Safety, Liquidity, and the Natural Rate of Interest

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Brookings Papers on Economic Activity, Spring 2017

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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

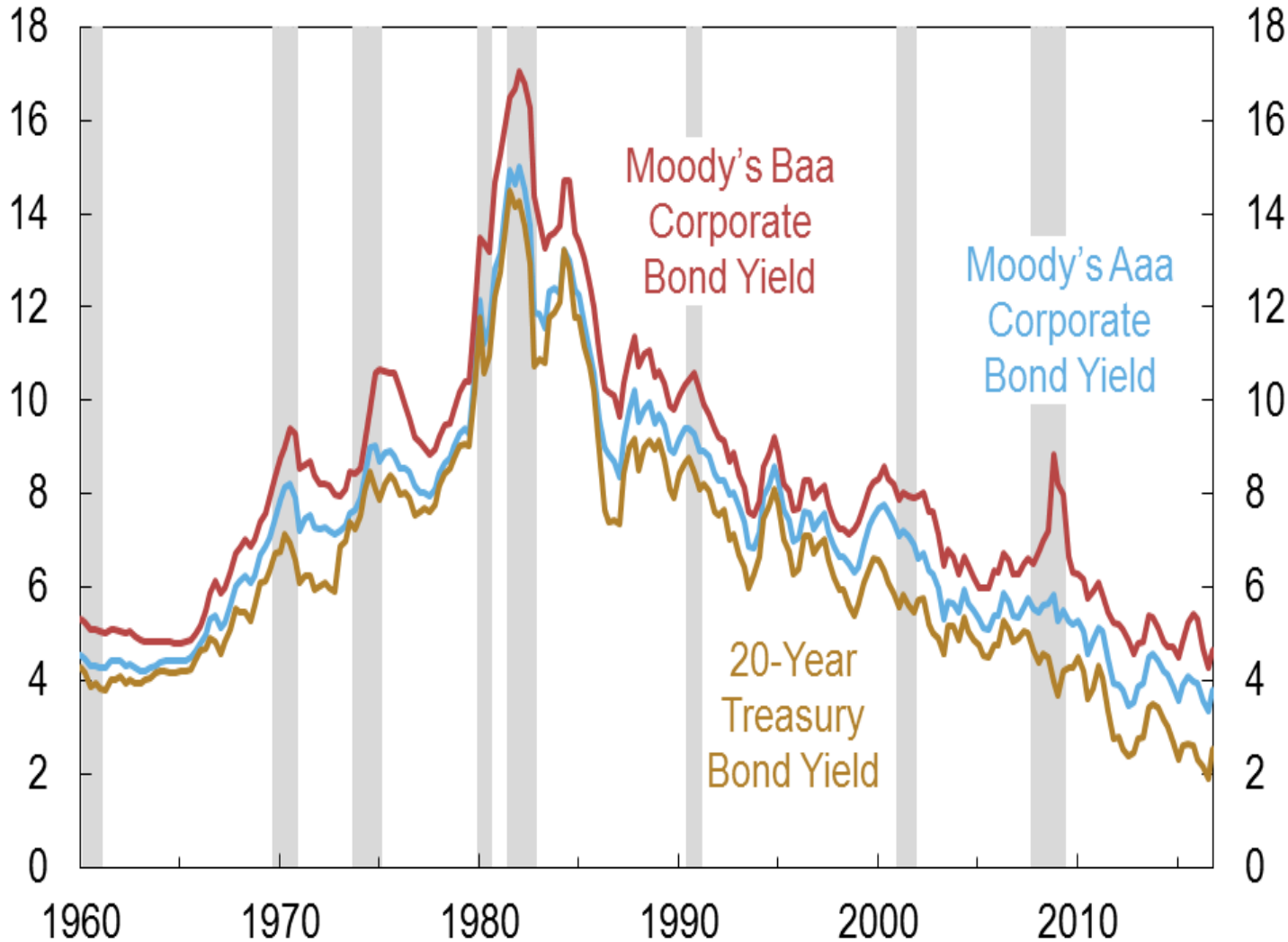
$$1 = E_t \left[M_{t+1} (1 + r_t)(\mathbf{1} + \mathbf{CY_{t+1}}) \right]$$

