepsilon\left(b_{t-1} - \overline{b}\right) & b_{t-1} \geqslant \overline{b} \end{cases}$$

$$b_t = \beta^{-1}(b_{t-1} - s)$$

$$b_t = \beta^{-1}(1 - \varepsilon) b_{t-1} + const$$

$$s_t = \begin{cases} s & b_{t-1} \leqslant \overline{b} \\ s + \varepsilon (b_{t-1} - \overline{b}) & b_{t-1} \geqslant \overline{b} \end{cases}$$

$45°$

$b^*$

$\overline{b}$

$b_t$

$b_{t-1}$

$b_t$

$b_t = \beta^{-1}(b_{t-1} - s)$

$b^*$

$45°$

$b^*$  $b_{-1}$  $\bar{b}$

$b_t = \beta^{-1}(1 - \varepsilon)\, b_{t-1} + const$

$b_{-1} \geqslant b^* \rightarrow P_0 \geqslant \dfrac{B_{-1}}{b^*}$

$P_{t+1} = \beta R_t P_t$

$b_{t-1}$
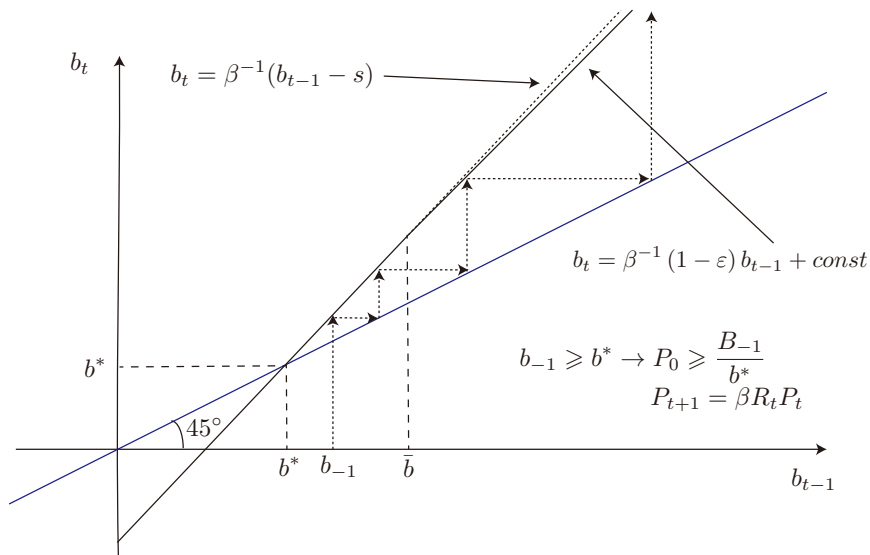
# Endogenous Fiscal Policy

- On the face of it, FTPL looks like a simple theory of the price level:

$$\frac{B_{-1}}{P_0} = \sum_{t=0}^{\infty} \beta^t s_t$$

- But, on closer examination it rests on an assumption that (in my opinion) defies common sense.

# 'Simple' Theory: How Presents Get Under the Tree On Christmas Morning

# Conclusion

- NK model is a very useful framework for thinking about financial frictions, business cycles, etc.

- NK model has a lot of dimension for improvement.
  - ▶ Deviations from Rational Expectations.
  - ▶ More interesting financial frictions.
  - ▶ Improvements in labor market.
  - ▶ Economic foundations for reduced form assumptions about price stickiness.

- Introducing the FTPL would not improve the NK model, at least for the US.
  - ▶ Maybe good for Japan?
    - ★ That country looks like it's on an interest rate peg (20 years of ZLB).
  - ▶ But, they have been piling up government debt, with no sign of pickup in prices.