Comments on "Robust Bond Risk Premia" by Michael Bauer and Jim Hamilton

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Questions

1. Facts: What do we learn about bond return / yield change predictability?
2. Do macro variables or yield information past 3 principal components help to forecast bond returns / yield changes?
3. What do we learn about econometric / empirical pitfalls?
4. Empirical / specification rather than (these) econometric issues are tougher.

JPS regressions

Table 4: Joslin-Priebsch-Singleton: predicting excess bond returns

	Original sample: 1985–2008			Later sample: 1985–2013		
	$\bar{R}_1^2$	$\bar{R}_2^2$	$\bar{R}_2^2 - \bar{R}_1^2$	$\bar{R}_1^2$	$\bar{R}_2^2$	$\bar{R}_2^2 - \bar{R}_1^2$
Two-year bond						
Data	0.14	0.49	0.35	0.12	0.28	0.16
Simple bootstrap	0.30	0.36	0.06	0.26	0.32	0.06
	(0.06, 0.58)	(0.11, 0.63)	(-0.00, 0.22)	(0.05, 0.51)	(0.09, 0.56)	(-0.00, 0.21)
BC bootstrap	0.38	0.44	0.06	0.32	0.38	0.06
	(0.07, 0.72)	(0.13, 0.75)	(-0.00, 0.23)	(0.07, 0.60)	(0.12, 0.64)	(-0.00, 0.21)
Ten-year bond						
Data	0.20	0.37	0.17	0.20	0.28	0.08
Simple bootstrap	0.26	0.32	0.07	0.24	0.30	0.06
	(0.07, 0.48)	(0.12, 0.54)	(-0.00, 0.23)	(0.06, 0.46)	(0.11, 0.51)	(-0.00, 0.21)
BC bootstrap	0.27	0.34	0.08	0.26	0.33	0.07
	(0.06, 0.50)	(0.12, 0.57)	(-0.00, 0.27)	(0.06, 0.49)	(0.11, 0.55)	(-0.00, 0.23)
Average two- through ten-year bonds						
Data	0.19	0.39	0.20	0.17	0.25	0.08
Simple bootstrap	0.28	0.35	0.07	0.24	0.30	0.06
	(0.08, 0.50)	(0.12, 0.56)	(-0.00, 0.23)	(0.05, 0.46)	(0.10, 0.52)	(-0.00, 0.21)
BC bootstrap	0.30	0.37	0.07	0.27	0.33	0.07
	(0.06, 0.55)	(0.13, 0.61)	(-0.00, 0.26)	(0.05, 0.50)	(0.12, 0.56)	(-0.00, 0.24)

$$rx_{t+1} = a + b_1' PC_t + b_2' [GRO_t \;\; INF_t] + \varepsilon_{t+1}^r$$

- JPS macro variables estimates are lower out of sample
- Remaining rise in R^2 is statistically insignificant.