  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**

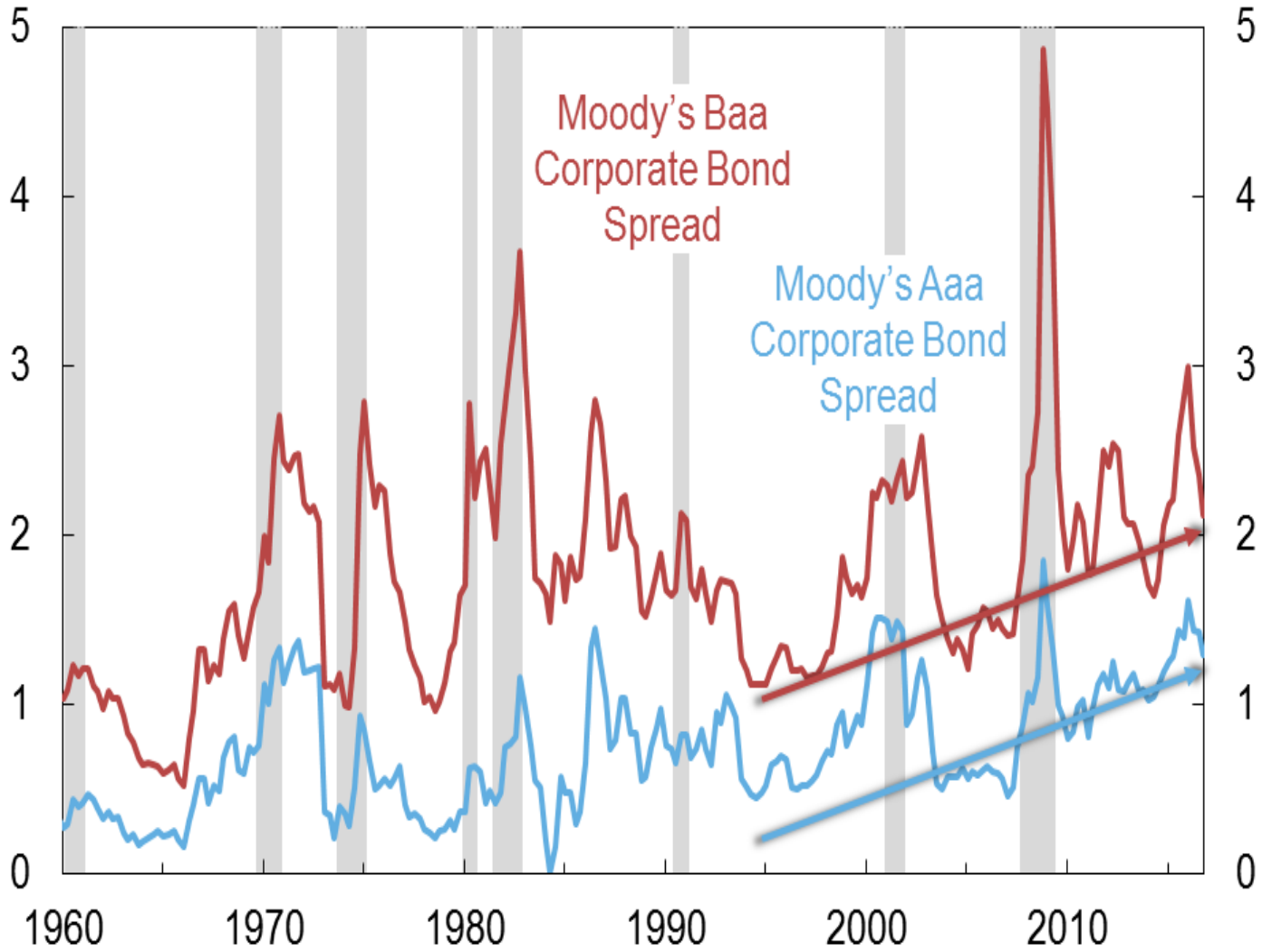
  - Krishamurthy & Vissing-Jorgensen, 2012, Greenwood, Hanson, Stein, 2015, Kyiotaki & Moore, 2012, ...

- Our story: $(\mathbf{1} + \mathbf{CY}) \uparrow \quad \Rightarrow \quad (\mathbf{1} + \mathbf{r}) \downarrow$

Treasury and corporate yields



Spreads


Moody's Baa
Corporate Bond
Spread
Moody's Aaa
Corporate Bond
Spread
5
4
3
2
1
0
1960
1970
1980
1990
2000
2010

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* (Λ 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

Trends		Observables (1960Q1-2016Q4)		
$\bar{\pi}_t$	Inflation	π_t	$= \bar{\pi}_t$	$+\tilde{\pi}_t$
	Infl. Exp. (long run)	π_t^e		$\dots$
$\bar{r}_t$	T-bill rate	$R_{3M,t}$	$= \bar{\pi}_t + \bar{r}_t$	
	T-bill Exp. (long run)	R_t^e	$+\bar{m}_t - \overline{cy}_t$	
			$+\bar{m}_t - \overline{cy}_t^s - \overline{cy}_t^l$	
	Long-run Treas.	$R_{20Y,t}$		$+\overline{\mathbf{tp}}_\mathbf{t}\,\overline{tp}_t$

