Macroeconomic Implications of Changes in the Term Premium

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Web Site

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- etc.

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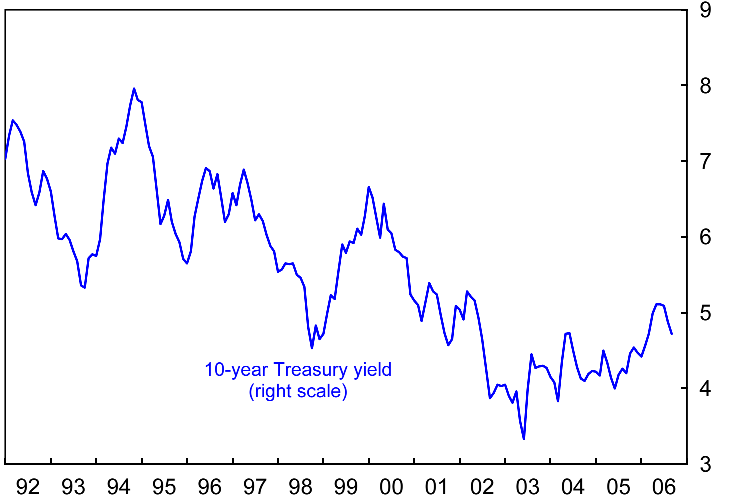
Yield on 10-Year US Treasury Securities and Federal Funds Rate



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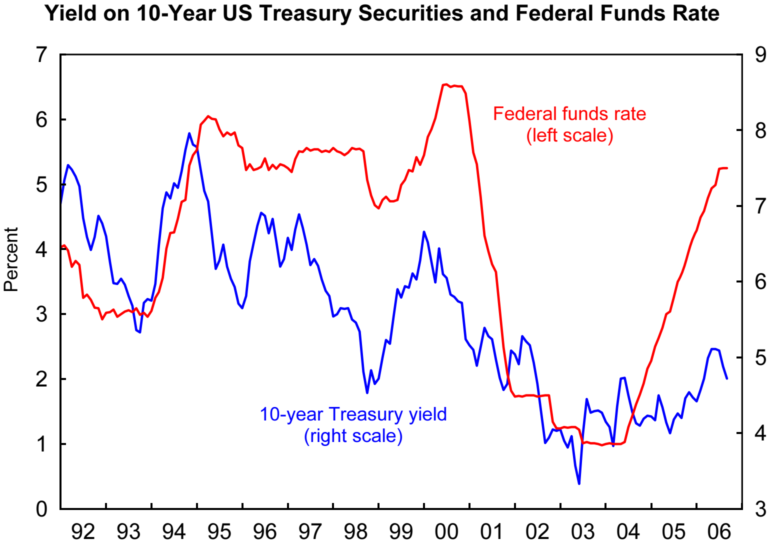

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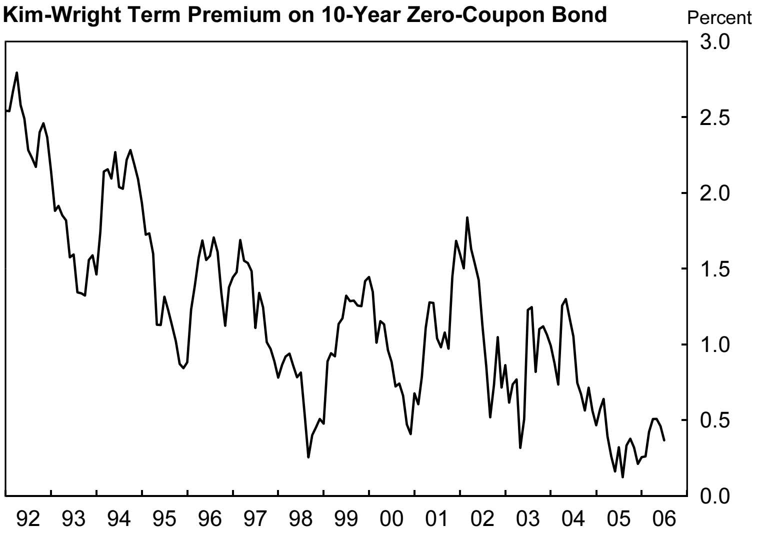

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How should monetary policy respond to a change in the term premium?

