Safety, Liquidity, and the Natural Rate of Interest

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Comment 1: Decomposing long term yield into expectation and term premium

This is one core question in the term structure literature

$$y_t^n = \bar{y}_t^n + tp_t^n$$

where

$$\bar{y}_t^n = \frac{1}{n}\mathrm{E}_t\left[r_t + r_{t+1} + \ldots r_{t+n-1}\right]$$

Expectation $\bar{y}_t^n$ is the trend.

Comment 1: Expectation

The short rate

$$r_t = \delta_0 + \delta_1' X_t$$

Dynamics for factors

$$X_{t+1} = \mu + \rho X_t + \Sigma \varepsilon_{t+1}, \quad \varepsilon_{t+1} \sim N(0, I)$$

Pricing equation

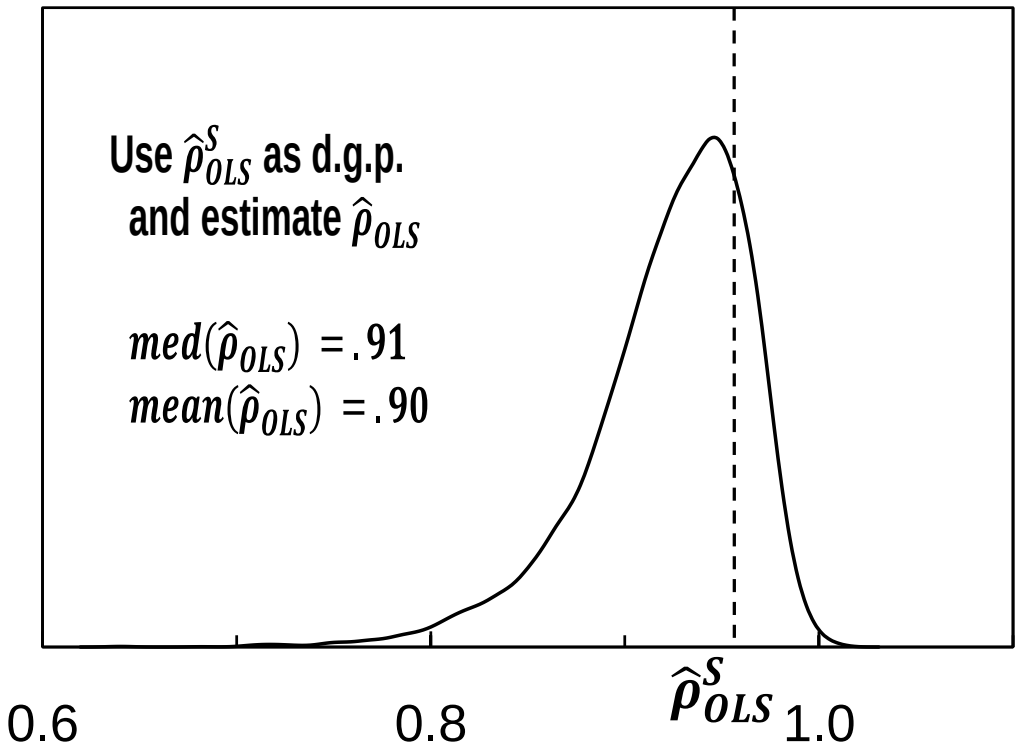
$$\begin{aligned} P_{nt} &= \mathbb{E}_t[\exp(-m_{t+1}) P_{n-1,t+1}] \\ y_{nt} &= -\frac{1}{n} \log(P_{nt}) \end{aligned}$$

