Measuring the stance of monetary policy in conventional and unconventional environments

by Leo Krippner

Discussion at the NBER East Asian Seminar in Economics

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- Topic: correct measurement of the monetary policy stance under ZLB
- I'm nowhere near this field
- But Leo is pretty much founding it
- So much so that FRB of St. Louis president James Bullard made a presentation few years ago that could be called "Leo Krippner's work"

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Monetary policy applications

- Leo Krippner is a financial market economist working at the Reserve Bank of New Zealand.
- Krippner (2012a,b) suggested modifications to the Black (1995) approach to allow for closed-form solutions to the option pricing problem.
  - This allows for considerable simplification.
  - Krippner (2012a,b,c) also emphasized a monetary policy application: Using the implied shadow overnight rate as a metric for the actual stance of monetary policy.
- One earlier U.S. monetary policy application is Bomfim (2003).*

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* *See:* A. Bomfim, 2003, "*Interest Rates as Options*: Assessing the Markets' View of the Liquidity Trap," Federal Reserve Board *Finance and Economics Discussion Series* paper 2003-45.

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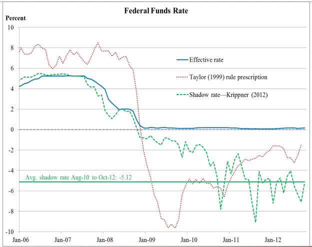
Recommended policy versus actual policy



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Source: Federal Reserve Board, Bureau of Economic Analysis, Bureau of Labor Statistics and author's calculations; the estimated shadow rate was kindly provided by Leo Krippner. Last observation: October, 2012.

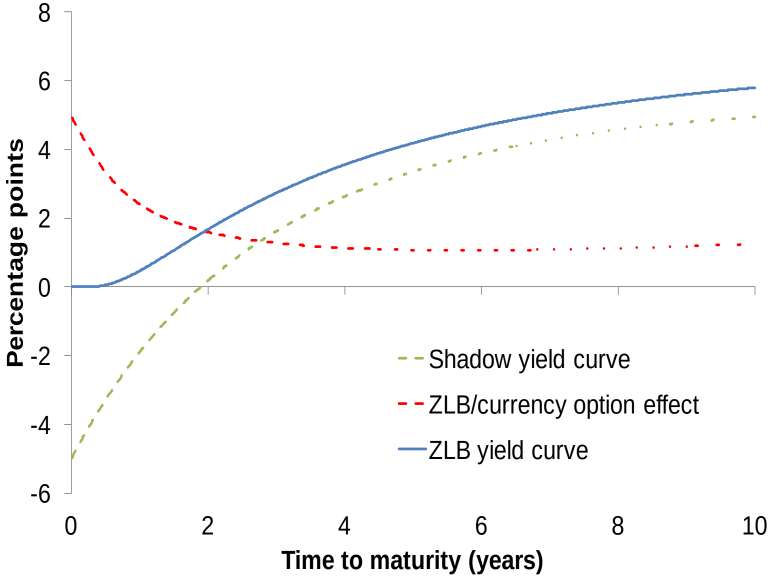
Shadow rates

- Estimate the yield curve even under ZLB, using shadow interest rates (due to Black, 1995):
  - $\underline{i} = \max(0, r + \pi)$: a real-world option of holding physical cash
- Shadow interest rate calculated by assuming there is no physical currency: "What policy rate would generate the observed yield curve if the policy rate could be negative?"
  - Assume shadow bond with price $P(t+\tau)$, $@\tau$, pays 1 at maturity
  - Physical currency pays pays 1, has price of 1
  - Risk-neutral investors choose a min-price investment $\min(1, P(t+\tau))$
  - The boundary condition of 1 implies a *shadow* bond price $P(t, \tau+\delta) - C(t, \tau, \tau+\delta)$ where C is a call option.
  - You can use it to obtain non-negative forward rates, approximately:

$$\underline{f}(t,\tau) = -\frac{1}{\delta}\left(\log\left[\frac{P(t,\tau+\delta) - C(t,\tau,\tau+\delta)}{P(t,\tau)}\right]\right)$$

