Discussion of "Yield Curve Premia" by Brooks and Moskowitz

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summary

- "carry" and "value" predict excess returns on government bonds
- "momentum" is not important/significant
- subsume information in other predictors used in literature
- builds on evidence on gov bonds in Toby's previous work on value & momentum everywhere, carry

comments

- what are the predictors? how do they relate to what we know?
- factor structure in expected returns?
- do they subsume information in other predictors?
- lessons for economics?
- discussion focuses on US evidence, paper has international data

what are the predictors?

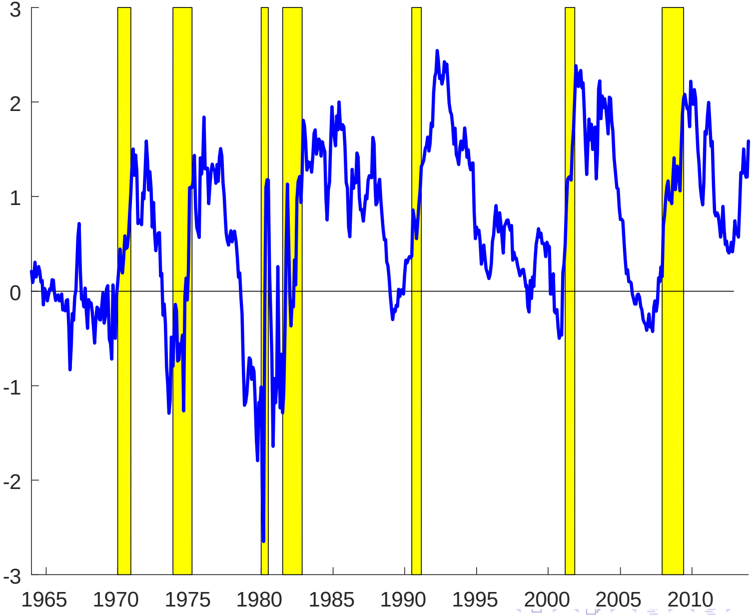
- "carry" = slope = long rate − short rate = $y_t^{(n)} - y_t^{(1)}$
- each bond n has its own slope
- classic predictor, Campbell and Shiller (1991)

$$rx_{t+1}^{(n)} = \alpha_n + \beta_n \left(y_t^{(n)} - y_t^{(1)} \right)$$

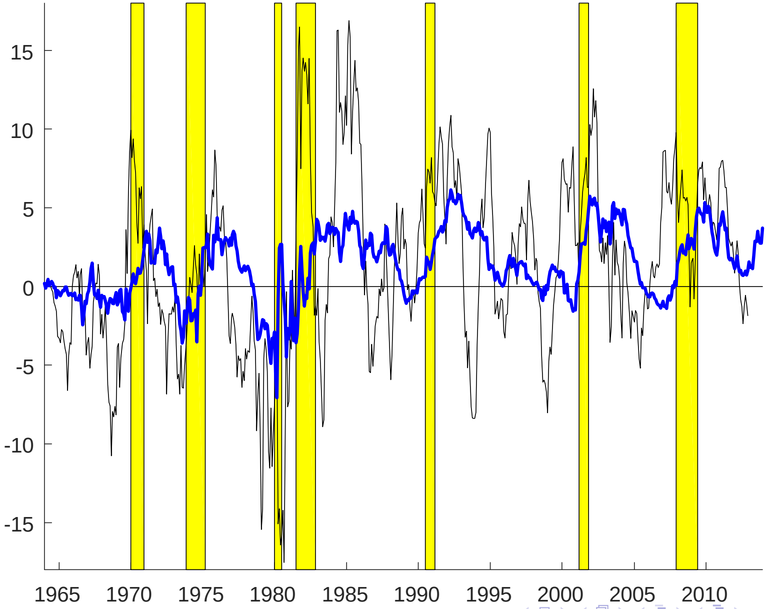
- monthly data 1964-2013

n	β_n	t-stat	R^2
2	1.7	3.6	0.12
3	2.1	3.7	0.14
4	2.5	4.1	0.17
5	2.5	3.9	0.15

slope for 5 year bond



slope forecast of excess returns on 5 year bond



what are the predictors?