Expectations

$$E_t[r_{t+n}] = \delta_0 + \delta_1' E_t[X_{t+n}]$$

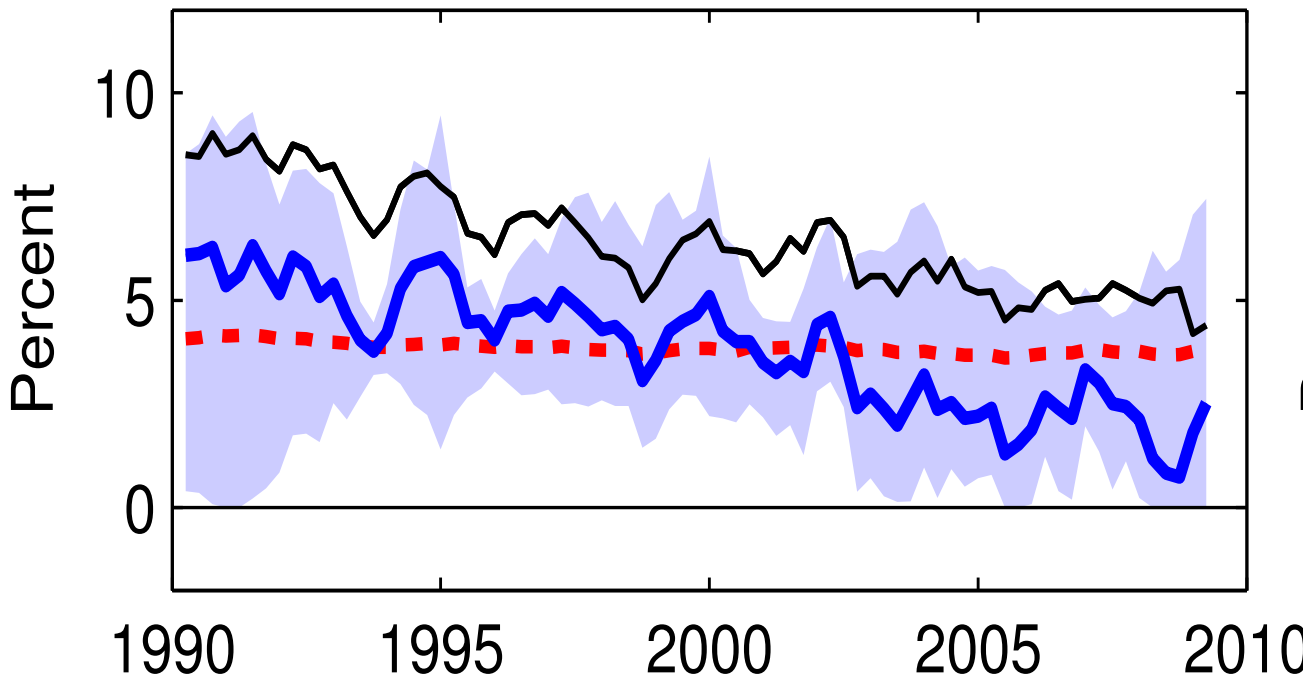
Comment 1: Bias correction

- Estimation: OLS for VAR. Highest eigenvalue of ρ: 0.95.
- However, the persistence is underestimated.



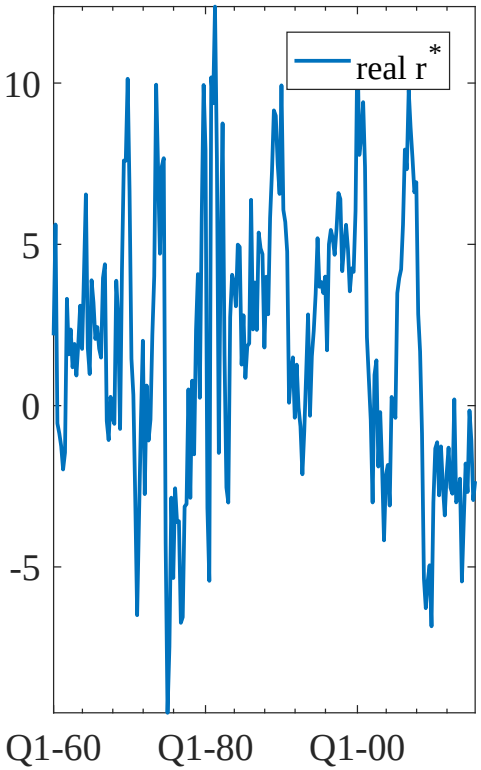
- Bias correction: Bauer, Rudebusch, and Wu (2012, 2014).

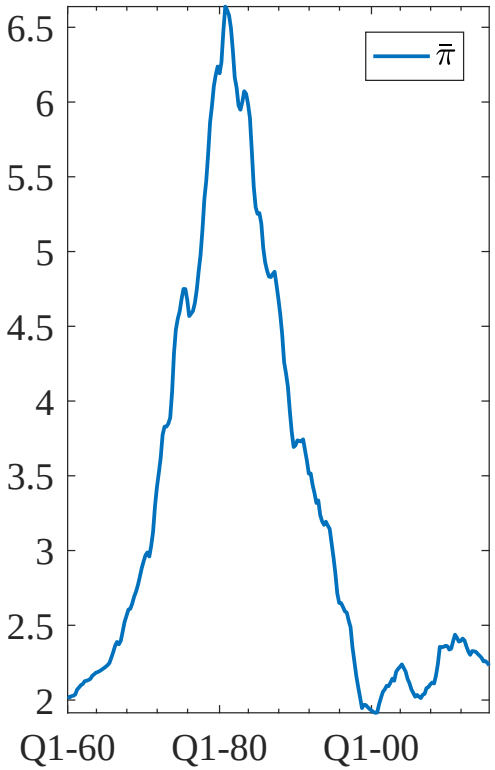
Comment 1: Downward trend in expectation