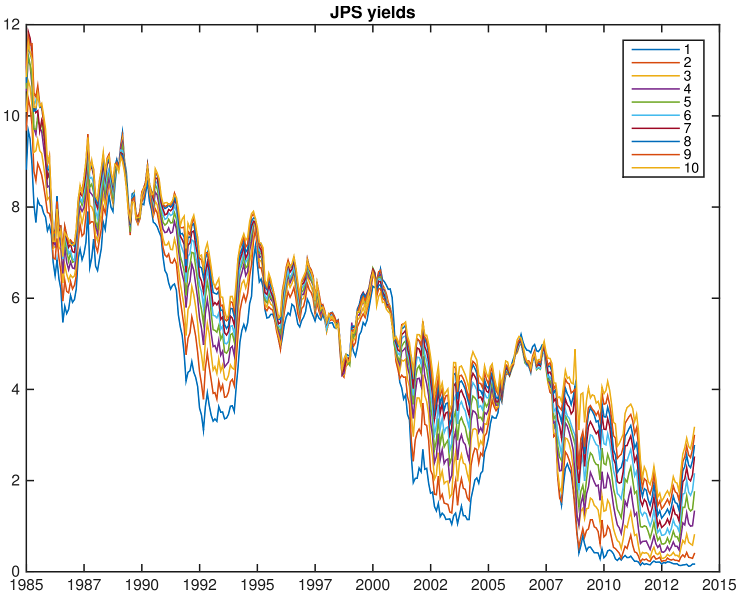
JPS regressions

	PC1	PC2	PC3	GRO	INF	trend	R^2
b	0.12	1.54	1.58				0.18
t	(1.14)	(2.35)	(0.56)				
b				-0.99	0.73		0.02
t				(-1.56)	(0.68)		
b	0.52	1.86	4.33	-0.27	-3.77		0.26
t	(2.25)	(3.38)	(1.23)	(-0.32)	(-2.17)		

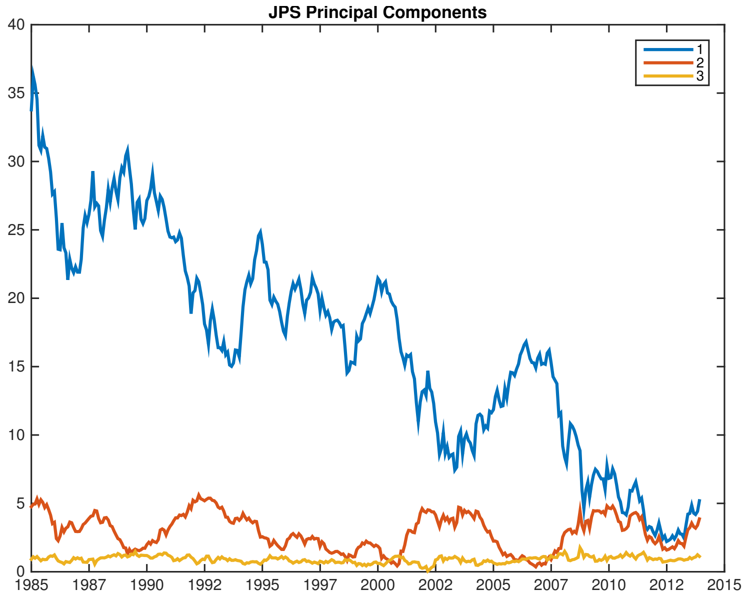
$$rx_{t+1} = a + b_1' PC_t + b_2' [GRO_t \;\; INF_t] + \varepsilon^r_{t+1}$$

- PC2 forecasts as usual
- GRO and INF alone do nothing at all
- INF with the others helps, and helps PC1 and PC2 also.
- What's going on? Look at the data

