Discussion of Wu and Xia

S. Borağan Aruoba
University of Maryland

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Summary

- Start with a standard Gaussian Affine Term Structure model, except

  $$r_t = max(\underline{r}, s_t)$$

  and s_t is an affine function of states, not r_t.

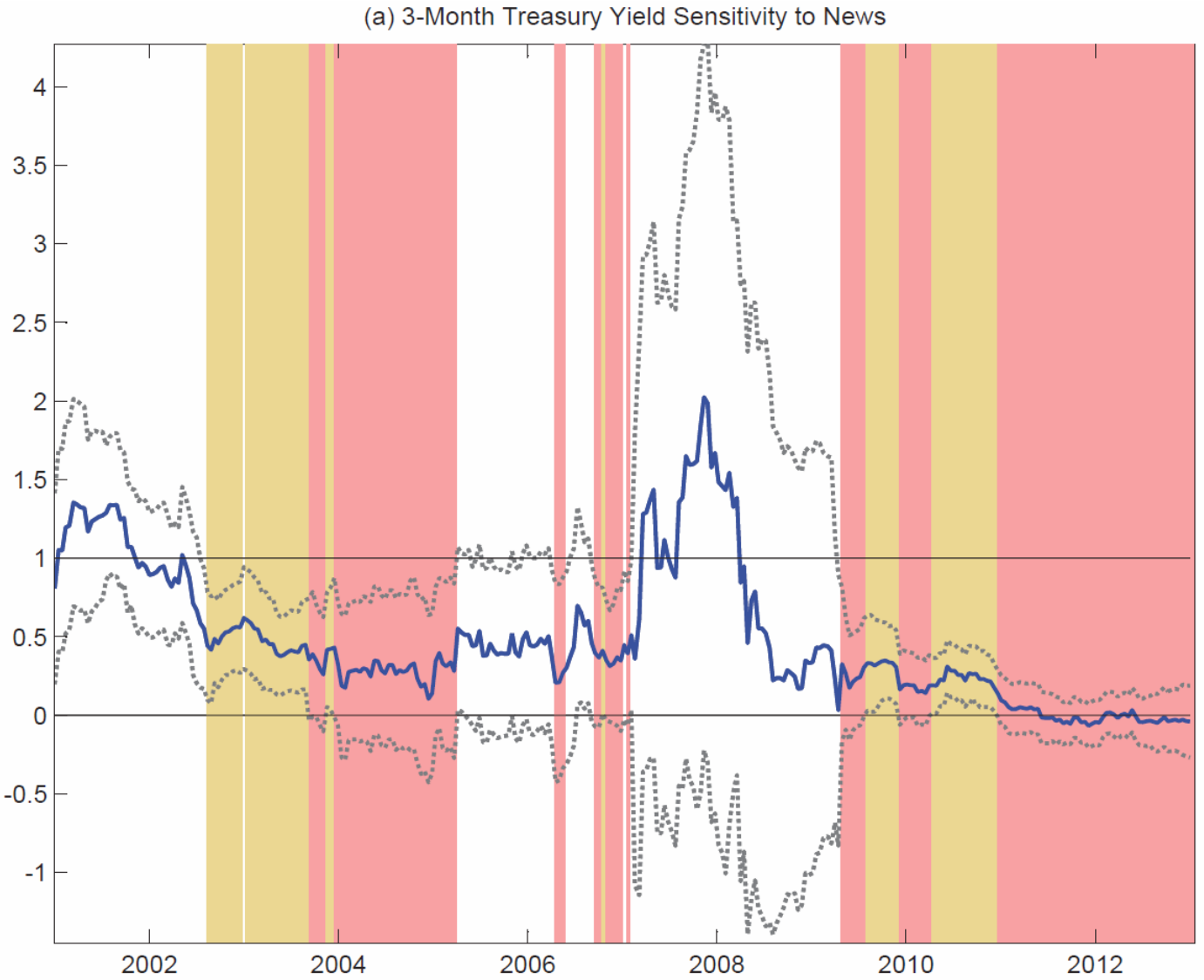
- Use an approximation for the forward rate using $g(z)$.
  - Faster than alternatives, not much loss in accuracy.

- Use extended Kalman filter (approximate the nonlinear state space model with a linear one) to estimate.
  - Data: One-month forward rates for maturities of 3-month, 6-month, 1-year, 2-year, 5-year, 7-year and 10-year.

- Obtain an estimate of s_t, the shadow rate.
  - Use it in a FAVAR as a measure of monetary policy.
  - Impulse responses
  - Link between unconventional policies and shadow rate

Is the Shadow Rate "Unconstrained"?