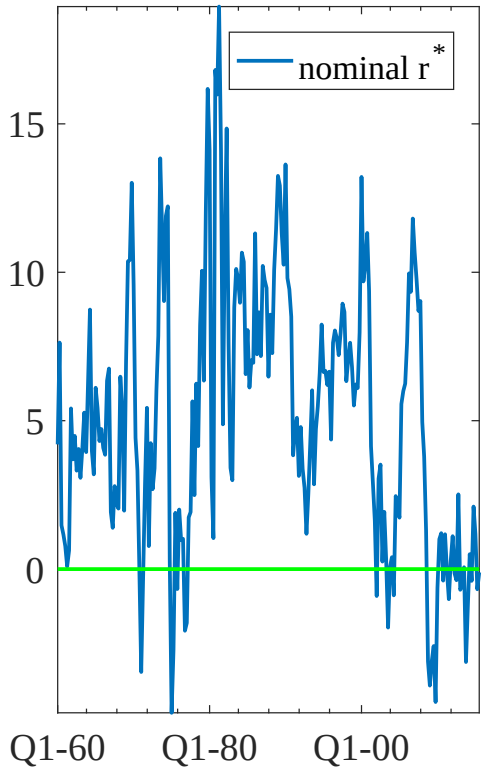


black: five-by-five-year forward rate
Red: OLS
blue: Bauer, Rudebusch, and Wu (2012, 2014) bias corrected

Comment 2: How negative can nominal rates be?







Comment 2: How negative can nominal rates be?

Nominal r^* was as negative as -5%.

Is it plausible?

- We do not observe negative interest rates in the US.
- The SNB's deposit rate is at record low of -75 basis points. But that's still far away from -5%.
- The negative interest rates in Europe were due to interventions by central banks, but r^* is in the conterfactual world where there is no central bank.

Frictions that potentially allow a negative nominal rate

- take physical currency out of circulation
  - highly unlikely
- storage cost
  - there is a limit

Comment 2: What causes implausibly negative nominal rate?

Lack of proper treatment for ZLB

- In the reduced form: discard short rate after 2008 Q3

Consequences

- internal inconsistency
  - remove short rate and its ZLB
  - forward looking agents factor the ZLB in the future into yields at longer maturities.
  - the same lower bound should constrain the nominal trend and r^*.
- less information leads to less accurate estimation

Comment 2: Shadow rate – a treatment for ZLB

Black (1995)

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

- Allow the model to be internally consistent
  - short rate, trend on nominal rates, and expectations in longer rates are subject to the same lower bound.
- Does not allow nominal rates to be (too) negative.