The Practitioner View

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- Term premium might be partly a “wedge”
- Term premium might be related to potential output rather than output gap

Structural Analysis

2 Structural Analysis
- Review Asset Pricing
- Define Benchmark New Keynesian Model
- Graph Impulse Responses

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Notation: let $i_t \equiv i_t^{(1)}$

Benchmark New Keynesian Model (Very Standard)

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Representative household with preferences:

$$\max E_t \sum_{t=0}^{\infty} \beta^t \left(\frac{(c_t - bC_{t-1})^{1-\gamma}}{1-\gamma} - \chi_0 \frac{l_t^{1+\chi}}{1+\chi} \right)$$

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Stochastic discount factor:

$$m_{t+1} = \frac{\beta (C_{t+1} - bC_t)^{-\gamma}}{(C_t - bC_{t-1})^{-\gamma}} \frac{P_t}{P_{t+1}}$$

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Parameters: $\beta = .99$, $b = .66$, $\gamma = 2$, $\chi = 1.5$

Benchmark New Keynesian Model (Very Standard)

Continuum of differentiated firms:

- face Dixit-Stiglitz demand with elasticity $\frac{1+\theta}{\theta}$, markup θ
- set prices in Calvo contracts with avg. duration 4 quarters
- identical production functions $y_t = A_t \bar{k}^{1-\alpha} l_t^{\alpha}$
- have firm-specific capital stocks
- face aggregate technology $A_t = \rho_A A_{t-1} + \varepsilon_t^A$

Parameters $\theta = .2$, $\rho_A = .9$, $\sigma_A^2 = .01^2$

Benchmark New Keynesian Model (Very Standard)

Government:

- imposes lump-sum taxes G_t on households
- destroys the resources it collects
- $G_t = \rho_G G_{t-1} + \varepsilon_t^G$

Parameters $\rho_G = .9$, $\sigma_G^2 = .004^2$

Monetary Authority:

$$i_t = \rho_i i_{t-1} + (1 - \rho_i)\left[i^* + g_y(y_t - y_{t-1}) + g_\pi \pi_t\right] + \varepsilon_t^i$$

Parameters $\rho_i = .7$, $g_y = 0.5$, $g_\pi = 2$, $\sigma_i^2 = .004^2$

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Term premium:

$$\log\left(\frac{p_t^{(\infty)}}{p_t^{(\infty)} - 1}\right) - \log\left(\frac{p_t^{(\infty)rn}}{p_t^{(\infty)rn} - 1}\right)$$

Solving the Model

The benchmark model above has a relatively large numer of state variables: C_{t-1}, A_{t-1}, G_{t-1}, i_{t-1}, Δ_{t-1}, ε_t^A, ε_t^G, ε_t^i

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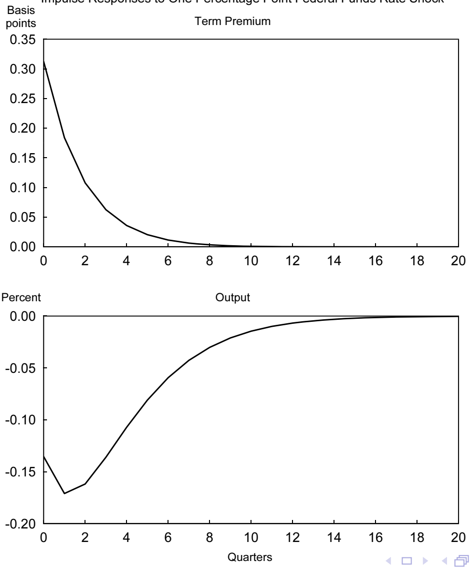
- perturbationAIM algorithm in Swanson, Anderson, Levin (2006) quickly computes *n*th order approximations

Impulse Responses

Figure 1

Impulse Responses to One Percentage Point Federal Funds Rate Shock



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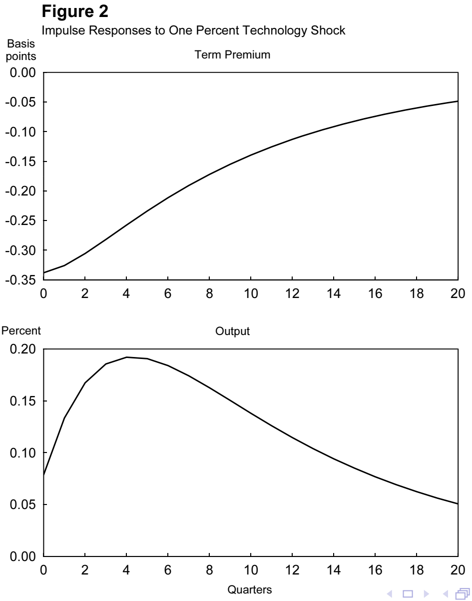
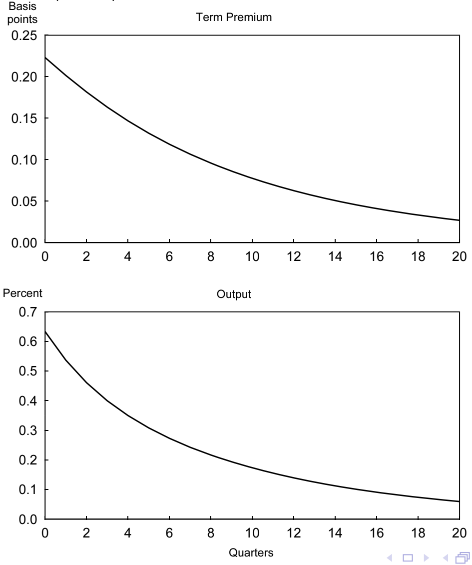


