MICHELSON-MORLEY, OCCAM AND FISHER: THE RADICAL IMPLICATIONS OF STABLE INFLATION AT NEAR-ZERO INTEREST RATES
BY JOHN COCHRANE

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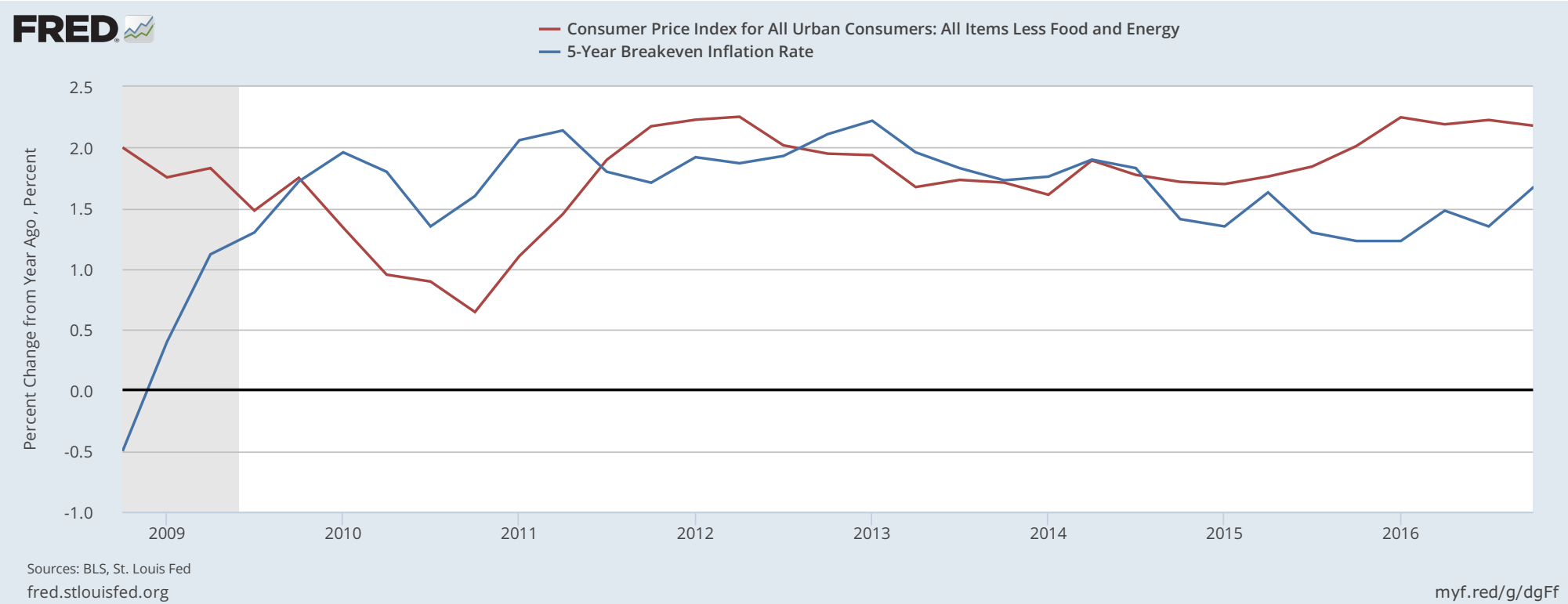
OFF THE TABLE

1. Indeterminacy/sunspots with feedback interest-rate rules. Woodford (1994), Cochrane (2011).

2. Defense of government valuation equation as important for inflation: Cochrane (2005), Sims (2013).

3. Monetarism in the context of QE and the specialness of reserves: Reis (2016).

4. VAR estimates of impact of monetary policy shocks are not as definitive as people cite them to be: Ramey (2016).

5. Money in utility function implies qualitatively small effects on impact of interest rates: Woodford (2001), Reis (2007).

Inflation in the last decade

FRED — Consumer Price Index for All Urban Consumers: All Items Less Food and Energy
— 5-Year Breakeven Inflation Rate

Sources: BLS, St. Louis Fed
fred.stlouisfed.org

myf.red/g/dgFf

FACTS OF INFLATION 2010-17

1. Nominal interest rates fixed.

2. Forward guidance as the shocks: announcement of future nominal interest rates.

3. Expected inflation very stable.

4. Inflation seems anchored (no trend).

5. Variance of inflation is low.

COCHRANE'S NEW ANSWER

- Approximately constant real interest rates:

$$r_t = i_t - E_t(\pi_{t+1}) = -\ln(\beta)$$

- Government debt valuation equation with long-term debt so shocks to interest rates:

$$\frac{\sum_{j=0}^{\infty} Q_t^j B_{t-1}^j}{P_t} = \sum_{j=0}^{\infty} \beta^j \mathbb{E}_t(s_{t+j})$$

- Right-hand side fixed, so changes in Q's come with changes in the unexpected part of P.

