Safety, Liquidity, and the Natural Rate of Interest

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Disclaimer: The views expressed are ours and do not necessarily reflect those of the Federal Reserve Bank of New York or the Federal Reserve System
Why are interest rates low in the U.S.?

- Interest rates are low because $r^*$ is low, and $r^*$ is low because of the increasing premium for safety/liquidity since the late 1990s

- Build on recent finance literature emphasizing the role of safety/liquidity in the pricing of securities

$$1 = E_t [M_{t+1}(1 + r_t)(1 + CY_{t+1})]$$

where $M_{t+1}$ is the stochastic discount factor, $(1 + r_t)$ is the pecuniary return, and $(1 + CY_{t+1})$ is the convenience yield

- Krishamurthy & Vissing-Jorgensen, 2012, Greenwood, Hanson, Stein, 2015, Kyiotaki & Moore, 2012, ...

- Our story: $(1 + CY) \uparrow \Rightarrow (1 + r) \downarrow$
Spreads

Moody’s Baa Corporate Bond Spread

Moody’s Aaa Corporate Bond Spread

Outline

- A flexible **reduced form** model:
  - Extract trends in observed interest rates, and in the convenience yield

- A **structural** model (DSGE):
  - Characterize the natural rate of interest $r^*$ and estimate its low frequency movements
The reduced form model: VAR with common trends

- Multi-variate unobserved component model:

\[ y_t = \Lambda \bar{y}_t + \tilde{y}_t \]

where \( y_t \) are \( n \times 1 \) observables, \( \bar{y}_t \) are the \( q \times 1 \) trends (\( \Lambda \) is the matrix of loadings)

\[ \bar{y}_t = \bar{y}_{t-1} + e_t \]

and the stationary components \( \tilde{y}_t \) follow an unrestricted VAR

\[ \Phi(L)\tilde{y}_t = \varepsilon_t \]

- Based on Stock and Watson, 1988, but estimated with Bayesian methods
<table>
<thead>
<tr>
<th>Trends</th>
<th>Observables (1960Q1-2016Q4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \bar{\pi}_t )</td>
<td>Inflation ( \pi_t ) ( = \bar{\pi}_t + \tilde{\pi}_t )</td>
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<tr>
<td>Infl. Exp. (long run)</td>
<td>( \pi^e_t ) ( \vdots )</td>
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<td>( \bar{r}_t )</td>
<td>T-bill rate ( R_{3M,t} ) ( = \bar{\pi}_t + \bar{r}_t + \bar{m}_t - \bar{cy}_t + \bar{m}_t - \bar{cy}_s - \bar{cy}_l )</td>
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<td>T-bill Exp. (long run)</td>
<td>Long-run Treas. ( R_{20Y,t} ) ( + \bar{tp}_t \bar{tp}_t )</td>
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Decompose \( \bar{r}_t = \bar{m}_t - \bar{cy}_t \)

Baa Yield \( R_{t}^{Baa} \) \( = \bar{\pi}_t + \bar{m}_t + \bar{tp}_t \)

\( \Rightarrow \)

\( \bar{R}_{t}^{Baa} - \bar{R}_{80,t} = \bar{cy}_t + \text{def}_t \)

Decompose \( \bar{r}_t = \bar{m}_t - \bar{cy}_s - \bar{cy}_l \)

\( \bar{cy}_t \) \( \text{Baa -Aaa Spread} \) \( \Rightarrow \)

\( \bar{R}_{t}^{Baa} - \bar{R}_{t}^{Aaa} = \bar{cy}_s \)
VAR Results #1 and #2: $ar{r}_t$ falls by 1.25% from late 1990s; Main driver is $\bar{cy}_t$
## Change in Trends, 1998Q1-2016Q4

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DSGE

- Medium/largish-scale model with Smets & Wouters’ nominal and real rigidities, and financial frictions as in Bernanke, Gertler, and Gilchrist, 1999
  - Observables (1960Q1-2016Q3): the growth rate of real output (both GDP and GDI), consumption, investment, real wage, hours worked, inflation (both core PCE and GDP), long run inflation expectations, the FFR, the ten-year Treasury yield, Fernald’s TFP growth, Baa and Aaa spreads

- **Convenience yield** assumed exogenous and identified off corporate spreads—as in VAR
  - see Del Negro et al., 2017, for a more structural analysis

- We define the **natural rate of interest** \( r_t^* \) as the real return to an asset that is as **safe/liquid** as a 3-month US Treasury bill *in a counterfactual economy without nominal rigidities*

- No nominal rigidities \( \rightarrow \) abstracting from the influence of monetary policy

- Safe/liquid: relevant benchmark for monetary policy
DSGE Result #1:
DSGE’s trends in $r_t^*$ are the same as $\bar{r}_t$

Thirty-year Ahead Forward Rate ($E_t r_{t+30Y}^*$) vs $\bar{r}_t$
DSGE Result #2:
Convenience Yield is the main driver of trends in $r^*_t$

Decomposition of Thirty-year Ahead Forward Rate ($E_t r^*_{t+30Y}$)
Laubach-Williams estimates very similar to DSGE’s 5-year forward rate (post 1980)
Conclusions
Why have interest rates been low?

- Interest rates are low because $r^*$ is low
- The secular decline in $r^*$ since the late 1990s has been about $1^{1/4}$ pp
- .. and the increase in the convenience yield for safe/liquid assets such as Treasuries is an important driver of this decline
  - Corporate yields have fallen much less than Treasuries
Reference Slide:
Distance to Default

![Distance to Default Graph]

Q1-77 Q1-87 Q1-97 Q1-07

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Reference Slide:
Trends in the Liquidity Convenience Yield and the Refcorp/Treasury Spread
Reference Slide: \( \bar{cy}_t, \bar{cy}^s_t, \bar{cy}^l_t, \) and Spreads

\[ \bar{cy}_t, \text{ and } R^{Baa}_t - R_{80,t} \]

\[ \bar{cy}^s_t, \text{ and } R^{Baa}_t - R^{Aaa}_t \]

\[ \bar{cy}^l_t, \text{ and } R^{Aaa}_t - R_{80,t} \]