Impulse Responses

Figure 3

Impulse Responses to One Percent Government Purchases Shock



Reduced-Form Analysis

3. Reduced-Form Analysis
   - The Yield Curve Slope and Forecasting GDP
   - Importance of Term Premium for Forecasting GDP

The Yield Curve Slope and Forecasting GDP

A large literature uses slope of yield curve to forecast GDP:

$$(y_{t+4} - y_t) = \beta_0 + \beta_1(y_t - y_{t-4}) + \beta_2(i_t^{(n)} - i_t) + \varepsilon_t$$

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Estimates in literature consistently find $\beta_2 > 0$, highly significant

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$$\underbrace{\left(\frac{1}{n}\sum_{j=0}^{n-1} E_t i_{t+j} - i_t\right)}_{\text{expectations component}} + \underbrace{\left(i_t^{(n)} - \frac{1}{n}\sum_{j=0}^{n-1} E_t i_{t+j}\right)}_{\text{term premium}}$$

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Generalize basic GDP forecasting equation to:

$$(y_{t+4} - y_t) = \beta_0 + \beta_1 (y_t - y_{t-4}) + \beta_2\, exsp_t + \beta_3\, tp_t + \varepsilon_t$$

GDP Forecasting Results

Table 2
Prediction Equations for GDP Growth
dependent variable: $y_{t+4} - y_t$

	1962–2005 Sample	
	(3)	(4)
$y_t - y_{t-4}$	0.32 (3.04)	0.38 (4.22)
$exsp_t$	1.03 (5.64)	
$exsp_{t-4}$	-0.79 (-3.49)	
tp_t	-0.61 (-1.34)	
tp_{t-4}	0.54 (1.24)	
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   - true in both the post-1960 and post-1985 periods
   - in this reduced-form sense, the Practitioner View of declines in the term premium may have some merit

Web Site

For additional information:

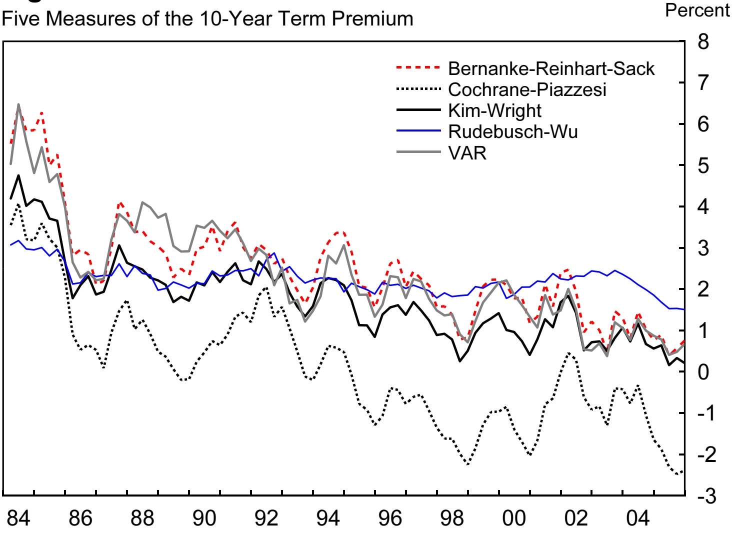
- a copy of these slides
- a copy of the paper
- related papers
- computer code
- etc.

visit http://www.ericswanson.pro

Five Measures of the Term Premium

Figure 4

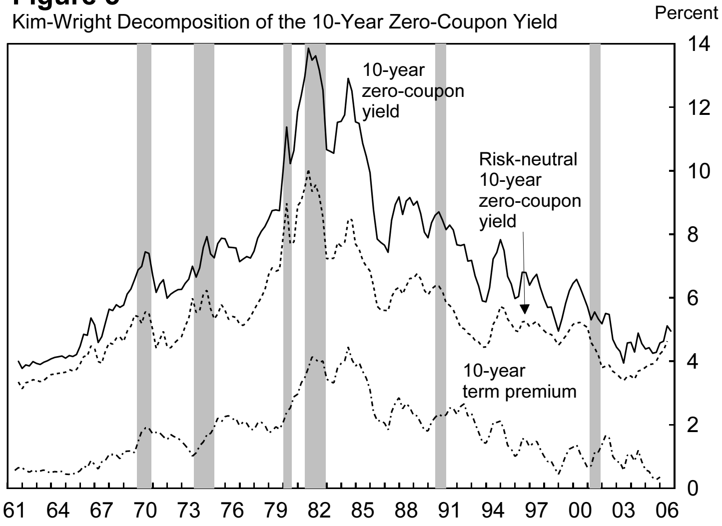
Five Measures of the 10-Year Term Premium