INTUITION

- Not a FTPL in the classic sense, but a theory of unexpected inflation as a function of future interest rates. From Cochrane (2001)

- To see it, use result in Hilscher Raviv Reis (2015)

$$\sum_{j=0}^{\infty} \beta^j B_{t-1}^j \hat{\mathbb{E}} \left(\frac{P_t}{P_{t+j}} \right) = \frac{\sum_{j=0}^{\infty} Q_t^j B_{t-1}^j}{P_t}$$

$$= \sum_{j=0}^{\infty} \beta^j \mathbb{E}_t \left(s_{t+j} \right)$$

LAST DECADE

- Larger *B*, smaller effects.

- Maturity of privately-held debt: did well to avoid Treasury; but misstep in using Hall-Sargent series.

  - Social security and non-marketable debt.

  - State and local pensions holdings.

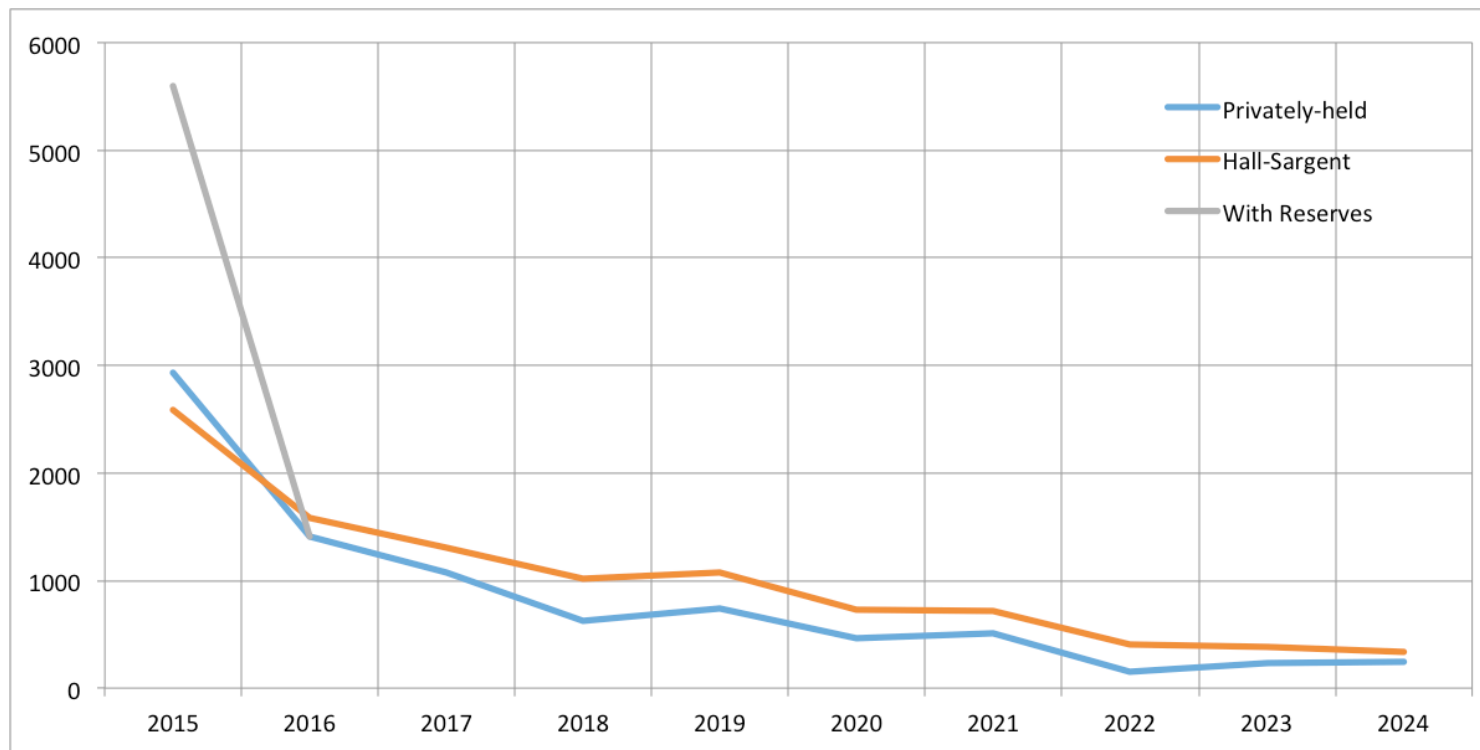 - Federal Reserve holdings of debt: very large maturity twist