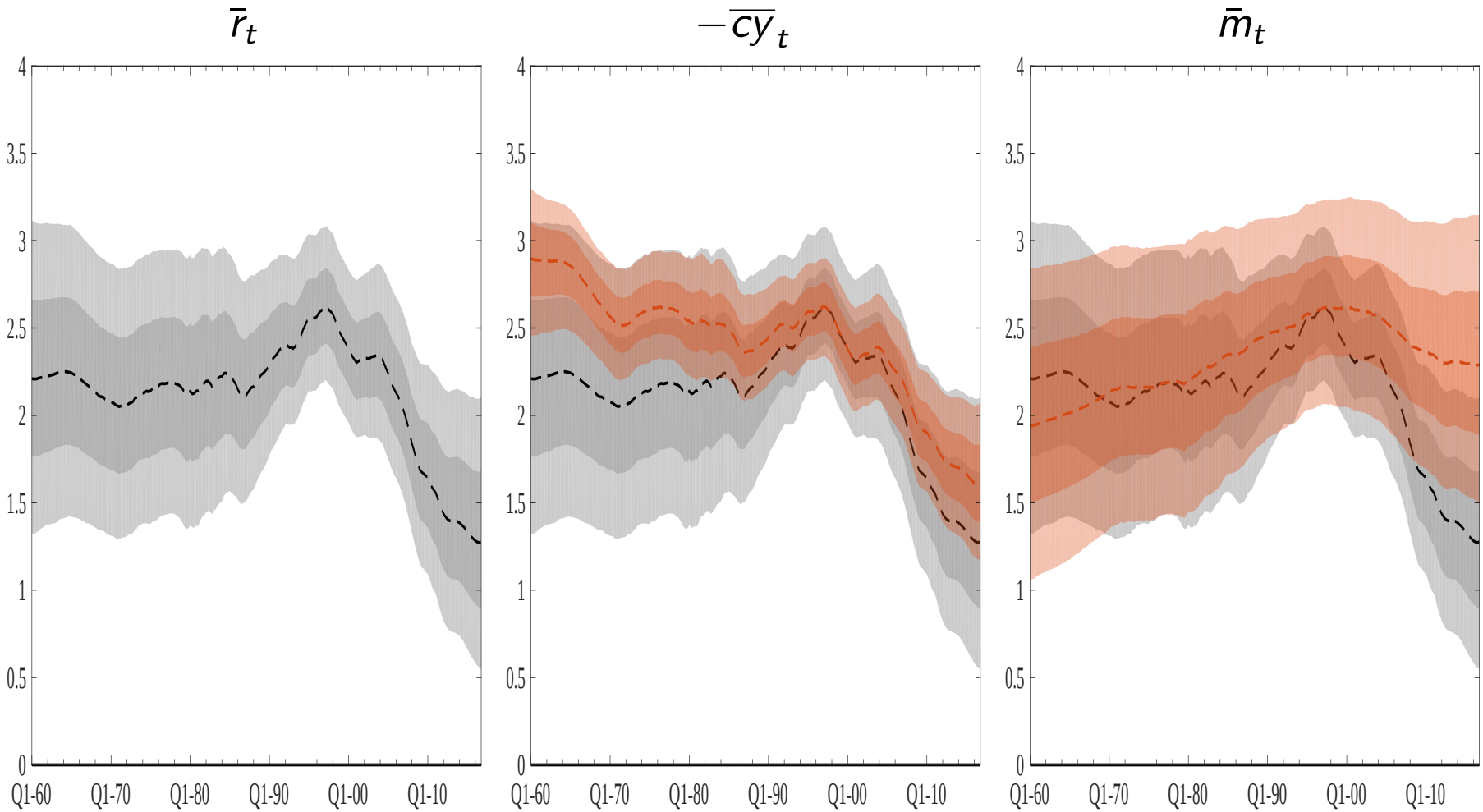
Decompose $\bar{r}_t = \bar{m}_t - \overline{cy}_t$

$\overline{cy}_t$	Baa Yield	R_t^{Baa}	$= \bar{\pi}_t + \bar{m}_t$	$+\overline{tp}_t$
	$\Rightarrow$	$\bar{\mathbf{R}}_\mathbf{t}^\mathbf{Baa} - \bar{\mathbf{R}}_{\mathbf{80,t}}$	$= \overline{\mathbf{cy}}_\mathbf{t} + \cancel{\overline{def}_t}$	

Decompose $\bar{r}_t = \bar{m}_t - \overline{cy}_t^s - \overline{cy}_t^l$

$\overline{cy}_t^s$ (safety)	**Baa -Aaa** Spread	$\bar{R}_t^{Baa} - \bar{R}_t^{Aaa}$	$= \overline{cy}_t^s$	

VAR Results #1 and #2: $\bar{r}_t$ falls by 1.25% from late 1990s; Main driver is $\overline{cy}_t$



Change in Trends, 1998Q1-2016Q4

	Baseline	**Conv.Yield**	**Liq.+Safe.**	Consumption
$\bar{r}_t$	-1.29**	-1.27**	-1.30**	-1.40**
$-\overline{cy}_t$		-0.93**	-0.97**	-0.78**
$-\overline{cy}^s_t$ (safety)			-0.45**	-0.33**
$-\overline{cy}^l_t$ (liquidity)			-0.52**	-0.45**
$\bar{m}_t$		-0.34	-0.33	-0.61
$\bar{g}_t$				-0.56
$\bar{\beta}_t$				-0.04
$\Delta\bar{c}_t$				-0.80