  - Back out the implied (shadow) interest rates from $\underline{f}(t,\tau)$

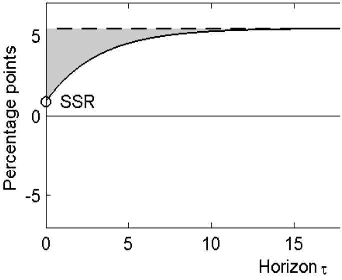
Shadow rates



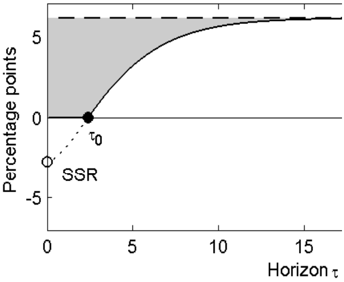
Leo's measure

- Estimate this shadow yield curve using shadow Gausiann Affine Term Structure Models, developed in Leo's other work
- Integral between the truncated shadow yield curve and the estimated long-run interest rate, to measure the stance of monetary policy
- Because this "Effective monetary stimulus" is an integral of full path of interest rates, it's less sensitive to model specification and estimation methods than SSR, "take-off horizon", etc.
- Estimated with different OECD datasets

Under normal conditions



Under Zero Lower Bound



Comments: I like the idea

- Heavy-artillery methodological contribution
- I like that the method presents a summary of current and future interest rates, rather than focusing on a single rate or a single point of time
  - E.g., a quick path to a long-run rate will have a smaller EMS value than a slow path
  - This presents a method of trading off different paths of interest rate changes
- Effect of monetary policy under ZLB measured through the "take-off" point τ_0, long-run rate, and the curvature of the yield curve.
  - This is much better than using shadow rates explicitly, since they don't exist in real world

Normative implications

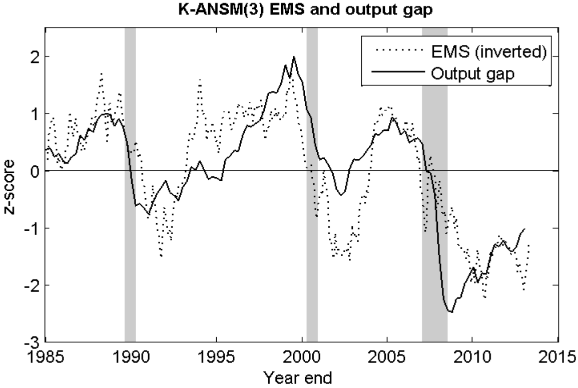
- The *right* way of summarizing a yield curve and trading-off i.r. paths?
- E.g., imagine two types of monetary policy actions (shock vs. gradual), but with an identical integral (EMS value)
- These may have different welfare implications
  - In economic theory, interest rates key for inter-temporal allocation of Consumption (e.g., the Euler equation)
  - Thus, the interest rate paths have first-order effects on welfare
  - Your EMS measure doesn't consider the path of the interest rates explicitly (risk-neutral agent)
- A quick way of considering this would be to derive your option-pricing kernel from a log-utility
- A short-cut could be to ad-hoc include the interest rate variability explicitly (more = bad)
- Such metric could inform much wider audience: welfare measures of MP actions under ZLB

Ranking your methods

- You present two main methods: EMS-Q and EMS-P
- Each can be estimated in different ways (method, number of factors)
- Is there a way to rank them?
  - Important for operational usefulness
- I'd again give (some negative) weight to i.r. variability when computing EMS

Volatility

- Your EMS measures seem very volatile
- The asset-price nature of your EMS: integrating over rates of maturities many years ahead; a shift of your yield curve, or a change in the long-run rate, therefore has quantitatively large implications



- Wasn't your EMS meant for ZLB times?

Small comments

- Make this more accessible for mere humans like myself
- Explain intuitively the meaning of your second (EMS-P) measure
  - EMS-P delivers much lower estimate of the long-run interest rate in your Figure 13 - why?
- I like you thinking about the nominal exchange rates
  - Also an asset price, similar to the nature of EMS
  - But should consider EMS in both countries
  - Construct an "EMS" measure for the interest rate *differential* between countries
  - This could be fertile ground for future work

Strange spike in Figure 11