Comment 2: Shadow rate – a treatment for ZLB

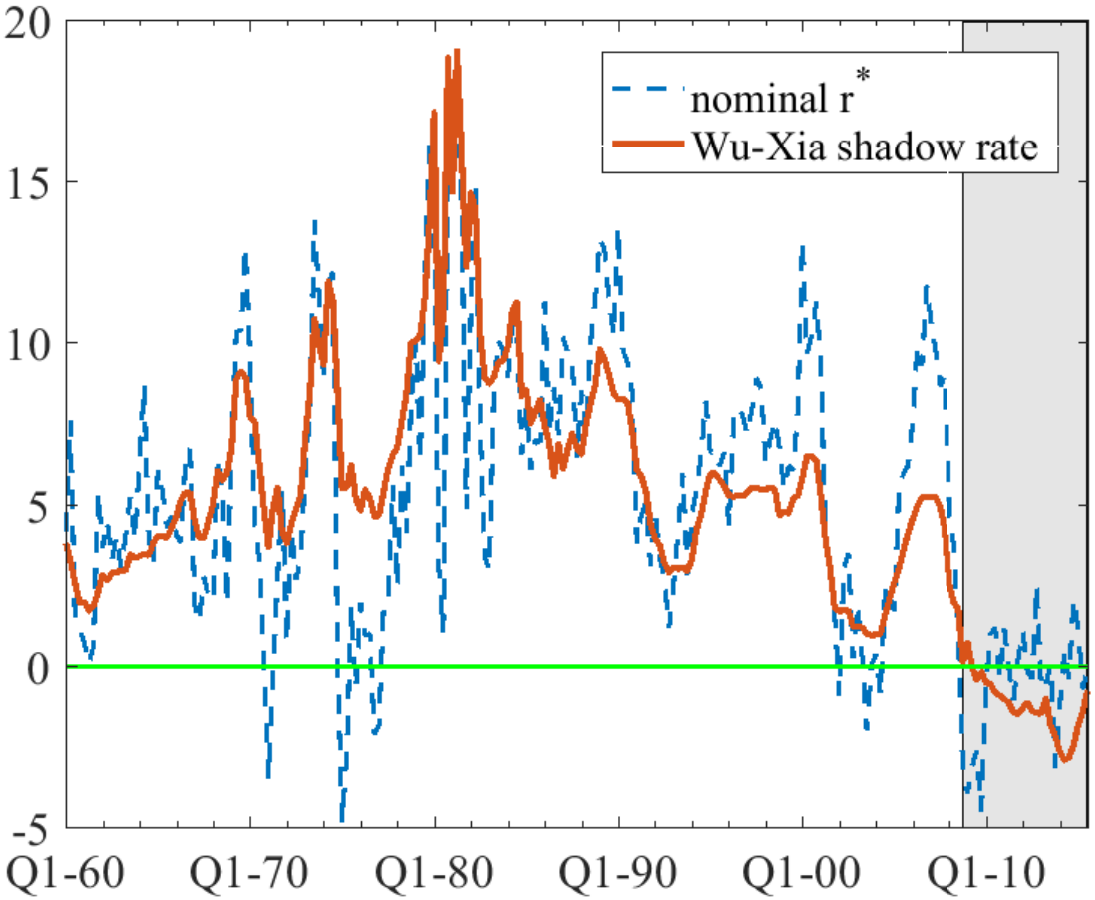
Wu and Zhang (2016)

- DSGE linear in s_t
- $r_t = max(s_t, \underline{r})$
- A negative s_t accommodates unconventional monetary policy

Potential consolidating negative nominal rates by relabeling r_t as s_t

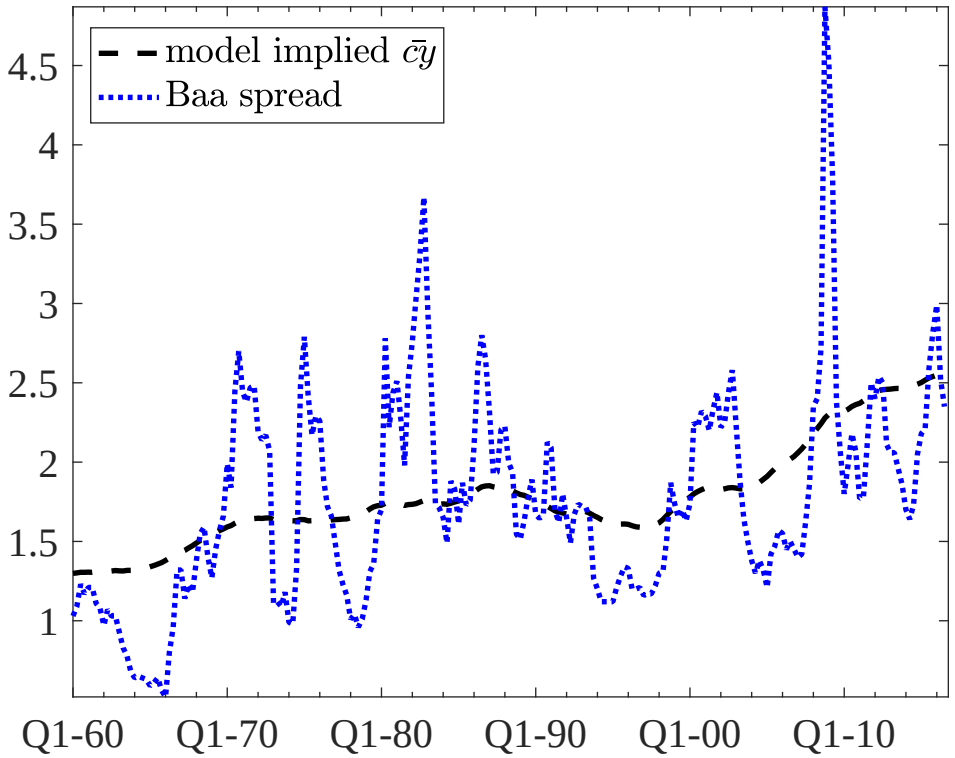
- $s^* + E_t\pi_{t+1} < 0$
- $r^* + E_t\pi_{t+1} > 0$
- A downward trend in s^* instead of r^* at the ZLB.