Kim-Wright Term Premium

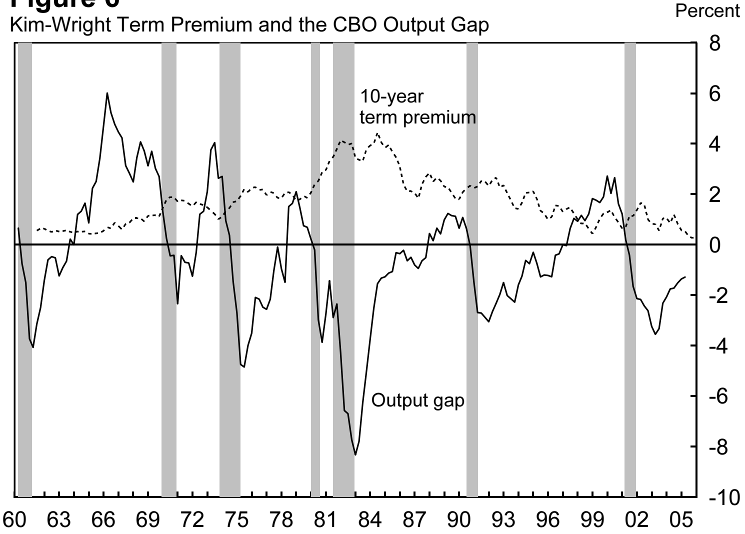
Figure 5

Kim-Wright Decomposition of the 10-Year Zero-Coupon Yield

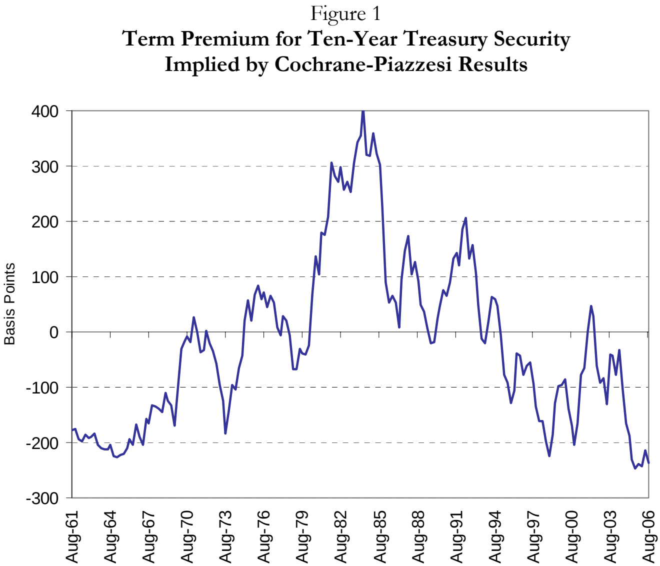


Kim-Wright Term Premium and Output Gap

Figure 6
Kim-Wright Term Premium and the CBO Output Gap



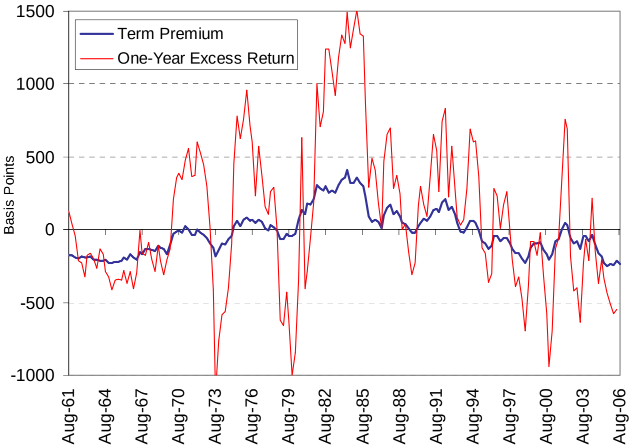
Cochrane-Piazzesi Term Premium Measure



Cochrane-Piazzesi Term Premium Measure

Figure 2

Comparison of Term Premium and One-Year Expected Excess Returns for Ten-Year Treasury Security



Five Measures of the Term Premium

Table 1
Correlations between Five Measures of the Term Premium

	BRS	RW	KW	CP	VAR
BRS	1.00				
RW	0.76	1.00			
KW	0.98	0.81	1.00		
CP	0.92	0.87	0.96	1.00	
VAR	0.96	0.68	0.94	0.88	1.00