- "value" = real rate

  $$= \text{nominal rate} - \text{exp. inflation over life of the bond}$$
  $$= y_t^{(n)} - E\left[\pi_{t \to t+n}\right]$$

- each bond n has its own real rate

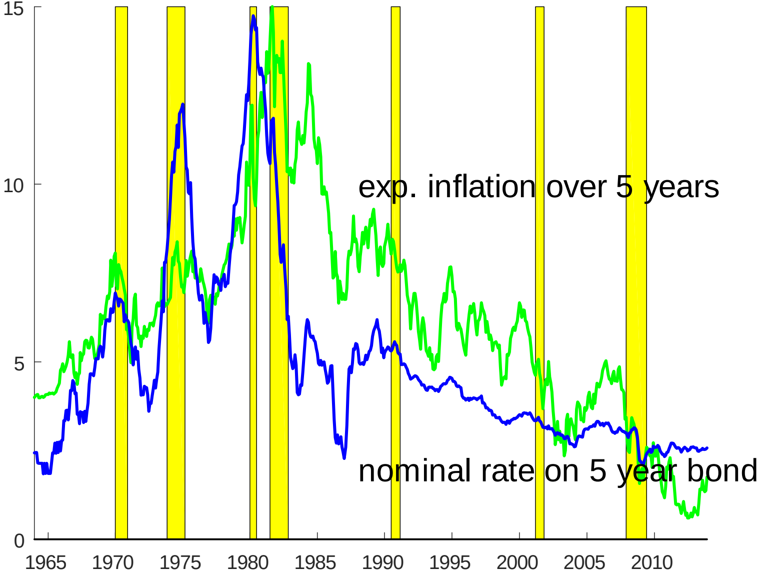
- recent debate about expected inflation as predictor
  one observation: Great Inflation
  54% R^2 in Cieslak and Povala (2015), Bauer and Hamilton (2016), Cochrane (2016) gets 62% with a time-trend

  monthly data 1985-2013

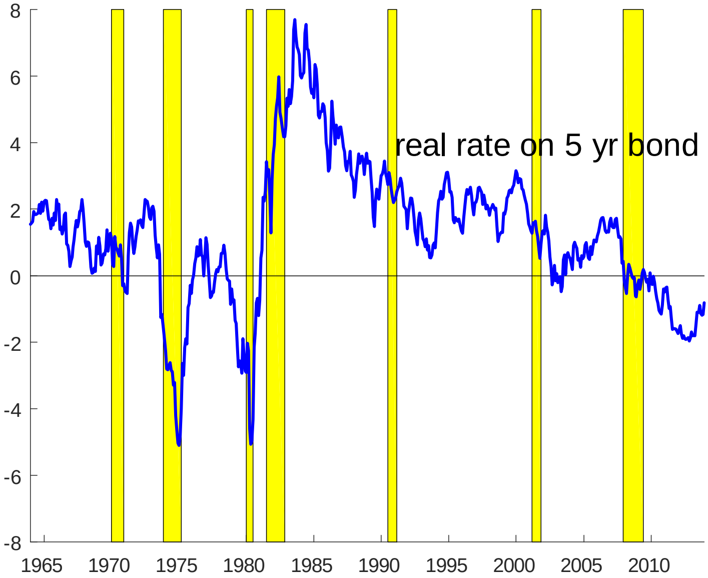
n	R^2 with all interest rates	include time trend
2	0.17	0.45
3	0.15	0.52
4	0.18	0.58
5	0.17	0.61

- here: exp. inflation over life of the bond, what happens here?