LAST DECADE

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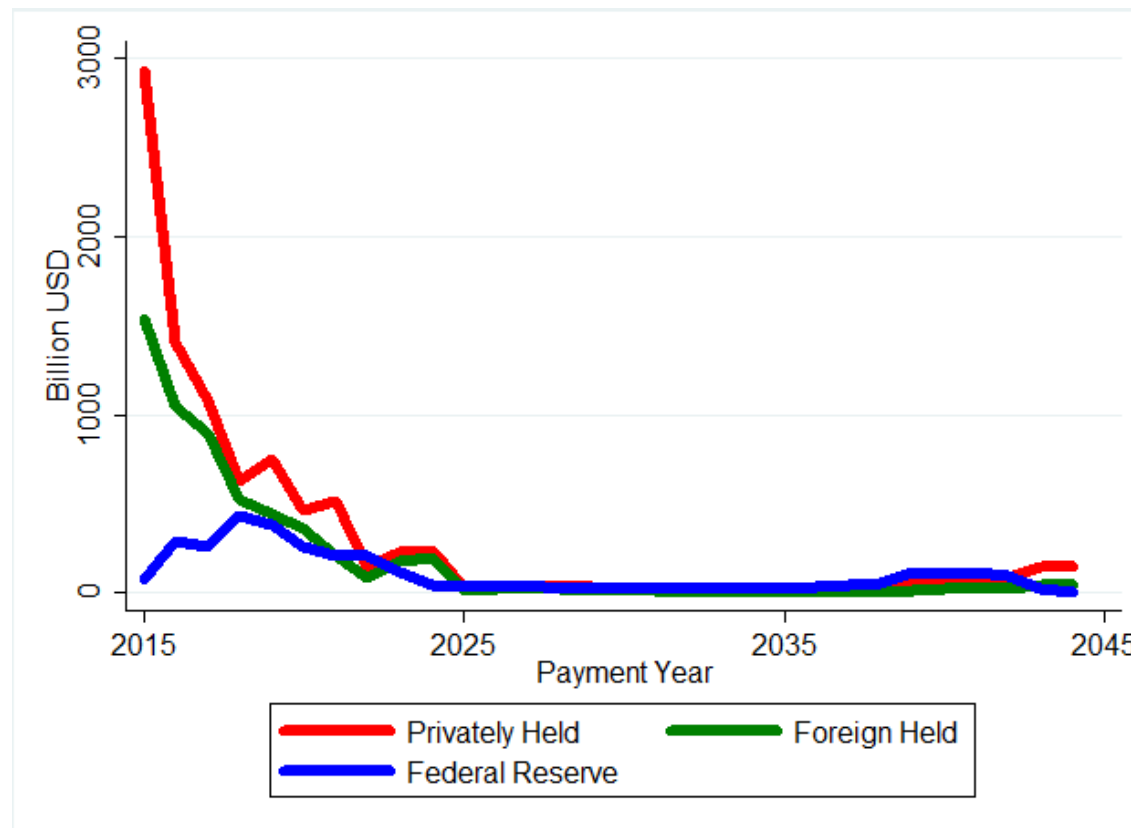
LAST DECADE

- Larger *B*, smaller effects.

- Maturity of privately-held debt: new series and include reserves issued by Federal Reserve.