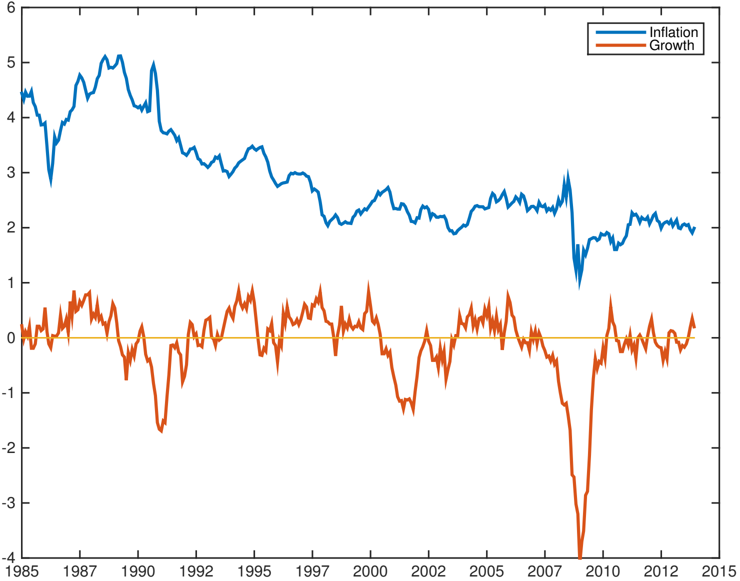
JPS Yield data



JPS Principal Components of yields



Macro Data

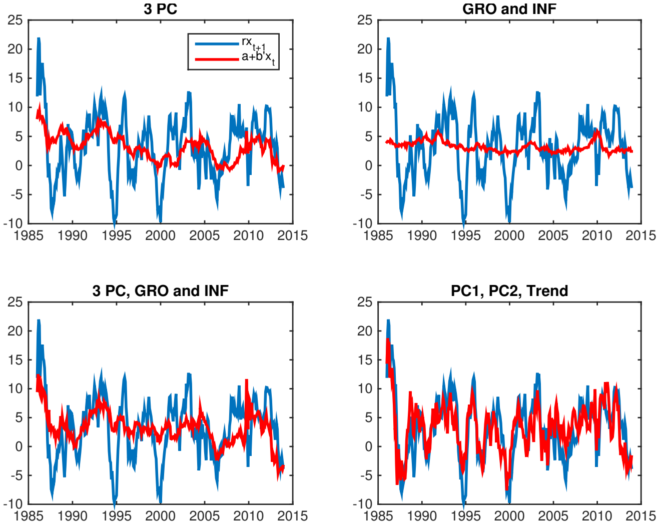


Inflation
Growth
6
5
4
3
2
1
0
-1
-2
-3
-4
1985
1987
1990
1992
1995
1997
2000
2002
2005
2007
2010
2012
2015

JPS regressions

	PC1	PC2	PC3	GRO	INF	trend	R^2
	0.12	1.54	1.58				0.18
t	(1.14)	(2.35)	(0.56)				
b				-0.99	0.73		0.02
t				(-1.56)	(0.68)		
b	0.52	1.86	4.33	-0.27	-3.77		0.26
t	(2.25)	(3.38)	(1.23)	(-0.32)	(-2.17)		
$\rightarrow$ b	1.52	3.43	3.17	0.08	-1.62	0.11	0.64
t	(8.40)	(8.99)	(1.44)	(0.11)	(-1.18)	(9.81)	
b	1.41	3.36				0.11	0.62
t	(11.81)	(8.81)				(11.44)	

Results



- Consistent across time in many episodes

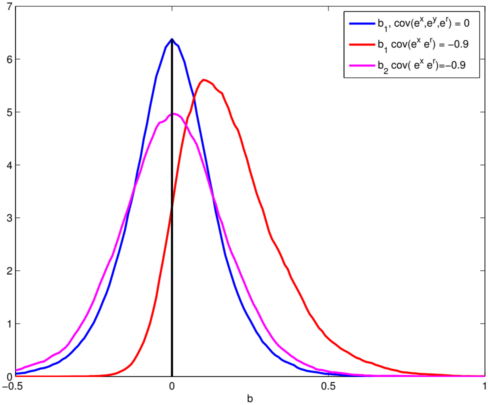
Genuis or error?

- Proof macro doesn't matter / spurious because trend?
- Brilliant demonstration that filtering PC is the key?
- Forecasting regressions with serially correlated right hand variables!

$$r_{t+1} = a + b_1 x_t + \varepsilon^r_{t+1}$$
$$x_{t+1} = a + \rho_x x_t + \varepsilon^x_{t+1}$$

- But...
- Fixed x? OLS is BLUE, standard errors ok. *OLS does not care about the ordering of right hand variables.*
- Stochastic x? if corr$(\varepsilon^r_{t+1}, \varepsilon^x_{t+1}) < 0$, b_2 biased up. (Stambaugh). Not here.
- Problem?

This paper: An important problem?

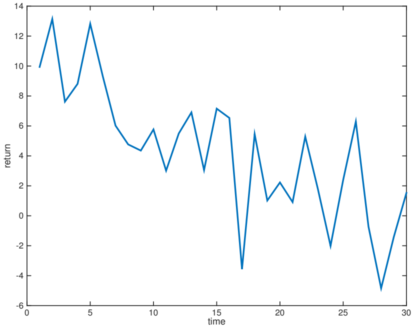


$$r_{t+1} = b_1 x_t + b_2 y_t + \varepsilon^r_{t+1}$$

$$x_{t+1} = 0.95 x_t + \varepsilon^x_{t+1};\;\; y_{t+1} = 0.95 y_t + \varepsilon^y_{t+1}$$

$$\text{corr}(\varepsilon^r, \varepsilon^x) = -0.9; \text{corr}(\varepsilon^r, \varepsilon^y) = 0.\ (T = 30).$$

Why are serially correlated RHV a problem?