Comment 2: Shadow rate – a treatment for ZLB



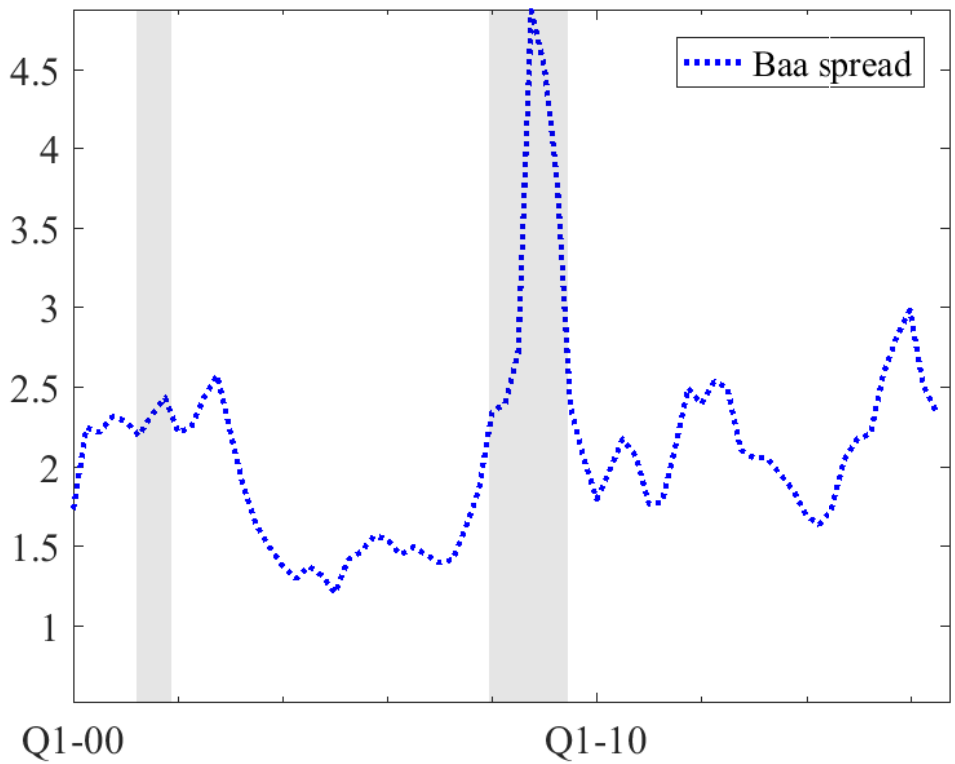
Puzzle remaining: what happened in the 1970s?