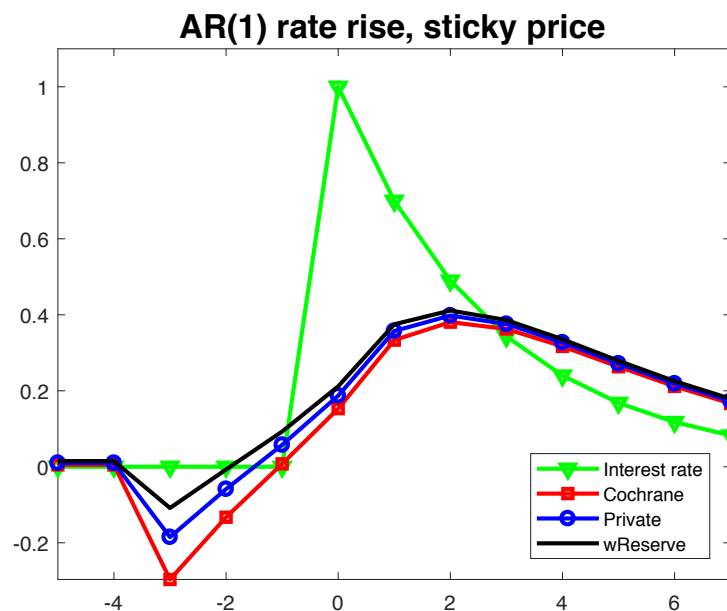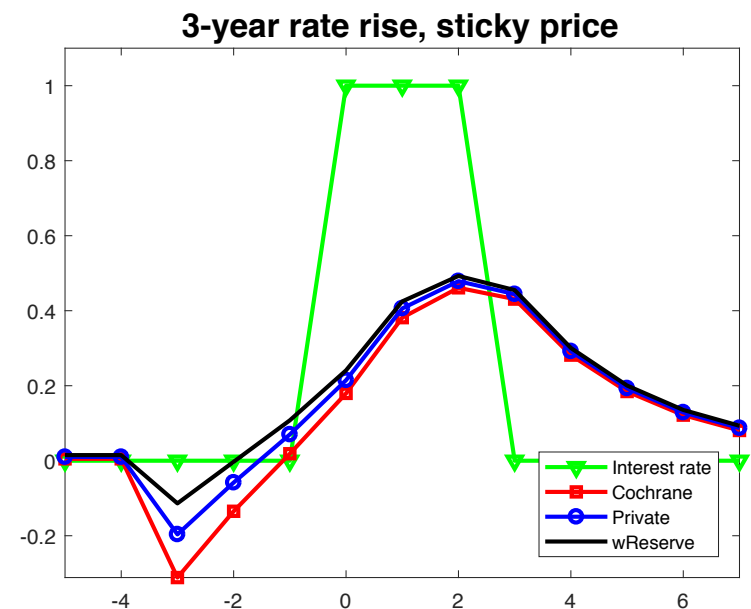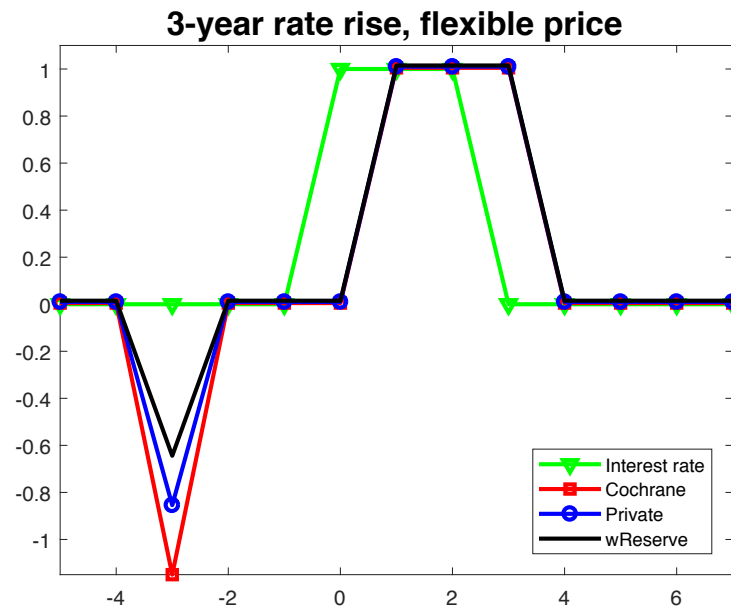- Isn't fixed surplus a strong assumption? Not really.

$$s_t = \alpha + \frac{\gamma}{1 + i_t}$$

- Overall effect on inflation

$$\sum_{t=-M}^{\infty} \beta^{(t+M)} \left(\frac{\alpha}{\alpha + \beta\gamma} e^{-\frac{1}{\sigma}(x_t - x_{-M})} + \frac{\beta\gamma}{\alpha + \beta\gamma} e^{-\frac{1}{\sigma}(x_{t+1} - x_{-M})} \right)$$

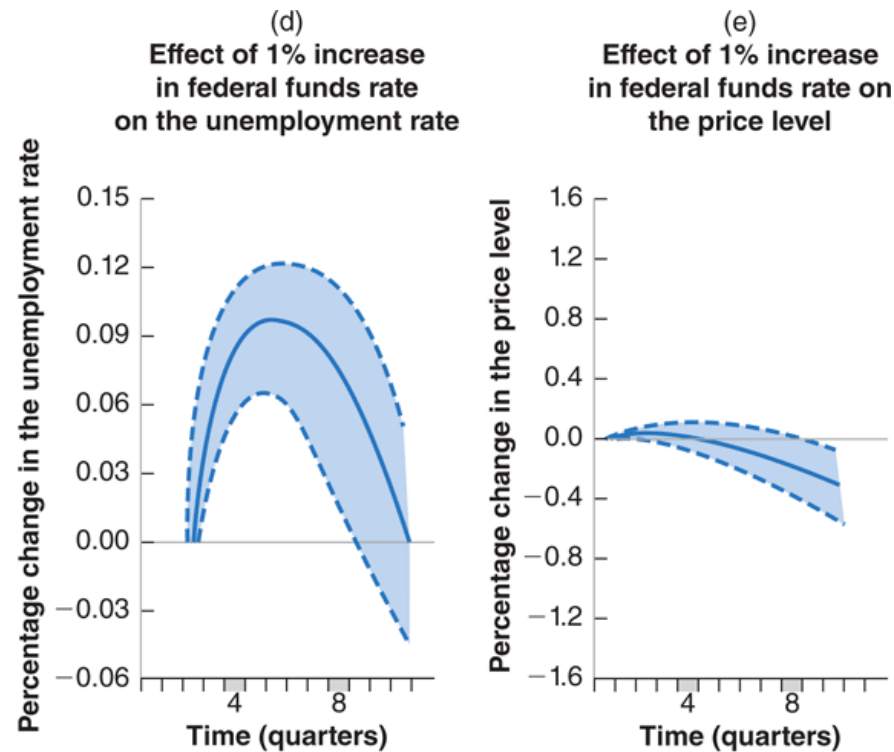- But even for a very large sensitivity (10 times intercept) negligible effects.

