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

\[ r x_{t+1} = a + b'_1 PC_t + b'_2 [GRO_t \ INF_t] + \varepsilon'_{t+1} \]

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

<table>
<thead>
<tr>
<th></th>
<th>PC1</th>
<th>PC2</th>
<th>PC3</th>
<th>GRO</th>
<th>INF</th>
<th>trend</th>
<th>$R^2$</th>
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<td>$b_t$</td>
<td>0.12</td>
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<td>$b_t$</td>
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<td>(3.38)</td>
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<td>(-0.32)</td>
<td>(-2.17)</td>
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$$r_{xt+1} = a + b_1'PC_t + b_2'[GRO_t \ INF_t] + \varepsilon_{t+1}'$$

- 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
## JPS regressions

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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!

\[
\begin{align*}
  r_{t+1} &= a + b_1 x_t + \varepsilon_{t+1}^r \\
  x_{t+1} &= a + \rho_x x_t + \varepsilon_{t+1}^x
\end{align*}
\]

- But...
- Fixed \( x \)? OLS is BLUE, standard errors ok. *OLS does not care about the ordering of right hand variables.*
- Stochastic \( x \)? if \( \text{corr}(\varepsilon_{t+1}^r, \varepsilon_{t+1}^x) < 0 \), \( b_2 \) biased up. (Stambaugh). Not here.
- Problem?
This paper: An important problem?

\[ r_{t+1} = b_1 x_t + b_2 y_t + \varepsilon_t^{r+1} \]

\[ x_{t+1} = 0.95 x_t + \varepsilon_{t+1}^{x} \; ; \; y_{t+1} = 0.95 y_t + \varepsilon_{t+1}^{y} \]

\[ \text{corr}(\varepsilon^r, \varepsilon^x) = -0.9; \text{corr}(\varepsilon^r, \varepsilon^y) = 0. (T = 30). \]
Why are serially correlated RHV a problem?

\[ r_{t+1} = a - 0.38 \times \text{time}_t \ (t = -6.7) + \varepsilon_{t+1} \]

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!

8 / 1985

7 / 1985

10 / 2008

1 / 2009

5 / 1985

12 / 2008
**Bigger dangers in this data**

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

\[ r_{t+1} = a + b(y_t + y_{t-1}) + \varepsilon_{t+1} \]

- Ad-hoc answers:
  - One-year horizon, not one month to 12 power.
  - Moving average of yields to forecast.
  - Splines or PC reduction.

- Econometrician help?

**Bottom line:** Empirical problems outweigh econometric problems.
Bigger questions: factor model of expected returns

\[ E_t r_{t+1}^{(n)} = a^{(n)} + b^{(n)} [PC1_t, PC2_t, PC3_t] + c^{(n)} [GRO_t, INF_t] \]
Bigger questions. Factor structure of expected returns

- Here: one \( n \) at a time,

\[
r^{(n)}_{t+1} = b^{(n)} x_t + c^{(n)} y_t + \varepsilon^{(n)}_{t+1}
\]

Look hard for parsimony, “right” \( y_t \).

- Instead, look over \( n \):

\[
r^{(n)}_{t+1} = \gamma^{(n)} [b' x_t + c' y_t] + \varepsilon^{(n)}_{t+1}
\]


- Across asset classes?

- What are the factors, covariance with which drives variation in expected returns? What’s \( F \) in

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

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 $Er_t$. 