Comment 3: Trend in convenience yield



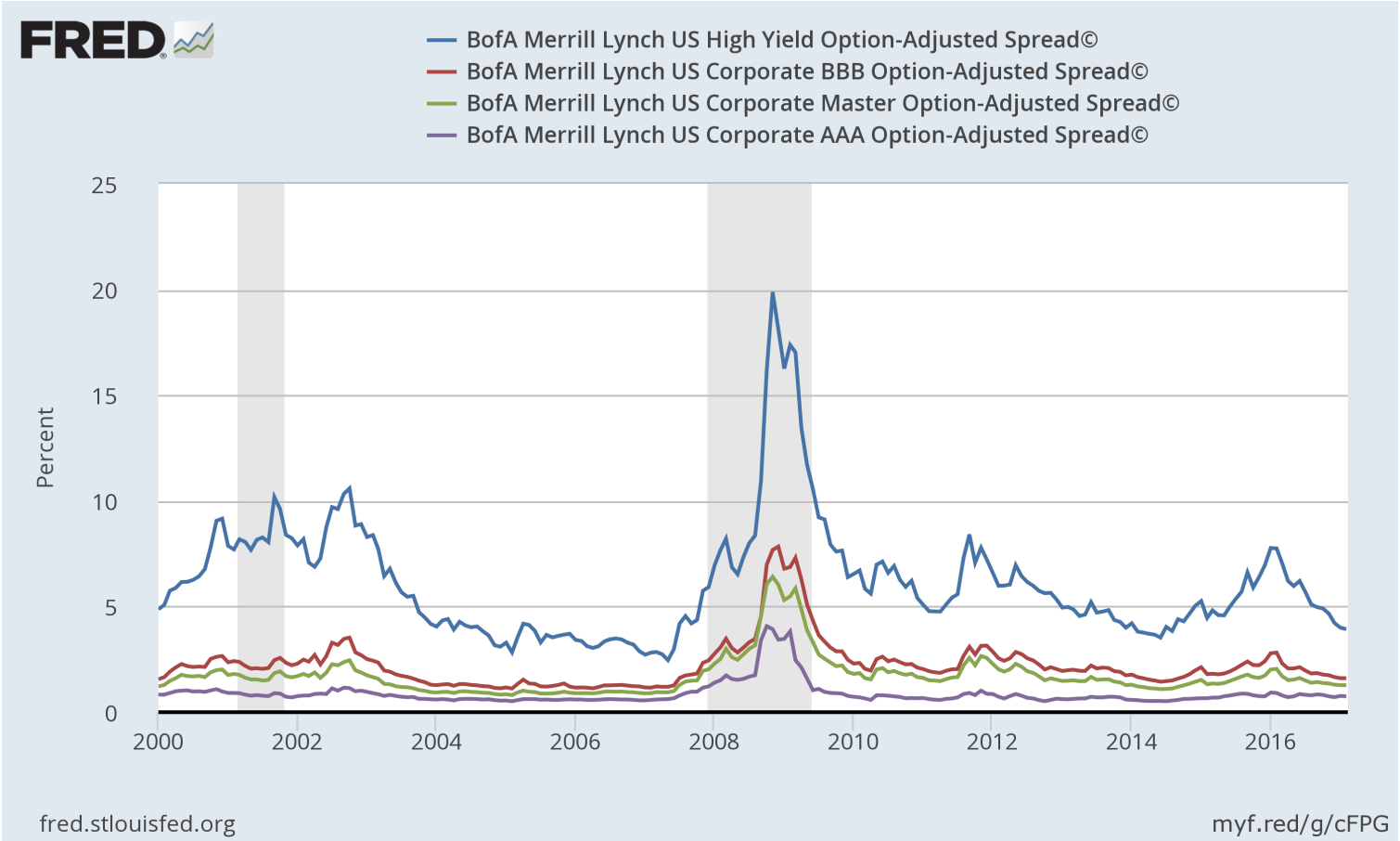
Main result: a trend in convenience yield from late 1990s explains the decline in $\bar{r}$.