ALL TOGETHER

Forward guidance shocks consistent with small effects of inflation. Stable inflation explained.

The economy and interest rates

Figure 5-9
The Empirical Effects of an Increase in the Federal Funds Rate

(d) Effect of 1% increase in federal funds rate on the unemployment rate

(e) Effect of 1% increase in federal funds rate on the price level

Source: Lawrence Christiano, Martin Eichenbaum, and Charles Evans, "The Effects of Monetary Policy Shocks: Evidence From the Flow of Funds," *Review of Economics and Statistics*. 1996, 78 (February): pp. 16–34.

- Debt valuation equation always holds (1-period)

$$\frac{B_{t-1}}{P_t} = \sum_{j=0}^{\infty} R_{t,t+j}^{-1} \mathbb{E}_t(s_{t+j})$$

- Given a change in monetary policy, resulting change in price level, can calculate the needed change in fiscal surplus.: fiscal index.

$$\Delta s \approx -\Delta E_t(\pi_t) + \frac{1-\beta}{\sigma} \sum_{j=0}^{\infty} \beta^j \Delta E_t(x_{t+j} - x_t)$$

- Can be estimated, expanded.

THE PUZZLE?

- *Hard to get higher interest rates lowering inflation*

- But, textbook NK Taylor rule model:

$$\pi_t = \mathbb{E}_t\{\pi_{t+1}\} + \kappa y_t$$

$$y_t = -\frac{1}{\sigma}(i_t - \mathbb{E}_t\{\pi_{t+1}\}) + \mathbb{E}_t\{y_{t+1}\}$$

$$i_t = \phi_\pi \pi_t + v_t$$

Solution:

$$\pi_t = -\left(\frac{\kappa\sigma}{1 + \kappa\sigma\phi}\right) v_t$$

where is the puzzle?

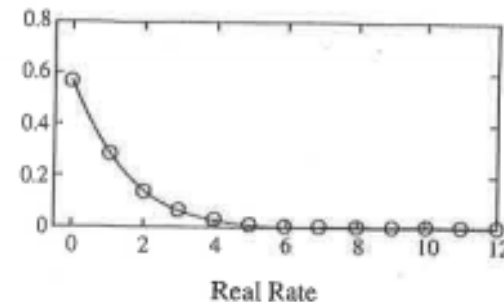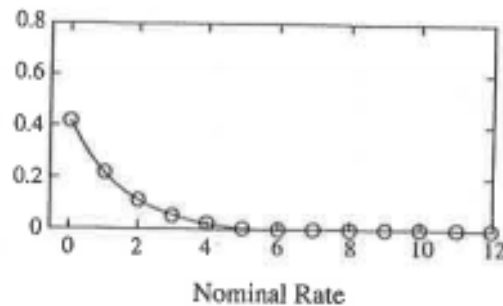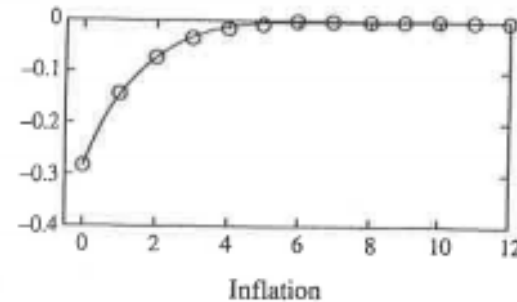$$i_t = \left(\frac{1}{1 + \kappa\sigma\phi}\right) v_t$$
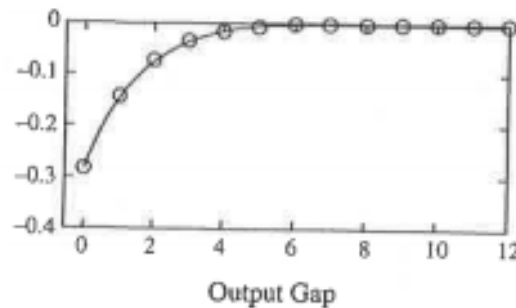
THE PUZZLE?

- *Hard to get higher interest rates lowering inflation*

- In textbook model with not too persistent shocks:

$$i_t = \rho + \phi_\pi \pi_t + \phi_y y_t + v_t$$

$$v_t = \phi v_{t-1} + v_t$$

Gali's book:

Output Gap   Inflation

Nominal Rate   Real Rate

THE PUZZLE?