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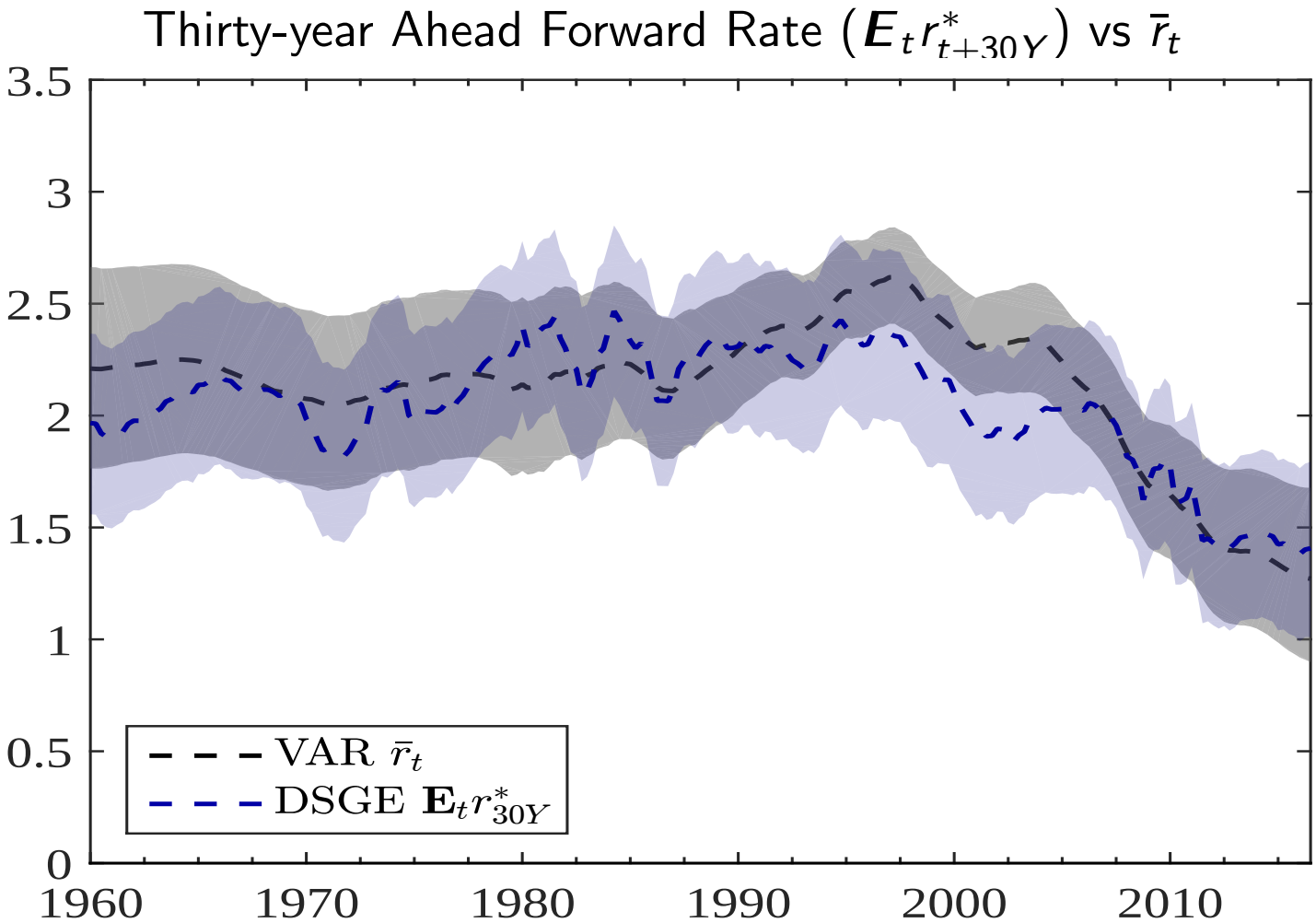
DSGE