Swanson and Williams (2015, AER)



Is the Shadow Rate "Unconstrained"?

	Pre-ZLB	Full	ZLB
Constant	-3.8	-3.8	-4.2 (**)
ZLB		0.3	
Initial Claims Surprises	-10.9 (**)	-11.1 (**)	-0.5
Initial Claims Surprises $\times$ ZLB		10.0 (**)	
R^2	0.05	0.05	0.00

- Perhaps more work needed with more surprises and a daily frequency.
- This suggests the shadow rate has muted response to news.
- Remember: the shadow rate is the short rate of the yield curve.

Shadow Rate To Describe the Stance of Monetary Policy

"The natural question is whether the shadow rate could be used in place of the fed funds rate to describe the stance and effects of monetary policy under the ZLB."

- They test (simplifying notation) if $\rho_1 = \rho_3$ in

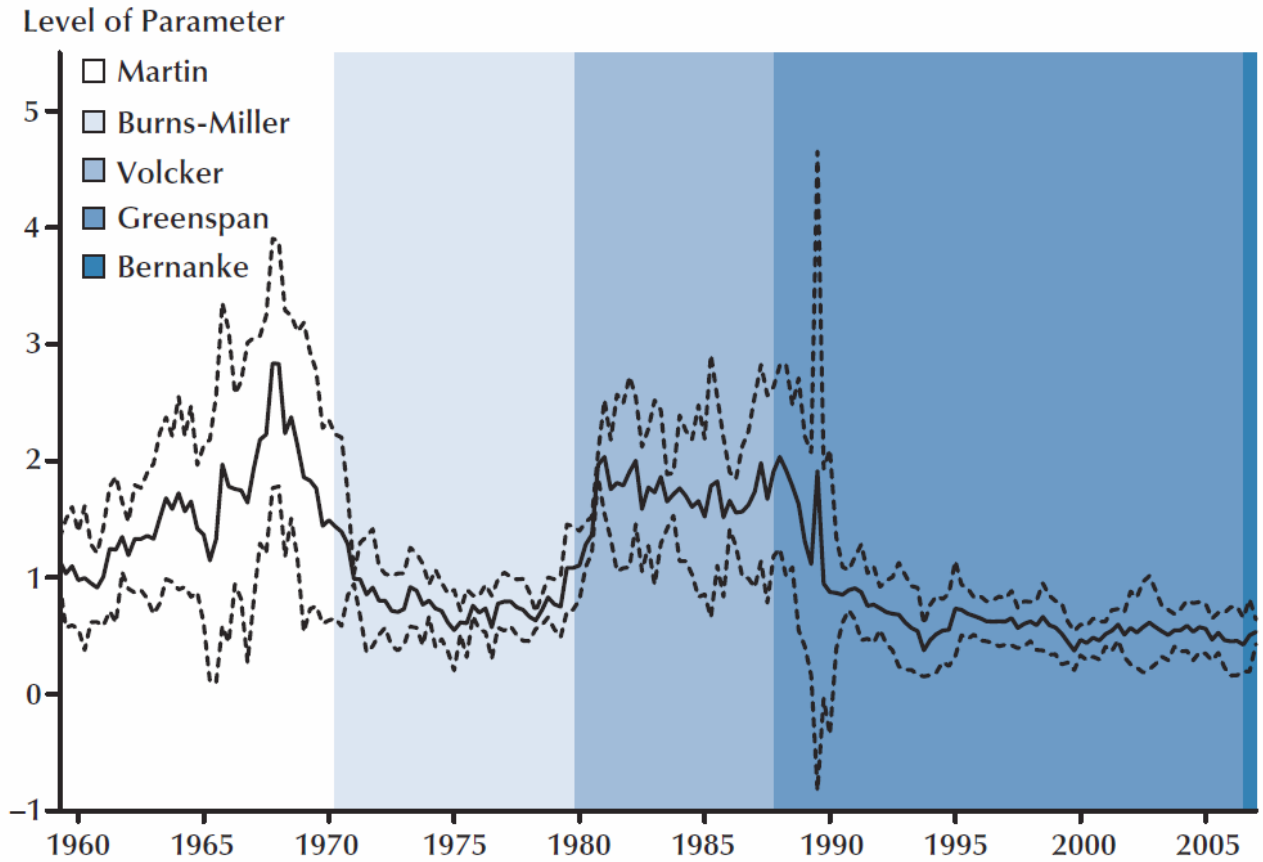
$$\begin{aligned} x_t &= \mu + \rho_x x_{t-1} \\ &+ \mathbf{1}_{(t<\text{December 2007})}\rho_1 s_{t-1} \\ &+ \mathbf{1}_{(\text{December 2007}\leq t\leq \text{June 2009})}\rho_2 s_{t-1} \\ &+ \mathbf{1}_{(t>\text{June 2009})}\rho_3 s_{t-1} + \epsilon_t \end{aligned}$$