Comment 3: No trend in the data



- No trend is present in the data
- Spread jumps up during the Great Recession

Comment 3: No trend in the data



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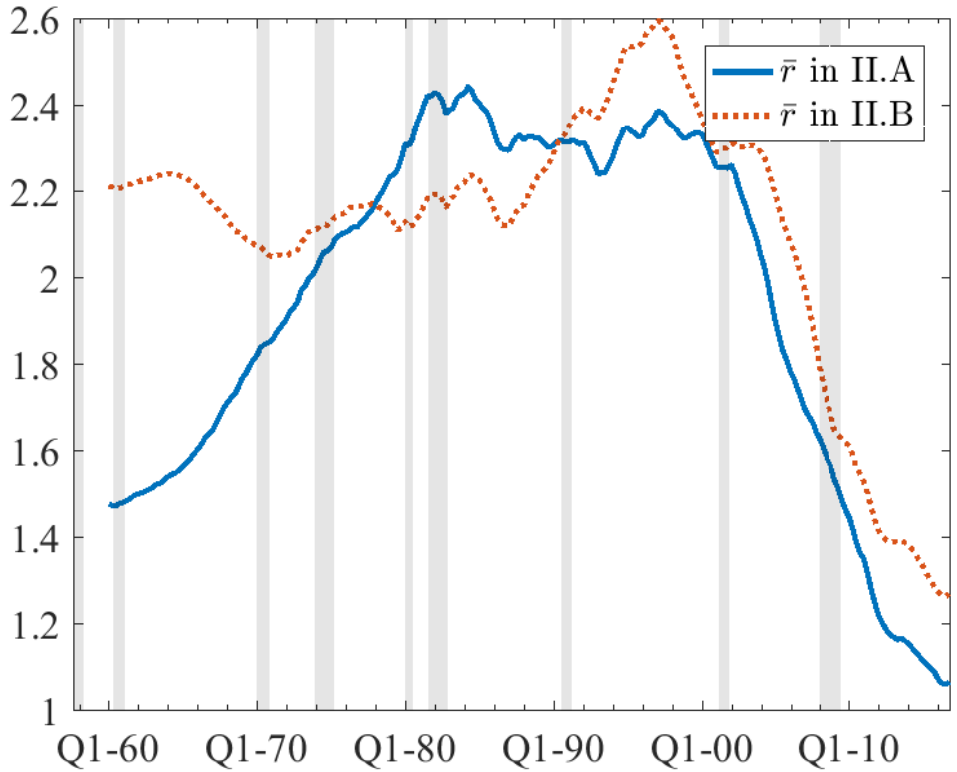
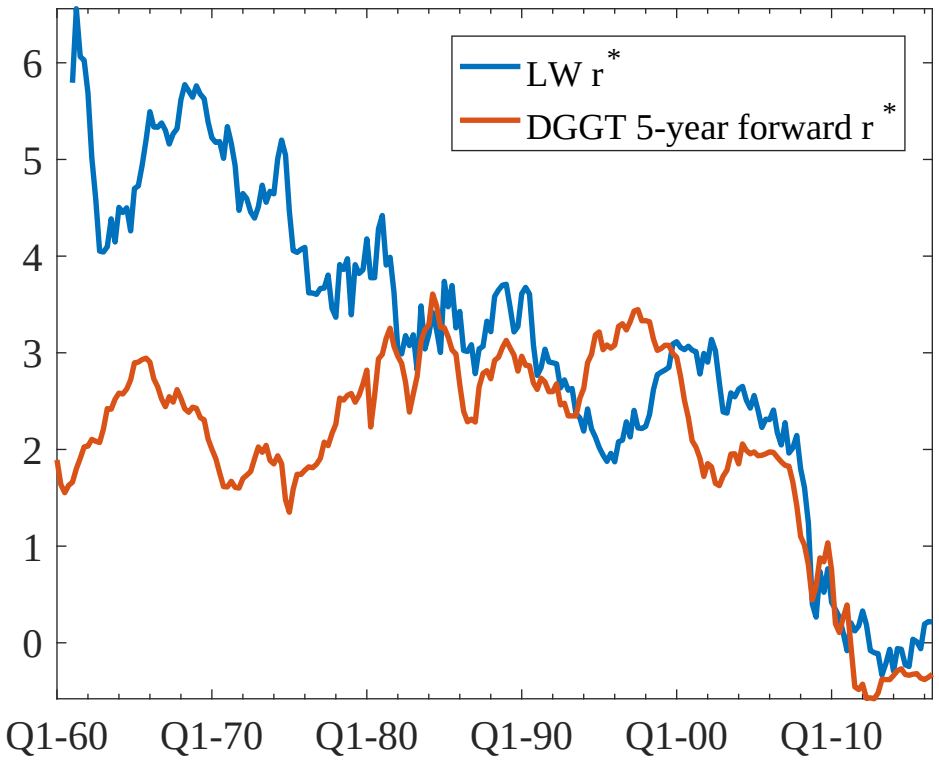
Comment 4: Model dependent results



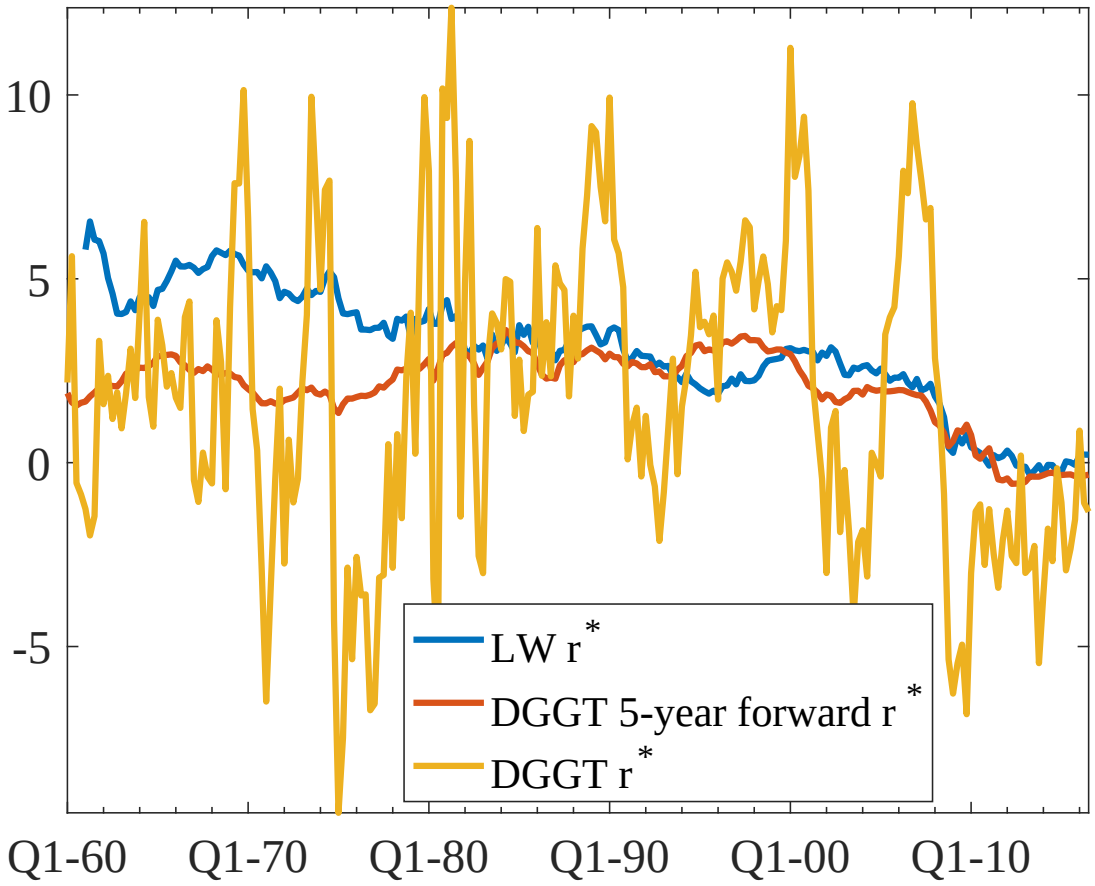
- For the first 70% of the sample, the correlation is 0.37
- The difference was 0.8% at the beginning
- Different cyclical behaviors