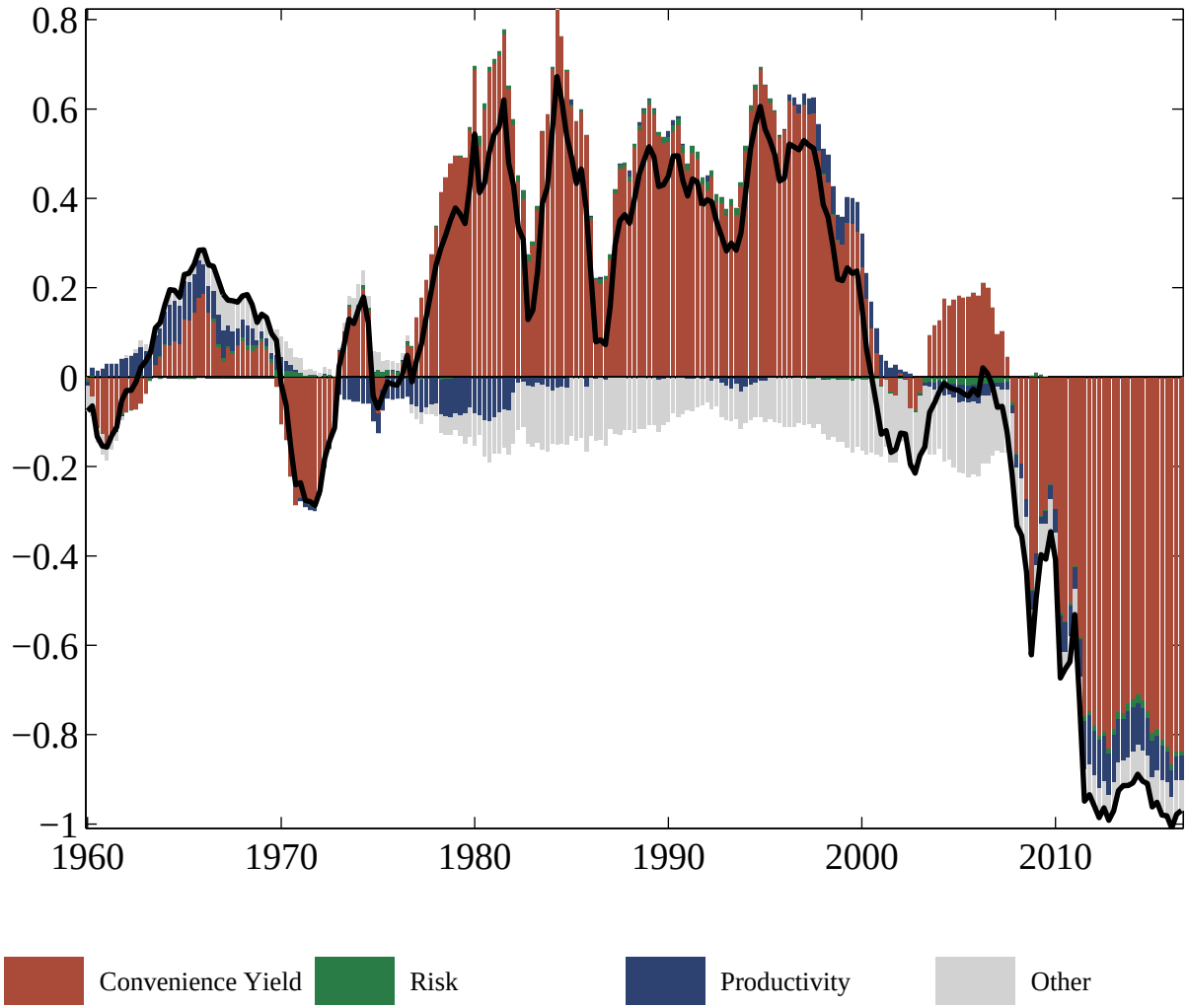
- Medium/largish-scale model with Smets & Wouters' nominal and real rigidities, and financial frictions as in Bernanke, Gertler, and Gilchrist, 1999
    - Observables (1960Q1-2016Q3): the growth rate of real output (both GDP and GDI), consumption, investment, real wage, hours worked, inflation (both 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 $\bar{r}_t$