nominal rate and expected inflation

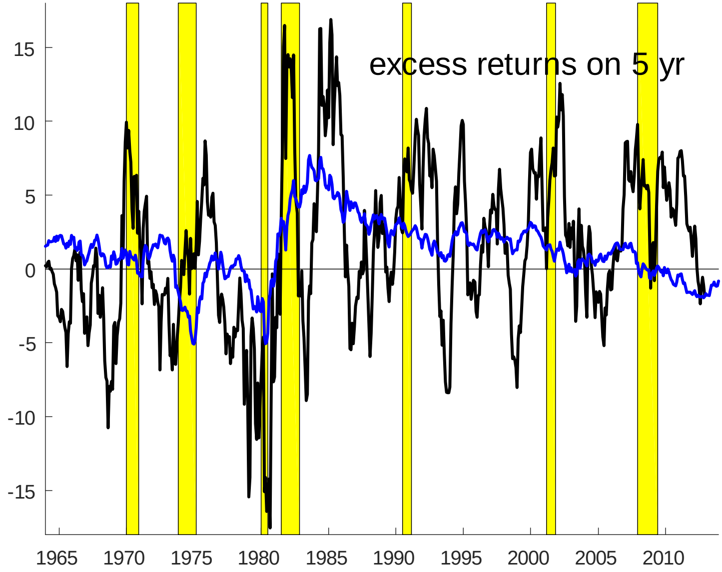


real rate



real rate on 5 yr bond
8
6
4
2
0
-2
-4
-6
-8
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010

real rate prediction of excess returns



$R^2 = 14\%$, smaller after 1985

what are the predictors?

- "momentum" = return of the bond over the last year
- momentum is not important/significant for bonds

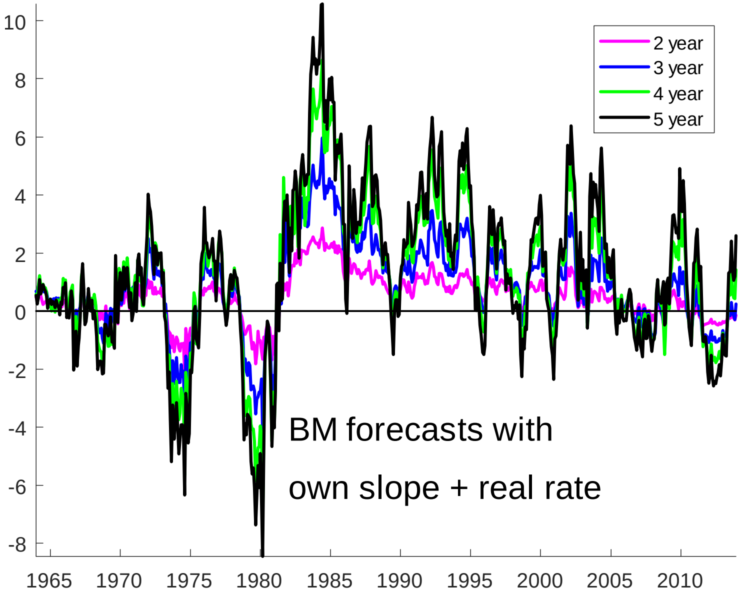
summary of predictors in Brooks & Moskowitz

- 2 predictors for excess returns: for each bond n, find
  1. its slope $y_t^{(n)} - y_t^{(1)}$
  2. its real rate $y_t^{(n)} - E\left[\pi_{t \to t+n}\right]$
- predictors are nominal rates and exp. inflation over various horizons

factor structure in expected returns?

- single factor structure in expected returns, Cochrane & Piazzesi 2005
- intuitively: fitted values are linear functions of nominal rates, which have strong factor structure
- does expected inflation over various horizons destroy it?

factor structure in expected excess returns?



factor structure in expected returns across bonds?