Comment 4: Model dependent results



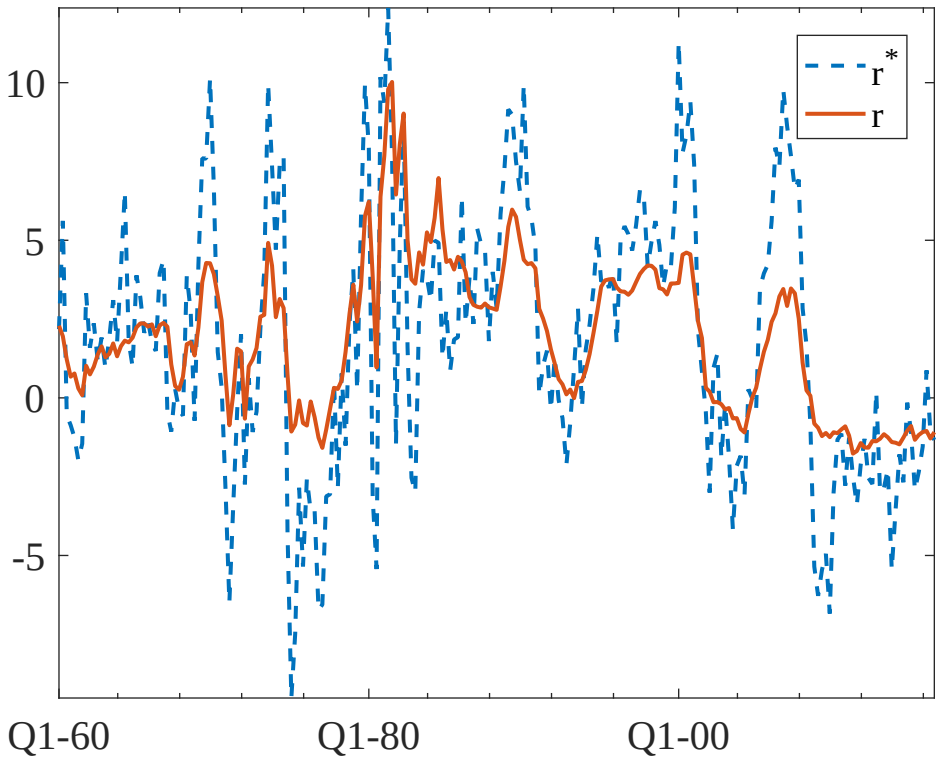
- For the first 70% of the sample, the correlation is -0.57
- The difference was 4.8% at the largest

Comment 4: Model dependent results



- r^* is much more volatile than the other two series
- There is hardly a common pattern across the three

Comment 4: Should the natural rate of interest be more volatile than observed rates?



The variance of r^* is 3 times the variance of r.

Conclusion

Overall, this is a very interesting, timely, and well written paper!

- Comment 1: downward trend in expectation.
- Comment 2: is very negative nominal r^* a shadow rate?
- Comment 3: there isn't a trend in convenience yield in the data.
- Comment 4: model dependent results.