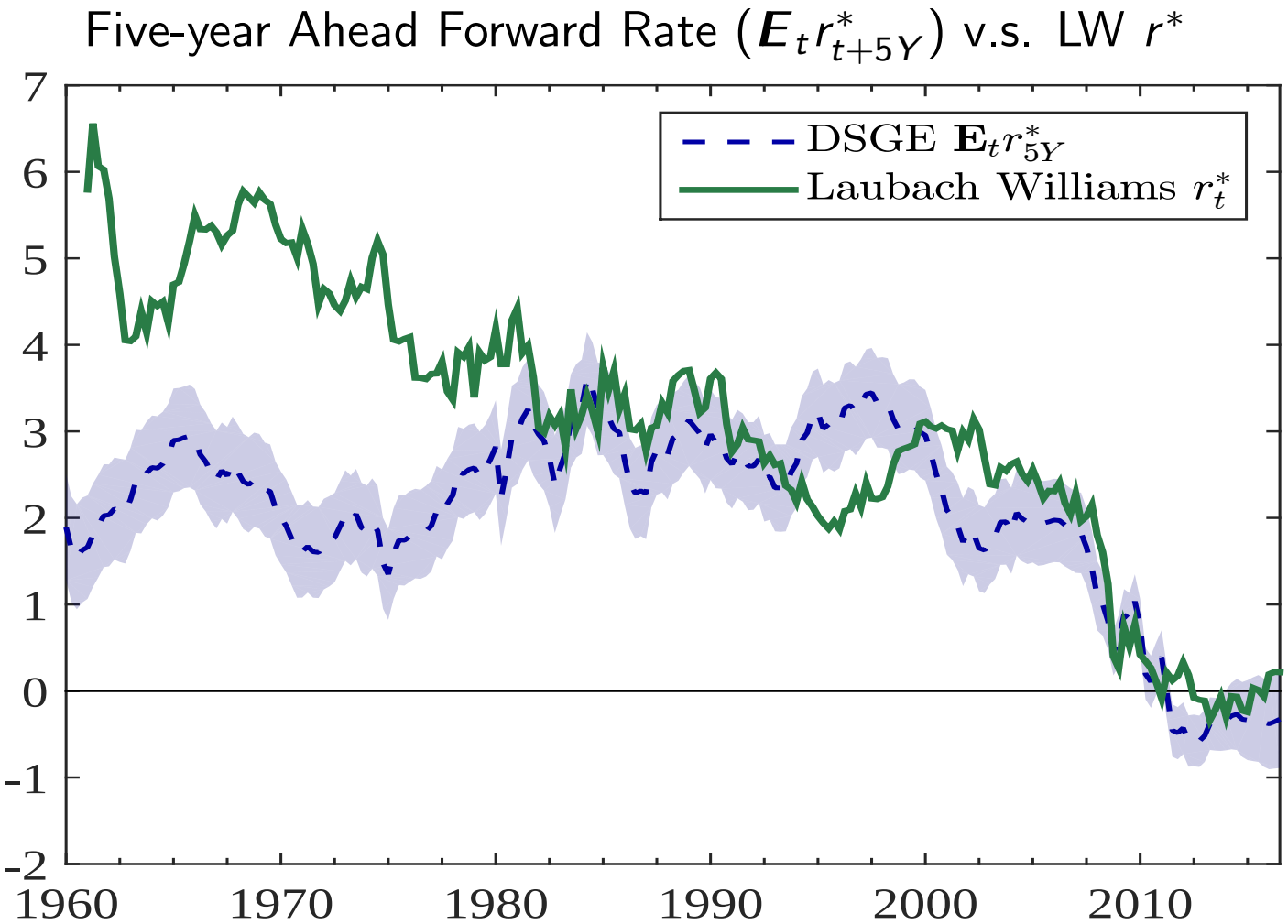


DSGE Result #2: Convenience Yield is the main driver of trends in r_t^*

Decomposition of Thirty-year Ahead Forward Rate ($E_t r^*_{t+30Y}$)



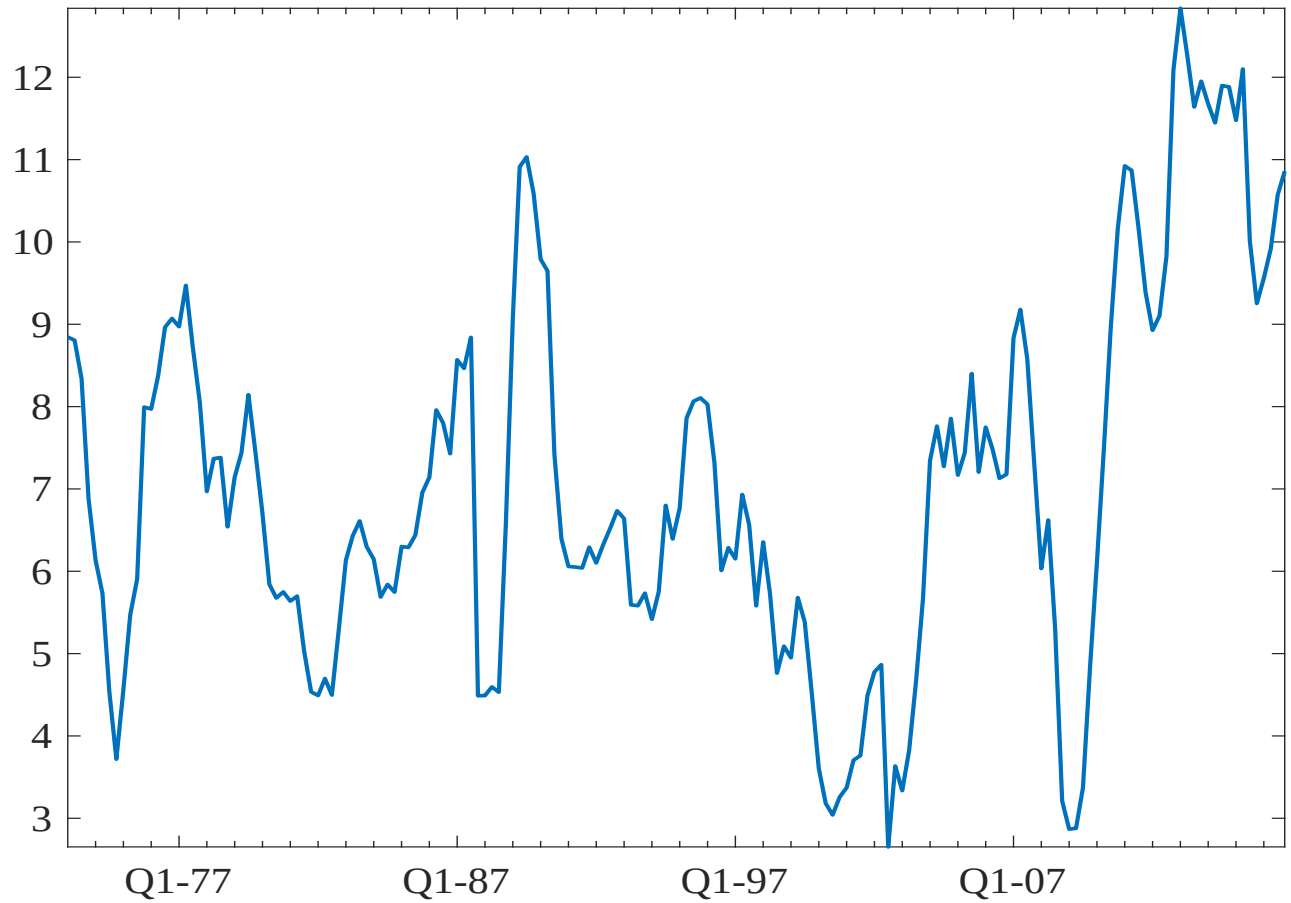
Laubach-Williams estimates very similar to DSGE's 5-year forward rate (post 1980)