- Issues:
  - Why omit December 2007-June 2009? Arguably the most active period of the Fed: Balance sheet grows from $\$886b$ to $\$2,060b$.
  - Why expect equality? A major structural change is occurring in the economy.
    - End of Great Moderation
    - New policy regime? (figure)
    - New shocks: financial, uncertainty, fiscal

Change in Policy Regimes

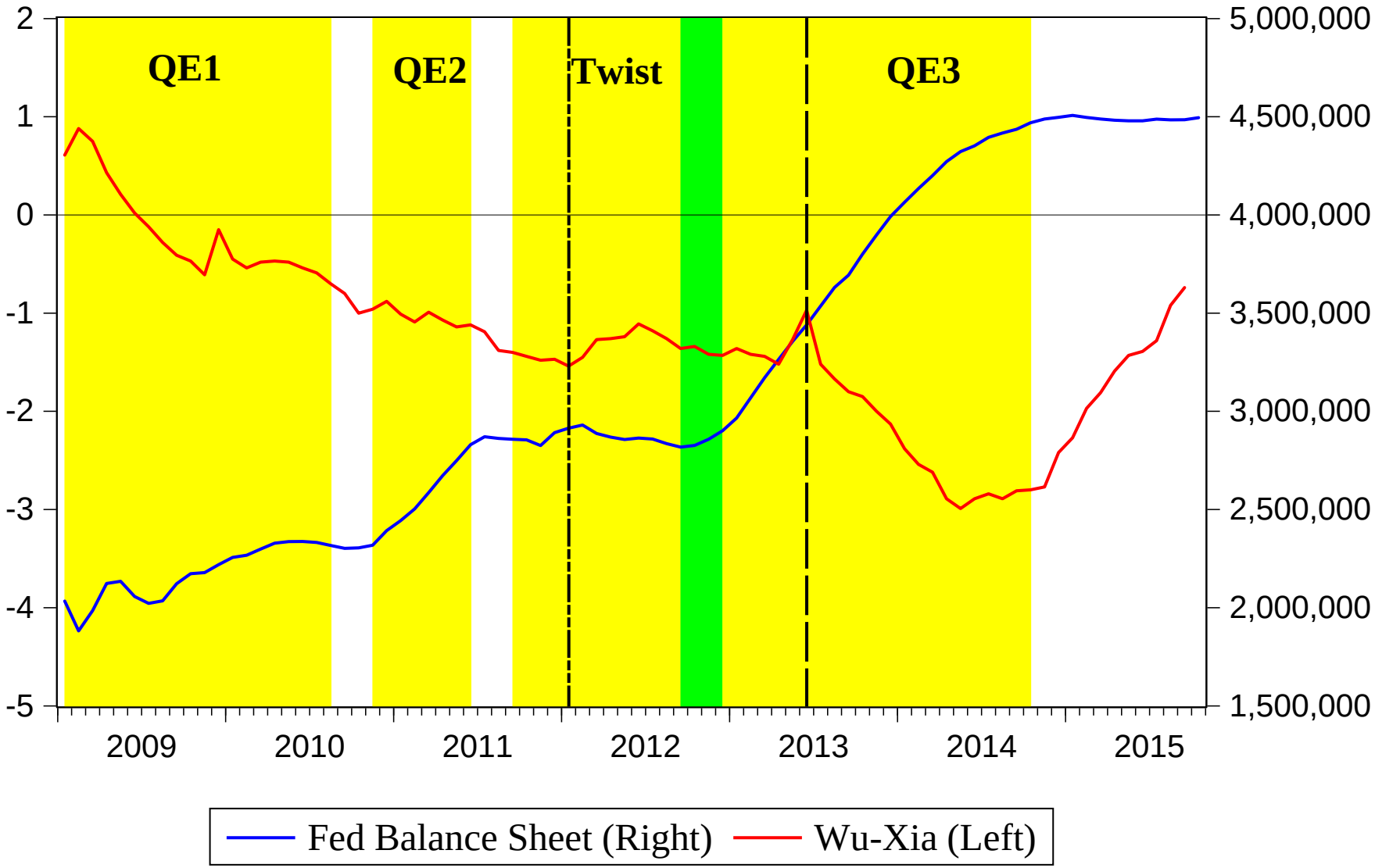
Fernandez-Villaverde et al. (2010, St. Louis Fed Review)