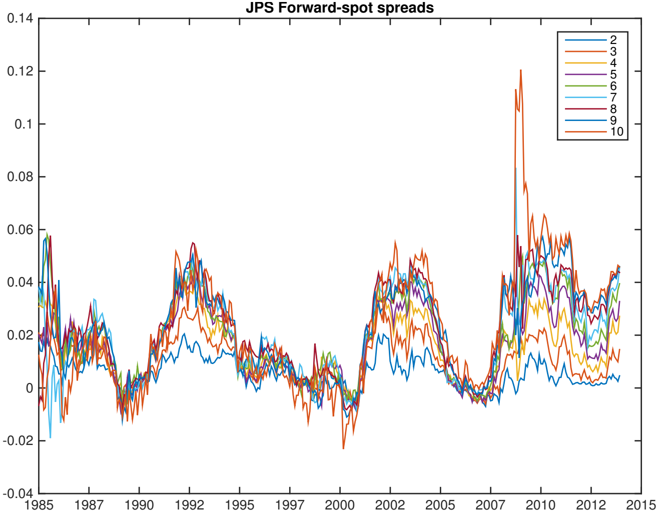


$$r_{t+1} = a - 0.38 \times \text{time}_t \ (t = -6.7) \ + \varepsilon^r_{t+1}$$

Problem?

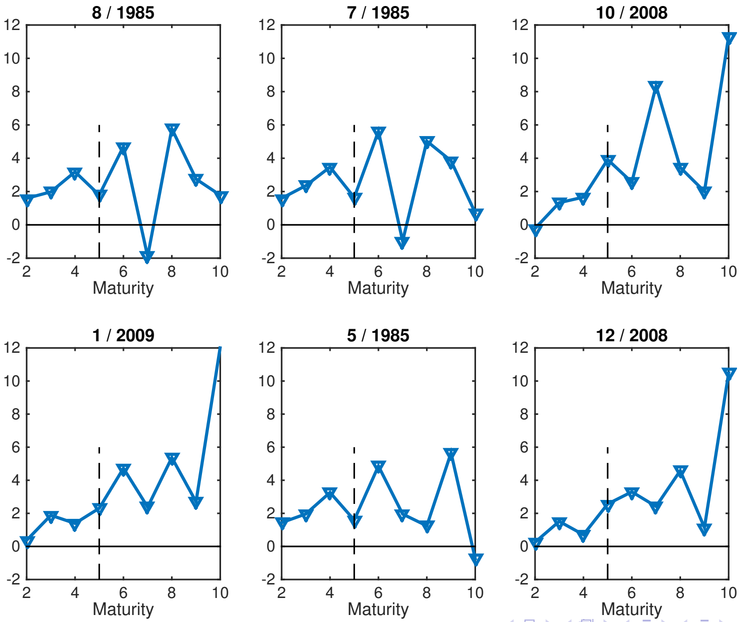
- Lots of other variables have trends
- "Too easy" is a specification, not econometric issue.

Bigger dangers in this data



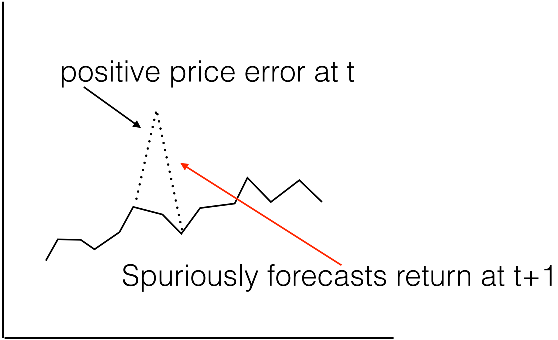
Small iid measurement error (or arbitrage mispricing)

Forward rates – no CP!