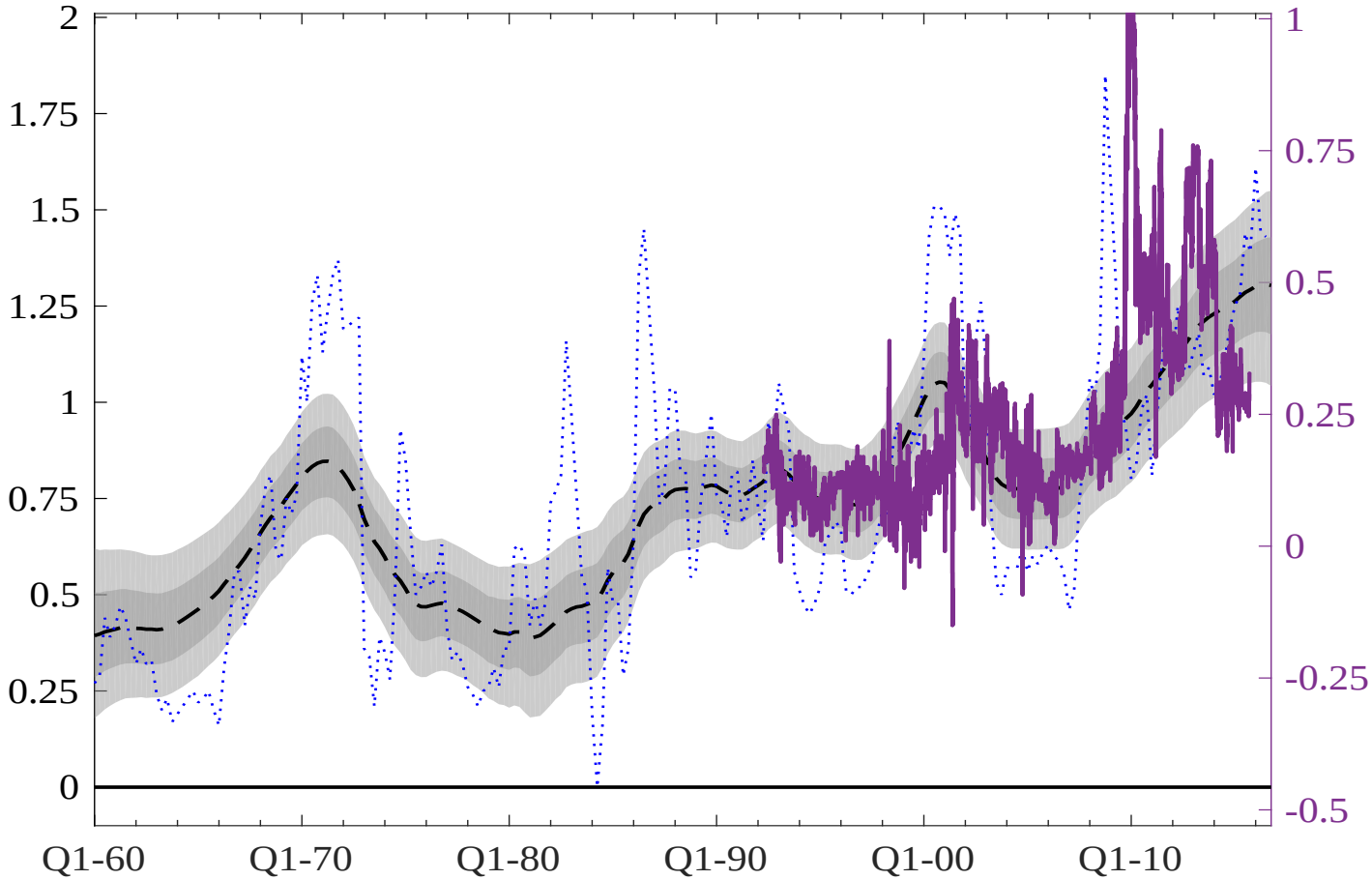
Conclusions
Why have interest rates been low?