- procedure as in Cochrane & Piazzesi 2005
- collect f_t = all slopes and real rates for all bonds n
- restricted regression:
  1. run regression for cross-sectional average

     $$\overline{rx}_{t+1} = \gamma^\top f_t + \varepsilon_{t+1}$$

     get fitted value $\widehat{\gamma}^\top f_t$

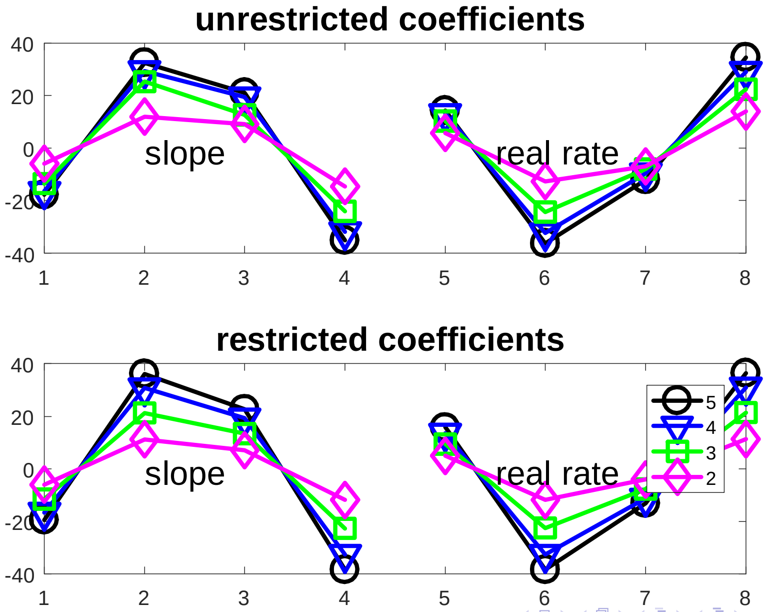
  2. run individual bond regressions on fitted value

     $$rx_{t+1}^{(n)} = \beta_n \left(\widehat{\gamma}^\top f_t\right) + \varepsilon_{t+1}^{(n)}$$

n	restricted R^2	unrestricted R^2
2	0.26	0.28
3	0.29	0.30
4	0.33	0.33
5	0.30	0.31

- compare restricted $\beta_n \widehat{\gamma}^\top$ and unrestricted coefficients

factor structure in expected returns across bonds?



do slope and real rate subsume other factors?

- depends on data and sample
- for example, not in monthly Fama-Bliss data, 1964-2013

n	slope	real rate	R^2	CP	R^2	slope	real rate	CP	R^2
2	1.2	0.2	0.20	0.5	0.20	0.03	0.2	0.3	0.25
	(2.1)	(1.9)		(5.3)		(0.1)	(1.6)	(2.9)	
3	1.9	0.4	0.23	0.9	0.21	0.22	0.3	0.6	0.26
	(2.8)	(2.0)		(5.3)		(0.5)	(1.6)	(2.8)	
4	2.5	0.6	0.27	1.3	0.25	0.60	0.4	0.9	0.29
	(3.7)	(2.0)		(5.5)		(1.0)	(1.5)	(2.7)	
5	2.6	0.7	0.26	1.5	0.23	1.5	0.5	0.7	0.28
	(4.0)	(2.0)		(5.2)		(1.5)	(1.6)	(1.7)	

- yes in quarterly GSW data for 10-year bond, 1972-2016

lessons for economics?

- evidence for a single factor in expected bond returns
- then bond markets are not segmented much
- standard models that generate time-varying risk premium are fine beliefs (e.g., learning), risk aversion (e.g., habits), risk (e.g., stochastic vol, ambiguity), liquidity risk, etc.
- here, each bond has its own factors: its slope and its real rate
- do we need a model with segmented bond markets?
  QE-style models as Vayanos & Vila?
- how are bond factors related to those in other asset markets, e.g. stocks and foreign exchange?
- hard to interpret the numbers in Table XII, needs more work!