Bigger dangers in this data

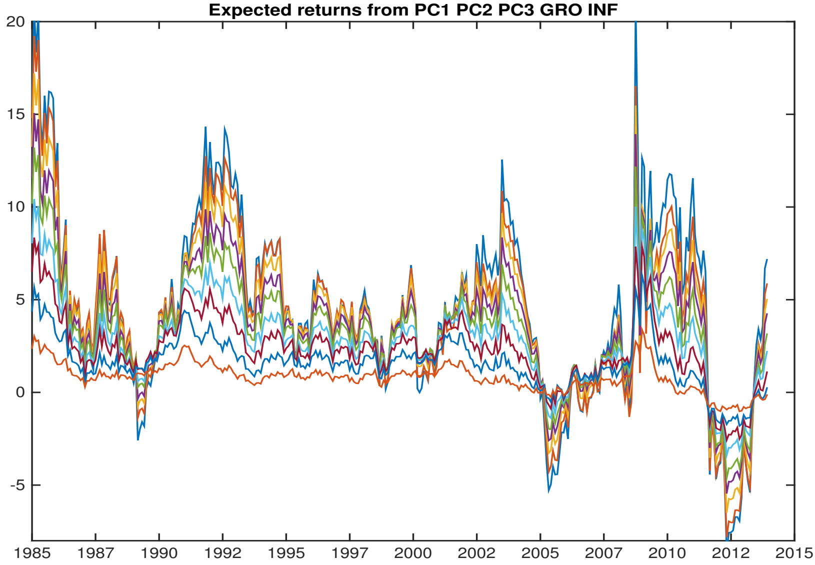
- Small "measurement" errors lead to spurious (imply arbitrage or near-arbitrage) return forecastability



- Ad-hoc answers:
  - One-year horizon, not one month to 12 power.
  - Moving average of yields to forecast. $r_{t+1} = a + b(y_t + y_{t-1}) + \varepsilon_{t+1}$
  - Splines or PC reduction.
- Econometrician help?

Bottom line: Empirical problems outweigh econometric problems.

Bigger questions: factor model of expected returns



$$E_t rx_{t+1}^{(n)} = a^{(n)} + b^{(n)}[PC1_t PC2_t PC3_t] + c^{(n)}[GRO_t INF_t]$$

Bigger questions. Factor structure of expected returns

- Here: one n at a time,

$$r_{t+1}^{(n)} = b^{(n)} x_t + c^{(n)} y_t + \varepsilon_{t+1}^{(n)}$$

  Look hard for parsimony, "right" y_t.

- Instead, look over n:

$$r_{t+1}^{(n)} = \gamma^{(n)} [b' x_t + c' y_t] + \varepsilon_{t+1}^{(n)}$$

  CP (2008): One factor. Right? Macro variables?

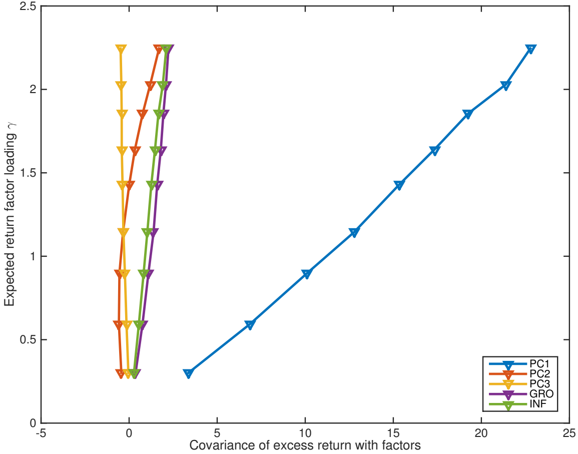
- Across asset classes?
- What are the factors, covariance with which drives variation in expected returns? What's F in

$$E_t(r_{t+1}^{(n)}) = \gamma^{(n)} [b' x_t + c' y_t] = cov(r_{t+1}^{(n)}, F_{t+1}) \lambda_t$$

  CP 2008 / next graph: Level only.

- Could we please add standard errors to decompositions of the yield curve into expectations and risk premium components?

Means and covariances



Covariance of excess bond returns (maturity 1-10 years) with innovations in 5 JS factors, vs. loading $\gamma^{(n)}$ on the return-forecasting factor Er_t.