- 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

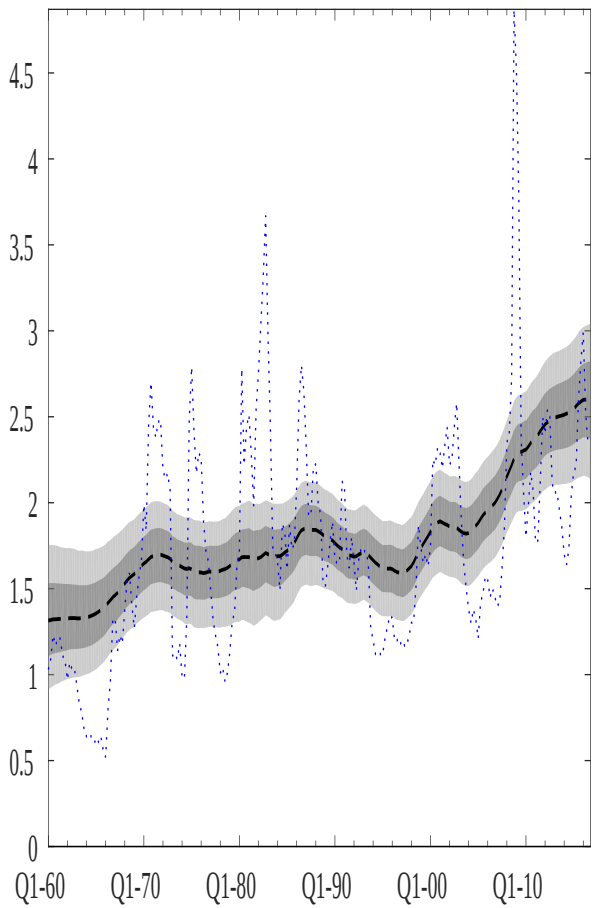


Reference Slide: Trends in the Liquidity Convenience Yield and the Refcorp/Treasury Spread

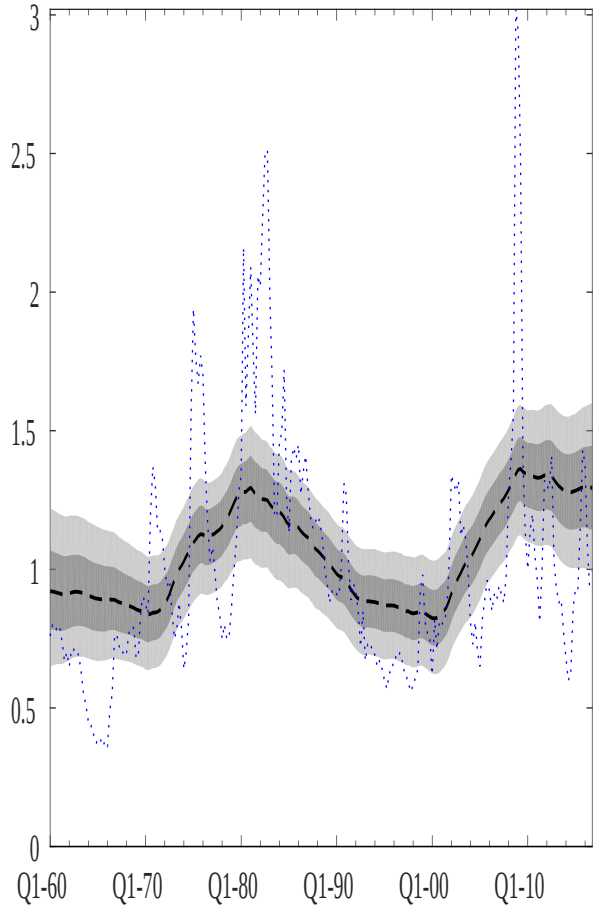


Reference Slide: $\overline{cy}_t$, $\overline{cy}^s_t$, $\overline{cy}^l_t$, and Spreads

$\overline{cy}_t$, and $R^{Baa}_t - R_{80,t}$



$\overline{cy}^s_t$, and $R^{Baa}_t - R^{Aaa}_t$



$\overline{cy}^l_t$, and $R^{Aaa}_t - R_{80,t}$