- *Hard to get higher interest rates lowering inflation*

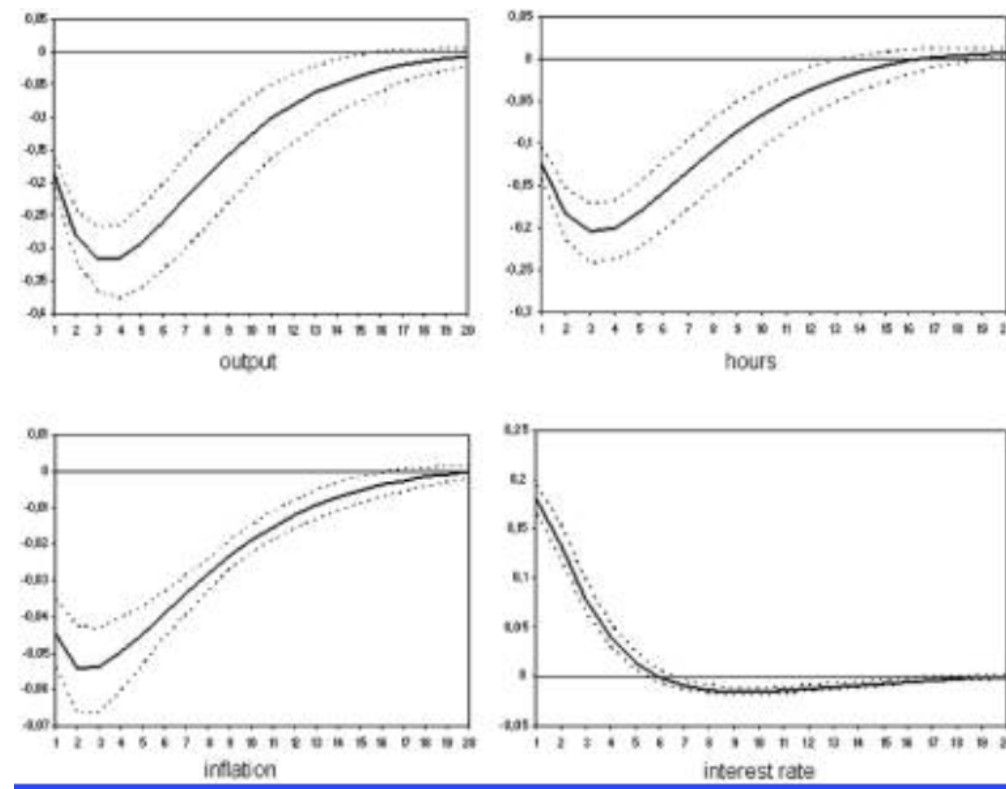- In large-scale policy Smets-Wouters model:

FIGURE 6. THE IMPULSE RESPONSES TO A MONETARY POLICY SHOCK

THE PUZZLE?

- *Hard to get higher interest rates lowering inflation*

- What if permanent increase, via inflation target?

$$\pi_t = \mathbb{E}_t\{\pi_{t+1}\} + \kappa y_t$$

$$y_t = -\frac{1}{\sigma}(i_t - \mathbb{E}_t\{\pi_{t+1}\}) + \mathbb{E}_t\{y_{t+1}\}$$

$$i_t = \rho + \pi^* + \phi_\pi(\pi_t - \pi^*) + \phi_y y_t$$

- Higher rates mean higher inflation right away. Target versus shocks matters. Persistence matters.

- Fed experience with keeping zero rates.

THE PUZZLE?

- *Hard to get higher interest rates lowering inflation*

- And this depends a lot on Calvo, because of front loading problem. Forward guidance example from Carlstrom and Fuerst (2015):