Smoothed Path for the Taylor Rule Parameter on Inflation ±2 SDs



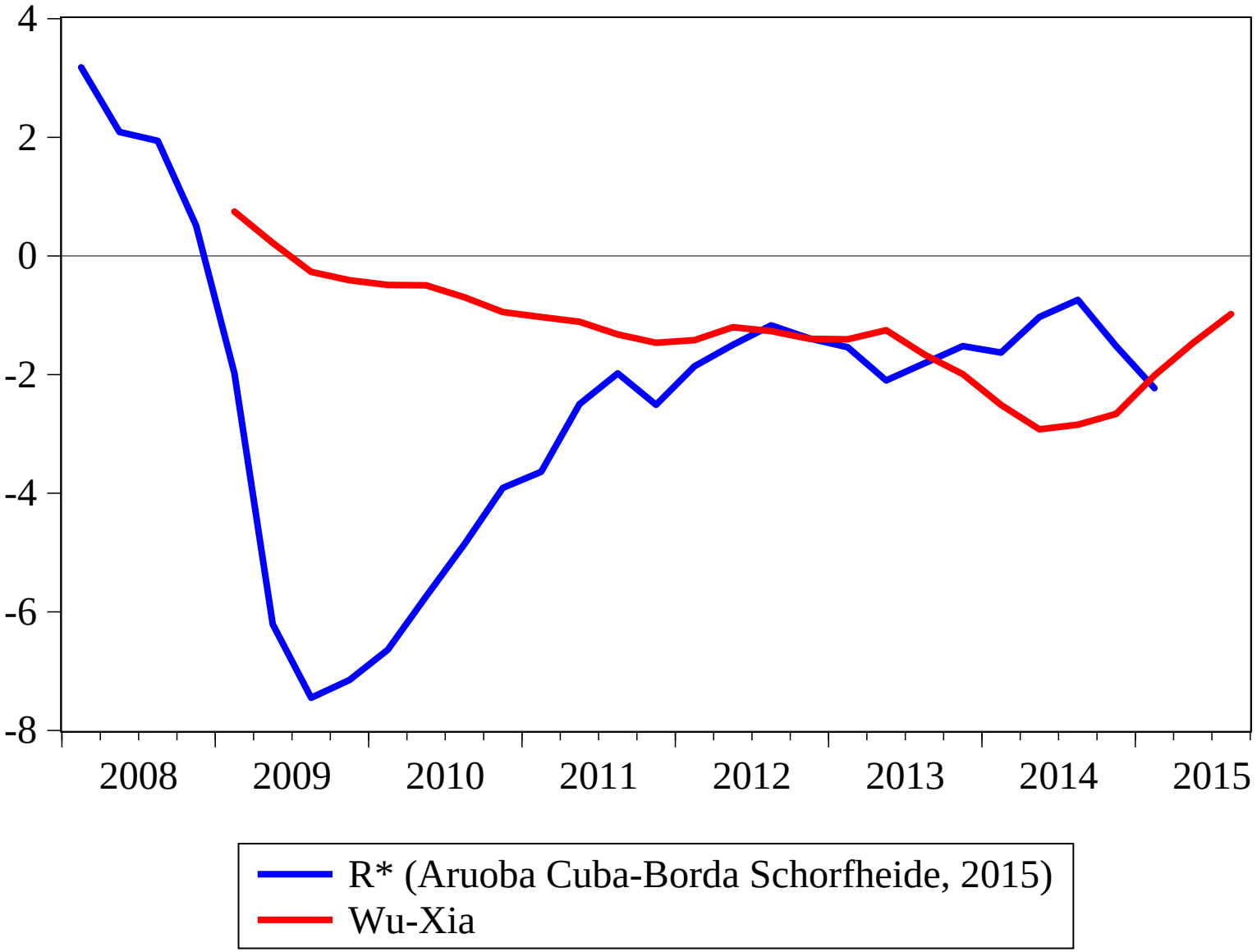
Unconvential Policies and the Shadow Rate

Does the shadow rate reflect the stance of monetary policy?



DSGE Models and the Shadow Rate

Was the Fed policy not nearly expansionary as it should be in 2009-2010?



Conclusion

- Promises replacing federal funds rate in one's favorite empirical model (DSGE, VAR etc.)
- Not clear if it is a sufficient description of Fed's stance.
- Lift-off? (End of September: -0.74%)
  - Is the Fed keeping the policy rate down by 100 basis points?
- Major challenge: When looking back to the U.S. data in 2020, how are we going to estimate our models?
  - Continuous regime?
  - New regime with new tools? (Balance sheet)
- Very useful step forward.