b

Inflation (annualized %)
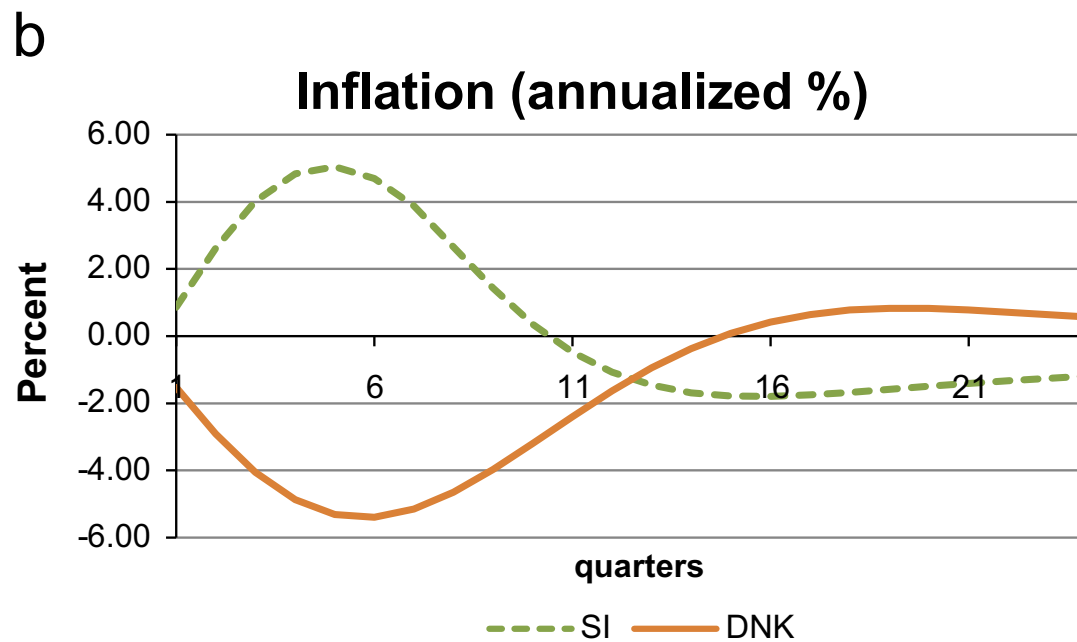
# Experiments and models on inflation

MICHELSON MORLEY?

- *"We observe a decisive experiment, in which previously hard-to-distinguish theories clearly predict large outcome. The experiment yields a null result, which cleanly invalidates those theories."* p.1 *"inflation can be stable at an interest rate peg."* p.26 *"The observed inflation stability is thus a big feather in the new-Keynesian cap."* p.1 *"The observation that inflation has been stable or gently declining and quiet at the zero is important evidence against the … new Keynesian view that it leads to sunspot volatility.* p.101 *"Theories fail no less when they predict movements that do not happen. That is the case now."* p17

- But anything but a clean experiment.

  - Treatment? Feedback rules, NK models fine with stable inflation.

  - Confounding factors? large clear shocks to r^n.

OCCAM?

- "*You cannot truthfully explain say, to an undergraduate or policy maker that higher interest rates produce lower inflation.*" p. 3. But I just did.

- "*Now, any theory, especially in economics, invites epicycles.*" p.1. But epicycles should come after the fact.

- "*Did we really avoid deflation in 2010 because people expected some sort of explosive promises around a 2% inflation target to emerge and select in equilibria, maybe sometime in 2025 when Japan finally exists zero rates?*" p.22. But Ricardian equivalence, PIH…

- "*But following these paths abandons the qualifiers "simple" or "economic".*" p. 86. But Del Negro, Giannoni, Schorfheide (2015)

Total Deficit (-) or Surplus
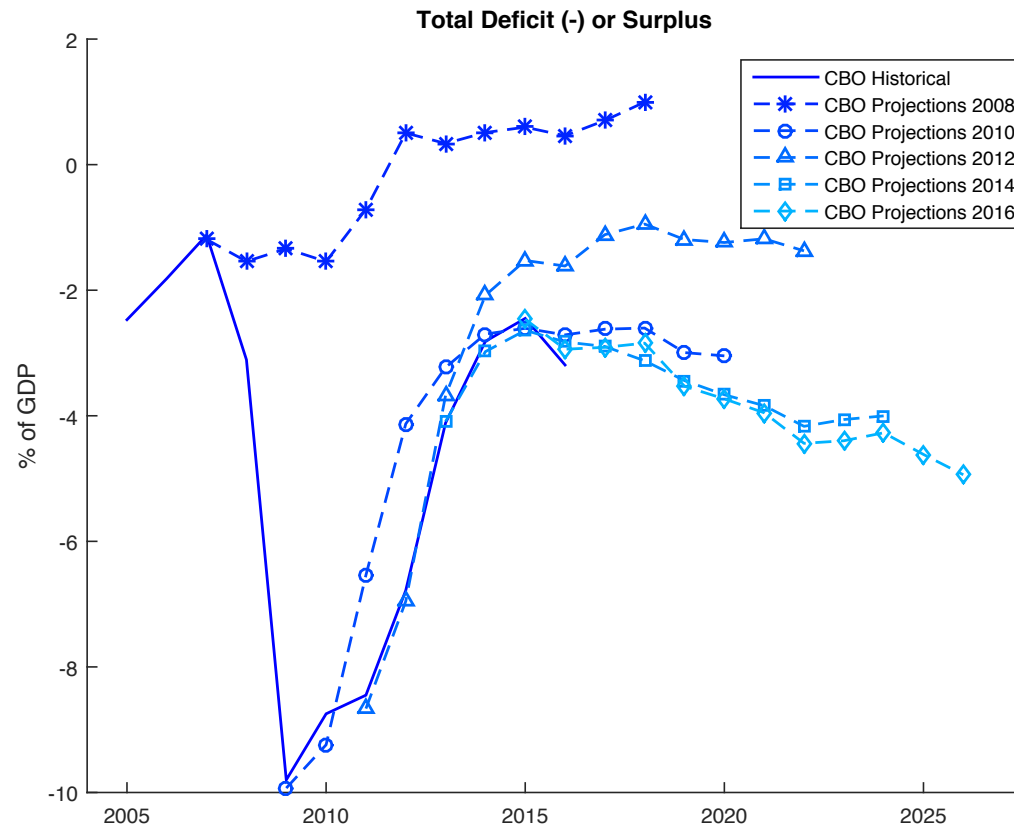
Source: Congressional Budget Office, Historical data and 10-yrs Projections

Michael Kinsley (2010, Atlantic): "My specific concern is nothing original: it's just the national debt.[…] There is a way out. It's called inflation."

John Kemp (2009, Reuters): "The stage is set for a long period of slow growth as debts are worked down and a rise in inflation in the medium term"

BCG (2010) "Ongoing fiscal-stimulus packages have left many governments with huge debt levels that may be tempted to inflate away. Ultimately, inflation may be the price we pay for the successful prevention of another Great Depression"

FTPL ALTERNATIVE

Fiscal Uncertainty Index
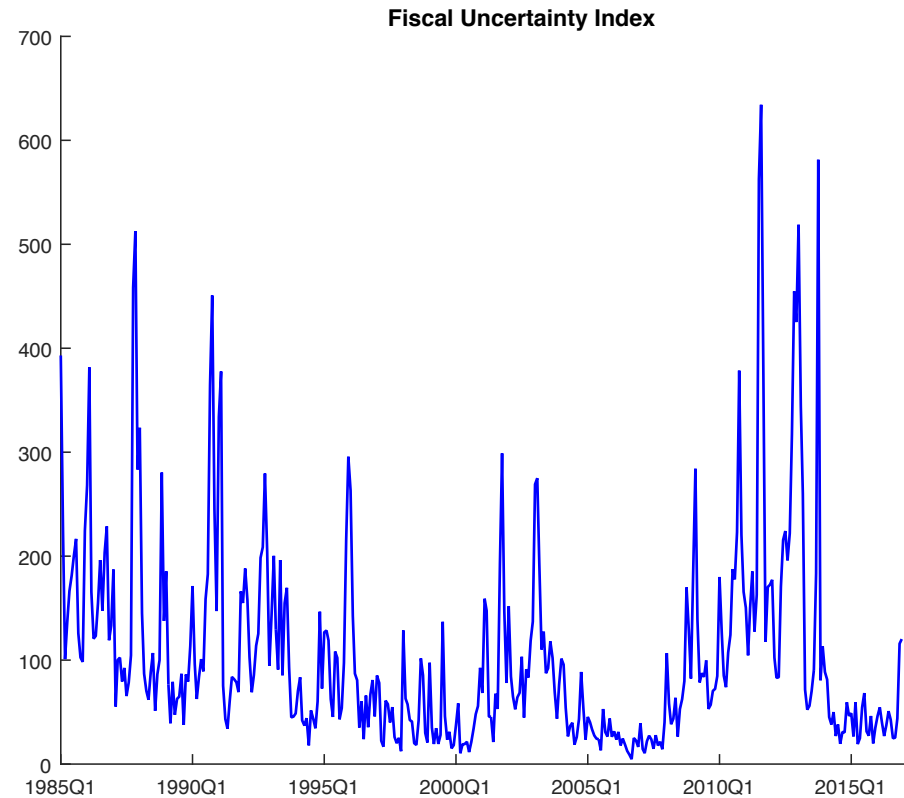
Source: EPU Index - Baker, Bloom and Davis (QJE, 2016)

Drift up in debt but no inflation trending up.
Volatile shocks, not volatile inflation.
Does this experiment invalidate the FTPL?

COCHRANE 16 RESPONSE

- *"Fortunately, the fiscal theory does not predict a tight linkage between current debts, deficits and inflation. Discount raters matter as well, and discount rates for government debt are very low."* But wouldn't Cochrane 1-15 call that epicycles, and is this simple and economic?

- *"Do people really pay that much attention to promises by Federal Reserve officials — and distinguish them from the routinely broken promises of other government functionaries — Treasury secretaries who routinely promise to end deficits one year after their president's term of office?"* p.22 But if I don't believe future s policies, where does that leave the FTPL as a guide for policy?

CONCLUSION

1. Inflation in last decade has been interesting and challenging for economics.

2. Cochrane (2001) FTPL with long-term bonds does a *very* good job.

3. Measuring fiscal impact of monetary policy should receive more attention.

4. I did not quite see the puzzle on interest rates and inflation that excited Cochrane.

5. Sweeping conclusions on models seemed overstated.